Atlantic States Marine Fisheries Commission

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Patrick C. Keliher (ME), Chair *Spud Woodward (GA), Vice-Chair* *Robert E. Beal, Executive Director*

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

MEMORANDUM

April 21, 2021

TO: Commissioners; Proxies; American Eel Management Board; American Lobster Management Board; Atlantic Coastal Cooperative Statistics Program Coordinating Council; Atlantic Menhaden Management Board; Atlantic Striped Bass Management Board; Executive Committee; Interstate Fisheries Management Program Policy Board; Mid-Atlantic Fishery Management Council; Shad and River Herring Management Board

FROM: Robert E. Beal
Executive Director

RE: ASMFC Spring Meeting Webinar: May 3-6, 2021

The Atlantic States Marine Fisheries Commission's Spring Meeting Webinar will be held May 3-6, 2021. Meeting materials are now available on the Commission website at http://www.asmfc.org/home/2021-spring-meeting-webinar. Supplemental materials will be posted to the website on Wednesday, April 28.

Board meeting proceedings will be broadcast daily via webinar beginning Monday, May 3 at 1:00 p.m. and continuing daily until the conclusion of the meeting (expected to be 12:30 p.m.) on Thursday, May 6. The webinar will allow registrants to listen to board deliberations and view presentations and motions as they occur. To register for the webinar go to https://attendee.gotowebinar.com/register/4182611915717793807, Webinar ID# 647-565-931.

Each day, the webinar will begin 30 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.

If you are joining the webinar but will not be using VoIP, you can may also call in at 1.562.247.8321 (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, you can do so by dialing 1.562.247.8321 (access code: 785-852-884)

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

Enclosure: Public Comment Guidelines and Final Agenda

Atlantic States Marine Fisheries Commission

Spring Meeting Webinar

May 3-6, 2021

Public Comment Guidelines

To provide a fair opportunity for public input, the ISFMP Policy Board approved the following guidelines for use at management board meetings. **Please note these guidelines have been modified to adapt to meetings via webinar**:

For issues that are not on the agenda, management boards will continue to provide an 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 3 weeks prior to the start of the webinar (April 19) has been included in the briefing materials.
2. Comments received by 5:00 PM on Tuesday, April 27 will be included in the supplemental materials.
3. Comments received by 10:00 AM on Friday, April 30 will be distributed electronically to Commissioners/Board members prior to the meeting.

Comments should be submitted via email at comments@asmfc.org. All comments must clearly indicate the commenter's expectation from the ASMFC staff regarding distribution.

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. It is our intent to begin at the scheduled start time for each meeting, however, if meetings run late the next meeting may start later than originally planned.

Monday, May 3

1:00 – 3:30 p.m. **American Lobster Management Board**
Member States: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia
Other Members: NMFS
Chair: McKiernan
Other Participants: Reardon, Perry, Beal, DeVoe, Webb
Staff: Starks

1. Welcome/Call to Order *(D. McKiernan)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from February 2021
3. Public Comment
4. Consider Technical Committee Recommendation on Management Strategy Evaluation Options for Gulf of Maine/Georges Bank and Southern New England American Lobster Fisheries *(K. Reardon)* **Possible Action**
5. Update on Development of Draft Addendum XXVII on Gulf of Maine/Georges Bank Resiliency *(C. Starks)*
   - Provide Guidance to Plan Development Team on Draft Management Options
6. Discuss Vessel Tracking for the Lobster Fishery *(C. Starks)* **Possible Action**
   - Update on Tracking Projects *(A. Webb, W. DeVoe)*
7. Other Business/Adjourn

Tuesday, May 4

9:00 – 10:30 a.m. **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 Meetings from February 2021
3. Public Comment
4. Review Funding Decision Document and 2022 Request for Proposals *(J. Simpson)* **Action**
5. Program Updates *(G. White, J. Simpson)*
6. Other Business/Adjourn

10:45 – 11:45 a.m. **American Eel 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
Chair: Fegley
Other Participants: Tuckey, Beal, DeLucia
Staff: Rootes-Murdy

1. Welcome/Call to Order *(L. Fegley)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from October 2019
3. Public Comment
4. Review 2020 Commercial Yellow Eel Landings *(K. Rootes-Murdy)*
   - Advisory Panel Report *(M. DeLucia)*
5. Progress Update on 2022 American Eel Benchmark Stock Assessment *(K. Anstead)*
6. Elect Vice-Chair **Action**
7. Other Business/Adjourn

11:45 a.m. – 1:00 p.m. **Lunch Break**

1:00 – 2:00 p.m. **Discussion Session on President Biden's Executive Order: Tackling the Climate Crisis at Home and Abroad**

Speaker: Paul Doremus, Ph.D., NOAA
Executive Order 14008 Section 216 (c) Directs NOAA to Collect Recommendations on How to Make Fisheries, Including Aquaculture, and Protected Resources more Resilient to Climate Change, Including Changes in Management and Conservation Measures, and Improvements in Science, Monitoring, and Cooperating Research

2:15 – 3:45 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: Woodward
Other Participants: Newhard, Kersey
Staff: Rootes-Murdy

1. Welcome/Call to Order *(S. Woodward)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from February 2021
3. Public Comment
4. Consider Fishery Management Plan Review and State Compliance for the 2020 Fishing Year *(K. Rootes-Murdy)* **Action**
5. Discuss Revisiting the Commercial Quota Provisions of Amendment 3 *(K. Rootes-Murdy)* **Action**

6. Review Data Needs for Spatially Explicit Management of Atlantic Menhaden in the Chesapeake Bay *(J. Newhard)*
7. Other Business/Adjourn

Wednesday, May 5

8:00 – 10:00 a.m. **Executive Committee**

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

1. Welcome/Call to Order *(P. Keliher)*
2. Committee Consent
   - Approval of Agenda
   - Approval of Meeting Summary from February 3, 2021
3. Public Comment
4. Report of the Administrative Oversight Committee *(S. Woodward)*
   - Presentation of the FY 2022 Budget **Action**
   - Presentation of Statement of Investment Policy Guidelines **Action**
5. Update on Activities of the Allocation Subcommittee
6. Discuss Second Round of CARES Act Assistance *(R. Beal)*
7. Future Annual Meeting Update *(L. Leach)*
   - October 18-21, 2021 – Long Branch, New Jersey
   - 2022 – North Carolina
   - 2023 – Maryland
   - 2024 – Delaware
8. Other Business
9. Executive Director Performance Review **(Closed Session)**
10. Adjourn

10:30 – 11:30 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, Gadomski, Warner
Chair: Davis
Staff: Starks

1. Welcome/Call to Order *(J. Davis)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from February 2021
3. Public Comment

4. Review Technical Committee Progress on Board Tasks *(B. Neilan)*
   - Consider Technical Guidance Document for Implementation of Amendments 2 and 3 to the Shad and River Herring Fishery Management Plan **Action**
   - Update on Methods to Evaluate Bycatch in Mixed-stock Fisheries in State Waters
   - Consider Technical Committee Recommendations on Addressing Fish Passage Performance **Action**
5. Consider Approval of Shad Habitat Plan Updates **Action**
   - Review Technical Committee Recommendations *(B. Neilan)*
6. Other Business/Adjourn

11:30 a.m. – 1:00 p.m. Lunch Break

1:00 – 4:30 p.m. Atlantic Striped Bass Management Board
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: Borden
Other Participants: Sullivan, Godwin, Blanchard, Lee
Staff: Franke

1. Welcome/Call to Order *(D. Borden)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from February 2021
3. Public Comment
4. Consider the 2020 Albemarle Sound-Roanoke River Atlantic Striped Bass Stock Assessment **Action**
   - Presentation of Stock Assessment and Peer Review Panel Report *(L. Lee, C. Godwin)*
   - Technical Committee Report *(K. Sullivan)*
   - Consider Acceptance of Benchmark Stock Assessment and Peer Review Report for Management Use
5. Public Comment Summary to Draft Amendment 7 Public Information Document
   - Public Comment Summary *(E. Franke)*
   - Advisory Panel Report *(E. Franke)*
6. Draft Amendment 7 *(D. Borden)* **Action**
   - Provide Guidance to the Plan Development Team for Draft Amendment 7
7. Review and Populate Advisory Panel Membership *(T. Berger)* **Action**
8. Other Business/Adjourn

Thursday, May 6

9:00 a.m. – Noon **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
ASMFC Chair: Keliher
Other Participants: Pugliese
Staff: Kerns

1. Welcome/Call to Order *(P. Keliher)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from February 2021
3. Public Comment
4. Executive Committee Report *(P. Keliher)*
5. Review and Consider New York's Appeal of Addendum XXXIII to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan *(P. Keliher)* **Final Action**
6. Discuss d*e minimis* within Commission Fishery Management Plans *(T. Kerns)*
7. Discuss East Coast Climate Change Scenario Planning Initiative *(T. Kerns)*
8. Discuss the Board Process of Approving Fishery Management Plan Reviews and Recommendations from Plan Review Teams *(T. Kerns)*
9. Update on the Mid-Atlantic Fishery Management Council's Research Steering Committee to Evaluate Restarting the Research Set-aside Program *(R. Beal)*
10. SEAMAP Report *(S. Murray)*
11. Review Noncompliance Findings (if Necessary) **Action**
12. Other Business/Adjourn

Noon – 12:30 p.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: Keliher
Staff: Beal

1. Welcome/Call to Order *(P. Keliher)*
2. Committee Consent
   - Approval of Agenda
   - Approval of Proceedings from October 2020
3. Public Comment
4. Consider Noncompliance Recommendations (if Necessary) **Final Action**
5. Other Business/Adjourn

Atlantic States Marine Fisheries Commission

American Lobster Management Board

May 3, 2021
1:00 – 3:30 p.m.
Webinar

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 (*D. McKiernan*)	1:00 p.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from February 2021	1:00 p.m.
3.	Public Comment	1:05 p.m.
4.	Consider Technical Committee Recommendation on Management Strategy Evaluation Options for Gulf of Maine/Georges Bank and Southern New England American Lobster Fisheries *(K. Reardon)* **Possible Action**	1:15 p.m.
5.	Update on Development of Draft Addendum XXVII on Gulf of Maine/Georges Bank Resiliency *(C. Starks)* • Provide Guidance to PDT on Draft Management Options	2:00 p.m.
6.	Discuss Vessel Tracking for the Lobster Fishery (*C. Starks*) **Possible Action** • Update on Tracking Projects *(A. Webb and W. DeVoe)*	3:00 p.m.
7.	Other Business/Adjourn	3:30 p.m.

The meeting will be held via webinar, click here for details.

MEETING OVERVIEW

American Lobster Management Board
May 3, 2021
1:00 p.m. – 3:30 p.m.
Webinar

Chair: Daniel McKiernan (MA) Assumed Chairmanship: 02/20	Technical Committee Chair: Kathleen Reardon (ME)	Law Enforcement Committee Representative: Rob Beal
Vice Chair: Dr. Jason McNamee	Advisory Panel Chair: Grant Moore (MA)	Previous Board Meeting: February 2, 2021
Voting Members: ME, NH, MA, RI, CT, NY, NJ, DE, MD, VA, NMFS, NEFMC (12 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from February 2, 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 Technical Committee Recommendation on Management Strategy Evaluation Options for Gulf of Maine/Georges Bank and Southern New England American Lobster Fisheries (1:15-2:00 p.m.) Possible Action

Background

- The ASMFC Management and Science Committee (MSC) formed a subgroup during the ASMFC 2019 Annual Meeting to develop a proposal for Management Strategy Evaluation (MSE) work on ASMFC-managed species. American lobster was identified as a priority candidate species for an MSE in the immediate future.
- In February 2021, the Board discussed a prospective work plan to outline potential focal areas, resource needs, and associated workload tradeoffs for a management strategy evaluation (MSE) of the lobster fishery. The Board agreed an MSE could allow environmental and economic factors to be more effectively incorporated into management. They tasked Technical Committee to identify timelines and cost estimates for developing an MSE for both stocks with several potential focal areas, including recommendations from the SNE stock assessment **(Briefing Materials)**.

Presentations

- Management Strategy Evaluation Options for American Lobster by K. Reardon

Board Actions for Consideration at the Meeting

- Consider initiating a formal process and forming a steering committee to develop lobster management goals and objectives and an MSE work plan

5. Update on Development of Draft Addendum XXVII on Gulf of Maine/Georges Bank Resiliency (2:00-3:00 p.m.)

Background

- Addendum XXVII was initiated in 2017 to proactively increase resilience of the GOM/GBK stock but stalled due to the prioritization of Atlantic right whale issues. After accepting the 2020 Benchmark Stock Assessment for American lobster, the Board reinitiated work on the draft addendum in February 2021, with a focus on developing a trigger mechanism that would automatically implement management measures to improve the biological resiliency of the GOM/GBK stock if the trigger is reached.
- The Plan Development Team (PDT) and Technical Committee have met a number of times to discuss the development of management options for the draft addendum. Both groups highlighted a need for additional guidance from the Board on the priorities and objectives for issues in the addendum **(Briefing Materials)**.

Presentations

- Update on the Development of Draft Addendum XXVII by C. Starks

Board Actions for Consideration at the Meeting

- Provide guidance to PDT on draft management options

6. Discuss Vessel Tracking for the Lobster Fishery (3:00 p.m.-3:30 p.m.) Possible Action

Background

- In October 2020, the Board reviewed the results of the electronic vessel tracking pilot program, which was initiated through Addendum XXVI. Recognizing that electronic tracking could significantly improve the information available to fishery managers and stock assessment scientists, the Board supported an expanded pilot project and future work on data integration and hardware testing.
- Massachusetts and Rhode Island have collaborated on a pilot project integrating cell-based tracking with ACCSP's SAFIS eTRIPS mobile trip reporting application. Five devices were tested, and the pilot demonstrated that tracks can be tied to trip reports. Additional work is being done to create trip viewers within SAFIS eTRIPS online.
- Several Board members have expressed the critical need for electronic tracking to characterize spatial and temporal effort of the lobster Jonah crab fishery. In particular, there is an acute need for electronic tracking in the offshore fishery. Enhanced spatial and temporal effort data is needed to address a number of challenges the fishery is currently facing, including protected species interactions, marine spatial planning for renewable energy, and enforcement of regulations **(Supplemental Materials)**.

Presentations

- Review of Electronic Vessel Tracking Benefits and Needs by C. Starks
- Update on Tracking Project by A. Webb and W. DeVoe

Board Actions for Consideration at the Meeting

- Consider writing a letter to NOAA Fisheries to recommend requirement for vessel tracking in federal waters

7. Other Business/Adjourn

American Lobster and Jonah Crab TC Task List

Activity level: High

Committee Overlap Score: Medium

Committee Task List
Lobster TC • Spring 2021: Provide recommendations on MSE focal areas, timelines, and costs • Spring-summer 2021: Provide analysis for development of Draft Addendum XXVII • Annual state compliance reports are due August 1 *Jonah Crab TC* • Spring-Summer 2021: Develop recommendations on initiating Jonah crab stock assessment • Annual state compliance reports are due August 1

TC Members

American Lobster: Kathleen Reardon (ME, TC Chair), Joshua Carloni (NH), Jeff Kipp (ASMFC), Kim McKown (NY), Conor McManus (RI), Chad Power (NJ), Tracy Pugh (MA), Burton Shank (NOAA), Craig Weedon (MD), Somers Smott (VA), Renee St. Amand (CT)

Jonah Crab: Derek Perry (MA, TC Chair), Joshua Carloni (NH), Chad Power (NJ), Jeff Kipp (ASMFC), Conor McManus (RI), Allison Murphy (NOAA), Kathleen Reardon (ME), Chris Scott (NY), Burton Shank (NOAA), Somers Smott (VA), Corinne Truesdale (RI), Craig Weedon (MD)

PDT Members

American Lobster: Kathleen Reardon (ME), Joshua Carloni (NH), Corinne Truesdale (RI), Allison Murphy (NOAA)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

AMERICAN LOBSTER MANAGEMENT BOARD

Webinar
February 2, 2021

These minutes are draft and subject to approval by the American Lobster Management Board.
The Board will review the minutes during its next meeting.

Draft Proceedings of the American Lobster Management Board
February 2021

TABLE OF CONTENTS

INDEX OF MOTIONS

1. **Approval of agenda** by consent (Page 1).

2. **Approval of proceedings from October 19, 2020** by consent (Page 1).

3. **Move to recommend to the ISFMP Policy Board that the Commission send letters to NOAA Fisheries with comments on the proposed rule to amend the regulations implementing the Atlantic Large Whale Take Reduction Plan and the draft biological opinion. The letter should include the following:**

   - **The rule and bi-op should be completed by the end of May to ensure the court does not intervene.**
   - **Implementation timeline recommendations that address practical start dates**
   - **Supporting trawl equivalency such that 8 traps with 2 endlines = 4 traps with 1 endline**
   - **Support enforcement and coordination with state agencies**
   - **Conservation Equivalencies that would allow for modifications related to trawl lengths**
   - **(specific to the bi-op) A statement that address the burden the US Fishery could bear based on the actions of Canada.**

   Motion by Pat Keliher; second by David Borden (Page 19). Motion carried with one abstention (NOAA Fisheries) (Page 20).

4. **Move to task the Technical Committee and staff with the development of a set of prioritized options, timelines and a draft budget to assist the Board in considering if MSE could be of use for management, for the GOM and SNE stocks, in as timely a manner as possible. This information shall be presented to the Board at the spring meeting** (Page 36)**.** Motion by Pat Keliher; second by Jason McNamee. Motion carried (Page 42).

5. **Move to re-initiate PDT and TC work on the Gulf of Maine resiliency addendum. The addendum should focus on a trigger mechanism such that, upon reaching of the trigger, measures would be automatically implemented to improve the biological resiliency of the GOM/GBK stock** (Page 43). Motion by Pat Keliher; second by Cheri Patterson. Motion carried (Page 44).

6. **Move to recommend to the ISFMP Policy Board that the Commission send a letter to the Secretary of the Interior restating the Commission's position on modifying the Northeast Canyons and Seamounts Marine National Monument.** (Page 46). Motion by Cheri Patterson; second by Raymond Kane. Motion carried with one abstention (NOAA Fisheries) (Page 48).

7. **Move to approve the nomination of Jon Williams of Rhode Island to the Jonah Crab Advisory Panel** (Page 48). Motion by Eric Reid; second by Emerson Hasbrouck. Motion carried (Page 48).

8. **Move to elect Jason Mcnamee as Vice-Chair of the American Lobster Board** (Page 48). Motion by Eric Reid; second by Cheri Patterson. Motion carried (Page 49).

9. **Move to adjourn** by consent (Page 49).

ATTENDANCE

Board Members

Pat Keliher, ME (AA)
Sen. David Miramant, ME (LA)
Cherie Patterson, NH (AA)
Ritchie White, NH (GA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
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)
Colleen Bouffard, CT, proxy for J. Davis (AA)
Bill Hyatt, CT (GA)
Maureen Davidson, 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)
Adam Nowalsky, NJ, proxy for Sen. Houghtaling (LA)
John Clark, DE, proxy for D. Saveikis (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, proxy for S. Bowman (LA)
Shanna Madsen, VA, proxy for Sen. Mason (LA)
Allison Murphy, NMFS
Mike Pentony, NOAA

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

Ex-Officio Members

Kathleen Reardon, Technical Committee Chair
Grant Moore, Advisory Panel Chair

Staff

Robert Beal
Toni Kerns
Maya Drzewicki
Kristen Anstead
Lindsey Aubart
Pat Campfield
Emilie Franke
Lisa Havel
Sarah Hylton
Chris Jacobs
Jeff Kipp
Laura Leach
Savannah Lewis
Sarah Murray
Mike Rinaldi
Julie Defilippi Simpson
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Karen Abrams, NOAA
John Almeida, NOAA
Jennifer Anderson, NOAA
Nathan Andrews, RI DEM
Michael Asaro, NOAA
Pat Augustine, Coram, NY
Richard Balouskus, RI DEM
Peter Benoit, Ofc. of Sen. King, ME
Dave Bethoney, CFR Foundation
Alan Bianchi, NC DENR
Karen Bradbury, Ofc. Sen. Whitehouse
Delayne Brown, NH F&G
Emily Brown, ETHS Foundation
Jeff Brust, NJ DEP
Mark Capone, NOAA
Joshua Carloni, NH F&G
Beth Casoni, American Lobstermen
Patrick Cassidy
Joe Cavaluzzi
Mike Celestino, NJ DEP
Yong Chen, Univ. Maine
Matthew Cieri, ME DMR
Heather Corbett, NJ DEP
Nicole Lengyel Costa RI DEM

Guests (Continued)

Jessica Daher, NJ DEP
Justin Davis, CT (AA)
John DePersenaire, RFA
Greg DiDomenico, Lund's Fisheries
Renee DiPippo
Steve Doctor, MD DNR
Chair Dollar, DBF
Tim Donovan, NOAA
Michelle Duval, MAFMC
Wes Eakin, NYS DEC
Aubrey Ellertson, CFR Foundation
Julie Evans
Catherine Fede, NYS DEC
Lynn Fegley, MD DNR
Marianne Ferguson, NOAA
Cynthia Ferrio, NOAA
James Fletcher
Rick Frenzel, Black Tree Inc
Erica Fuller, CLF
Jack Fullmer
Alexa Galvan, VMRC
Jim Gilmore, NY (AA)
Angela Giuliano, MD DNR
Sonny Gwin, Berlin, MD
Jon Hare, NOAA
Amelia Harrington, Univ. ME
Marin Hawk, MSC
Heidi Henninger, Offshore Lobster
Jay Hermsen, NOAA
Helen Takade-Heumacher, FL FWS
Cameron Hodgdon, Univ. ME
Asm. Eric Houghtaling, NJ (LA)
Rachel Howland, NC DENR
Peter Hughes, Atlantic Capes
Bob Humphrey
James Jewkes
Ellen Keane, NOAA
Adam Kemberling
Noah Khalsa, Univ. ME
Richard Klyver, Blue Planet Strategies
Rob LaFrance, Quinnipiac Univ.
Wilson Laney
Charles Lynch, NOAA
John Maniscalco, NYS DEC
Dan Marrone, NOAA
Gregory Mataronas
Patrice McCarron, Maine Lobstermen
Kim McKown, NYS DEC
Conor McManus, RI DEM
Nichola Meserve, MA DMF
Alicia Miller, NOAA
Pat Moran, MA OLE
Jerry Morgan
Brian Neilan, NJ DEP
Kennedy Neill
Jeff Nichols, ME DMR
Scott Olszewski, RI DEM
Gerry O'Neil, Cape Seafoods
Derek Orner, NOAA
Danielle Palmer, NOAA
Ruth Pelletier, UNE
Derek Perry, MA DMF
Mariah Pfleger, OCEANA
Nick Popoff, FL FWS
Tracy Pugh, MA DMF
Jill Ramsey, VMRC
Jocelyn Runnebaum, TNC
CJ Schlick, NC DENR
Eric Schneider, RI DEM
Alicia Schuler, NOAA
McLean Seward, NC DENR
Burton Shank, NOAA
Kara Shervanick, NOAA
Thomas Sminkey, NOAA
Somers Smott, VMRC
Erin Summers, ME DMR
Pam Thames, NOAA
Wes Townsend
Marisa Trego, NOAA
Corinne Truesdale, RI DEM
Beth Versak, MD DNR
Jesica Waller, ME DMR
Megan Ware, ME DMR
Anna Webb, MA DMF
Craig Weedon MD DNR
Zach Whitener, GMRI
Kelly Whitmore, MA DMF
Angel Willey, MD DNR
Chris Wright, NMFS
Sarah York, NOAA
Phil Zalesak
Erik Zlokovitz, MD DNR
Renee Zobel, NH F&G
Chao Zou, NOAA

The American Lobster Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Tuesday, February 2, 2021, and was called to order at 8:30 a.m. by Chair Daniel McKiernan.

CALL TO ORDER

CHAIR DANIEL McKIERNAN: Welcome to the American Lobster Management Board. It's February 2, 2021, and I am Dan McKiernan from the Commonwealth of Mass, and I'm the Board Chair.

APPROVAL OF AGENDA

CHAIR McKIERNAN: First on the agenda would be the approval of today's agenda. Are there any recommended changes to the agenda? Toni, I will ask you to keep an eye opened for raised hands for me.

MS. TONI KERNS: Yes, I don't see any hands.

APPROVAL OF PROCEEDINGS

CHAIR McKIERNAN: Next on the agenda is Approval of the Proceedings from the October 19, 2020 meeting. Are there any recommended changes or any discussion needed on that proceedings?

MS. KERNS: I see no hands.

PUBLIC COMMENT

CHAIR McKIERNAN: Next is Public Comment. We have a very lengthy agenda today, but if there is anyone who would like to speak on an item that is not on today's agenda, we would give you a few minutes to speak. Raise your hand and let us know, if you have any other business this morning.

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

CHAIR McKIERNAN: Obviously, today's meeting is going to be very much heavy on recent federal actions and the issues that are before the states, as a result of a lot of ongoing federal activities, especially this Large Whale Take Reduction Plan. That is the first thing on the agenda this morning. We all know that the Large Whale Take Reduction Team met almost two years ago.

We're very busy working with our fellow partners, especially back in my home state, as we deal with devising proposed regulations to address the risk of entanglement with northern right whales in the crab and lobster trap fisheries.

REVIEW AND DISCUSS PROPOSED RULE AND DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR ATLANTIC LARGE WHALE TAKE REDUCTION PLAN PROPOSED MODIFICATIONS FOR 2021

CHAIR McKIERNAN: Today we have a presentation from Jen Anderson, to examine the proposed rule, and take some clarifying questions on that. Why don't we get right to that? I'm sure her presentation is going to be very enlightening. Is Jen cued up, Toni?

MS. KERNS: She got booted out. It says she's offline. I know she said she might lose power.

MS. JENNIFER ANDERSON: Okay, I think we're good.

CHAIR McKIERNAN: Welcome, Jenn.

MS. ANDERSON: Good morning. I can't tell if I'm getting through.

MS. KERNS: Jen, we can hear you.

MS. ANDERSON: (Lost words, poor reception)… Northeast Fisheries Science Center, along with Ellen Keane, who keeps her efforts on the batched biological opinion. When we get to the Q and A process, they should be able to chime in, and hopefully get us over the hump. I do have a pretty good storm going, so if I drop you guys, I'll do everything I can to jump back on as quickly as possible. My Wi-Fi is a little intermittent this morning.

As I mentioned, we're going to be doing the Take Reduction Plan I'll review, and then the Section 7 Consultation Review. Just to give a sort of road map of how we'll go. I'll provide a brief recap of the

measures being proposed in the proposed modification to the Atlantic Large Whale Take Reduction Plan.

The Proposed Rule and the Draft Environmental Impacts came out and were released for review and public comment on December 31. The purpose of the Atlantic Large Whale Take Reduction Plan is to reduce the impacts of incidental injuries and deaths in commercial fisheries on North Atlantic Right Whale, humpback, and fin whales.

However, modifications you have over the years has been focused on reducing serious injuries and mortalities to right whales, which is the most endangered of the listed large whale. The scope of the current action is focused on the northeast American lobster and Jonah crab trap pot fisheries in state and federal waters.

I'll also be discussing the draft Batched Biological Fisheries Opinion. Section 7 of the Endangered Species Act requires federal agencies to ensure that any action taken by a federal agency is not likely to jeopardize the continued existence of listed species, or destroy or adversely modify critical habitat.

Today's presentation is intended to provide an overview to help you review and provide input on the Draft Opinion, which is due by February 19, just a few weeks out. As I'll review, this consultation considers federal waters fisheries in the Greater Atlantic Region under the Magnuson-Stevens and Atlantic Coastal Act. That is just an overview we're kicking off first with the Environmental Impact Statement and the Proposed Rule.

First, just a little bit of history on the rulemaking process. The Take Reduction Team had started meeting back in 2008, but didn't have a consensus about the level of risk reduction that was needed to achieve the potential biological removal and uncertainty regarding how to compare risk reduction proposals. Starting in April, 2019, we provided some updates, NMFS did to try and help the process. First, we created a target risk reduction level, to better characterize the size of the risk reduction needed to achieve potential biological removal. Based on what we knew about documented entanglements and related serious injuries and mortalities, we determined that a 60 percent risk reduction was needed to reduce those injuries and mortalities to fewer than one per year. Because many mortalities occur unobserved, we also provided an upper goal of an 80 percent reduction. To help us evaluate and compare how different measures work toward achieving that goal, our Science Center created a decisions support tool, to help compare among the management measures.

However, at that April meeting in 2019, we were able to bring in our staff who could use the decision support tool to model the risk reductions of both targets that were being proposed by team members. This allowed us to determine how much those measures reduced risk relative to the 2017 baseline risk. I also need to acknowledge at this point that the target we provided to the team included assumptions that were not accepted by all team members

The decision support tool, as used in April, was still in development. But both were subsequently, or it was subsequently peer reviewed in late 2019, and the target was considered to be reasonable, given the data that we had available, and the input from the peer review has subsequently been used to continue to improve that model over the last year and a half.

We gave a final piece of advice to the TRT related to the scope of the recommendations that they would need. Because of the urgent need for management measures we focused our efforts initially on the northeast lobster and Jonah crab pot fisheries, because they account for around 93 percent of the vertical lines that occur where right whales are found.

The framework that the Take Reduction Team provided us was not directly translated into regulations. Some measures required further clarification. For example, one group committed to rapid research in development of measures to approve that 50 percent target, and one jurisdiction

indicated that they needed stakeholder input before they could confirm the agreed upon measures.

Additionally, just like the Council and the federal process that I think most of you are familiar with. Through NEPA we conducted broad public scoping, in spite of development of the Draft Environmental Impact Statement. In addition to considering the teams recommendation to use the input we received through our scoping process and input from the states. We also followed a number of basic principles, starting with the April recommendations and our commitment to demonstrate at least a 60 percent risk reduction.

Further, we followed the team's recommendation to broadly apply reduced line and weak rope measures across the board, to develop measures that spread that risk reduction across jurisdictions throughout the northeast. We recognize that the need to adapt the diverse fishing positions across the region, that included the first consideration of the states proposals, which were also informed through stakeholder engagement.

We also collaborated with the American Offshore Lobstermen's Association, who offered options to achieve that 60 percent risk reduction among the LMA3 fishery. I think, if you look up there, we provided an overview of the maps of those areas. I believe you guys know that very well. In the end is a preferable time that NMFS developed, and that we are proposing in the Rule considers the Team's direction, with some modification of gear which will apply the most protection for the areas of predictably high seasonal aggregations of right whale, substantial risk reductions across high co-occurrence with fishing lines, and we apply the precautionary measures everywhere across the region to be resilient to ecosystem changes and associated changes in right whale distribution. As determined by the decision support tool, these measures were estimated to achieve at least a 60 percent reduction.

During its April, 2019 meeting, the Team created a near consensus risk recommendation, with all but one attending team member agreeing that NMFS should move forward on a framework of measures designed to achieve at least 60 percent. The Team's recommendation relied upon a broad application of buoy line reductions, and weak rope measures that were distributed evenly across jurisdiction.

Extensive scoping was done during the summer and early fall of 2019, and each New England state also conducted extensive scoping. Given the broad differences in how people fish, and how the fishery is conducted and managed by states across this large area. The states proposals were considered, along with other information received during scoping, including the American Offshore Lobstermen's Association.

The tools we used and why. Before we kind of go any further, I just want to touch on this. In order to select the measures and assess whether those measures might then get us to above our 60 percent risk reduction target. We used the decision support tool that was developed by NMFS, that I mentioned earlier.

This tool was first used at that April, 2019 meeting, and was of course then peer reviewed. Overall, the preferred alternative is an effort to reduce the co-occurrence of vertical lines in right whale paths by approximately 69 percent. Every line would get weaknesses introduced into them, which in total is about 30 percent of all line in the northeast.

The baseline map on the left, shows areas of co-occurrence according to current measures, or darker colors correlate to the higher co-occurrence in the dark red up there. The map on the right show's changes in co-occurrence with the implementation of the new measures we are proposing. The darker colors showing greater reductions in co-occurrence, so that one on the right with the dark blue.

We also used percent reduction in buoy lines as a proxy for the reduction in the likelihood of entanglement. Fewer lines in the water, particularly in areas of high whale occurrence, should lead to fewer entanglements. To look at the potential impact of conversion to weak line measures, a portion of all line that would be converted to full weak line or its equivalent.

The preferred alternative, this is just an overview, and I'll go into each one of these a little further. Each measure is the sum of all the measures leads us to, of course inserting weak links and maximum breaking strength at 1,700 pounds. We also achieved risk reduction by reducing the overall lines in the water, including trawling up and seasonal restricted areas. In the blue box you'll see the snapshot of the measures that go beyond just the thorough regulations, in addition to what we considered in ours, we're also looking at what the states have done. Those will be considered as going towards the overall risk reduction, and helping us achieve that 60 percent. This is just for the lay of the land. The first thing we did, of course, was the line reduction measures. We used these proposals that we had received to develop trawling up measures from the states, and the TRT as we recommended the preferred alternative changes the number of traps per trawl, based on distance from shore, as well as lobster management area.

In order to accommodate the proposed trawl up measures in LMA3, the maximum amount of groundline allowed would need to be extended from 1.5 to 1.75 pounds. We also are proposing seasonal restricted areas. It would reduce the amount of persistent buoy line in the water in those two areas during months where higher aggregations are more likely.

Here the current restricted areas are in blue, and the newly proposed areas are in yellow. Each of these restricted areas would be modified to allow locals fishing with an exempted fishing permit. A permit will be required to use ropeless gear in these areas, until the lobster regulations are modified to remove surface gear marking requirements.

The preferred alternative also contains state regulations that delay the reopening of state waters within the Massachusetts area into May, until they can confirm that the whales are no longer in the area. The two new restricted areas were identified as potential hot spots, so persistent buoy lines would be restricted under the proposed rule.

The one that you can see is south of Nantucket, and that would run from February through April, and the other is of course up around on the border between LMA1 and LMA2. That one would run from October through January. There are also two additional co-proposals that we are looking for input on, that will get included in the proposed rule.

The first co-proposal would have no restricted area, so would implement neither of those yellow boxes. The second would only implement if certain restrictions or determinations were met. The weak rope regulations were primarily from state proposals, all the lines that would be regulated out of the proposed rule will be weakened to some extent. Most proposals included weak inserts at specific points along the vertical line depending on the distance from shore.

To evaluate weak rope, any proposal that proposed using inserts that were not necessarily a full length of rope, or equivalent, which is considered to be insertions every 40 feet. We used two approaches for those to evaluate the risk reduction. For the lower bound we calculated the proportion of the proposed number of inserts, to the equivalence of full weak line.

We did that using average depth and number of inserts, and the expected scope ratio within each area. We then corrected for risk reduction, as though we were using full weak line according to that proportion. The upper bound is risk reduction considered in the depth of the lowest weak insert is equal to the proportion of risk reduction achieved.

For example, if the lowest insert is halfway down the line, the risk reduction is half of that for a full weak line. In LMA3 full weak line or the equivalent would be

required only on the buoy line up to the top of the 75 percent, allowing for full strength line to be used on other buoy line. Then we of course included gear marking, which is pretty straightforward, Maine, New Hampshire, Mass, Rhode Island in LMA3, will each get their own color. Most of these I think in some places are already being implemented. To summarize for the overall risk analysis affects. If you have listened into the Atlantic Large Whale Take Reduction Team's meetings, or participated in any way, you'll know that we have these sessions recorded.

You can certainly get more information via webinar through our Atlantic Large Whale Take Reduction Plan website. You can also learn a lot more about the full biological and account of the sex analysis that was performed not just for the preferred alternative, but also for the non-preferred.

The March, 2020 version of the decision support tool was used to sort of get us to that 66 percent reduction, and although we used that, we also used a co-occurrence model to help assess the impacts in DEIS. That was done, because at the time we were formulating everything, the decision support tool was still undergoing peer review, and our analysis wasn't quite ready for both.

We wanted to make sure that we had something to sort of benchmark against, so the co-occurrence estimated that we would have approximately a 69 percent reduction. Comments on the Proposed Rule and DEIS were due on March 1st, to be submitted to regs.gov, so finally we already received, I think around 6,000, so those are definitely coming in. Around 300 attendees have attended our sessions, 15 sessions so far, I will be kicking off public scoping meetings in the coming days.

To wrap up on this portion, the economic impacts, these are provided in millions of dollars, and it's just, this slide is just associated with the proposed measures. The first column looks at cost during the first year, and then again at six years. The first-year costs were estimated to be between 7 and 15 million, or between 1 and 2 percent of the estimated 2019 value of the fishery, which is down there at the bottom a little over $600 million.

Year 6 costs were estimated to be between 28 and 61 million or 4.5 to 10 percent of that $600 million value. We struggle a little bit to be able to give more precise cost estimates, because we can't be certain of how some costs will be borne out. For some things it is obviously very easy to estimate the cost of new gear, or sort of concrete things.

But it's a little more difficult to estimate those reductions when it goes towards what might be lost, in terms of catch over time, and so that is where you see the wide variance there. We'll do the Biological Opinion up next, just sort of an overview of what we'll get into for this one. First off, why are we discussing the Bi-Op today, and why does this have to be done? The federal agencies have to consult with NOAA Fisheries, which in this case would mean the Sustainable Fisheries Division, this consults with my division, the Protected Resources Division.

If any action might affect an ESA listed species or critical habitat. Unlike the TRT process that we just covered, which is focused more on reducing mortality and serious injury caused by fisheries. The Endangered Species Act considers all of this, so it's not just entanglements, but for example vessel strikes. To list species, even if they don't result in mortality or serious injury. Actions that may affect ESA listed species fall into two broad categories. The first are actions that may affect a species, but are not likely to adversely affect. Those would be more on the insignificant, or could be on the beneficial side of things. The second type of actions are those that may affect, or are likely to adversely affect. Those are expected, and not discountable, insignificant, or beneficial.

That is the kind of thing that triggers a formal consultation, which is what we're looking at and discussing today. Just a couple of definitions to be familiar with, that you can come back to and check on, as we go through this. Obviously, to jeopardize the

continued existence of a species would be an action that reasonably would be expected to appreciably reduce the likelihood of survival of an animal or species.

Destruction of adverse modification habitat would be diminishing the value of critical habitat, as it says up there, and then the Opinion of course is what we're talking about today, and that is what we produced, and is the conclusion of our formal consultation. This just goes over the various fisheries that we cover through this action.

It includes eight federal FMPs, and of course then the two, Jonah crab and lobster, that are covered by the Commission. The action area extends from Maine through Florida, because some of the species, I believe bluefish doesn't spawn south of Florida. The consultation includes the New England Council's Omnibus Habitat Amendment, and the Right Whale Conservation Framework.

We'll discuss both of those a little bit more when I get into the presentation. The consultation does not include the sea scallop FMP, the tilefish, Atlantic Herring, or surf clam and quahog FMPs, those were done under other different actions. This is just a list of what is current in terms of species. There are 11 likely to be adversely affected by the fisheries, including large whales, sea turtles, and listed fish.

Affects from interactions with gear and strikes by vessels as it turns it to and from a fishing grounds are considered. With respect to vessel strikes, we've preliminarily determined that the only species likely to be affected by that is sea turtles. However, interactions with gear are anticipated for all the species that you see listed on a slide there.

Gears that are considered in the opinion include both mobile and fixed season fisheries, and while today is more focused of course on the right whales, we will provide information at the end of your questions more, and want to dig into some of the other species that are also covered by the opinion. We'll talk a little bit more about this as we go through it.

Based on the analysis, we've determined that the proposed action is not likely to jeopardize a species, or destroy or adversely modify critical habitat. The opinion includes an incidental take statement, this is a statement that specifies the anticipated level of incidental take due to the authorization of the fishery.

They are covered by the opinion. Take specified in the ITS is exempt from the take prohibitions of the Endangered Species Act, and its implements and regulations. The Opinion also includes reasonable and prudent measures in terms and conditions, which are designed to help us minimize the impact of take. From here on out we'll focus more on the right whales, but I just wanted to kind of give that overall preview. First, we'll just run through sort of just the overview. We'll go through the mortality and serious injury that have been assigned to federal fisheries. The development of a conservation framework, the analysis that is used and our determination in the draft opinion.

First up is the mortality and serious injuries that are caused by fisheries, which are really simple to the analysis that we conducted. For federal fisheries, we first estimated total mortality to be the vessel strikes and entanglements. Natural mortality is not included, because there is very little evidence showing the natural mortality is a cog that might tell mortality except at the past stage.

Using data from 2010 through 2019, we estimated that on average annually, approximately 20 mortalities or serious injuries to right whales occur. That includes those that are both unobserved, but an estimated for what we'll call cryptic mortalities, from the papers you will see. In some cases, we know whether an action occurring in the U.S. were in Canadian waters, but unfortunately in many cases we do not have that information.

When the country is known, we assigned the case to a country. In those cases where it is unknown,

however, we followed the approach used by the Take Reduction Team, which is to split those mortalities and serious injuries at a 50/50 rate between the U.S. and Canada. That split was applied to all mortalities with countries unknown regardless of the cost.

Based on this, we estimated that 45 percent or approximately 9 right whale mortalities or serious injuries are occurring each year in U.S. waters. It's important to note that the interactions in Canada are also considered in this opinion, and provides some context of how our analysis is conducted. We'll jump into that a little bit in the next slide.

Next slide, just to look briefly at the serious injuries and mortalities. As I mentioned in the last, there are two pieces of information that we need to attribute to mortalities and serious injuries in the U.S. These are the cause of the mortality and injury and where it occurred. Like I said, when both are both available that is pretty straightforward.

However, since it's often not available, and we don't know where the incident occurred, we've had to divide them evenly between the U.S. and Canada. Following the TRTs approach, when we do not know the cause, like when our carcass is not recovered, or we can see the carcass but we can't get any gear, or it's so decomposed we just don't know what happened.

We use the entanglement to vessel strike ratio from cases with a known cause. In those cases, we assign 74 percent to entanglement, and to the various categories this results in 37-74 percent of the cases with missing information being assigned to entanglements in the U.S., and that is that last column on the slide. Finally, we have to apportion those mortalities in U.S. waters between the state and federal fisheries.

That is necessary, because the biological opinion is assessing the effects of the fisheries when fishing in federal waters only. In this part of the analysis, we assume that the low number of gillnet interactions occurred in federal waters, as we do not have information available to partition that between federal and state waters. For the pot trap fisheries however, we use the decision support tool to estimate where. Given it's a vast majority of vertical lines, it was greater than 99 percent. In the action area of all pot trap lines, we assume that entanglements in U.S. waters in gear that could not be identified occurred in pot trap gear.

The decisions support tool indicates that 73 percent of the risk is in federal waters, therefore we've assigned 73 percent of the entanglements to the federal fisheries. This gives us an estimate of almost 5 right whales per year suffering mortalities or serious injuries in the U.S. federal fishery. As I mentioned earlier, the analysis here considers all affects, and therefore we needed to estimate the total number of entanglements that occur, not just those from serious injuries, but also from non-lethal entanglements, which are called sub-lethal effects.

Those are the kind of effects that can reduce an animal's health, including its reproductive ability. To estimate those total entanglements, we use scarring rates from a 2019 study that the New England Aquarium conducted. That study estimates that 30 percent of the population is entangled each year.

Although that's not broken out by country by the New England Aquarium, we applied that 50/50 split, and then further split that rate down between state and federal waters, which results in the approximate estimate of 11 percent of the population being entangled in federal waters each year.

Given the mortality and serious injury numbers that have run through, we realize when we looked at this that we needed reductions in mortality and serious injury that went beyond what was being implemented by the Take Reduction Team rules I discussed earlier in this presentation, in order to ensure that the federal fisheries were not likely to jeopardize the recovery of right whale.

To determine the level of reduction that was necessary, we projected the female population over 50 years, with reductions in mortality and serious

injuries ranging from 0 to 100 percent, so we just ran a series of models, our federal model listers of applications. At the time of the analysis, the available data on mortality and serious injury was through 2018, and we had not received any viable population estimate updates.

Through using that information, we determined that a 95 percent reduction at year 10 was needed to put the population on a similar trajectory towards your trajectory that would occur in the absence of federal fisheries. We began to develop a conservation framework, which outlines the reductions needed and our approach for achieving those targets. The framework is basically a phased approach, and it lays out how we intend, or ways that we can achieve the responses, and get to the point where you kind of get past the terrible situation that we've predicted out here.

We first want to note that subsequent to determining an additional 95 percent reduction with having serious injury was needed, data in 2019 became available, so we were able to update it, and we reran those predictions. Some new information got factored in, and that's what's out in the vast biological opinion that you can comment on now. Based on that, we concluded that a reduction in mortality and serious injury had to be at 95 percent, so it didn't change much. However, we did adjust the implementation process for the framework. The conservation framework outlines our commitment to implement measures necessary for the recovery of right whales. The framework is specific to reductions in mortality and serious injury in the fisheries in the opinion.

That is the fixed-gear fisheries in federal waters, it does not apply to state waters. The phased approach describes flexibility and adaptability. We really want to be able to consider new information and make adjustments as appropriate throughout the management portion of this. In addition, the conservation framework does not specify measures that will be implemented.

This should allow us to consider input from our partners, ongoing advances in technology, new information on the distribution and co-occurrence of whales, and any other reductions in mortality or serious injury from other sources, among other factors. Given the limited time the community measures have been in effect, as well as angler changes to the community measures, and for the dynamic nature of them.

We've been unable to assess the benefits of those at this time. However, the framework takes a conservative approach, and assumes no benefit from Canadian measures right now. But we do think that using adaptive management over time, we should be able to better inform our analysis of how things are going in Canada, and we hope to be able to apply those measures to our modeling, and take more credit for those reductions in those.

The framework, as I mentioned, is intended to be adaptable. We broke it into four phases. The first is the current Take Reduction Team rulemaking that is underway right now. The second would address the mortality and serious injury in gillnet and other pot trap gear. Then in the third or fourth phases, we would require reductions in fixed gear fisheries in federal waters, and those would be in any of the fixed-gear fisheries, not limited to trap pots.

After the implementation of Phase 3, we will take complete and comprehensive evaluation, including developing new population projections, based on the information available at that time. This will include actions under other FMPs, or through the TRT, and how they continue to contribute to the goals of the framework.

During this evaluation to offer us any new information on the population and distribution, calving and survival rates, threats, changes to the fisheries and how we apportion mortality or serious injuries to cause and country. Gear mark that we hope will provide more information, and allow us to better

assign cases. The evaluations are built into the conservation framework.

Recognize that certain uncertainties are in the data need to be reconsidered and adjusted as new information becomes available. We have identified criteria for reducing Phase 4, if mortality and serious injury from other sources, as we learn that things are working better than we thought, if we're able to factor in some of those reductions from Canadian waters, then we would be able to reduce the overall mortality or serious injury that needs to be taken in the U.S. waters.

Moving into sort of the final phase of what we looked at from the Bi-Op, how we came to the jeopardy determination. In Section 7, we compare the proposed actions to a scenario without the action. This is a little different from the way no action alternatives would be considered in NEFA. In Section 7, without the action, it is considered what the proposed action is, so if no special federal fisheries were taking place. This no federal fisheries scenario is compared to the proposed action of the fisheries under the ten FMPs and the conservation framework.

In assessing whether there is a likelihood of jeopardy, you would look at the difference between the two scenarios to determine whether there is an appreciable reduction, so that difference between the yellow line and the black line. If there is an appreciable reduction, a determination is made that an action is likely to jeopardize a species. If not, no reduction in determination is made.

To assess the likelihood of jeopardy, we use both quantitative and qualitative analysis. Using the survival and calving data from our 2010 to 2019 timeframe, we projected the female population over the next 50 years. We used the 2010 to 2019 time period, because we felt it was the most appropriate, given the regime change that occurred in 2010, when the whale surge moved, looking for food, and the food shifted north. We believe that is just the most reflective of what the survival and calving rates are going to be going forward in the future.

Under both the no federal fishery and the support action scenarios, the population was declining. As you can see there was the red line on the no federal fisheries, and the blue on the proposed action. However, as described in the last slide, in Section 7 we're looking at the difference between those two lines.

The projections result in a difference of approximately 5 females birthed at year 10 under both scenarios, and it continues into years 10-40. We evaluated the proposed action qualitatively, in addition to looking at the quantitative measures. We also looked at sub-lethal effects that you would expect to be reduced for the conservation framework.

Although we couldn't quantify those to the degree with which serious injury and mortality was quantified, we could qualitatively evaluate, and determine that reductions in sub-lethal effects from entanglement would approve the trajectories of the previous slide. In other words, you know we would see a benefit, hopefully, to the animal's health from fewer entanglements.

Since Phases 3 and 4 will likely require significant reductions in your total occurrence of birth of Atlantic whales, we expect the benefits from reducing sub-lethal effects to be higher, with the implementation of those phases. That should certainly be positive. We also determined that interactions in federal fisheries are not expected to reduce the genetic diversity or results in genetic biomass.

Just ultimately, sort of repeat the determination that I mentioned above. Based on our analysis, which includes the conservation framework, we determined that the course of action would not appreciably reduce the likelihood of survival and recovery of North Atlantic right whale, compared to the no action. Last but not least, sort of just an add on. It doesn't easily fit into our analysis, but I mentioned the Canadian impacts. We know that they are doing things that are positive, and we have a good working relationship

with Canada, and will continue to try and make inroads there, incorporating the measures that they are taking into our analysis. We anticipate that we will be able to do that in the future. Just a note that that is ongoing, and it is one of the things we're working towards.

The information we can reach, you can expect to get more information about the actual documents I've discussed today, but also the points for commenting through regs.gov, in the Take Reduction Team action, or the e-mail feedback for the fisheries Bi-Op. With that I 'll stop and we can take questions.

CHAIR McKIERNAN: Thank you, Jen, that was an amazing presentation. Are there any questions at this time from members of the Board?

MS. KERNS: Pat Keliher.

CHAIR McKIERNAN: Pat.

MR. PATRICK C. KELIHER: Mr. Chairman, I've got comments and questions on both the rule and the Bi-Op, do you want to stay focused on one or the other right now, or is it all right to just go into all of them?

CHAIR McKIERNAN: Jen, would you prefer to cover the Proposed Rule first?

MS. ANDERSON: I think either, anyway, we can take it however you prefer, or we've got staff on standby.

CHAIR McKIERNAN: We'll start with the Proposed Rule first, Pat.

MR. PATRICK C. KELIHER: Proposed Rule first, okay. First Jen, I thank you for the presentation. There is obviously, as you well know, there are a lot of moving parts here. But first I want to take the opportunity to thank NOAA for working with all the states in the northeast. The fact that you've included much of what we have submitted to the Agency, is appreciated. There are two areas that were missed, or not included, not missed, not included within the areas for the Maine Plan.

One specifically, was conservation equivalencies, giving states flexibility to make adjustments. I think that is incredibly important going forward. We will have comments for Maine, regarding zone-by-zone conservation equivalency that you'll see. Could you possibly speak to why you didn't go in the direction of conservation equivalencies? There were indications that it looked like it was going to be included, and then to see it silent within LMA1 was concerning.

MS. ANDERSON: I think I'm going to see if Colleen Coogan can answer this, because I know we did discuss it, but I don't have the detail level that she does. We may have hit on the storm problems of our day, hold on just a second.

MS. KERNS: Colleen, you just have to unmute yourself, and if you're having trouble with that then raise your hand, and I can double check your sound. I think you're listed under Colleen Bouffard.

MS. CAITLIN STARKS: I don't think that she's on the webinar.

MS. ANDERSON: She was. Yes, she is on her phone, called in because of storm issues today, so I think she can't for some reason. She has unmuted her phone, but tells me she can't. For whatever reason it's not unmuting her on the system, I guess.

MS. KERNS: I just need to try to find here. Caitlin, do you see her?

MR. KELIHER: We can come back to it, Toni, if she's able to join later. I think it's the joys of a webinar. We have these types of troubles with webinars. If we were flying, we would all be stuck in an airport. I'm certainly happy to come back to that if possible. Just a last comment on the trawling up scenarios for eight traps, and the concerns about fishing four traps with a single end line. In many, many cases, those are safety requirements.

Fishermen are fishing in areas where due to vessel size or bottom type, fishing eights for those type of vessels becomes a safety issue. No need to comment. I'm not looking for an answer, but just want to stress that whenever we can take vessel safety into consideration, it's important. We'll make further comments on that with our state comments that will be submitted prior to the deadline. I'll withhold the rest of my questions and comments for the Bi-Op discussion.

CHAIR McKIERNAN: Thank you, Pat. Jen, as Chairman, but also as the Mass DMF Director, I also have a comment and a question. I would like to also thank the NMFS staff, especially at the Science Center, and at GARFO, for being very responsive to my agencies request for multiple runs of the risk reduction model, in order for us to finalize some proposals that the staff was extremely responsive, sometimes responding to us within 24 hours, really close to the holidays.

I did have one codifying question, and I'm not sure which slide it was that you showed, but it was an estimate of the number of entanglements that occurred each year, and an attribution of the entanglements to federal versus state waters, where you said that you estimate 30 percent are entangled each year, 11 percent were entangled in federal waters.

I guess that leaves 4 percent have been entangled in state waters. I guess my question is, is that based on a co-occurrence model, or was that just an assignment of those extra entanglements to the presence of vertical lines? I guess I'll reveal, my real question is, I'm surprised that even though I know there are a lot more vertical lines in state waters, I didn't think there were as many whales up against the shoreline. If you could comment on that, that would be really helpful.

MS. ANDERSON: Is that on that maybe Slide 23, the mortality and serious injuries assigned to the entanglements, where we're trying to split out the 50/50? I'm trying to figure out where it's coming out.

MS. ELLEN KEANE: Jen, this is Ellen. I think it's Slide 25.

MS. ANDERSON: Okay.

MS. KEANE: It's that one.

CHAIR McKIERNAN: Yes.

MS. KEANE: I can speak to that. This estimate is actually based on the scarring data that the New England Aquarium pulls together, and so we looked at the percentage of the population estimated entangled annually is 30 percent, and then we applied the 50/50 percent, and then we used the decision support tool to split the U.S. portion of that between state and federal waters.

CHAIR McKIERNAN: Yes. The number of 4 percent entanglements in state waters, versus 11 percent federal waters. That ratio seems a little skewed to me, but thank you for clarifying that. Who's up next for questions? Toni.

MS. KERNS: Dan, I don't see any hands up, but I do have a question, and I think it might be somewhat related to Pat's conservation equivalency question. In some of the discussion that we have had, in terms of the trawling up, and being able to, as Pat had said, do some differences in the number of traps per trawl. NOAA has come back and said it is not possible, because of regulations that are in place in the Commission plan. But the Commission doesn't have any regulations in the number of traps per trawl in our plan. We're just wondering where that is coming from.

MS. ANDERSON: I think we had not indicated. My understanding was we've not said that it wasn't possible, but rather that we wanted to ensure we had the support or ideally would like the support of the Commission. I think GC might have to speak more to the analytics of how we would get there from a rule breaking perspective. But we would certainly be open to working with the Commission. We were primarily

focused on how we have to come together to change the lobster regulations, because we wouldn't take that of course on our own.

MS. KERNS: I guess then my question is, if it's a regulation that's in the rule that comes out, how is that regulation any different than any other regulation that comes out of the rule? I see that Chip has his hand up, so maybe he would be. I don't know if you want me to go to Chip, or if you want to answer that.

CHAIR McKIERNAN: Go ahead, Toni.

MS. KERNS: Chip, if you put your hand back up, I need to find you again.

MR. CHIP LYNCH: Hi everyone. If I don't cut out, I'm experiencing those same wintery conditions. The issue that we are trying to bring up is that we are, as the federal government, we are obligated to support the Commission generally, and that can come in all different manner of doing so. But to the extent that we regulate, we have to make sure that our regulations are compatible with the Commission Plan. What you're hearing from Jen was the concept that we're coming to the Commission, not only as a legal requirement, but also really as professional courtesy. We want to work with you, we want to make sure that to the extent that we go in a direction, where we are regulating, that we don't do so in a manner that oversteps the Commission's Plan.

You know, as we all know, the Commission Plans, as detailed as they are, can be subject to interpretation by various entities, and we want to make sure that as we proceed forward in a way, and we are thinking that we are compatible with you, that we don't at the eleventh hour hear that we are indeed not compatible, which would create a legal sort of dissonance. I hope that answers the question, let me know if not.

CHAIR McKIERNAN: Toni, are you good?

MS. KERNS: Chip, I think I guess I'll follow up with you later. I just don't see how it's different than any other regulation that's in the Take Reduction Plan.

MR. LYNCH: I guess the point I was making is that it's not. When we regulate, we make sure that we check in with the Commission, to ensure that we are acting in a manner that is compatible. Hypothetically, we could act without checking in with the Commission. But we would run the risk.

MS. KERNS: Okay, thanks.

CHAIR McKIERNAN: Toni, are there any other hands up for discussion of the Proposed Rule?

MS. KERNS: I see no other hands, Dan, we have a member of the public, do you want to?

CHAIR McKIERNAN: Yes, certainly.

MS. KERNS: It's Richard Zack Klyver.

MR. RICHARD ZACK KLYVER: Thank you, Dan, and thank you Jen and Colleen for the presentation. I had brought this point up, and I still feel a tremendous amount of concern around the trawling up, and the fact that right whales and humpbacks spend a lot of time deeper in the water column.

In my experience, it's not uncommon for the right whale to dive down 15 to 20 minutes, especially off the coast of Maine, where I've watched them a lot. When they are out in deeper water, if they're feeding, they are diving down. They're spending a lot of time farther down in the water column.

The same with humpbacks when they're feeding. We now have a proposal that suggests that we'll put a weak breakaway at the top of the end line, but you have two-thirds of the end line which will have more risk, because you're adding more traps, and more weight. We know that 1600 entanglements have happened. It's estimated that 20-30 percent of the population get entangled every year. That is not all in the United States, but even at that rate, there is still a significant chance that animals will get entangled in the lower part of the end line, somewhere in U.S.

waters. I'm extremely concerned that we're actually adding more risk here. I am afraid that we're going to ask the industry, the states and all the fishermen that have so much concern over this, to change the way they fish.

Then at the end of the day, we're not going to get where we want to go. We actually increased risk. I think there should be some analysis done that really considers whether we're adding more risk, and more lethality by doing that. Do you have any perspective on that, in terms of how you evaluated that, and thank you very much?

CHAIR McKIERNAN: I think that's a question for Jen.

MS. ANDERSON: Yes, I'm going to see. I think you guys weren't able to get Colleen off of mute, but Marisa is on standby. I think we can speak to that. Toni, I think Marisa raised her hand, if you can see it.

MS. KERNS: She has not raised her hand. Marisa, your hand is raised when the red arrow is pointing down, there we go. All right, Marisa, go ahead, you have to unmute yourself first.

MS. MARISA TREGO: I'll take a stab at that. In terms of increasing lethality. I don't think we have a lot of evidence that over a certain trap trawl size that it increases too much. I think one of the trawl lengths that has been thrown out there is about 20, so over about 20 it might just be similar. But that's also why we incorporated weak points, to add in another level of precaution, so if there is a lot more weight at the bottom of the line, there is some evidence that that could help break the line with that high tension. What was the other portion of your question?

MR. KLYVER: Well, I'm just wondering if you will, you know to me it seems if you're adding a lot more weight. If you're going from 10 or 15 traps to 25, or even 45, and then a whale gets entangled in that lower two-thirds, it's at much more risk, because the breakaway is above. Whales, we know when they get entangled, they roll. They feel tension, they roll, and it's unpredictable, you know how that line is going to assemble itself around that animal. It could quickly wind up carrying a lot more weight, which could cause a more severe entanglement to them.

MS. TREGO: Yes, so there are some areas where we do have longer trap trawls with a higher break point. In LMA3, the weak line actually goes down 75 percent, so there is a little extra protection there. But that is a concern, and that is why we didn't give those areas as high a credit for weak rope, because there is still some risk there.

CHAIR McKIERNAN: Thank you, those were great questions, and I'm sure you'll take the opportunity to formally comment on this proposed rule during this comment period. Toni, is there anyone else in the queue, who would like to ask any clarifying questions of the presentation?

MS. KERNS: We have two additional members of the public, one is Jim Fletcher, and the second is Ruth Pelletier.

CHAIR McKIERNAN: All right, go ahead, Jim Fletcher.

MR. JAMES FLETCHER: As crazy as this may be, I ask, has there been a cost analysis including all of the pot fishermen who trawl for dredge gear equipment. In the early years that I fished, we fished for lobsters just trawl vents. If the whales are so important, shouldn't there be a cost analysis done to switch all of the pot fishermen to either dredge or a trawl net for a period of time, and see how much you can save the whales and the fishing. My question is, has there been analysis for switching all the pot fishermen to either dredge or trawl? Thank you.

MS. ANDERSON: Thank you, Mr. Fletcher. I do not believe that analysis has occurred. I'm not sure if that would be consistent with the Commission's rules, but we can certainly touch on it. However, I do think we had that comment from you, and we've entered it in. We'll be sure to get back to you and address that, as part of the process.

CHAIR McKIERNAN: Next member of the public, Ruth.

MS. RUTH PELLETIER: Hi, I'm a Marine Science student at the University of New England, and I was just curious about the increased risk of ghost traps and pollution from this Protection Act.

MS. ANDERSON: Thank you, meaning concerns that the weaker rope might cause gear to break away and get left out there?

MS. PELLETIER: Yes.

MS. ANDERSON: Okay, I don't know that we have evidence to suggest that is a concern. We did discuss it a little bit of DEIS. We don't know that it's anything worse. No evidence, I guess, to suggest it would be worse than what we already experience. I think that if fishermen lose pots if they lose lines, they clearly want to get that back, because there is a cost associated with it.

It's pretty common for them to grapple the gear and try to recover it. We would expect that to continue. The proposals have been built in a way that would hopefully avoid that. It's certainly not in anyone's interest, the fishermen or the whales for that to happen. But I don't think we have evidence to suggest that it's going to be a greater concern now.

CHAIR McKIERNAN: Let's move on to a discussion of the Biological Opinion. Pat Keliher, I'm going to invite you up first, since I asked you to postpone those comments from earlier.

MR. KELIHER: Jen, my first quick question around the Bi-Op. You stated it is focused on the federal water fisheries. Is the Agency expecting all the states to develop incidental take permits at this point in time?

MS. ANDERSON: No, I don't believe that we are. As you know, we've been working with the state of Maine, and with Massachusetts as some of the legal issues have come forward. But that is not something we are anticipating.

CHAIR KELIHER: Okay, thank you, I appreciate that. A follow up comment, Mr. Chairman?

CHAIR McKIERNAN: Yes, go ahead, Pat.

MR. KELIHER: Jen, try not to be overly critical here, but the Bi-Op was a gut punch. I don't know if there was a single manager sitting around the table that's been engaged that thought that the Biological Opinion was going to go nearly as far as it did, calling for upwards of a 98 percent risk reduction in a ten-year period.

What you're asking us to do is to reinvent the lobster fishery, if not all of the fisheries, at least in the northeast, at a cost of hundreds of hundreds of millions of dollars. I'm not sure how we come out the other side of this. I mean this is the single most valuable species by commercial landings in the country, and the Agency has got the cross-hairs directly on it.

I don't know why the Agency just didn't say, you need to be fishing ropeless in ten years, because it sounds like that is what the result is. Then further compounding my sleepless nights here is, we now have the United States bearing the burden of the actions of another country, in this case Canada.

They have a direct impact on risk reductions, and as such, have a direct impact on our fisheries and the fish survival of our fisheries in the United States. I think you classified the conversations with Canada as productive and meaningful. We don't know that. All we know is that there is consultation. The states need to be brought into those conversations.

We need to be at the table with those conversations, and NOAA needs to be ready to make some major changes with the importation rule that it has at its fingertips, in order to put pressure on that country. We can't be in a position where our fate, even with closed fisheries, as it says in the Bi-Op. Our fate hinges on Canada, and that's just not a great place to be. Not looking for a response on that. I felt like I

needed to put that on the record, thank you very much, Mr. Chairman.

CHAIR McKIERNAN: Jen, I have a question for you. I know that the data that went into the analysis obviously is a little bit dated. I wonder if the 14-calf count that we have going on this winter, and the much-reduced number of carcasses that were detected over the past year, gives you any optimism?

MS. ANDERSON: In terms of personal optimism, absolutely. You know it is unfortunate we can't incorporate those numbers. They are not ripe for going into the assessment, but it certainly makes us feel hopeful. I Think that you know one of the things we leaned on with doing the framework, and structuring that the way we did, was we are hopeful.

We're looking ahead and thinking, and certainly hoping that as time goes on, we're going to keep incorporating things, and seeing larger calf counts, and being able to attribute those, and make adjustments that will bring some of those reductions down, get it as healthy as necessary. Yes, I think that we are overall hopeful that we're on the right track, and that we're moving forward in a positive direction, and certainly hoping that as time comes through and we can adjust, we will be able to continue to have these good years, and factor that in.

CHAIR McKIERNAN: Toni, is there anyone else on the Board that would like to make a comment or ask a clarifying question?

MS. KERNS: Yes, we have Senator Miramant.

CHAIR McKIERNAN: All right, great, go ahead, Senator Miramant.

SENATOR DAVE MIRAMANT: Two things come up, one Commissioner Keliher already addressed, but it's worth repeating. When I believe the notes that say, we can do this, and it still will not have a positive direction. But if Canada is included it will. It starts to sound like my Marine Resources Committee here in Maine. It starts to sound like, you know, let's just do something, because people expect us to do something and the science doesn't even support it.

But I will get reelected if I do it. I just don't expect that to ever get through this Commission with that kind of science. I'm listening closely to the rest of this discussion, and I thought I was one of the strongest environmentalists in Maine, until I started reading this stuff. Thank you, and I can't wait to be educated, but I'm just having a hard time with this one.

CHAIR McKIERNAN: Toni, who's next?

MS. KERNS: It will go to the public next, Dan, but I do have a question myself if that is all right.

CHAIR McKIERNAN: Help yourself.

MS. KERNS: Thanks Jen for the presentation, really appreciate it. Pat started on the question that I was going to ask, but he didn't ask the question, so I am going to follow up. The Biological Opinion potentially could change a little bit and hinge on measures that Canada puts in place, and there have been these discussions between NOAA Fisheries and Canada in the past that the Commission and the states have not been involved in.

It seems very important for this body that manages the lobster fishery to be involved in those discussions, and to be talking to the fishermen who are fishing in the waters just north of us. What will NOAA Fisheries do to bring the Commission into those discussions, because they are vitally important to us.

MS. ANDERSON: Thanks, Toni, I appreciate your question. We, as I noted in my presentation, spent a lot of time talking back and forth through, staff has had communications with Canada. They are actually doing things. If I gave the impression that things aren't going on into that, I'm sorry. There are ongoing measures taking place up there.

The difference is just in how they do the measures, and a lot of time so far what we've seen from them is

a very dynamic approach, where they change on almost an annual basis. We're far more consistent in how we implement things here. It's easier to account for that consistency, and work it into our model. One thing we can do is check. I don't know how or if the ASMFC or states can be involved in the bilateral process, so I think we would have to get back to you on that. But it is certainly a good comment as a question of something we can take back.

MS. KERNS: Thanks, we're looking forward to hearing how that can occur. Dan, we did have David Borden raise his hand during this time, and then Patrice, I do see your hand up, just so you're in the queue.

CHAIR McKIERNAN: Yes, let's go to David first, and then on to Patrice.

MR. DAVID V. BORDEN: I would just like to follow up on this issue of a bilateral discussion. I've participated in various capacities in a number of bilateral discussions with Canada. The thing I think that is being missed somewhat by the current format, is that in those discussions we had a combination of government officials, like Mr. Pentony, and Colleen, mixed in with Council members or Commission members, or even industry members.

There was a lot, from my experience, there was a lot that was brought to the table by the industry representatives. I would even include the environmental groups as potentially being a participant in that. In other words, it's a mix on our side that eventually brought pressure to get agreements. For instance, I chaired the group that negotiated the cod, haddock and yellowtail sharing agreement with Canada.

I would just agree with Pat and Toni's comment. I think we need a different mix of people at the table with Canada, and we can't fix this problem without Canada. They've been good neighbors, and we've collaborated with them on a number of different issues. But somehow, we've got to figure out a really creative way to partner with them, and solve this problem.

CHAIR McKIERNAN: Patrice McCarron.

MS. PATRICE McCARRON: I had a few questions about the model. First, I certainly want to echo Commissioner Keliher's comments and concerns, and David Borden's about Canada, and I would add to that the question of how U.S. Fisheries are also being held accountable for vessel strikes. Does the model itself look at vessel strikes at all?

It looks like it's just dealing with entanglements. How do future reductions in vessel strikes happen and fit into this process, so that we're not being held accountable for that? Then specifically, I had a question on the third model run, which includes Canada doing a parallel exercise to the U.S. which ultimately does increase the right whale population.

I'm just curious, which fisheries in Canada are included in that? Is that just snow crab, is that lobster, is that all Canadian fixed-gear fisheries, and does that address Canadian vessel strikes at all, because that seems to be a very significant source of mortality? Then my last question is just with the baseline data. The Bi-Op itself you said goes through 2019, but it looks like the model only goes through 2018. I know we had ten right whale mortalities in Canada in 2019, and I'm afraid that when you add that year, these scenarios potentially get even worse than they are for us now. That is my bundle of questions, thank you.

MS. KEANE: Thanks, Patrice, this is Ellen, and I can, I think take a stab at those. In terms of the first question, which was how U.S. fisheries are being held accountable for vessel strikes. In our analysis we concluded that the fisheries are not likely to adversely affect large whales from vessel strikes. The only species that we found was likely to be impacted adversely affected by vessel strikes, was sea turtles.

MS. McCARRON: I'm talking about vessels strikes from like the larger Maritime industry. When you look at the observed mortalities, and you assign those to vessel strikes and entanglements. Large shipping

interests are causing additional mortalities that are independent of the fishing industry.

MS. KEANE: You're right, and so those would factor into our analysis in the environmental baseline, and so we considered 2.3 vessel strikes per year in the baseline of the model. Not in terms of what the fishery contributes, but in that overall line. Does that help any?

MS. McCARRON: Yes. My question is, clearly you have a plan to reduce our fishery by 98 percent, which is essentially to eliminate us to solve this problem. How do you get that significant portion of mortality eliminated from the larger Maritime vessel industry, and not have that full burden ride with the fisheries?

MS. KEANE: The Agency did just finish review of the vessel strike regulations, and that review is out now. It was released, I think last week. I would have to check on that. There is an opportunity to provide feedback, kind of going forward, and how to best change the measures, and we can get you that information on where to provide that feedback.

MS. McCARRON: Yes, I've got that, thank you.

MS. KEANE: Then the second question I think was the parallel exercise of Canada, and how we did that. I think this is explained more sensibly in the Biological Opinion, but basically, we wanted to compare apples to apples, and because we are unable to apportion out the vessel strikes and entanglements in fisheries, as we are in the U.S. and Canada, because we aren't able to do it in Canada, because we don't have as much information.

What we did was, we took and calculated what the percent in total reduction from all mortalities in the U.S. is, and then applied that same total reduction to the Canadian mortalities. It wasn't specific to any fishery, as I said. If we reduce in Phase 1 to this level, what is that reduction from all mortalities in the U.S. Then we use that same reduction in Canada. It was a little bit of a different approach.

MS. McCARRON: Okay that's helpful, thank you.

MS. KEANE: Then for the last one with the baseline data. We did use the most recent data from FW, the estimate came up from 2010 to 2019, and we did update our models to do that. I will have to go back and look at the Canada model. I believe that incorporates the 2019 data, but I can verify that. It should be 2010 through 2019. We kind of got the data for last minute, we were scrambling, so they might be mislabeled there.

MS. McCARRON: Okay, so the model that is in the Bi-Op, even though the tables and the documentation say through 2018, it is in fact run with the 2019 data.

MS. KEANE: Yes, so you're talking about the documentation that is the appendices talking about the projections Dan Linden did?

MS. McCARRON: Correct, yes correct that Linden paper.

MS. KEANE: Yes, we had done the model originally with the 2010 to 2018 data, and that report that is attached is the report that underwent CI review with them, just incorporation of their comments on it. However, for the Biological Opinion itself, we did update with the 2010 to 2019 data.

MS. McCARRON: Okay, that is confusing, but thank you for that clarification.

CHAIR McKIERNAN: Patrice, did you ask which Canadian fisheries were being regulated with new restrictions? Was that part of your line of questioning?

MS. McCARRON: No, I was just curious when they applied the U.S. scenario to Canada. We know which fisheries in the U.S. have to take the reductions, but it's unclear which fisheries in Canada would need to take similar reductions to achieve that end. But it sounds like it's just a generic application of Canada,

whatever they decide they would want to take 98 percent of, which probably wouldn't be that much.

CHAIR McKIERNAN: All right, thanks.

MS. KEANE: Those were probably total reductions from both countries.

CHAIR McKIERNAN: All right, Toni, are there any other hands up?

MS. KERNS: Yes, Dan, you have two Commissioners up, Ray Kane had his hand up first, and then Eric Reid.

CHAIR McKIERNAN: All right, Ray Kane.

MR. RAYMOND W. KANE: Yes, good morning. Thank you very much for the presentation. I will concur with Pat Keliher, Dave Borden and Toni Kerns, being how we are the management body that oversees the lobster industry. I believe we should be sitting at the table with the Canadians in this bilateral agreement. Secondly, I didn't get a chance to look at the ship strike paper. My question is, is the cruise line, have they got numbers in that ship strike paper? I'll do my rationale. Are the cruise lines involved in this ship strike paper?

MS. ANDERSON: This is Jen, thanks for your question. I don't have that right at my fingertips, somebody is checking. We think it is probably vessels that are greater than 65 feet, but I'll need to confirm it, so that would catch them, provided they are using AIS, which I would imagine they are.

MR. KANE: Okay, my rationale. In the past five to ten years, we're all aware of the cruise line industry, and how it's taken off. They started with the Alaskan summer cruise lines. I would venture to say, if you look historically at the cruise lines, and the increase of cruise line trips through the Bay of Fundy in the summertime, and we all know cruise lines steam at night. Their clientele, their passengers want to be in ports during the day. You've got a lot of cruise line traffic in the Bay of Fundy, and I think that should be included in that report. That's all I've got to say, thank you very much.

MS. ANDERSON: Thank you, appreciate those comments.

CHAIR McKIERNAN: Toni, who's up next?

MS. KERNS: We have Eric Reid and then Pat Keliher.

CHAIR McKIERNAN: All right, Eric.

MR. ERIC REID: I have two questions, one relates to trawling up, and one is about noise. Are they fair game at this point?

CHAIR McKIERNAN: I guess the trawling up would. I don't know that this plan is addressing noise at all. But let's go with your first one.

MR. REID: Okay, well I look at trawling up in a different context, which has to do with gear interactions in a ropeless fishing with the trawl fleet. I am concerned about the lack of economic analysis on a mobile gear fleet, because it's going to be expensive for us, for sure, when it comes to ropeless fishing.

We addressed that in New England, but I just wanted to put that out now, and Dan, my question about noise has to do with wind power. The noise generated by monopile driving, with equipment that is capable of the hammer strike somewhere in excess of 4,000 kilojoules, really hasn't been analyzed.

There is some analysis at 2,500, but we've got a lot bigger wind monopiles, and a lot bigger pile driving, and I'm concerned that the effect of noise on whales hasn't really been fully analyzed, given the capability of the installation equipment now. Those are my two comments or questions.

MS. ANDERSON: On Vineyard Wind anyway, I believe that has been analyzed. I don't have the Biological Opinion in front of me, but we did complete that, and have looked at those issues. I know that as obviously, some of the larger wind turbines are going up, and different styles and things evolving quickly. I don't

know what that means for future installations. But we have looked at things, and I can get you more information on what our findings were there, and circle back.

CHAIR McKIERNAN: That will be great, Jen. Toni, who's up?

MS. KERNS: Pat Keliher.

CHAIR McKIERNAN: Okay, Pat.

MR. KELIHER: Mr. Chairman, I know we've had a good discussion, and I don't want to end it if there are other comments, but I do have a motion for the Board to consider.

CHAIR McKIERNAN: All right, go ahead, Pat.

MR. KELIHER: I think staff has that motion, if they want to put it up. It's a little Dave Pierce-esque in length, so.

CHAIR McKIERNAN: As long as it fits on the screen, I think you'll be all right.

MR. KELIHER: There it is right there. I kept that as the standard, to fit on the screen. I think it's incredibly important that ASMFC as a body comment on these rules. They are potentially, especially the Bi-Op is potentially economically devastating. I've crafted this motion for consideration.

I would move to recommend to the ISFMP Policy Board that the Commission send letters to NOAA Fisheries, with comments on the proposed rule to amend the regulations implementing the Atlantic Large Whale Take Reduction Plan, and the draft Biological Opinion. The letter should include the following: The implementation of the rule and the Bi-Op should be completed by the end of May to ensure the court does not intervene.

The implementation timeline recommendations that address practical start dates. Supporting trawl equivalency such as 8 traps with 2 endlines equal 4 traps with 1 end line. Support enforcement and coordination with state agencies. Conservation Equivalencies that would allow for modifications related to trawl lengths. Specific to the Bi-Op, a statement that address the burden the U.S. Fishery could bear based on the actions of Canada.

CHAIR McKIERNAN: Is there a second?

MS. KERNS: Yes, David Borden.

CHAIR McKIERNAN: All right, would you like to speak to the motion, or do you think you've covered it, Pat?

MR. KELIHER: I think I've covered it, Mr. Chairman.

CHAIR McKIERNAN: Pat, I have one question in terms of the timing and who would complete the task, since the Biological Opinion comment period closes in less than three weeks. Would you be asking for the Policy Board to review a letter before the end of this meeting week, or to convene separately sometime after the meeting, and before the deadline?

MR. KELIHER: Yes, I think we're going to need probably more than this week to finish the letter, so I think the Policy Board is going to need to reconvene separately. The Policy Board could consider, you know, since the Executive Committee meets annually, the Policy Board could consider allowing that to be kind of the final signoff, as long as it's within line with this. But that is kind of my thinking on that. It's going to take a little bit of time.

CHAIR McKIERNAN: Would Bob Beal or Toni like to weigh in about the ability for the Policy Board to approve such a letter?

MS. KERNS: Bob has his hand up, Dan. Bob, are you there?

EXECUTIVE DIRECTOR ROBERT E. BEAL: Yes, I'm here. The Policy Board can sign off on a letter like this. I think the idea would be to bring it forward to the Policy Board later this week, and get their blessing to draft a letter. Then there are two options, one is what Pat Keliher said, which is the Executive Committee can approve the letter, or we can have the Policy Board

approve the letter via e-mail vote, or something along those lines. There is a little bit of risk in an e-mail vote, if there is multiple wordsmithing of a letter over e-mail, prior to approval.

But you know we've done that in the past. I think getting the Policy Board's agreement to send a letter would be good. Actually, while I'm speaking, the motion refers to letters plural in the first sentence, and then in the second it says the letter singular, should include. We just need to sort out, you know are we sending one letter or are we sending one on the draft regulations and one on the Biological Opinion? Is it more than one letter? But we can sort that out.

MR. KELIHER: Mr. Chairman, if I may, and if it's okay with my seconder for a friendly amendment here. The first bullet, we probably need to remove the implementation of the rule, because it needs to be a final rule, in order to ensure that the Court does not intervene. I think if just remove the first three words in that line on that first bullet, and it should say, the rule and Bi-Op should be completed by the end of May, if David is okay with that change.

MR. BORDEN: Okay.

CHAIR McKIERNAN: All right, Pat, any discussion on the motion from the Board?

MS. KERNS: You have Cheri Patterson.

CHAIR McKIERNAN: Go ahead, Cheri.

MS. CHERI PATTERSON: Pat, I have a question in regards to the third bullet and the fifth bullet. They seem to be saying essentially the same, they are addressing the same issue.

MR. KELIHER: I think there could be other areas that equivalencies could be looked at, so I'm looking just for more, broader statements on the development of conservation equivalencies. I mean for the most part they do focus on trawling up requirements. But as we were drafting this, and kind of catching other people's input on it, we ended up with both of those bullets. I think at the end of the day when we draft this, we could sort that out in the drafting.

MS. PATTERSON: Okay, that sounds good, thank you.

CHAIR McKIERNAN: Toni, anyone else?

MS. KERNS: No other hands, Dan.

CHAIR McKIERNAN: We can vote on this. Is there any objection to the motion? If there is raise your hand, otherwise we'll consider it adopted by consent. Toni, are there any hands up among the Board?

MS. KERNS: I assume he's not objecting, he's probably wanting to abstain, but Mike Pentony has his hand up.

MR. MIKE PENTONY: That is correct.

CHAIR McKIERNAN: All right, therefore with one abstention, this motion is considered approved. I think that covers all of this Item Number 4. Would the Board like to take a five-minute break, before we get into the Benchmark Assessment and Possible Action? I would recommend that. Toni, can we take a five-minute break?

MS. KERNS: Yes, Mr. Chairman.

MS. ANDERSON: Mr. Chairman, this is Jen. I just want to say thank you for having us today, we really appreciate the Commission's interest and your timing, and the good questions and thoughtful input that we received. Just two quick reminders the different cutoff dates for the feedback on the Bi-Op, it's February 19, and the Proposed Rule and the DEIS go to March 1, so just as you're formulating your response back to us, keep those in mind, please.

CHAIR McKIERNAN: Thank you. All right, we'll reconvene at 10:05, Toni.

(Whereupon a recess was taken.)

CHAIR McKIERNAN: Toni, are we ready to resume?

MS. KERNS: Ready to go, I think. I'm ready anyway.

CONSIDER MANAGEMENT RESPONSE TO THE 2020 LOBSTER BENCHMARK STOCK ASSESSMENT AND PEER REVIEW

CHAIR McKIERNAN: All right, next item is Number 5**,** Consider Management Response to the 2020 Lobster Benchmark Stock Assessment and Peer Review; with a possible action. I think we have a presentation, is that Caitlin's?

MS. STARKS: Yes, let me get my slide up. This is Caitlin Starks; I'm the FMP coordinator for lobster, and I'm just going to go over management response from the Lobster 2020 Benchmark Stock Assessment. To start off, I'll just cover some quick background for the discussion, and then I'll go into a review of the 2020 assessment results, and the recommendations coming out of the assessment and peer review. Then I'll wrap up with some potential actions for the Board to consider moving forward.

At the October meeting, the Board reviewed and accepted the 2020 Benchmark Assessment and Peer Review for lobster for management use, and the stock status determinations that came out of that were that Gulf of Maine and Georges Bank stock is not overfished, and not experiencing overfishing, while the southern New England stock is depleted, but not experiencing overfishing.

REVIEW STOCK STATUS, REFERENCE POINTS, AND ASSESSMENT RECOMMENDATIONS

MS. STARKS: The Board also adopted at that meeting the recommended reference points from this assessment, and then agreed to postpone decision making on a management response until this meeting. As a reminder, in the 2020 assessment, new reference points were developed to account for changing environmental conditions for the stock, and the assessment and peer review put forward three abundance reference points for Gulf of Maine and Georges Bank, which are a fishery industry target, an abundance limit, and an abundance threshold.

The fishery industry targeted the highest of the reference points, and below that level of the stocks ability to replenish itself is not considered jeopardized, but the Stock Assessment Subcommittee felt that falling below this level may indicate degrading economic conditions for the lobster fishery, and the abundance limit is below that level.

Below this threshold, stock abundance is considered depleted, and the stocks ability to replenish itself is diminished. Then finally, the abundance threshold is the lowest of the reference points, and below this level stock abundance is considered significantly depleted, and in danger of stock collapse.

Just as a note, this was the only reference point put forward for the southern New England stock, and that is due to the current condition of the stock, which is below that reference point. For exploitation, two reference points were recommended for each stock, an exploitation threshold, above which the stock is considered to be experiencing overfishing, and an exploitation target, which is calculated as the 25th percentile of the relative exploitation during the current abundance regime.

Just to quickly review where we're at with these stocks, based on the updated reference points the Gulf of Maine and Georges Bank stock abundance is not depleted, and the average abundance from 2016 to 2018 was 256 million lobster, and the fishery industry target, the highest reference point is 212 million lobster, so we're above that level.

Projections for this stock done in the assessment, suggest that there is a low probability of abundance declining below the abundance target over the next ten years. The average exploitation for Gulf of Maine and Georges Bank from 2016 to 2018 was below the exploitation target, so that means it is not experiencing overfishing. For southern New England, based on the updated reference points, the stock abundance is significantly depleted. The average abundance from 2016 to 2018 was 7 million lobster,

which is well below the abundance threshold of 20 million lobster, and the stock projections for southern New England show a low probability of the stock condition changing among the most realistic scenarios that were run. There was a sensitivity analysis conducted for southern New England, which the Board talked about last time.

This shows that in the absence of fishing mortality, reference abundance would be projected to increase, along with recruit abundance to exceed the maximum abundance for the current regime that has been seen. However, it is noted in the assessment that increases in abundance are likely to be limited, because of the projected continuing decline in recruitment. The average exploitation for southern New England from 2016 to 2018, was between the exploitation threshold and exploitation target.

That means it is not experiencing overfishing, but exploitation is not considered favorable, as it does exceed the target. The assessment and peer review also noted some additional considerations when thinking about the southern New England stock. But I wanted to remind the Board, so first recruitment indices are indicating that the stock is not rebuilding, and it is in recruitment failure.

The stock distribution has continued to contract, and it's becoming more apparent also in the offshore portion, as well as inshore areas. Landings from southern New England have continued to decline, and the time series low was in 2018. Disease prevalence also remains high in Rhode Island and Massachusetts water than all four of the temperature indicators that were looked at in the assessment are negative, and environmental stress may also be having lethal and sub-lethal effects.

Then lastly, there is evidence that environmental influences have resulted in a decreasing recruitment rate, and as a result the assessment notes that substantive measures would be necessary to increase adult abundance to improve recruitment success. In terms of recommendations coming out of the assessment and peer review, for Gulf of Maine and Georges Bank, there were no management actions recommended at this time, considering the positive condition of the stock.

But the assessment and peer review reports did recommend that some kind of economic analysis be performed to provide advice on what actions would be appropriate to stabilize the fishery, if abundance falls below the target. For southern New England, the reports did not offer specific advice for management measures. But they did state that if stock abundance falls below the abundance threshold, then significant management action such as a moratorium is recommended, to halt the decline of abundance and increase reproductive capacity and recruitment to the stock.

Recommendations that applied to both of the stocks, included that an annual data update process be implemented, to monitor changes to the stock abundance, that all indicators be updated annually, and that a science-based rule be developed, where certain conditions of those indicators would trigger an earlier than schedule assessment.

They recommended continued use and expiration of the indicators developed in the assessment, to understand the relative merits of indicator-based management, and controlled. They also suggested that a management strategy evaluation could inform appropriate management targets for measures to meet defined objectives. Now I'll transition, talking about some way forward that the Board could consider today.

D**EVELOPMENT OF DRAFT ADDENDUM XXVII ON GULF OF MAINE RESILIENCY**

MS. STARKS: At the October meeting, the Board indicated intent to move forward with the development of Addendum XXVII, which is focused on increasing resiliency in the Gulf of Maine and Georges Bank stock.

For this Addendum, staff is looking for the Board to indicate if they would like the PDT to continue developing the Addendum with a focus only on a standardization of measures across LCMAs, which is the direction it was going before it was put on hold, due to prioritization of whale issues.

The things that were being considered were things like V-notching regulations, gauge, and vent sizes, trap tags for lost traps, and a few others, in terms of standardizing those across the areas, or if the Board is interested, the Addendum could also consider incorporating a trigger mechanism, where abundance falling below the target level from the reference points would trigger a change to management measures.

Based on the assessment recommendations, the appropriate trigger and management measures should be determined through some economic analysis. If the Board is interested in developing a trigger such as this, staff can work on providing the Board with potential analyses, and what information those could provide for consideration at the May meeting.

For southern New England, today the Board could consider initiating a management action to address the depleted status of the stock. The Board could also task the Technical Committee with conducting analyses of some potential management options, to get an idea of their projected impacts on the stock.

With this route, the Technical Committee would need very specific direction, such as a range of reductions or a specific set of management measures to be analyzed. I'll also note that following the 2015 assessment, the Technical Committee did a lot of work like this, analyzing a number of different changes to management measures and their potential impact.

The advice from those exercises is largely still applicable under the current stock condition, so it might be worth seeing what the Technical Committee had already done, in terms of impact analysis. Then lastly, the Board may want to think about the potential impacts of the impending changes that will be made in the fishery, in response to the federal rulemaking on Atlantic Large Whale Take Reduction. With that, I am happy to take any questions, Mr. Chair.

CHAIR McKIERNAN: Thanks Caitlin. I guess one question that I would have is, in the seat that I sit in right now as Director at Mass DMF, I am kind of overwhelmed with the workload that's facing me and my agency over the next few weeks and months on the large whale plan, and also some litigation.

I'm wondering if folks who have similar roles as mine might want to consider not May, but maybe August, because I know the staff that I would be calling on to help me with some of these analyses, could probably use what time I'm going to need them for what is coming up over the next few months. Let's take some questions from the Board on your presentation. Toni, are there any?

MS. KERNS: So far, I don't have any hands up, Dan. You've got Mike Luisi, and then Pat Keliher.

CHAIR McKIERNAN: Go ahead, Mike Luisi.

MR. MICHAEL LUISI: You know, I guess my question would be to staff. We were talking about making changes years ago, and the Board ultimately decided not to. What information is new at this point that would direct some changes? I'm thinking about, you know we went through a long, kind of process of considering changes based on the previous assessment. Is there something new in the information that would suggest that we do something now, as compared to kind of the final decisions that we made under the previous assessment?

I don't know if that makes sense, but I'm just trying to decide if this is something that we need to take on, if we're going to consider changes is there anything new about the information, or are we going to find ourselves considering what, personally I would not support a moratorium. But are we going to go down

that road ultimately to end up in the same position we were in, you know a couple years ago?

CHAIR McKIERNAN: It sounds like a rhetorical question, but let's see if staff have a response.

MS. STARKS: Yes, for the most part it probably is a little rhetorical. My understanding is that there isn't much new information that might change the direction of the Board, in terms of action on southern New England. There was, as I mentioned, the sensitivity analysis that shows that if you remove fishing mortality, there is a chance that the stock could improve.

But there are also changing environmental conditions that we can't necessarily predict or control. I guess, in terms of the Technical Committee's advice, I've been kind of guided in that nothing about the current stock status invalidates anything that they recommended after the last assessment.

Generally, the recommendation is that if you want to see an increase in the stock abundance, large reductions in fishing mortality will still be required. I think that's all I can add at this point. There are some Technical Committee folks on the call today, if we have specific questions for them though.

HAIR McKIERNAN: I would like to keep the conversation focused on southern New England for now, so Pat, maybe I'll invite some of the other southern New England and Mid-Atlantic states to speak first, and we'll get back to you in the north.

MR. KELIHER: That's good, Mr. Chairman.

CHAIR McKIERNAN: Is there anyone else on the Board from that southern New England region would like to discuss this matter.

MS. KERNS: You have Jason McNamee, David Borden, and then I assume Cheri. I don't know if Cheri wants to speak to southern New England or not.

CHAIR McKIERNAN: Let's go with Jason, and followed by David. Jason, go ahead.

DR. JASON McNAMEE: I'll start with, I guess I'll call it a question. You know I'm thinking about the assessment information, and the projections that were done for southern New England. What I'll offer is my interpretation of those projections, and either you, or potentially a Technical Committee member, or somebody who was on the Stock Assessment Team can correct me if I'm off.

You know the projections for southern New England, you could basically decrease fishing mortality down to zero, and that is what you have to do to get any reaction, but the reaction you get from that is really minor. You know that increase, I guess. I know there are a lot of assumptions that go into those projections.

I think the critical one in this case is the recruitment assumption, and I wonder if what was used there is even something, you know we feel really confident in. I guess I yammered a lot there, so just to recap. You know even in the absence of fishing, while there is some recovery in the stock, it is modest at best. Is that a correct interpretation of the projections?

MS. STARKS: Yes. I believe so, and I'm going to call on Kim McKown, who is the SAS Chair and on the Technical Committee, and see if she has anything to add.

MS. KIM McKOWN: As far as the recruitment that is used in the projection. We used the current downward trend in recruitment for one of the runs, and what was based on our recruit covariates, those two were pretty similar. Even with those, we did see an increase. You are right, it is a moderate increase, but there would be some rebuilding. Any other questions?

DR. McNAMEE: Just a couple of other questions/comments, I guess. But thank you for that, Kim, I appreciate it. In the case of southern New

England, we're using this term depleted, and I think you know the reason for that is we believe that environmental drivers are having a larger impact on the stock, and fishing is, looking at one of the plots that Caitlin had up.

It's the exploitation relative to the reference points for southern New England, and I think there is some work we can do that we're kind of bouncing around between the target and the threshold. We are above the target. There is a little bit of work that we can do there to get to or below the target. However, going back to what Mike Luisi said.

I have to say, I agree with him. When I first came onto this Board, we were sort of in the throes of a management action, and we asked the Technical Committee to do just a ton of work. In the end we didn't feel compelled to do much of anything. I don't think we have anything new at this point, and so I guess what I would suggest, and I'll save most of this discussion for later is, I think there are things that we can do. From this point moving forward, looking at the Technical Committee's comments. I'm not sure if it was the Review Committee or the Technical Committee. But management strategy evaluation is something that could provide us some new information, which I think would help move us into actually taking some action, and not just kind of rolling forward with very little new information, and probably ending up in the same spot we did last time.

I'm hopeful that we can get some additional work done, to give us a more comprehensive understanding of what the tradeoffs are, with the different things that we might want to do in southern New England, to better inform that management process, and get us over that hump of actually taking some action in the future. Thanks, Mr. Chair, I went on for a while there. I appreciate it.

CHAIR McKIERNAN: Sure. Dave Borden.

MR. BORDEN: Jason just made the point that I was going to make, but I would add to that. I mean this is a consistent problem that the Commission has across a number of stocks. This isn't unique to just lobster. I mean we've got, and I won't go into which stocks, but we have a number of stocks that we manage that are in this type of position.

I think that we need to do something, Number 1, and I'm comfortable with a targeted management strategy evaluation. We'll get into that under the subsequent agenda item. But I'm happy with that strategy. But I think it really has to be prioritized, and focused on what we think we can do in a reasonable timeframe.

I don't think that we have the luxury, either in southern New England or northern New England, to take a lot of time on this. I think we need to get on with it, and hopefully we can kind of construct a model that would be useful to some of these other stock problems we're having with other species.

CHAIR McKIERNAN: Toni, is there anyone else with their hand up?

MS. KERNS: Jason still has his hand up. I don't know if you have a follow up, Jason. No, he put it down. Everybody else is for, I think Gulf of Maine. You had Pat Keliher, Cheri, Ritchie White, and Senator Miramant.

CHAIR McKIERNAN: Okay. I would like to get the Board's feedback. Would it make sense to have the Management Strategy Evaluation presentation now, and Jason and David Borden had mentioned that they may embrace that, kind of in lieu of an instant response, or do we want to talk about the Gulf of Maine/Georges Bank stock first? I promised we would get back to the Gulf of Maine/Georges Bank stock response after this management strategy evaluation. Pat, what are your thoughts on that?

MR. KELIHER: You are kind of reading my mind, Mr. Chairman. I think we have several items on the agenda that are kind of rolled all into one, and so what I would include on that list is maybe the discussion of the draft Addendum, as far as Gulf of Maine resiliency,

and then the management strategies, because I just want to echo what Dave Borden said.

You know there are some issues that are very time sensitive, I think. But there are also some benefits with MSE that potentially could play out here as well for a kind of more medium- and long-term issues. I would like to hear all of it, and then kind of have a more organic, open discussion about how we may want to proceed.
CHAIR McKIERNAN: Would the other northern New England delegations agree to that?

MS. KERNS: Dan, Ritchie had just said he wanted to comment on southern New England, if you're willing.

CHAIR McKIERNAN: Sure, certainly, go ahead, Ritchie.

MR. G. RITCHIE WHITE: Yes, I don't know how we go forward, but I agree with Dave Borden, and this is a continual kick the can down the road. I can't remember how long ago we met in Rhode Island, and the Technical Committee recommended moratorium, and we did not do it, and we have not done it since.

I'm not saying we should do a moratorium now. But like northern shrimp, I see no way this situation is going to get better. I think we need to, on a Commission level, try to come up with some method of addressing these stocks that regular management is not going to bring them back.

Does it make sense for us to continue regular management, is what we are doing on this stock. Northern shrimp obviously is the moratorium, and the numbers continue to get worse. Anyway, I hate to see us just leave that and we'll be doing this same thing year after year. I don't know what the answer is. But I think we need to take a different tact somehow.

MS. KERNS: Dan, you have some more hands now. Colleen Bouffard from Connecticut has her hand up.

CHAIR McKIERNAN: All right, go ahead, Colleen.

MS. COLLEEN BOUFFARD: I just wanted to echo Jay and Dave's comments, and also the feeling that we should go forward and listen to the Management Strategy Evaluation. We could take a whole lot of different management actions now, that given the effect of environmental factors on recruitment, it might not reap much of a benefit. I think it would be valuable to hear the options that we could look at in the management strategy evaluation, to kind of give us maybe some fresher ideas on how to move forward in southern New England.

CHAIR McKIERNAN: Anyone else, Toni?

MS. KERNS: I'll say this. Pat, Jason, Cheri, and Senator Miramant all have their hands up, and I'm wondering if you would put your hands down if you're okay with moving forward for hearing the MSE presentation, or if you want to speak before an MSE presentation, please leave your hand up. You have Jason and David Borden with their hands up still.

CHAIR McKIERNAN: Okay, Jason.

DR. McNAMEE: After Ritchie made his comment, I just felt compelled, and I'll try to be quick. I think the underlying point, as I interpreted it, of Ritchie's comments I think are fine. You know this idea of wanting to move forward and do something. I just want to, you know the discussion on the moratorium, I guess, is why I felt compelled to speak. This is different than northern shrimp. You remember that lobster, we talk about the separate stocks, but it's a single species, and the species is doing very well to the north. There is a spatial consideration here that I think is really important, but the species is doing fine in parts of the range.

You know when we start talking about moratorium, I think it's really important to remember that., and then this follow on to that, which again will segue way us into the following conversation is, it's really important when you start talking about really draconian measures, or less draconian measures, to understand what the tradeoffs are.

If we take a really draconian measure, or you can take some less draconian measure and end up with a similar benefit. You know that information is important to consider, when developing management. I'll stop there, Mr. Chair, and thanks for giving me another couple minutes there.

CHAIR McKIERNAN: All right, David Borden.

MR. BORDEN: Going back to your question. I would prefer, I would say, to have the MSE discussion, and then circle back to Pat's issue of Gulf of Maine resiliency, and what we do with the southern New England stock. I think we'll have a more informed discussion if we follow that sequence.

DISCUSS POTENTIAL FOR CONDUCTING A MANAGEMENT STRATEGY EVALUATION FOR THE AMERICAN LOBSTER FISHERY

CHAIR McKIERNAN: All right, so I'm going to take us in that direction. Let us go to the Item Number 6, the potential for conducting an MSE for American Lobster, so let's queue that presentation up. Jeff Kipp.

MR. JEFF J. KIPP: I'm Jeff Kipp; I'm the Stock Assessment Scientist on staff, working on lobster here at the Commission. Just to get a little background on this agenda item. The Management and Science Committee met at the ASMFC Annual Meeting back in 2019 up in New Hampshire, and they discussed Management Strategy Evaluation, and using it as a tool for managing ASMFC species.

They tasked the Subcommittee for exploring the development of Management Strategy Evaluation for use in ASMFC managed species, and they did discuss sort of some initial candidate species or stocks to develop MSE work for. American lobster was identified as an ideal candidate.

A smaller subgroup of the Technical Committee for lobster got together with this subgroup from the MSE, and talked about a potential MSE for lobster, whether they thought it was a good fit. Since then, MSE has come up several times. It was noted in the recent benchmark stock assessment as a priority by both the Peer Review Panel and the Technical Committee, as a tool for informing management in the future for lobster. The purpose of today's discussion for the agenda was, we needed to come to the Board and identify the Board's interest in pursuing an MSE, and the priority level of an MSE, given many competing management needs, as we've been discussing here today, to determine whether it would be fruitful to pursue an MSE for lobster.

We felt that that was certainly a critical first step here. You know if this isn't something that the Board sees themselves using to inform a management framework down the road, this becomes certainly a lower priority, given everything else going on. But if there is interest among the Board to use something like this, we felt that that would be really helpful to know, and then we could start exploring and moving on to some next steps to inform how to initiate an MSE.

That's a little background on why this is on the agenda for today, and with that we felt that it might be helpful to give the Board just a brief kind of 10,000-foot introduction to what a Management Strategy Evaluation is, for those that may not be so familiar with this process. I'm going to turn it over to Burton Shank up at the Northeast Fisheries Science Center, and he's going to give us that introduction to Management Strategy Evaluation.

MR. BURTON SHANK: Yes, so as a general introduction, I will try and keep this fairly brief, but provide enough detail to understand what we're discussing. Management Strategy Evaluation is a collaborative process to build a simulation tool for evaluating management actions. The first key step is that stakeholders and managers identify goals, or desired outcomes for a fishery.

The stakeholders and managers then work with a group of scientists to include population modelers, potentially including ecosystem scientists, economists, sociologists, et cetera. This is the first translate these management goals into some measurable quantity that you can capture in a simulation, and then to

identify candidate management actions that are intended to potentially achieve these management goals.

Scientists then run a very large number of these various simulations, and evaluate how different management scenarios perform for achieving management goals. In some ways, some of what we did following the 2015 assessment for southern New England, is sort of a light or simplified version of the management strategy evaluation.

The managers and stakeholders then examine the performance of different management actions under different situations, and select preferred management actions from this. Sort of a road map for all this, it starts clearly with stakeholders and managers, and getting them to identify the objectives and the long-term goal for a fishery.

What do you want this fishery to do over the next 10 years, 30 years, 50 years? Related metrics, how are you going to measure how well a fishery is doing, and if you're achieving your goals. What are the uncertainties? What are the things we don't know, or things that might come up in the future? Then propose management actions or procedures that they would like to entertain at different possibilities. This is then all communicated to a group of scientists, who basically sort of create a virtual reality simulation of the system, and what they attempt to capture within this simulation is the process of data collection, the stock assessment, implementing any harvest rules or management actions. It can include an ecosystem dynamic. Ideally it includes human or fleet behaviors, it can include economic models.

You account for uncertainties, and you record the metrics that come out of this. Initially when this happens, there are a lot of two-way conversations here. Scientists can very well say, here is what we built for the simulation, and the managers can say, no that is not what we meant at all.

Then there is a lot of conversation, understand, so that everyone is getting what they want. Scientists very possibly need clarification on exactly what it was that managers and stakeholders were looking for, and how it can best be implemented. Once this whole set of simulations is done, this is passed back to the stakeholders and managers, and you see how different management actions potentially perform, what the tradeoffs were, how well the metrics seem to work.

There is sort of a second round of feedback that occurs with people going back to the scientist and saying, what you gave us makes no sense. Is there a better way we can look at this, so we can better understand the results? After a series of back and forth then you finally understand what your different management options are, what the tradeoffs are in those, and what you might expect to get back from that.

At that point, managers can either select and implement an action, or you can have a plan or suite of plans that can be enacted in the future under set circumstances. There is a critical early role for stakeholders and managers. The first step is to identify really what they want to achieve, management goals and objectives.

An example, but not constrained to, maximizing landings, giving stable or predictable landings across different years, whether you're interested in maximizing profits or profitability, or maintaining fleet diversity and participation. Then there is the performance metrics, which is the measurements of a fisheries performance.

What is the basis for assessing if a management action was successful? Do you want to track landings, value of landings, resource health, resilience of the resource, et cetera? This is the basis for choosing among different management actions, and is used to demonstrate the tradeoffs among different objectives.

Cases where things work well, a given management action may achieve some objectives well, but not

other objectives as well. Then there is the identification of different management actions to evaluate. What should management do to achieve the objectives? This can be conceptual, or it can be very specific. Some may not be very realistic, but it can be attempted, and then explored.

This forms the foundation for management procedures and actions before simulated. Again, if some of this sounds familiar, it's similar to in many ways what we did following 2015, but on a much more complex level. What the scientist is doing is an interim closed-loop simulation. People have called it things like virtual reality or a flight simulator, sort of an opportunity to play what-if scenarios, in which there is no real-world risk. Thinking of a flight simulator analogy, you can have the reality while you're building something very complex, and you know that you can't capture all this complexity, but you can if you step forward, produce a number of models of this.

Simple simulations, everybody gets to bring their own simulation to the table. You do your best to attempt to build a model, based on what people want for the simulations, and then you can test these models out and step forward, and recognize that some of these models are going to crash, and not perform very well. Others might continue to do well. But you might learn something in the process.

There is a lot in this one to sort of unpack, but this is one concept of what this closed-loop simulation could look like. Actually, I'm going to sort of start bottom center with this, where you have a fishery population and a model. This captures exploitation effects, recruitment and growth, mortality, et cetera.

You can either have a lot of these parameters be static through a time series run, or you could simulate that these population parameters are changing, due to the environment, like ecosystem effects. From this virtual population then, you sample it to get what would look like survey indices, length composition, et cetera, and feed this into a stock assessment model.

The stock assessment model then provides population metrics, and then with the population metrics, like stock status and trends, and economic metrics coming from the fishery. Then you consider this information from the perspective of management strategy. The management strategy can be adaptive, so it can change in response to the metrics coming from the population in the economics, or it can be static.

It can simply not change. You come up with one strategy, and you keep it, no matter what happens with the fishery. Any changes of management strategy then, has impacts on the fishery, and that is captured in the socioeconomic model that looks at fishing effort, strategies, expenses, profits, et cetera for the fishery.

This then feeds back into the next round of the population model. You run the cycle again and again and again for years, and capture the performance of the fishery, and the economics associated with the fishery over that time period. At the end of it, you can come up with a summary of how this given management strategy performed, and repeat this to account for random variations that you expect are in that and then run this again for different management strategies.

For this we would point out that this is one concept of what a closed-loop simulation model could look like. The complexity of this model is really dependent on the complexity of the question, and the measures that you really want to examine. As of right now, we have candidates that could work for the fishery population model. We have a stock assessment model. There is no real socioeconomic model of any complexity available to the lobster fishery at this point. That would need to be built, if we want to entertain some more complex questions. Then there would need to be basically, build a work flow to tie all these different models to each other. This is easiest for single-species management. You can imagine how complex this could be, if the fishermen are choosing among multiple species, and you have the ecosystem affecting different species in different ways.

But this entire process for building and running these models, and providing feedback to managers, is not fast. It takes time to understand. You set them up properly. It takes time to run the simulations. It takes time to consider the output from this. Once the simulations are done, then management has the opportunity to select among the management actions that we entertained.

You are rarely going to find a single optimal action. There are many cases where you would expect multiple different actions might give you different performances on different metrics. You might find a suite of actions that perform similarly. You might find actions that perform better under some circumstances than others.

You can often eliminate options that don't seem to perform well under any circumstances, and can eliminate some obviously bad options. These actions then can be implemented immediately, or held in reserve under future circumstances, so a lot of this can simply be the value of building a plan.

Having thought through a lot of these questions and issues before a crisis happens, so that when things suddenly change and you need to make a decision, a lot of this thinking through has already happened. Then finally, we would have to consider how to scale for the strategic long-term considerations down to tactical short-term realities.

How would you start with a management action, and then actually execute that on the ground? Advantages for performing management strategy evaluation, you have to explicitly consider what your objectives are. There is a certain amount of time spent just thinking about what you actually want out of this fishery.

It does make decision making easier. Everything is sort of in a common set of units that people can discuss, and look at objectively. There is a lot of feedback control that allows the management cycle to be evaluated. There is a lot of focus on uncertainty and robustness, or resilience, not necessarily finding optimal solutions.

You do have a formal system for comparing different options, so again that sort of puts everything in a common currency, and you can look at tradeoffs associated with having multiple different objectives. The down side is, it does force you to explicitly consider what your objectives are.

It is complex, it requires specialized expertise. There is a lot of work involved. The development can be lengthy. Plan accordingly. Expect it's going to take some time to do this, especially if there is any level of complexity that you're interested in. This is not going to give you tactical advice. It is not going to tell you how to do it on the ground. It is still going to give you sort of a broad picture set of results. I think here I can pass it back to Jeff to finish up.

MR. KIPP: Yes, thanks Burton. Moving on more specifically for lobster here. This subgroup kind of got together, and they talked about some ideas on, you know given the major management issues and challenges for lobster, what some really broad focal areas might be for an initial MSE, and maybe future MSEs, to build upon an initial MSE. I'll just preface this slide with a note that a lot of these discussions were with the mindset that this would be something for the Gulf of Maine/Georges Bank specifically, as a sort of proactive tool.

Like Burton was saying, to develop a plan to give us some information and some guidance on how to respond to things that might be coming down the pipeline for Gulf of Maine, as opposed to for southern New England, where I think what we've seen previously in stock assessments and projections.

Those essentially indicate that a reduction in fishing mortality is the action that would be necessary to see any response in things like reference abundance. I just wanted to make that note, given the discussion prior to this presentation on using this for southern New England. But these focal areas, the four that we came up with and included in the work plan that came

out as a memo in meeting materials. The first was stock productivity resiliency.

This ended up being sort of what we recommended for an initial Management Strategy Evaluation, given the tools that are currently available, and datasets that are currently available to inform and MSE focusing on this issue. But broadly, this would be evaluating the performance of management actions in response to changing productivity, as has particularly been indicated by changes in settlement and young of year indices recently in the Gulf of Maine stock, and may not have yet come through the model population in landings.

But some other focal areas included, another was stock socioeconomic resiliency. This one was in response and to address the stock assessment recommendation for socioeconomic analyses, to inform management actions in response to abundance declines below that target that Caitlin mentioned previously in the review of the stock assessment.

Some other probably much more complex issues. There was a lot of time spent this morning talking about whale interactions, and I think this is straightforward here. It would be essentially to incorporate those whale interactions within the evaluation of lobster management strategies. Then another broad focal area that we have discussed was climate change impacts.

This would be explicitly linking environmental drivers to population dynamics within this valuation of management strategies. Something like stock productivity resiliency, the recommended first focal area may include environmental impacts, in the form of potentially declining recruitment in the future.

But that would be implicit in those declining recruitment trajectories, and not necessarily explicitly linked to that recruit. I just wanted to make that distinction there. Then since we've sent out the work plan and meeting materials, another topic that did come up was, you know the development of wind farms, and potential implications of those on the stock. There may be some overlap here amongst these focal areas, and a lot of it will be determined on, as Burton mentioned, the specific objectives that stakeholders and managers want to address with a Management Strategy Evaluation. Some benefits we discussed and saw for a Management Strategy Evaluation for lobster.

As we talked about here, there is the direct stakeholder inclusion in the process. It's not as much of an iterative process through time. They are directly involved in developing objectives, potential management strategies, and identifying things like performance metrics to evaluate the performance of those strategies.

The explicit incorporation of socioeconomic considerations was certainly seen as a benefit here, which is not really something that is coming through in advice from a typical or traditional stock assessment. Then there is the availability of several resources and tools currently, that would really support a lobster Management Strategy Evaluation. The lobster stock assessment model is a well vetted, well established assessment model, and that's a key component of a Management Strategy Evaluation.

Then there are also several projection models that could be used for this operating model or simulation model that simulates the population forward. There would be some work to sort of tie those and link those two components together. But those tools are readily available. Additionally, Canada DFO is developing a Management Strategy Evaluation to manage their lobster stocks, and there has been some communication between lobster scientists in Canada and the U.S.

I think there was seen a potential benefit in collaborating on MSEs for both countries, and the development of tools that could be used to support MSEs for both countries. Then another thing that has come up is the Northeast Fisheries Science Center has brought on a contractor to support the future

development of a Management Strategy Evaluation, in terms of a socioeconomic model and data needs.

That contractor has currently got a one-year contract to start doing some of that work, and so there is already some things in motion for the socioeconomic side of a potential Management Strategy Evaluation. In the work plan, we wanted to include an outline. In the work plan we wanted to include just an outline of what the major resource needs would be for the Board to consider for a project like this.

For the Lobster Technical Committee and ASMFC staff being the ISFMP coordinator, and the assessment scientist, we see this being similar to a benchmark stock assessment, in terms of workload and time. The Lobster Board would be probably more involved directly in this process than in the stock assessment, where they review it at the end.

Their participation would be throughout the process of a Management Strategy Evaluation, and that would be in the form of reviewing progress updates through Board meetings throughout the process, and likely participation in stakeholder workshops, where stakeholders would come and offer input to then form all the components of a Management Strategy Evaluation, so probably more direct participation throughout the process then in a traditional stock assessment. Then there would be the need for several external folks, likely a professional facilitator, to facilitate those stakeholder workshops and effectively elicit input from the various stakeholders that are present and participating in the process.

Then there would be the need for a modeling team, essentially, and this is highly dependent on what the objectives and overall goals of the Management Strategy Evaluation are. But there would need to be modelers for the biological and/or environmental side of the MSE, and then also for the socioeconomic components of the MSE, depending on how involved the socioeconomic side gets in this.

Then there would be the need for travel costs associated with MSE workshops, similar to stock assessment workshop, albeit a larger group of folks, including stakeholders for this type of a process. Those were the major sort of categories of resource needs for a project like this, as Burton mentioned in his overview. It's quite resource intensive, and requires a lot of folks to contribute.
We also felt that it would be important to consider the potential workload tradeoffs, if we were to pursue an MSE. There are several other projects and needs that require personnel on either the Technical Committee, or other groups that are currently working or plan to be working on several of these upcoming projects.

Notably, there is the potential for 2023 Jonah crab stock assessment, which will be discussed at the August Board meeting. There is the development of the Gulf of Maine Resiliency Addendum, there is potential work to support management response to the 2020 lobster stock assessment, which has now been covering potential MSE work, so that kind of all wraps into this. There is the ongoing and future whale interaction work, which again requires several technical folks would likely be needed for this project.

Then there is the next scheduled lobster stock assessment, which would currently be scheduled to be completed in 2025. That brings us to sort of the purpose of the presentation, or the original purpose of the presentation for today, was to generally get some feedback, take the Board's pulse on the potential for a Management Strategy Evaluation for lobster, and determine whether it would be fruitful to pursue sort of the next steps necessary to start developing an MSE.

Those questions are, is there Board desire to pursue and use an MSE for supporting a future management framework? Another question would be, what timeframe would the Board want to pursue an MSE, given all the competing needs and projects that are ongoing. A lot of work that's going to be needed for the whale work and whale interactions, and so then

you get the sense as to whether the Board might think that would be a useful tool.

But given all the things that are going on, it might be more appropriate to try and pursue this a year, or two years down the road, or whatever it may be. Then the last question we hope you can get some feedback on today was, does the Board agree with the recommended focal area that the Subgroup came up with, being stock productivity resiliency? With that, I can stop there and see if there are any questions or discussion about these questions.

CHAIR McKIERNAN: Thanks, Jeff, that was great. Board members, comments and questions.

MS. KERNS: Okay Dan, we have Senator Miramant, Jason McNamee, David Borden, and Colleen Bouffard.

CHAIR McKIERNAN: Okay, Senator Miramant, you are up.

SENATOR MIRAMANT: Thank you, Jeff, that was good. Are you dividing out the difference between the windmill effects of fixed windmill bases and floating windmill, as far as impact with noise and vibration, or do you have information yet, and should I get that sent from the University? We've already proven the concept of floating, but we want to know the effects, if they are not already established. Thank you.

MR. KIPP: Yes, thank you. That issue came up, sort of the last couple of days. That has been very loosely discussed, I think that issue, wind farms, and the details of those. Then also, I think that brings up the whale interactions. Those are seen as longer term MSEs right now. We think that there is going to be considerable complexities that would be required, and so we saw those generally as longer term MSEs that might build upon an initial MSE, focusing here on stock productivity resiliency. But yes, we didn't talk about the specific details of those wind farms, and the implications of those.

CHAIR McKIERNAN: Jason.

DR. McNAMEE: A couple of quick comments on the attributes of MSE. First, to Burton and Jeff, awesome job! I think that was a really well-done presentation, sort of an MSE 101. I thought that was great. I mean you guys have thought a lot about this in the application to lobster. Quickly, for the Board, the notion of explicitly identifying the goals and objectives is such a valuable exercise.

That is a part of this. I can't overstate that aspect of this. It's such a critical part of an MSE. You know I think there are lessons learned from the Atlantic Herring experience with MSE, which was really well done, I think followed the Andre Punt's Best Practices for MSE to the T. But I think they learned a lot, and I think Dr. Deroba did a nice job of kind of debriefing that in particular with stakeholder workshops.

I think the Commission has a good model with, we called it the EMOW, which was a workshop we did, God, it was a long time ago now, but it was a much more controlled workshop, with a facilitator and a smaller workshop. But we got a lot of value out of it for years and years afterwards. I think in the case of lobster, a real important aspect would be the development of an economic model, to be a part of the MSE.

You know I feel like we've got a lot of good tools and information already on population dynamics, and it's the economic and in particular in the Gulf of Maine, I think there is some really important social considerations as well, because you've got some really highly dependent communities in that region on lobster. That would be just a fundamental area of focus. A lot of investment should be made on an economic and a social aspect to any MSE on lobster. Then finally to my question, and it's the last question that you posed here, Jeff. My inclination is to agree with the Technical Folks that this should be the focal area, but I'm not sure I quite grasp the nuance between what this means, versus just that population dynamics aspect to an MSE, like I know you've tried to, Jeff, but to restate what the stock productivity resiliency aspect means, I would appreciate that.

MR. KIPP: Yes, thanks, Jason. I see your point; you know trying to make the distinction between just a standard or traditional population dynamics type approach. I don't think there really is. I think that is another kind of characterization or terminology you could use here. But it was basically the idea was, you know given that we have seen some concerning signals in the young of year and settlement indices that we do have in Gulf of Maine.

The idea was to use MSE if those trends are realized down the road in reference abundance, the population abundance that we model, and in catch levels. What management actions might help prepare for maintaining the stock to a level that it doesn't experience similar things than the southern New England stock, so just continual decline. That was kind of the overarching focal area for that issue.

DR. McNAMEE: Thanks for that, Jeff, and so that clarifies it for me, and I will support what the Technical Committee, this area of focus I support that. I think this is a critical, probably the primary area, and I maybe shouldn't be saying that as a southern New England person. But I think looking and focusing on stock productivity resiliency in the Gulf of Maine, given where that fishery is, trying to protect it from a similar fate. I think that would be hugely valuable, and probably would have some application to southern New England as well.

CHAIR McKIERNAN: I've got David Borden up next.

MR. BORDEN: I generally support the concept here, as I indicated before. A question if I might, Mr. Chairman. Jeff or Burton, how long would this take, if we were to start today? Are we talking two, three, five years? I mean what is the timeline? I realize that depends on what we want incorporated into it. What would you envision, like a range of timelines to do those?

MR. KIPP: I think you hit the nail on the head there with the note that it's highly dependent on what is entailed in the specific MCE we would pursue here. But something like the stock productivity resiliency, where we do have several tools available, and certainly some work that could help support that. We were envisioning something like two-to-three-year timeframe for this MSE. Then you know, for anything like.

MR. BORDEN: Go ahead, Jeff.

MR. KIPP: I was just going to say, for any of these other focal areas, we identified like whale interactions. Those timeframes would become considerably longer, given the additional complexities that would be required, and the potential need for additional datasets that might not be readily available currently.

MR. BORDEN: Thank you. If I might, Mr. Chairman, just a couple of follow up questions.

CHAIR McKIERNAN: Sure, go ahead.

MR. BORDEN: With a Canadian MSE, what is the timing of the Canadian MSE?

MR. KIPP: Theirs is similar. They are working on a two-to-three-year timeframe, and theirs has been initiated, so they've started work, and they are looking at a two-to-three-year timeframe.

MR. BORDEN: Okay, so at least in my case, given the fact that I'm pretty much exclusively involved in right whale issues these days. I would support integrating a whale consideration into this, not only stock considerations. The only reason I say that is, right whales have the potential to override a lot of the work that we might be doing, if we exclusively function on stock resiliency. I think it's incumbent on us to factor in some of those considerations, so that we get joint benefits out of the proposals that might come forward.

Then, I guess my last question, Mr. Chairman is, is it possible to do a scaled down MSE, where we kind of focus on a couple of key issues, and that fills the groundwork for a more elaborate MSE at a later date? Because I'm a little bit concerned about the timeline

of doing this. If we could do it in an iterative manner, it might make more sense, where we could integrate some of these considerations into the resiliency amendment.

CHAIR McKIERNAN: I think that question you are posing to Jeff, and maybe Burton?

MR. BORDEN: Please.

CHAIR McKIERNAN: Do Jeff and Burton want to comment on whether we can do like a scaled back MSE, and then scale it up with time?

MR. SHANK: This is Burton. I think that is the logical thing, is not to expect that an MSE is something that you do once, but like stock assessment, it's something that develops and gains complexity over time. You would start off with a relatively simple model that you could ask relatively simple questions to, and then expect to sort of build that. It's a question of what that first simple model needs to do, and then what our timeline is for incorporating more complex questions.

CHAIR McKIERNAN: I had a clarifying question. I'll get to Colleen next. Jeff, you had mentioned the Canadians were doing an MSE on their lobster fishery. Would that be area specific? Would there be a separate one for southwest Nova Scotia, and a separate one for PEI, or was it Canada wide?

MR. KIPP: That I don't know. Burton, I don't know if you have more details on that.

MR. SHANK: I think that the focus right now is southwest Nova Scotia. This is being primarily driven by the group out of Halifax.

CHAIR McKIERNAN: Okay thanks. Colleen, I've got you up next.

MS. BOUFFARD: Jeff, I was just looking for a clarification. Is it that southern New England would not be a candidate for inclusion in an MSE, or was it just the Management and Science Committee's tasked with looking at the Gulf of Maine/Georges Bank, and the resiliency aspect of the focal area for this one?

MR. KIPP: Yes, I don't think that it was that the southern New England stock could not be a candidate for MSE. I think it was more so we saw, you know the issues with uncertainty on how to respond to something like declining recruitment in Gulf of Maine, and just ran with that as what a very significant issue it would be to pursue an MSE. It wasn't that we didn't feel that southern New England was a good candidate, it was just that the discussion sort of directed towards the Gulf of Maine stock.

CHAIR McKIERNAN: Toni, are there any other Board members that wish to speak?

MS. KERNS: Yes, we have Pat Keliher and Jason, your hand is back up again. I don't know if that was on purpose, and David Borden, your hand is back up again. Is that on purpose, nope. All right, so just Pat Keliher, and then you have a member of the public.

CHAIR McKIERNAN: Yes, and I think I had cut off Senator Miramant and Cheri earlier, because I wanted to move into this presentation, so Pat, why don't you go first, and any of your northern New England neighbors are welcome to join after you.

MR. KELIHER: Great, thank you, Mr. Chairman. Jeff and Burton that was a great presentation, and I appreciated Jason's comment about MSE 101 I think is applicable here. I think there is some additional work that potentially could be done, some of the next steps that you laid out, and particularly around the cost.

The fact that we don't have a budget, it looks like this could be incredibly costly. I think we do need more information around that particular issue. There is also right now, because of whales, and it's been touched on, a high level of stakeholder fatigue. I'm concerned about, you know, getting beyond.

I think, Dan, it goes to your point, not only from a staff perspective, but there is a lot of work that is upcoming. Trying to pull people in from a stakeholder perspective right now, I think we might be asking for a

little bit too much. Down the road, after we get through some of the whale work, that may change.

The tradeoff though that was listed in the slide, in particular the tradeoff for delaying some work around resiliency, is also very problematic for me. We've seen, I'm going to get press calls when I say this, but we're below 100 million pounds this year, or for last year in Maine, for the first time in a long time.
We've seen some trends, as it pertains to settlement into ventless traps. Staff clarifies it as what we're seeing is a soft decline. David talked about this a little bit in his comments, but I don't want to be in a situation where we're too far down the road in the developing of MSE, and not have anything already in place, in regards to a trigger mechanism for resiliency that is there as a backstop. I think there is a need for that backstop while MSE is developed. While I'm commenting about what David said, I mean I have been adamant that I don't want whale conversations mixed into lobster conversations. I guess I'm getting over it. I don't know how we can avoid it, and I can see MSE possibly as a tool. You just have to look at that Bi-Op to see what's going to be changing, to see that we're going to need kind of a very focused effort.

While I've been critical of MSE in the past, I can see some benefits here. I don't want this to be an academic exercise, by any stretch of the imagination. I'm warming up to it. With all that said, Mr. Chairman, I don't know if you want to entertain a motion around this now. I would be happy to make it now, just to further discussion around MSE, or I can just hold a turn and wait for some comments, and then come back to it.

CHAIR McKIERNAN: Is there any other Board members that are seeking to speak at this time?

MS. KERNS: Just Tom Fote.

CHAIR McKIERNAN: Okay, go ahead, Tom.

MR. THOMAS P. FOTE: Yes, I found the presentation very interesting. But I looked at what is required to get the information through here, and I looked at how many stakeholder meetings. We're going to have more, to basically do this. The final product, it's going to be on lobsters. Is it going to be used? Set as a guideline for how we do other species. I mean, I don't see this type of work right now working on say winter flounder, because it's mostly all environmental.
I don't see it happening on weakfish, because we really don't know what's going on. But I do see it, if we really start heating up the water as much as we think we're going to be heating up in the next ten years that you'll see. I remember the comments somebody made before that Gulf of Maine has plenty of lobsters, but southern New England, but it isn't one stock.

Well, we're going to be looking at cobia and other stocks like that from the south moving up north, and how do we deal with it when Florida disappears with cobia, God forbid. But that could happen, and we wind them up with south, so how do we handle that? I see this as a tool for that. But it's a lot of work and it's a lot of money, and that's the only thing that concerns me.

CHAIR McKIERNAN: Pat, back to you. Why don't you bring your motion forward, because I think you had a motion that I think you wanted to present to address the stock assessment, with a possible action. You've warmed up a little bit to MSE, so is there a way that you can put the two into perspective?

MR. KELIHER: I think either Caitlin or Maya may have my motion that they could put it up on the screen. I am making this motion with the understanding that there is some interest around southern New England, this could potentially be of benefit for some of those conversations**. I would move that the Board task the TC and staff with the development of a set of prioritized options, timelines and a draft budget to assist the Board in considering if MSE could be of use for management, for the Gulf of Maine and Southern New England stocks, in as timely a manner as possible. This information shall be presented to the Board at the spring meeting.**

CHAIR McKIERNAN: Is there a second?

MS. KERNS: We have Jason McNamee.

CHAIR McKIERNAN: All right, Jason, any discussion?

MR. KELIHER: If I may, Mr. Chairman, I would just say that I also have another motion for what I'm calling an addendum light on resiliency, that kind of feeds into my earlier comments. Within the motion I'm asking for this information to be presented at the Board at the spring meeting. I'm not sure if that's even possible, but I thought if it was discussed at the spring meeting, it would help us keep some momentum. With that I'll be quiet, thank you.

CHAIR McKIERNAN: Pat, you are basically asking subject matter experts back in the office to convene with the ASMFC staff and their NOAA counterparts, to kind of brainstorm and devise sort of a plan and a budget to develop and MSE for both stocks.

MR. KELIHER: Correct.

CHAIR McKIERNAN: You're not talking about doing the work, you're just talking about kind of scoping out the work.

MR. KELIHER: Correct, yes.
CHAIR McKIERNAN: Any discussion on the motion from the Board?

MS. KERNS: We have Bill Hyatt.

CHAIR McKIERNAN: Go ahead, Bill.

MR. WILLIAM HYATT: I have a question for clarity. Is the intent of this motion for there to be two products coming out of it, one being all this set of prioritized options, timelines, et cetera for the Gulf of Maine, and one having products for southern New England, so that it's not a single product, but two products, understanding that the exercise could ultimately be manageable for one of the stocks but not the other? Is that the intent?

MR. KELIHER: Bill, my intent here was actually specific to the Gulf of Maine, but after having some additional correspondence with other members of the Board, and hearing some of the interest here today. I thought that, and I think either Burton or Jeff might have spoken to it, the fact that the work and the development of MSE for the Gulf of Maine could benefit that conversation for southern New England.

I guess what I would look for is the subject matter experts to make that determination when they come back to us. Is it more heavy on Gulf of Maine, and then we can see some benefits down the road for southern New England, or if it's two different products? I guess I would like to hear from them on what they think it should be.

MR. HYATT: Very good, thank you.

MS. KERNS: Dan, you have Dennis Abbott.

CHAIR McKIERNAN: Go ahead, Dennis.

MR. DENNIS ABBOTT: I'm not sure if this is the exact place to make my comments. But I was interested to hear a moment ago, Pat said that he initially wanted this for the Gulf of Maine, because the southern New England stock, and what we've done in the past has been problematic. I wanted to make some comments regarding southern New England.

Not to pull a Tom Fote, taking us back in history, but we've been dealing with the southern New England stock problem for over 20 years, to my recollection, and I've been there through this whole thing. We were asked that in the very early days to take action to do something to turn things around in southern New England. That is my recollection.

We also spent a lot of money back then. I won't say we spent it, but the government spent a lot of money on researching the problem with southern New England lobster, as it relates to pesticides and whatever in Long Island Sound, I think probably up to $20 million as I recall. Going back in time, in 2003, I

think we came up with Addendum IV to Amendment 3 to deal with the problem of southern New England lobsters.

We talked about vessel sizes, no new permits, trap limits, conservation TACs, gauge sizes, so on and so forth. Whatever we came up with, every time we've come up with something to cure, not cure, but to improve the situation in southern New England, we were met with a lot of resistance. If we suggested that we do a certain percentage to achieve a goal in the plan, it was always chopped down to next to nothing.

If that would have done any good, I don't know. But it seems like through the years, we just beat our heads against the wall, and keep trying to tell ourselves that it feels good. But we haven't been able to get to this problem, and we probably can't. Jason made some comments about northern shrimp, and I sat on that Board for 20 plus years also.

When we declared a moratorium there, we had somewhat of a buy-in from the fishermen there, reluctantly maybe, but they realized that things had gone to hell in a handbasket, and there wasn't any sense in going fishing. With southern New England, do we need a moratorium? You could say on one hand probably yes, but would the moratorium do any good?

I question that it would, and I don't think that I would support it. Are we going to reach a point of taking another management action, and shoveling something against the tide, when it's not going to work? Even going back to 2003, we weren't even considering climate change at that time. I don't know what the answer is, but maybe the answer is just leave southern New England the way it is, and let things play out.

It might be an experiment. Are things going to get better by themselves? Are we affecting things positively, negatively, or whatever? But I really think that spending a lot of time trying to improve the southern New England stock is really, after 20 years, probably a waste of our time, and it is frustrating to the Board members, I'm sure to deal with this over and over and over again, and just watch things deteriorate.

CHAIR McKIERNAN: Well Dennis, I can't disagree with you, it's pretty sobering. You know one of the things that strikes me, in southern New England we've got a massive projected impact, or potential impacts of offshore wind development, not to mention the potential closures of areas in the proposed federal rule. I think those are two big items on the horizon, but I'm guessing those might be, at least the second one, would be completed prior to any MSE being conducted. Who would like to follow Dennis' recommendation in this discussion, anyone?

MS. KERNS: You've got Tom Fote.

CHAIR McKIERNAN: Okay, Tom.

MR. FOTE: Since I've been around a little longer than Dennis, and realize what we've been doing with lobsters for all these years. It's a situation that we can't control. I mean, it's like why am I going to bring surf clams back to off Island Beach State Park, which was one of the heaviest surf clam fisheries we had in New Jersey, when it was worth, back then I think $200 million.

All the surf clams just moved offshore, and further north. There is nothing we can do about it. Dong that unless you stop rising the temperature. I'm tired of spinning my wheels. I look at the cost of staff time, our time, stakeholders time, promising that we're going to do something. Then we do all these meetings, and then just as Dennis says, and we don't do nothing.

I mean we could put a moratorium if we talked about it, but I don't agree with a moratorium, because I don't think it accomplishes anything. It's the same that we did with winter flounder and weakfish. We put a basically almost a moratorium in place, but it hasn't really done any good. I'm not sure of the answers. We're not God, and we can't control the temperatures by ourselves. We can't control the environmental.

There is more than just climate change. We talk about, you know the change of winter flounder was because of stuff we're putting in the Bays and estuaries. You know Jim Fletcher talks about it all the time, and so do I. Basically, screwing around with the sex lives of fish, and lobsters and everything else in here. I'm not sure, sometimes I feel like I'm shoveling against the tide, as Dennis would say.

CHAIR McKIERNAN: One comment I would make is, the southern New England stock is managed with some rather vulcanized sets of rules, with all of the various lobster conservation management areas and teams. I don't know if the MSE could take a crack at that, and try to meliorate some of the differences.

I think that's in part, part of the frustration. I know that in Area 2 that states of Rhode Island, Massachusetts, reduced the traps by 50 percent, and we're in the sixth year right now, and that action has yet to be evaluated. Then of course, the Area 3 fleet cut their traps by 25 percent as well, finished I believe last year. Does Jason have his hand up? I wouldn't mind hearing from Jason at this point.

MS. KERNS: Yes, he does, and then Dan, let me know if you're going to go to the public. You have a couple folks.

DR. McNAMEE: Yes, just I largely will repeat what you just said. You know, I think there is a perception that we've not done anything in southern New England, but I don't think that's true. I think we've done a lot. There was a schedule of gauge increases, you know a while back. I can't overstate the investment in the trap reduction plan that the Area 2 fishermen.

That holds for the fishermen and the agencies to minister that program, so we've not, I guess in my view, been sitting on our hands. We've done a lot, I think. It's correct to say it doesn't appear to have improved stock condition, and I guess that's why I made my comments earlier about I think there is a lot being driven here by the environment, not by fishing.

But just to kind of loop it back to the conversation that we're having here and the motion on the board. It's exactly the point of doing something like an MSE is to kind of look at these things, and how effective was the trap reduction strategy, and you kind of look at that relative to what the stock did, and the cost of that, you know through the economic piece of it.

We can kind of weigh that against other management strategies of having a single management effort, like Chairman just mentioned, you know having kind of a cohesive set of regulations across LMAs, or something like that. I'm not suggesting that is what we should do. I'm just suggesting MSE. Burton put up that slide of the airplane crashed on the ground. You know this is the flight simulator, where we don't have to worry about actually crashing our airplane.

You can look at these things and weigh them against each other, without real world harm. That is the attribute here. That is why I think it's worth the investment. I know people are concerned about the time, but two years goes by pretty quickly. We'll get a lot of good information, and using that information, well that's on us. We have to make an effort to not just use this as a delay tactic, but to use it to give us information with which to act. I commit to doing that, and hope others on the Board do as well.

CHAIR McKIERNAN: Toni, you said we had two members of the public?

MS. KERNS: We now have three, and then at some point, David Borden also just put his hand up. But I think staff is going to need some clarifications if this motion passes. If we could go back to Jeff that would be great at some point as well. You have David Borden, three members of the public.

CHAIR McKIERNAN: Well, why don't we try to get the motion clarified, because that might affect some of the comments that some of the members on the Board and the public are going to make. I'll invite Jeff and Burton to ask clarifying questions of the motion.

MR. KIPP: The clarification I think we're seeking is for the first part, the prioritized options. You know I think we view the priorities as coming from the Board. What are the pressing management issues, what are the priorities for addressing through MSE? I think that was what we were hoping to get from the Board.

Then we could come up with, you know what the timeline then budgets would be associated with addressing those issues. For example, if something like MSE without whale interactions is just not going to be useful. That would be helpful to know here for us, to then be able to determine what would be required for some of those options. But I think we were looking for some guidance on what the priorities are from the Board, in addressing with an MSE.

CHAIR McKIERNAN: Pat Keliher, the motion maker, would you like to speak to that?

MR. KELIHER: Yes, I guess I was going off the list, Jeff, that you had presented. Obviously, some thoughts around prioritization have already taken place within your group, because you did put a list of items up there. I guess I'm not in the place right now, as a member of the Board, that I can throw items up there at this time, because I wanted to get additional information out of the TC and from staff, where they think this should go. I'm struggling how I could give you that additional information right now. I don't know if Jason has some additional thoughts on that.

MS. KERNS: He has his hand up.

CHAIR McKIERNAN: Great, Jason.

DR. McNAMEE: Yes, I actually Jeff, I'm not going to be any more helpful than Pat just was; no offense, Pat. But you know the way that I interpreted this motion was, I think you guys have thought through the types of things that could be plugged in, you know across those slides you have identified a number of them. I can't think of any additional ones, beyond what you all have already thought of on them. What I anticipated you would do with this motion, is just kind of have a, I'll call it like a decision tree, where you have, okay if you do this one thing, we can knock that out in a year, and it will cost, you know ten dollars.

If you added in whales, that is going to take a year and a half and will cost twenty dollars. You know I would be very satisfied if the Technical Committee kind of took the universe that you have already defined, and just kind of scale it. You know if you do focus on this one thing, we can get done quickly.

If you want us to focus on all of these things, you know that is your three-year timeline. That is again, I can't be more definitive than that right now either, but hopefully that gives you at least a little bit of structure, and then you know when you guys come back with that next time, we can't get mad at you.

MR. KIPP: This is Jeff, maybe you're thinking about this as prioritized, in terms of feasibility, and some of the things that are currently available, in terms of MSE tools, not necessarily prioritized from the perspective of what priority level each of the management issues is.

CHAIR McKIERNAN: That sounds right to me. Jason.

DR. McNAMEE: Jeff, you were trying to help guide me a little bit. That's how I interpreted that. I'll offer a couple things. First is, if people get concerned about MSE and timelines, because they think about the Atlantic herring version of the stakeholder process. What I would suggest is as a first step, focusing on a more streamlined stakeholder process.

For instance, maybe starting with a survey, and only doing one stakeholder workshop to hone in on, you know your goals and objectives, so there is one. I mentioned earlier that I think focusing on economic model would add a lot of really good information, so you've got existing tools, you've got your stock assessment model.

Something external to that, that would require some development that I think should be invested in, would

be an economic model. That would be another area to kind of focus in on. I'm sort of brainstorming, so I think I'll stop there, and see if others want to kind of rip off that a little bit.

MS. KERNS: Dan, you now have David Borden, Pat Keliher and Bill Hyatt from Board members, and you have additional members of the public.

CHAIR McKIERNAN: We stay with the Board. David Borden.

MR. BORDEN: As I indicated before, I support the motion, specifically because it includes southern New England. I just remind the Board, in the assessment and the peer review recommendations, the Technical people and scientific guidance is pretty clear on southern New England, about this use of a moratorium, once the stock gets below a certain level, and we want to avoid that as quickly as we can.

I think it is kind of incumbent upon us to include southern New England, and avoid putting us in a situation when the technical people are back here, actually recommending that instead of dancing around it. In terms of the actual motion, and I mean this to try to help, Mr. Chairman. I think this is going to be iterative, in terms of this issue.

This is a complex issue, a complex process, as Burton and Jeff have basically pointed out some of the things that go into it. What I could see us do is task this motion as general guidance to the Board Chair, and basically allow the Board chair to work with the technical people and the scientific staff, and whomever else he wants.

If he wants to pull a couple of Board members into the dialogue, that would be fine with me. But then have him come back at the next meeting, or the staff come back at the next meeting, and basically provide us with whatever guidance they can provide us with, and kind of a short-term framework and a longer-term framework, and prioritize it. Then at that point what we could do is have another discussion of it, and winnow down our priorities, so that we focus on the really key issues, in terms of the consensus of the Board, having more information to make decisions on. In other words, this is going to cost $100,000.00 to generate these models over three years or five years. That type of consideration is going to be an important aspect of any decision we would make to rank priorities.

I think we should just, Pat, take up the motion, vote on the question, authorize the staff and the Board Chair to do that, and specifically provide the Board Chair the flexibility to come back with a memo that fleshes some of this uncertainty out. I'm afraid we're just going to keep discussion this endlessly, and in fact it will improve the product, because we're going to have to evaluate it again at the following meeting. I apologize for being long winded, but hopefully that helps.

CHAIR McKIERNAN: Pat Keliher.

MR. KELIHER: I wasn't going to take my comments in the direction that David just went, but I agree. I mean this should be an iterative process. I wouldn't want to see some sort of a working group developed here on this. I think as the Chair, being able to work through these types of issues with staff and TC, if you needed additional input, your ability to reach out if needed would work. You know I think Jeff's comments earlier are also applicable here. You know back to the MSE 101. We just need more information to start having at our disposal, to be able to make decisions on how we're going to advance it.

CHAIR McKIERNAN: Bill Hyatt.

MR. HYATT: Yes, I just wanted to reiterate something that I hinted at before, and which I think has been hinted at by a number of other speakers as well. We just want to be sure that one of the products coming out of this motion was some very, very clear on whether or not MSE for southern New England stock would be worth the investment. We just would want to be clear that that is guidance that we would want to see, sort of up front at this first cut at it.

CHAIR McKIERNAN: That's something you would like to hear back from in May.

MR. HYATT: Yes. That would be, the sooner the better.

CHAIR McKIERNAN: All right, to the public. Toni, who do we have?

MS. KERNS: We have Julie Evans, Yong Chen, Pat Augustine, and Sonny Gwin.

CHAIR McKIERNAN: Okay, Julie Evans.

MS. JULIE EVANS: Nice to meet you all. Thank you for allowing me to speak. I find this MSE technology highly interesting for many different reasons. I am the East Hampton Town Fisheries Advisory Committee representative to all things fish, and I have been representing the local fishermen to offshore wind for the past three years.

I see this application, and I heard that the Senator was on earlier, I don't know if he is still on, but I think if I can make this comment. It's a little bit off the realm of what you're talking about, but I think this would be highly effective in dealing with the placement of wind turbines and the fishermen who trawl between the transit lanes, and the problems associated with that. We are also experiencing the offshore wind industry, coming up all on the south shore of Long Island into New York, and recently the proposal to land their cable onshore in Wainscott has made lots of newspapers, and is the cause for Wainscott to try to succeed from East Hampton Town.

I think, you know if anyone has any participation in offshore wind, and they can promote the MSE technology in that respect, I think it could really help everyone save time, save fishermen, save stocks, save whales, actually. I find it highly applicable. As far as the lobster fishery goes, we are experiencing a downturn in our catches here, and prices are very high. Anything this Board could do to help the southern New England lobster fishery, which I do believe some of our fishermen go that far, would be quite helpful. I thank you for the time you've given me.

CHAIR McKIERNAN: Next is Yong Chen.

MR. YONG CHEN: Thank you, Mr. Chair, for giving me the time to make a comment here. I'm a professor at the University of Maine, actually my lab developed this lobster pot initiating stock assessment models. I just want to look at two comments. One is about MSE work. I think that there are two components of MSE work, and one is basically developing the tool and computer programs.

The other one in how we can condition the satoris to specific fisheries, and here we have a Gulf of Maine/Georges Bank and southern New England stocks, and so once we have a course, I think that we have to engage stakeholders and to have a model conditioned on the two stocks. I think they intermingle with each other.

But at the same time, they are also pretty separated to kind of our tasks. I really think we should start this tour development early. It took ten years for the model that we developed to be utilized by Atlantic States Marine Fisheries Commission for a formal assessment, and you know if we say wait for two or three more years on these five years, and the tool will not be there. We needed to start this from somewhere.

My second comment, I think is about the utility of an MSE. I think, with all of the parameters you would use to choose in your lobster distributions and life histories, and all those complicated interactions with the right whales, and other issues. I think you know this MSE can address a lot of what-if questions, and to mitigate a negative impact of climate change on lobster stocks.

I think you have many, many different ways to utilize MSE. For example, the reference point we use right now in assessment, I don't think it has to be tested, and we will be able to use MSE to test the performance of different reference points, you know

in terms of a target and a threshold reference points. I think there are many different ways to utilize the MSE. I'll stop here. Thank you very much for giving me the time to talk.

CHAIR McKIERNAN: Thank you. All right, we have two more comments from the public, first is this Pat Augustine of Hart Award fame?

MS. KERNS: That's the one.

CHAIR McKIERNAN: Welcome back, Pat. Toni, why don't we go to Sonny Gwin, we'll come back to Pat, once you work out the technology issues, so Sonny Gwin.

MS. KERNS: Sonny, if you could just raise your hand again so I can unmute you really fast.

MR. SONNY GWIN: I'm sorry to be a bother, but my question was answered, so I'm good, thank you.

CHAIR McKIERNAN: Back to Pat Augustine, do we have you, Pat?

MS. KERNS: He's still self-muted, Dan.

CHAIR McKIERNAN: All right, well I guess we will have to just move on. We can't hear from Pat, it's unfortunate.

MS. KERNS: Roy Miller has his hand up.

CHAIR McKIERNAN: Go ahead, Roy, and then we'll take the vote on the motion.

MR. ROY W. MILLER: I've been thinking about what Dennis Abbott said earlier, also what Tom Fote said. It seems to me; we've been going down this road as they mentioned for a long time. The critical question in my mind for the southern New England stock is, what would a moratorium on fishing accomplish?

Would it be worth the economic tradeoff? What measures could be taken that would have a positive impact short of a moratorium? If none of those measures would make an appreciable difference, is there anything further to do in a way of management of the southern New England stock? Do we just let nature take its course?

The fishery will be self-regulating enough on a depleted stock that it will scale back to the size of the stock. It would become sustainable, but at a depleted or low level. In other words, I think it's very important that we answer the question as soon as we can, whether it's through an MSE evaluation or some other mechanism.

Is a moratorium needed, and is it worth having a moratorium, or just let the fishery self-regulate in southern New England, based on the environmental parameters that appear to be controlling the abundance and well-being of this stock. That is my question, thank you.

CHAIR McKIERNAN: All right, thank you. Is there any chance Pat Augustine can make a comment, or is he in the abyss? Let's move on to the vote**. Is there any objection to this motion by anyone on the Board? Raise your hand.**

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

CHAIR McKIERNAN: **I thank you, Toni, so with no objections I'm going to assume that it's passed by unanimous consent.**

CHAIR McKIERNAN: Well, the good news is we're pretty much on schedule, and we're moving into Item Number 7, which is a Discussion of the Executive Order on the Northeast Canyon and Sea Mounts Marine National Monument. Do we have a short presentation?

MR. KELIHER: Mr. Chairman, this is Pat Keliher. We had skipped over the discussion on resiliency.

CHAIR McKIERNAN: I'm sorry, my apologies. Yes, go ahead, Pat. Let' bring that one back.

MR. KELIHER: I don't know what Caitlin was going to present on this, but I'll just let folks know where I'm at. We have just talked about MSE, we've heard the

fact that it could take two to three years to develop. One of the tradeoffs that as I mentioned earlier that I'm not willing to make at this time, is resiliency as it pertains to the Gulf of Maine.

I think we need to have; you know we use what I think Megan called it in our staff meeting the other day, kind of an Addendum-like that deals with a trigger that would react when we hit a certain level. If you would like me to go into a motion now, Mr. Chairman, I would, or we could hear from Caitlin first.

CHAIR McKIERNAN: Yes, go ahead, Pat, since we're a little tight on time.

MR. KELIHER: I think staff has that motion. I'll read it into the record. **Move to re-initiate the PDT and Technical Committee work on the Gulf of Maine resiliency addendum. The addendum should focus on a trigger mechanism such that, upon reaching of the trigger, measures would be automatically implemented to improve the biological resiliency of the Gulf of Maine/Georges Bank stock.**

CHAIR McKIERNAN: Is there a second for that motion?
MS. KERNS: Cheri Patterson.

CHAIR McKIERNAN: Discussion, go ahead, Pat.

MR. KELIHER: Just to reiterate. I would hate to be in the situation that we were in with southern New England when the Board was continually trying to develop plans, and the stock continued to decline. We're starting to see some slipping now with the stock. As I said, we've seen a decrease in landings now a couple years in a row.

There are some issues with settlement as well as ventless trap surveys. I think it would be incredibly prudent at this point in time, to have a very focused measure in place that deals with a reaction, an automatic reaction to ensure that we don't fall into that trap, where it's just too late, and we're always trying to react.

I think reacting, we talked about this two years ago when I made the original motion for resiliency that was much more broad and complicated. What I'm trying to get to now is something that would be incredibly focused, and would be triggered again, based on improving biological resiliency. With that I'll end my thoughts.

CHAIR McKIERNAN: Pat, on behalf of the Technical Committee members and the PDT, who sometimes get frustrated with us as managers, because we give directions but not enough. The measures that you have in mind would be in the realm of existing measures, such as minimum sizes, trap limits, maximum sizes, those things that we already have in the Gulf of Maine, right?

MR. KELIHER: Yes, exactly. The quickest thing obviously to do would be to deal with potential changes in gauge. That was a focus of some of the work that has been done earlier. I think there is a lot of that within the draft that currently exists. I am not looking to try to reinvent the wheel here. I think we've got measures in place that can deal with the biological side of a decline, and we need to have something in place that can react quickly.

CHAIR McKIERNAN: All right, any other discussion on the motion by the Board?

MS. KERNS: I have Ritchie White.

CHAIR McKIERNAN: Go ahead, Ritchie.

MR. WHITE: I fully support this. It's forward thinking, I think it's something that could make a difference in the future. I think the problem will be, or the issue that we'll have to figure out, is just as in southern New England, there was action taken, it was just way short of what the Technical Committee recommended.

It's one thing to say we're going to have a trigger and we're going to take action, but will the action or can this be written such that the action will be what's needed to correct the measures? That will be the

difficult part, because there certainly will be push back from fishermen, to take less severe actions, conservation equivalency, you know do less than we really need to do. Anyway, that will be a challenge, but I fully support it. This is a smart thing to do.

CHAIR McKIERNAN: Clarifying question for the motion maker. When would you like to see proposals come back to the Board on an addendum, May, August, November?

MR. KELIHER: I would like to see it sooner rather than later, but I think, you know we do have a little bit of time on our hands in considering the other work. If we could just be updated by the PDT and the TC on when they think they could get it to us, but no later than the summer meeting would be my recommendation.

CHAIR McKIERNAN: All right, thanks. Anyone else on the Board?

MS. KERNS: Cheri Patterson.

CHAIR McKIERNAN: Go ahead, Cheri.

MS. PATTERSON: I think that this is, obviously I seconded it, to be very, very important. But I also think that this is something to be in tandem with MSE progression, because that will also further inform any sort of mechanisms, we might be able to move forward in our future.

CHAIR McKIERNAN: Is there anyone else on the Board, Toni?

MS. KERNS: That's all, Dan.

CHAIR McKIERNAN: All right, let's take a vote. Is there any objection to this motion?

MS. KERNS: I see no hands.

CHAIR McKIERNAN: **Seeing none that is passed by unanimous consent,** thank you very much. We're still pretty much on schedule.

DISCUSSION OF THE EXECUTIVE ORDER ON THE NORTHEAST CANYON AND SEA MOUNTS MARINE NATIONAL MONUMENT

CHAIR McKIERNAN: Thank you, Pat, next up I think Caitlin has a short presentation on the Sea Mounts and the Northeast Canyons issue.

MS. STARKS: Yes, just give me one second to get it up.

CHAIR McKIERNAN: I know there is a supporting memo that is in the materials dated January 26.

MS. STARKS: I believe we should be all set. I'm just going to give a little presentation on the Executive Order related to the Northeast Canyons and Sea Mounts Marine National Monument that was recently released. The background is that President Biden issued an Executive Order on January 20, 2021, and this was aimed at protecting public health and the environment, and restoring science to tackle the climate crisis.

Within this Executive Order in Section 3, there is a mandate for the Secretary of the Interior to review among others, the 2020 Proclamation, which allowed commercial fishing in the Northeast Canyons and Sea Mounts Marine Monument, and the Executive Order requires the Interior Secretary to report findings back to the President by March 21 of this year.

As many of you are aware, the Northeast Canyons and Sea Mounts Marine Monument was established by Presidential Proclamation under the Antiquities Act in September, 2016, during the Obama administration, and the Proclamation prohibited commercial fishing within the monument, with a seven-year exemption for American lobster and red crab fishing.

Before it was established, the Commission provided a letter to the Obama administration, stating its preference for protection of corals in this area through the New England Fishery Management Council's regulatory process, rather than through the establishment of a marine monument, and that letter was also provided in the materials.

Then in June, 2020, another Proclamation was issued by the Trump administration, which modified the Monument, only by returning commercial fishery

management authority to the Magnuson-Stevens Act, as well as other applicable laws, but no further modifications were made. Today, if the Board would like, they can consider if there is a desire to provide comments on an issue. This is not an open public comment period, but if desired the Commission could send a letter to the Interior Secretary during the review period, and if that's how the Board would like to move forward, then the next step would be to provide that recommendation to the ISFMP Policy Board. That is just a quick presentation, so I'm happy to take any questions.

CHAIR McKIERNAN: I suspect the sentiment on many of the Board members is to further advise the administration to allow the New England Council and the ASMFC to be managing fisheries. But maybe we should have an open discussion about that. Is there anyone on the Board that would like to speak to this issue?

MS. KERNS: Eric Reid has his hand up.

CHAIR McKIERNAN: Go ahead, Eric.

MR. REID: Yes, thank you, Mr. Chairman, I agree with you, 100 percent. Caitlin pointed out, we did send a letter to President Obama back in May of 2016, you know, talking about our position then. I think we should do the same now. The fisheries we manage, they're going to be under consideration in the review, and we should inform any decisions that come out of that review. I do have a motion. Dan, if you want one, I'm happy to make it at any time, if you want to take some discussion, but just let me know when you're ready.

CHAIR McKIERNAN: Sure, let's get a little discussion around the table. Toni, is there anyone else on the Board that would like to speak?

MS. KERNS: Cheri Patterson.

CHAIR McKIERNAN: All right, Cheri.

MS. PATTERSON: I completely agree with Eric. I think that it should go through an MSA process, and not just have you know a quick signature due to an Antiquities Act without much input, in regards to the fisheries or any other sort of economic process that is happening out there. I would, depending on how it's worded, Eric, I would love to second your motion.

CHAIR McKIERNAN: Eric, why don't you throw your motion up at this time. I think we're going to get a lot of support for it. Then we can debate it once it's up.

MR. REID: I move to recommend to the ISFMP Policy Board that the Commission send a letter to the Secretary of the Interior stating the Commission's position on modifying the Northeast Canyons and Seamounts Marine National Monument. I'm pretty sure I have a second, and I don't really need to have any more discussion about the rationale.

CHAIR McKIERNAN: I'm assuming the Commission's position is to retain management authority along with the New England Council.

MS. KERNS: Dan, you have Cheri Patterson raising her hand to second it.

CHAIR McKIERNAN: Go ahead, Cheri.

MS. PATTERSON: Yes, thank you. I'm just seconding the motion.

CHAIR McKIERNAN: Should we be clearer about the Commission's position in this motion? That being to retain management authority?

MS. KERNS: I'm just reading, I guess an easy way to do that is we could say restating the Commission's position if we want to, since the previous letter made that statement. That's an easy way to put it into the motion, and it's also on the record from Eric's testimony. Then in addition you have Pat Keliher with his hand up.

CHAIR McKIERNAN: I like that, because the position itself can be refined by the Policy Board later on in the week. Pat Keliher.

MR. KELIHER: No, Toni covered it, actually. I think, you know including our past letter into this and restating is the way to go.

CHAIR McKIERNAN: Toni, is there anyone else that wants to comment?

MS. KERNS: Dan, if you could just get concurment from Eric that that is okay to reword his motion to say restating, and Ms. Patterson, that would be great.

CHAIR McKIERNAN: All right, Eric and Cheri, are you both agreeable to those amendments?

MS. PATTERSON: Yes.

MR. REID: Yes, I'm find with that, Mr. Chairman, and I do like the suggestion of taking our original May, 2016 letter, using that as a template for our position. Of course, some of that is not applicable anymore, but I'm sure the Policy Board can doctor it up a bit.

CHAIR McKIERNAN: All right, thank you. If there are no other comments, let's vote on this motion. Are there any objections to this motion?

MS. KERNS: You had Tom Fote with his hand up, and Ali Murphy with her hand up.

CHAIR McKIERNAN: All right, I'm sorry, go ahead, Tom.

MR. FOTE: I've been opposing these presidents be allowed to set up sanctuaries since Bill Clinton started doing it in Hawaii and other areas, just on a decision of the President without science to back up the decision. We don't need a change when one administration changes to another administration.

We don't need to rewrite the rules, it should be left to the management process, whether it's New England, whether it's the Mid-Atlantic, whether it's the West Coast Council basically doing it. But it shouldn't be an arbitrary decision by each president that comes in.

CHAIR McKIERNAN: Thank you, Tom, Ali Murphy.

MS. ALISON MURPHY: I just wanted to let you know, when you are ready to take this to a vote that I will be abstaining. Thank you.

CHAIR McKIERNAN: Toni, are there any other hands up?

MS. KERNS: You have one member of the public.

CHAIR McKIERNAN: All right, and who is that?

MS. KERNS: It is Richard Klyver, and I'll unmute him.

CHAIR McKIERNAN: Richard, go ahead.

MR. KLYVER: Yes, hi, this is Zack Klyver with Blue Planet Strategies, thank you, Mr. Chairman. I just wanted to say for the record that I think having a Monument out there actually benefits the Commission tremendously. This is one of 40 offshore shelf-breaking canyons, and it's important that we study those environments. What this does is bring resources to bear, to study this particular canyon, which is right at the crux of where climate change is having an enormous impact, right where the Gulf Stream meets cold water.

You have an opportunity here to bring resources, you know more and more resources to bear to study the impact of climate change. We need to have some areas that are absent from use, to truly understand these as a baseline area. Also, I guess the point is this is a control sight. This is an area where there is less human impact.

Also, all the benefits that monuments or protected areas can bring to fisheries, is an important piece to understand. Where you protect, create marine sanctuaries, often the spillover effect results in great abundance. There could be a tremendous value to resources. What I'm trying to say is, this is one tool in the toolbox that we should be considering, and the Commission should be considering to use that can help improve the health of the oceans and fisheries.

I encourage the Commission to consider it, and not just to fall back on the idea that it's within just your position to make decisions about it. I am not trying to be disrespectful, but it feels like we have national parks, and we wouldn't question whether those areas should be protected. We should have some places in the ocean that deserve the same kind of protection, so I hope the Commission will consider that.

CHAIR McKIERNAN: Thank you for your comments. All right, Toni, anyone else?

MS. KERNS: No. Tom Fote has his hand up.

CHAIR McKIERNAN: Go ahead, Tom.

MR. FOTE: I just couldn't let that slide by.
CHAIR McKIERNAN: Tom, I don't want to have a debate, I would rather just have the vote, because the meeting is getting on, and I don't want to run over, please. I would like to take a vote**.** Is there anyone in opposition to this motion on the Board?

MS. KERNS: I see no hands in opposition, just noting that NOAA Fisheries is abstaining.

CHAIR McKIERNAN: Okay thank you. **It's passed by unanimous consent with one abstention**, so it's not unanimous. It passed by majority with NOAA Fisheries abstaining, thank you.

REVIEW AND POPULATE JONAH CRAB ADVISORY PANEL MEMBERSHIP

CHAIR McKIERNAN: Now we're on to Jonah Crab Advisory Panel membership, Tina.

MS. TINA L. BERGER: Thank you, we have one nomination for your consideration and approval, and that is Jon Williams, a commercial offshore trap fisherman from the state of Rhode Island.

CHAIR McKIERNAN: Do we have a motion?

MS. KERNS: You have Eric Reid with his hand up.

CHAIR McKIERNAN: Okay Eric, do you want to make the motion?

MR. REID: Yes, I do. I move to approve the nomination to the Jonah Crab Advisory Panel for Jon Williams of Rhode Island, he's more than qualified.

CHAIR McKIERNAN: Second. Do we have a second?

MS. KERNS: Emerson Hasbrouck.

CHAIR McKIERNAN: Any discussion on the motion?

MS. KERNS: No hands up.

CHAIR McKIERNAN: **All right, then is there any objection to the motion? Seeing none, it passes by unanimous consent.**

ELECTION OF VICE-CHAIR

CHAIR McKIERNAN: Second to last item i**s** election of a Vice-Chair. Is there anyone among the Board members who would like to serve as Vice-Chair, any motions?

MS. KERNS: Eric Reid has his hand up.

CHAIR McKIERNAN: All right, Eric, go right ahead.

MR. REID: I move to elect Dr. Jason McNamee as Vice-Chair of the American Lobster Board.

CHAIR McKIERNAN: A brilliant choice, any seconds?

MS. KERNS: Ms. Patterson.

CHAIR McKIERNAN: Thank you, Cheri. Any objections to this wonderful nomination of Jay McNamee?

MS. KERNS: I do not see any hands raised.

CHAIR McKIERNAN: Thank you so much, Jason you're a good man. Jason, you are now the Vice-Chair by unanimous consent. Is there any other business to come before the Board?

MS. KERNS: I see no hands.

ADJOURNMENT

CHAIR McKIERNAN: Brilliant, it's 12:25, we have a few extra minutes for lunch. Thank you everyone for a great Board meeting this morning, and we'll see most of you later today virtually. Thank you very much!

(Whereupon the meeting convened at 12:25 p.m. on Tuesday, February 2, 2021.)

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MEMORANDUM

TO: **American Lobster Management Board**

FROM: **American Lobster Technical Committee**

DATE: **April 16, 2021**

SUBJECT: **Lobster Management Strategy Evaluation Options**

The Atlantic States Marine Fisheries Commission's Lobster Technical Committee (TC) was tasked by the American Lobster Management Board (Board) at the Commission's 2021 Winter Meeting to develop a set of prioritized options, timelines, and draft budgets to assist the Board in considering if management strategy evaluation (MSE) could be of use for management of the lobster fisheries. The TC met via webinar two times following the Winter Meeting to develop and prioritize these options. Options are outlined at the end of the memorandum, and include anticipated personnel needs, major budget line items, and timelines with milestones that would incur a substantial cost. However, the TC indicated that due to the highly interdisciplinary nature of MSE, additional perspectives are needed to provide a comprehensive work plan. Therefore, the TC has provided some recommendations for next steps for MSE development in addition to a recommended option to pursue. In addition to the line item cost estimates for each option, it is important to keep in mind that these costs do not include time and, consequently, indirect costs of several participants' time being allocated to participating in the MSE process (e.g., TC members); workloads would have to be prioritized and modified to accommodate the MSE workload. Competing workloads include the next lobster stock assessment (tentatively scheduled for 2025) and a potential Jonah crab stock assessment (tentatively scheduled for 2023), at a minimum. The details of the options provided at the end of the memorandum are considered preliminary and may change dependent on management goals and objectives (e.g., need to include anthropologists to address human dimensions objectives).

TC Recommendations on MSE Focus

The TC recommends the option for a two-phase MSE of the Gulf of Maine/Georges Bank (GOM/GBK) stock. The first phase of this option would provide an intermediate MSE at a coarser spatial resolution (i.e., stock level) that can be used to support a management framework in a relatively short timeframe, while also allowing time to build knowledge and tools to develop a subsequent, spatially-explicit MSE in phase two. This phased approach provides short term management guidance, while concurrently building the framework to expand to a spatially explicit approach in phase two. The extended timeframe may also allow several large-scale changes on the horizon for the lobster fishery to develop that could impact the lobster fishery and management goals, and thus better guide the cost and focus of incorporating spatial considerations explicitly into the MSE.

The TC believes MSE has potential for supporting a management framework for the Southern New England (SNE) stock, but believes a SNE-focused MSE is a lower priority option for several reasons. First, the scale of the fisheries in terms of fleet size and landings make the GOM/GBK stock a higher priority. Second, MSEs are generally focused on proactive management strategies for the future of the fishery, such as strategies intended to promote stock resilience, as opposed to reactive management strategies responding to stock conditions estimated in past stock assessments; the TC believes this further skews cost-benefit considerations of MSE in favor of the GOM/GBK stock. Third, the TC anticipates unique

challenges that would require more complex tools to provide a successful SNE MSE. These challenges include the dominant mixed-crustacean nature of the fishery, and the degree and rate at which the lobster population and fishery have changed in response to climate change. These factors require modeling aspects of both Jonah crab and lobster population dynamics and distributions, as well as spatial dynamics of the fishery in any MSE option. There is also a high likelihood for an MSE to require customized model development and data collection by stock (e.g., socio-economic indicators), making MSE focused on one stock at a time most feasible.

TC Recommendations on Next Steps

The TC recommends two next steps for development of an MSE. First, a formal process is recommended to develop management goals and objectives for the future of the lobster fisheries. A good example is the process used by the Ecosystems Management Objectives Workshop conducted by the Commission to guide development of ecological reference points for Atlantic menhaden. Objectives developed from such a process would be used to further develop an MSE work plan for lobster. The second recommendation is to form a steering committee for additional scoping and development of a comprehensive work plan with a detailed timeline, including: outreach components that are not anticipated to incur a substantial cost but are imperative to the success of an MSE (e.g., outreach at regularly scheduled industry association meetings), identification of funding sources for the MSE costs, and identification of personnel. Representation recommended for the steering committee includes Board members, TC members, Commission staff, members of the Commission's Committee on Economics and Social Sciences, industry stakeholders (preferably those with past experience in MSE), and members of the Commission's Assessment and Science Committee or Management and Science Committee with past experience in MSE. To be effective, the number of people in the steering committee should be limited to approximately a dozen members.

The TC discussed two ongoing developments that will potentially streamline the development of a formal MSE approximately a year from now. First, University of Maine researchers have submitted a proposal to the current round of the Sea Grant's American Lobster Research Program funding; while funding is uncertain, the project is to evaluate population dynamics simulations that will incorporate environmental effects into the biological modeling framework likely to be used in a lobster MSE. Second, work towards the conceptualization of an economics model and economic data gathering is being funded by NOAA Fisheries; this will support development of an economic model within the MSE modeling framework. These developments support the TC recommendation for the formation of a steering committee, with a start date for the MSE to be determined pending the results of the steering committee's findings.

GOM/GBK MSE Option (high priority)

Phase One - Stockwide GOM/GBK MSE

Purpose: Evaluate performance of management strategies at the stock level for the GOM/GBK stock in response to changes in recruitment with biological, fishery, and other socio-economic performance metrics.

Timeline: Three years. One modeler workshop in the first year and one modeler and one stakeholder workshop in years two and three.

Personnel and responsibilities:

- ASMFC Lobster TC – Stakeholder recruitment and engagement, data gathering, guidance on technical aspects of the MSE, report writing, and training for using the MSE tools in future updates

- ASMFC Staff – Project management, data gathering, workshop coordination, and report writing/publishing
- ASMFC Lobster Board Members – Define management goals and provide guidance on the direction of the MSE based on established goals, participate in stakeholder input gathering (webinars and workshops)
- Stakeholders – Identify desired objectives and outcomes of an MSE and provide guidance on the direction of the MSE, participate in stakeholder input gathering (surveys, webinars, and workshops)
- Biological modeler – Couple existing assessment model and operating model in a closed-loop model (six months to program, six months to modify based on workshop feedback and to provide training to TC members)
- Economics modeler – Develop an economics model guided by NOAA Fisheries' economic model conceptualization and data gathering work and couple with the assessment model and operating model in a closed-loop model.
- Professional facilitator - Facilitate stakeholder webinars and workshops, assist with stakeholder input survey development and analysis

Costs:

- Facilitator - $25,000
- Travel - $37,500 for two in-person stakeholder workshops (30 people), $22,500 for three in-person modeler workshops (12 people)
- Biological model development - $85,000 (one year postdoc with ASMFC indirect cost cap)
- Economic model development - $115,000 (one year full time or two six month full time contractors)
- Total - $285,000

Phase Two - Spatially-Explicit GOM/GBK MSE

Purpose: Evaluate performance of spatially-directed management strategies for the GOM/GBK stock triggered by external forces (e.g., whale interactions, wind farm development and operation, climate change).

Costs: Estimates to be developed during phase one.

<u>Spatially-Explicit SNE MSE Option (low priority)</u>

Purpose: Evaluate performance of spatially-directed management strategies for the SNE stock in response to changes in recruitment and diversification of the fishery (targeting lobster and Jonah crab) with biological, fishery, and other socio-economic performance metrics.

Timeline: Five years. One modeler workshop in years one through five. One stakeholder workshop in years two, four, and five.

Personnel and responsibilities:

- ASMFC Lobster TC – Stakeholder recruitment and engagement, data gathering, guidance on technical aspects of the MSE, report writing, and training for using the MSE tools in future updates

- ASMFC Staff – Project management, data gathering, workshop coordination, and report writing/publishing
- ASMFC Lobster Board Members – Define management goals and provide guidance on the direction of the MSE based on those pre-defined goals, participate in stakeholder input gathering (webinars and workshops)
- Stakeholders – Identify desired objectives and outcomes of an MSE and provide guidance on the direction of the MSE, participate in stakeholder input gathering (surveys, webinars, and workshops)
- Biological modeler – Conceptualize modeling of the spatial dynamics necessary to address stakeholder objectives by integrating lobster population distribution models along with Jonah crab population distribution and the resulting fleet dynamics. Identify biological and fleet spatial dynamics and resolution of each that can and cannot be modeled with available data to guide configuration of operating and assessment model. Couple assessment model and operating model in a closed-loop model (eighteen months to program, eighteen months to modify based on workshop feedback and provide training to TC members).
- Economics modeler – Conceptualize modeling of the economic processes driven by lobster landings, and interactions between lobster and Jonah crab effort and landings. Identify processes that can and cannot be modeled with available data to guide configuration of model. Couple economics model with the assessment model and operating model in a closed-loop model.
- Professional facilitator – Facilitate stakeholder webinars and workshops, assist with stakeholder input survey development and analysis
- ***Potentially others dependent on management and stakeholder objectives (e.g., reduce whale interactions would require a whale biologist and protected resource personnel)***

Costs:

- Facilitator - $42,000
- Travel - $56,250 for three in-person stakeholder workshops (30 people), $46,875 for five in-person modeler workshops (15 people)
- Spatially-explicit closed-loop model development: $255,000 (three year postdoc with ASMFC indirect cost cap)
- Economic model development: $345,000 (three year full time or two one and half year full time contractors)
- Total - $745,125 (minimum with potential for additional costs dependent on stakeholder objectives)

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MEMORANDUM

TO: **American Lobster Management Board**

FROM: **American Lobster Plan Development Team**

DATE: **April 19, 2021**

SUBJECT: **Board Direction Needed for Development of Draft Addendum XXVII on Gulf of Maine/Georges Bank Resiliency**

Background

At the February 2021 meeting, the Board reinitiated work on Draft Addendum XXVII on Gulf of Maine/Georges Bank (GOM/GBK) Resiliency with the following motion:

> *"Move to re-initiate PDT and TC work on the Gulf of Maine resiliency addendum. The addendum should focus on a trigger mechanism such that, upon reaching of the trigger, measures would be automatically implemented to improve the biological resiliency of the GOM/GBK stock."*

Addendum XXVII was originally initiated in 2017 to proactively increase resilience of the GOM/GBK stock by standardizing measures across Lobster Conservation and Management Areas (LCMAs) within the stock, but stalled due to the prioritization of Atlantic right whale issues. In October, the Board reviewed the results and recommendations from the 2020 Benchmark Stock Assessment for American lobster, and determined that while the GOM/GBK stock is near time-series high abundance and not experiencing overfishing, there is a need to proactively address stock resiliency given recent declines in young-of-year indicators.

The Plan Development Team (PDT) and Technical Committee (TC) have met several times since February to continue development of Draft Addendum XXVII (see enclosed meeting summaries). The meeting summaries include more detail pertinent to Board review and discussion, while this memo requests specific guidance on the Board's priorities and objectives for the Addendum. Additionally, the memo outlines the PDT's draft set of management options for Board discussion and feedback. With additional input from the Board, the PDT and TC expect to provide a draft Addendum document for consideration for public comment at the ASMFC Summer meeting.

Requested Board Guidance

In their discussions, both the PDT and TC have highlighted the need for additional Board guidance in order to develop draft management options and analyses that align with the Board's objectives for this action. The PDT and TC have requested the Board provide direction on the following questions:

- What are the Board's objectives with regard to biological resiliency of the stock? For example, should proposed management options aim to maintain current levels of abundance and productivity, to broaden stock size structure, or meet other objectives?
    - If the objective is not to maintain current levels of abundance, then what levels of abundance is the Board aiming to maintain?
- How proactively does the Board want to react to changes in the stock? For example, when stock indices have declined for 3 years by a certain magnitude, etc.?

    - How does the Board want to react to changes in the stock indices between assessments?
- What are the Board's priorities with regard to standardization of measures across LCMAs versus stock resiliency? Is one more important than the other?
- What are the Board's goals for standardizing measures throughout the GOM/GBK stock?
    - For example, is the purpose of standardization to increase biological resiliency, improve enforcement, facilitate stock assessment, address supply-chain issues, etc.?
    - If there is more than one goal, how should they be prioritized?

Draft Management Options

The PDT recommends a "packaged" structure for the proposed management options in the Draft Addendum, where several options would be provided that would establish a predetermined set of management measures that would be automatically implemented when a defined trigger is met. Under this approach, some options would not be mutually exclusive, therefore the Board could establish multiple triggers to automatically implement pre-defined measures. This structure could also allow for measures to be crafted relative to different stock conditions. Some of the options focus more on the standardization of measures while others focus on increased biological resiliency. The draft options are provided below with some considerations for the Board to discuss and provide feedback. The management measures specified in these draft options are examples and may be modified depending on Board guidance and future TC analysis and PDT recommendations.

Option 1: Status Quo

- Maintain current management measures and do not establish a trigger mechanism. This option cannot be selected in combination with the other options.

Option 2: Standardized measures to be implemented upon final approval of addendum *(can be combined with options 3-5)*

- **Sub-option 2A**: Upon final approval of the addendum (not dependent on a trigger), implement standardized measures within each LCMA to the most conservative measure where there are inconsistencies in measures for state and federal waters within LCMAs in the GOM/GBK stock. This would result in Outer Cape Cod (OCC) maximum gauge being standardized to 6-3/4" for state and federal waters, and the V-notch definition and requirement being standardized to 1/8" with or w/out setal hairs.
- **Sub-option 2B**: Upon final approval of the addendum, implement the measures specified in sub-option 2A, AND standardize the V-notch requirement across all LCMAs in the GOM/GBK stock. This would result in mandatory V-notching for all eggers in LCMA 1, 3, and OCC.
- **Sub-option 2C**: Upon final approval of the addendum, implement the measures specified in sub-options 2A, 2B, AND standardize regulations across LCMAs in GOM/GBK for issuing trap tags for trap losses, such that there would be no issuance of trap tags before trap losses occur.

Option 3: Implement LCMA-specific measures to increase resiliency upon reaching a Trigger *(cannot be combined with options 4 and 5)*

- **Sub-option 3A**: Upon reaching a defined trigger (to be proposed later based on Board direction and TC recommendations), increase Area 1 and Area 3 minimum size by equivalent amounts.

- *For example, this option could increase Area 1 to 3- 5/16" minimum gauge size, and make equivalent increases to Area 3 and OCC. Measures would be defined in the draft addendum for public comment, and changes would be equivalent to the change in Area 1, or closer to the size at 50% maturity.*

- **Sub-option 3B**: Option 3A measures, AND decrease maximum gauge size in Area 1, Area 3, and OCC by equivalent amounts (measures would be defined in the draft addendum for public comment).

Option 4: Standardized measures to be implemented upon reaching Trigger 1 ***(cannot be combined with option 3)***

- **Sub-option 4A**: Upon reaching Trigger 1 (to be proposed later based on Board direction and TC recommendations), implement a standardized minimum gauge size, vent size, and maximum gauge size for all LCMAs in the GOM/GBK stock.
    - *The PDT and TC have discussed that the trigger for this option could be defined as an observed magnitude of decline in the most appropriate recruit abundance index that would approximate reaching the Fishery/Index abundance target reference point. This would allow for a more proactive reaction to declining trends in the stock between stock assessments.*
    - *As an example for Board deliberation, the PDT suggested a standard minimum gauge size of 3-5/16" for this option. This is about 84 mm, an increase of about 1 mm for Area 1, and a decrease of about 6 mm for Area 3. This would bring the legal minimum size closer to the size at 50% maturity for Area 1, where the majority of stockwide landings are harvested. An alternative option for minimum size is 3- 3/8", which would bring all areas to the same minimum size as OCC and Southern New England. It is also closer to size at maturity for eastern Maine which is where most of the Area 1 landings occur.*
    - *As an example for Board deliberation, the PDT suggested a standard maximum gauge size of 6 ½" for this option. This would be a compromise option that decreases the maximum size in Area 3, and increases it in Area 1.*
    - *Please note these are examples proposed to invite Board discussion, and additional TC analysis is needed to evaluate overall impacts by Area.*
- **Sub-option 4B:** Upon reaching Trigger 1, in addition to the measures specified in sub-option 4A, implement any measures not selected under Option 2.

Option 5: **Measures to be automatically implemented upon reaching Trigger 2 to increase stock resiliency**

- **Sub-option 5A:** Upon reaching Trigger 2 (to be proposed later based on Board direction and TC recommendations, but should be set at a lower level of abundance or higher level of stock concern than Trigger 1), implement a change to the minimum gauge size, vent size, and maximum gauge size for all LCMAs in the GOM/GBK stock to increase biological resiliency.
    - *The management measures should include an increase to the minimum gauge size and a decrease to maximum gauge size from Option 4 in order to increase stock resiliency, and will be proposed later based on Board direction and TC recommendations.*
    - *As an example for discussion, the PDT suggested that abundance falling below the abundance limit reference point from the assessment could be the trigger established for*

this option. This would mean measures would be automatically implemented if assessment results indicate abundance is below the limit. This would allow a faster reaction to a poor stock status determination than the time required to initiate and complete an addendum after receiving the stock status determination.

- *The PDT also proposed an index-based trigger could serve as a proxy for the abundance limit based on a certain magnitude of change in indices that is equivalent to falling below the abundance limit. This would allow for a management reaction to a decline not tied to a stock assessment. The PDT indicated two triggers could be established, such that the pre-defined management measures would be automatically implemented if one or the other were met (both triggers would not have to be met).*

- **Sub-option 5B:** In addition to the measures specified in option 5A, standardize the V-notch definition to 1/16" across LCMAs in the GOM/GBK stock.

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American Lobster Plan Development Team
Meeting Summary
Webinar
Tuesday, March 16th, 2021

PDT Members: Allison Murphy (NOAA), Kathleen Reardon (ME), Joshua Carloni (NH), Corinne Truesdale (RI), Caitlin Starks (ASMFC)

Public: Ronald Huber, Daniel McKiernan (Board Chair)

The Plan Development Team (PDT) met on Tuesday, March 16th, 2021 to discuss the development of Draft Addendum XXVII on resiliency in the Gulf of Maine/Georges Bank stock (GOM/GBK). Staff reviewed background information on the addendum and outlined objectives for the PDT discussion. The addendum was originally initiated in 2017 as a proactive measure to improve the resiliency of the GOM/GBK stock in response to signs of reduced settlement and the combination of the GOM and GBK stocks following the 2015 Stock Assessment. The focus of the addendum at that time was standardizing management measures across the Lobster Conservation and Management Areas (LCMAs) within the GOM/GBK stock. The addendum was then placed on hold as the Board had to prioritize work related to Atlantic large whale take reduction efforts. At the February 2021 Board meeting the Board re-initiated PDT and Technical Committee (TC) work on the addendum, and specified that the addendum should focus on a trigger mechanism such that, upon reaching of the trigger, measures would be automatically implemented to improve the biological resiliency of the GOM/GBK stock.

Staff reviewed relevant results and recommendations from the 2020 Benchmark stock assessment, which showed that the GOM/GBK is at or near record high abundance and recruitment levels, however, GOM/GBK settlement surveys have been trending downwards (particularly in Areas 513 and 514) since the mid-2000s, and have been below time series means in all statistical areas since around 2012. The assessment established three new reference points for stock abundance: The fishery/industry target is calculated as the 25th percentile of the abundance during the high abundance regime; if abundance falls below this target the stock's ability to replenish itself is not jeopardized, but it may indicate a degrading of economic conditions for the lobster fishery. The abundance limit is calculated as the median abundance during the moderate abundance regime. Below this limit, the stock is considered depleted and its ability to replenish itself is diminished, therefore management action to halt the decline in reference abundance is recommended. The abundance threshold is calculated as the average of the three highest abundance years during the low abundance regime, and stock abundance level below this threshold is considered significantly depleted and in danger of stock collapse.

The PDT discussed the appropriate scope of the document, focusing on what metrics should be used to establish a trigger mechanism, what level is appropriate to trigger management measures to increase stock resiliency, and what management measures should be implemented to increase stock resiliency. With regard to the trigger metric, the PDT agreed that if the goal is to be able to

respond quickly to changing stock conditions, the trigger mechanism should not be model-derived because a modeled index would require an assessment and that would take several years. The group suggested using an index of abundance that would be an appropriate proxy for the biological condition of the stock, and deliberated whether a trigger should be established at a certain level of abundance versus a defined trend in the index, such as a decline X% over 3 years, for example. Additionally, the PDT thought it was worth considering a tiered approach with multiple trigger levels that would result in different management measures. In this case, the group thought it could be appropriate to have one trigger based on reference abundance modeled in the assessment, and one based on a trend in abundance indicators. This could allow for a range of options to be developed, including more conservative and less conservative triggers for the Board to consider.

The PDT agreed that for the trigger metric, the Ventless Trap Survey (VTS) indices would likely not be preferred because there is only data since 2006, whereas the trawl surveys (NEFSC and state surveys) have a much longer time series, but both data streams could be considered. Additionally, they agreed that the trigger should be based on recruit abundance including sub-legal sizes, in order to allow for proactive management action in response to the trigger being met. They noted the caveat that the state trawl surveys are more focused on inshore areas than offshore areas and the NEFSC survey trends are driven by nearshore strata, but concluded that the surveys should still be reflective of stock-wide abundance trends. The PDT ultimately agreed that the TC guidance is needed on the most appropriate index or indices that could be monitored annually and used to establish the trigger mechanism.

The PDT also discussed whether it is still appropriate to consider the standardization of management measures in the addendum, in addition to the trigger mechanism. The Board Chair indicated that the Board may still be interested in measures being uniform within LCMAs where there are inconsistencies between the rules for state-permitted and federally-permitted vessels. The PDT was in agreement that the Draft Addendum could include one option to implement some standardized measures within LCMA's considered to be "low hanging fruit" without the use of a trigger mechanism (i.e., upon Board approval of the Addendum), as well as other options that would implement standardized measures across LMCA's upon reaching a trigger. The group noted that determining what measures should be implemented upon reaching a trigger could be challenging due to historic differences in management measures between areas, but that the proposed measures should be based on the desired effect they would have on the stock. The PDT members agreed that minimum and maximum gauge sizes may be more contentious, but that of the existing measures, increasing the minimum gauge has the greatest impact on the resiliency of the stock.

The Board Chair noted that it might be helpful to consider an option to phase-in changes to management measures to spread out impacts to the industry. He also noted that the Draft Addendum should make it clear that states would still be allowed to implement more restrictive measures than those that are implemented through the FMP.

The PDT developed a draft structure of proposed management approaches that would include several different options that are not mutually exclusive:

- Option 1: Status quo. Maintain current management measures and do not establish a trigger mechanism.
- Option 2: Implement some standardized measures immediately.
    - The PDT suggested that these could include less contentious measures like standardizing the v-notch requirement and maximum gauge sizes within LCMAs, standardizing rules on when tags are issued to harvesters for trap tag losses, and potentially standardizing the v-notch definition and requirement across LCMAs. These changes (max-gauge size) could provide a minor increase in protection of spawning stock biomass but would more so address enforcement challenges and concerns.
- Option 3: Establish a trigger mechanism to implement standardized measures across LCMAs.
    - The PDT discussed that for this option a more conservative trigger level could be used, such as something equivalent to the fishery/industry target reference point. The PDT noted that multiple indices could be used to establish the trigger, but they should be limited to what is included in the annual data update process that was recommended in the assessment. The proposed measures that would be implemented upon reaching the trigger should include anything under Option 2 (e.g. uniform v-notch requirement and definition if not already implemented) and also a uniform minimum and maximum gauge size across the LCMAs.
    - The PDT requested TC guidance on the most appropriate index or indices that could be monitored annually and used to establish the trigger mechanism and acts as a proxy for the fishery/industry target reference point.
    - The PDT discussed the potential for a phase-in of additional measures (e.g., a 1/16 increase in the minimum size annually over three years).
- Option 4: Establish a trigger mechanism to automatically implement a set of measures to increase stock resiliency.
    - The PDT discussed that more work will be needed to determine what the appropriate trigger metric(s) and level(s) would be for this option, with guidance from the TC. They discussed that the trigger could be based on trends in abundance indices, based on the assessment, or potentially both, but noted that using abundance indices would allow for a faster reaction time to changing stock conditions.
    - The PDT suggested that proposed measures that would increase biological resilience could include an increase to minimum gauge size, or season closures. They also discussed whether it could be appropriate to consider effort/output controls like a total allowable catch limit.
    - The PDT requested TC guidance on the most appropriate trigger (index or indices that could be monitored annually versus metrics from the stock assessment) and used to establish the trigger mechanism.

The next steps for the PDT are to schedule a call with the TC to discuss appropriate trigger metrics and trigger levels, as well as how different management measures could be evaluated to project their impacts on stock resiliency. Following that call the PDT will reconvene to further

develop a set of management options. Given the estimated time needed to accomplish these tasks, staff suggested the following draft timeline for the next few steps of action development:

- May 2021: Present draft management options to Board and solicit feedback/additional guidance on what to include in the Draft Addendum for public comment
- May-July: PDT further develops options based on Board feedback and develops Draft Addendum XXVII document for public comment
- August 2021: Board considers Draft Addendum XXVII for public comment

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American Lobster Technical Committee
Meeting Summary
Webinar
Thursday, March 25th, 2021

TC Members: Kathleen Reardon (Chair, ME), Josh Carloni (NH), Tracy Pugh (MA), Corinne Truesdale (RI), Kim McKown (NY), Chad Power (NJ), Craig Weedon (MD), Somers Smott (VA), Burton Shank (NEFSC), Caitlin Starks (ASMFC), Jeff Kipp (ASMFC)

Additional Attendees: Conor McManus (RI), Megan Ware (ME), Toni Kerns (ASMFC)

The Technical Committee (TC) met on Thursday, March 25th, 2021 to discuss and provide input to the Plan Development Team (PDT) on the development of Draft Addendum XXVII on resiliency in the Gulf of Maine/Georges Bank stock (GOM/GBK). Staff reviewed background information on the addendum, PDT discussion, and outlined objectives for the TC discussion. The addendum was originally initiated in 2017 as a proactive measure to improve the resiliency of the GOM/GBK stock in response to signs of reduced settlement and the combination of the GOM and GBK stocks following the 2015 Stock Assessment. The focus of the addendum at that time was standardizing management measures across the Lobster Conservation and Management Areas (LCMAs) within the GOM/GBK stock. In February 2021, the Board re-initiated PDT and TC work on the addendum focusing on a trigger mechanism such that, upon reaching of the trigger, measures would be automatically implemented to improve the biological resiliency of the GOM/GBK stock.

Staff reviewed the abundance reference points established following the 2020 assessment, as well as PDT discussion on the draft addendum since the February Board meeting. The PDT discussed which metrics should be used to establish a trigger mechanism, what level or levels would be appropriate to trigger standardized management measures or measures to increase stock resiliency, and which types of management measures should be considered to increase stock resiliency. As a result of this discussion the PDT determined a need for TC guidance on three issues: 1) identifying the most appropriate index or indices that should be used to establish a management trigger, 2) identifying appropriate trigger levels at which measures would be automatically implemented, and 3) Identifying management measures that should be considered to increase biological resiliency of the stock. The TC guidance provided on each of these issues is summarized below, followed by additional considerations and next steps.

Indices for Establishing Triggers

The TC discussed the pros and cons of various survey indices that could be used to establish triggers. Conor stated that he understood the PDT's concern about the Ventless Trap Survey (VTS) index related to it being more biased for inshore areas, but believes it is still a valuable indicator that should be considered. He also noted that if the goal of resiliency is maintaining or increasing spawning stock biomass (SSB), then perhaps female abundance indices should be used. Tracy added that both sexes should be considered rather than just females. The group agreed that there should be a focus on recruits or pre-recruits because looking at sub-legal sizes can provide a

forewarning for future trends in SSB. Conor also suggested consideration of an oceanographic index such as bottom temperatures, since temperature can be a driver of changing stock conditions.

Jeff suggested that the indices used to set the triggers should be those that the stock assessment subcommittee recommended for use in the annual data update process: the trawl survey indicators, including recruit abundance (71-80 mm lobsters) and survey encounter rate), and ventless trap survey sex-specific model-based abundances indices (53mm+). Burton expressed some concerns with basing short term decisions on the federal trawl survey due to annual variation and low sample sizes, but suggested that the ME/NH trawl survey and MA trawl survey could be combined into one index. He suggested that the index should be based on the trawl survey and VTS abundance of pre-recruits during the current abundance regime (since 2011). The TC discussed whether the offshore stock dynamics would be adequately reflected in the inshore surveys, but agreed that there is not a better index to use for GBK, because GBK recruit trends are not indicative of overall population trends. The TC supported further analysis of the ME/NH and MA trawl indices to determine how they can best be used for establishing a trigger mechanism. Kim noted that correlation analysis for modeled abundance and the trawl indices was conducted for the stock assessment, which adds to the rationale for using these indices. Jeff agreed to run the trawl survey function from the assessment to combine the ME/NH and MA trawl survey data into one index constrained to 2011 forward for the TC to review.

Appropriate Triggers to Implement Measures

The TC considered the PDT suggestion that a trigger level correlated with the Fishery/Industry Target abundance reference point may be of interest, given the addendum is meant to proactively increase stock resiliency. The Fishery/Industry target is a higher level of abundance than the abundance limit, so establishing a trigger at that level would be a more conservative approach than using the abundance limit. The TC agreed that the trigger levels should be related to model outputs and reference points. They also discussed the potential to set multiple triggers that could automatically implement the same set of measures. For example, one trigger could be based on abundance indices, and another could be based assessment results, and whichever trigger is met first would result in the measures being implemented. This way there would be a backstop in case there are unforeseen delays in the assessment timeline.

Burton suggested an empirical trigger where the terminal three years of the index data are compared to previous years. For example, if the trigger were based on the spring and fall trawl index and VTS index for pre-recruits since 2011, perhaps the trigger could be a certain percent decline in the index over a certain amount of time. Jeff suggested looking into the data from the SNE indices around the time the SNE stock collapsed as a way to approximate what rate of decline should trigger management action for GOM/GBK. Additionally, the group discussed that different rates of decline could trigger different management reactions; if the decline is more rapid that could require a more severe management response. The group agreed that an additional trigger could be based on a number of consecutive years of decline in the index, such as three consecutive years of decline.

Management Measures to Increase Biological Resiliency

The TC discussed the types of management measures that could increase the biological resiliency of the stock. Past TC analysis has focused on minimum gauge size as the measure that is expected to have the largest impact, even for relatively small changes in the minimum size. The TC agreed that this still holds true. Tracy noted that based on new maturity data, the gauge size is currently set closer to the size at which half of the population can reproduce, at least in western GOM. Thus, increasing it could have a fairly big positive impact on keeping individuals in the population so that they can reproduce. Also, changing the minimum size only delays harvest so lobsters are caught at a large size but are not removed from harvestable population. The TC agreed that minimum size limit has the most certainty of increasing the reproductive capacity of the stock and is also the easiest to enforce, which means compliance should be higher.

In addition to minimum gauge size, the TC noted that vent size selectivity could have impacts on abundance. Conor noted that in the sensitivity analyses performed for the assessment, vent size had notable impacts on reference abundance. The group agreed that vent size should be considered along with gauge size, but that changing vent size only may not be as transparent.

With regard to the maximum gauge size, the TC noted that minor decreases would be less effective due to the size structure of the population. Conor noted that projected impacts are more uncertain because current survey tools do not adequately monitor larger lobsters offshore. Kim and Tracy noted that in the inshore fishery where most of the GOM landings are from, the size structure is truncated and there are not many large lobsters, so small increases to the maximum gauge size would not have much impact. Burton mentioned that the Commercial Fisheries Research Foundation offshore fleet length composition data could provide a sense of what changes to maximum gauge size would have an impact for that fishery.

Trap reductions, v-notching, season closures, and quotas were also discussed, but the TC noted various challenges and sources of uncertainty of the effectiveness of these measures for increasing stock resiliency and the ability to estimate the impact. The group agreed that the impacts of trap reductions on the stock are difficult to estimate due to uncertainty in how harvesters will react to them (e.g. increasing effort) and latent effort. Tracy noted that season closures would be difficult to time appropriately because of the lag between molting and spawning for mature females; Burton added that based on updated information on the lobster reproductive cycle, past analysis was likely flawed and overestimated the benefits of the effects of season closures. The TC discussed quotas as a means of controlling the number of lobsters removed from the population, but noted that it would be challenging to determine an appropriate quota level because there is less certainty in the magnitude of abundance estimates from the assessment than the trends in abundance.

The TC generally is in favor of standardizing measures within and across areas from a stock resiliency perspective, but noted that the industry in some areas will be more impacted than others.

Next Steps

The next steps for the TC are to schedule a second meeting for mid-April to continue discussing trigger indices and levels. Burton and Jeff agreed to combine the MA and ME/NH trawl data into a single index for the TC to review. Conor agreed to put together the VTS indices from the

assessment since 2010 to look at the slopes, and send to the TC. Kim provided the TC with correlation analysis for reference abundance and trawl indices. TC members were encouraged to seek feedback from their state Commissioners on the trigger mechanisms.

Atlantic States Marine Fisheries Commission

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American Lobster Plan Development Team
Meeting Summary
Webinar
Monday, April 5th, 2021

PDT Members: Allison Murphy (NOAA), Kathleen Reardon (ME), Joshua Carloni (NH), Corinne Truesdale (RI), Caitlin Starks (ASMFC)

Additional Attendees: Toni Kerns (ASMFC), Megan Ware (ME)

The Plan Development Team (PDT) met on Monday, April 5th, 2021 to continue discussing the development of Draft Addendum XXVII on resiliency in the Gulf of Maine/Georges Bank stock (GOM/GBK). Staff and the TC Chair reviewed takeaways from the Technical Committee (TC) meeting where the TC discussed items requested by the PDT, noting that the TC is still developing additional work to inform appropriate indices for use in the trigger mechanism for this addendum. The TC also agreed that changes to the minimum gauge size would have the most impact on stock resiliency with the highest certainty relative to other types of measures, but that maximum gauge size and vent size changes should be considered in combination.

Then the PDT discussed how to structure the options for the draft addendum document. Staff proposed two alternative ideas, one where the document presented trigger levels and management measures as separate issues with multiple options, and another where several options are presented including "packaged" trigger levels and management measures. With the latter approach, the options would not be mutually exclusive, and the Board could elect to establish multiple triggers that would automatically implement a pre-defined set of measures. This structure could allow for measures to be crafted relative to different levels of concern about the stock condition. For example, one trigger could be set at a higher level of abundance that would result in the implementation of measures to provide a relatively small increase in stock resiliency, and in addition, another trigger could be set at a lower level of abundance that would result in the implementation of measures to provide a more substantial increase in resiliency.

The PDT noted that they could not make complete recommendations on measures to be considered for each option at this time given the need for TC analysis of the measures. Specifically, the PDT requested analysis on the impacts of minimum and maximum gauge size combinations on spawning stock biomass and catch. The PDT requested that the TC perform this analysis for all of the minimum and maximum gauge sizes that were previously considered for this addendum, including the following:

- Minimum gauge sizes: status quo, 3-5/16", 3-3/8", 3-17/32", and one additional size between 3-3/8" and 3-17/32"
- Maximum gauge sizes: status quo, 5-1/2", 5-3/4", 6", 6-1/4", and 6-3/4"

The PDT did agree that proposed vent sizes should be linked to minimum gauge size, and not considered as a separate decision. With the information available, the PDT began to develop a draft structure for several option packages for triggers and measures, which are summarized below.

Option 1: Status Quo

- Maintain current management measures and do not establish a trigger mechanism. This option cannot be selected in combination with the other options.

Option 2: Measures to be implemented upon final approval of addendum

- **Sub-option 2A**: Upon final approval of the addendum (not dependent on a trigger), implement standardized measures within each area to the most conservative measure where there are inconsistencies in measures for state and federal waters within LCMAs in the GOM/GBK stock. This would result in OCC maximum gauge being standardized to 6-3/4" for state and federal waters, and the V-notch definition and requirement being standardized to 1/8" with or w/out setal hairs. These changes would be implemented for the fishing year following final approval of the addendum.
- **Sub-option 2B**: Upon final approval of the addendum, implement the measures specified in sub-option 2A, AND standardize the V-notch requirement across all LCMAs in the GOM/GBK stock. This would result in mandatory V-notching for all eggers in LCMA 1, 3, and OCC.
- **Sub-option 2C**: Upon final approval of the addendum, implement the measures specified in sub-options 2A, 2B, AND standardize regulations across LCMAs in GOM/GBK for issuing trap tags for trap losses, such that there would be no issuance of trap tags before trap losses occur.

Option 3: Standardized measures to be implemented upon reaching Trigger 1 (TBD)

- **Sub-option 3A**: Upon reaching Trigger 1 (which will be proposed later based on TC recommendations), implement a standardized minimum gauge size, vent size, and maximum gauge size for all LCMAs in the GOM/GBK stock.
    - The measures proposed under this option will be developed based on TC analysis and PDT recommendations.
- **Sub-option 3B:** Upon reaching Trigger 1, in addition to the measures specified in sub-option 3A, implement any measures that were not selected under Option 2.

Option 4: **Measures to be automatically implemented upon reaching Trigger 2 (TBD) to increase stock resiliency**

- **Sub-option 4A:** Upon reaching Trigger 2 (which will be proposed later based on TC recommendations, but should be set at a lower level of abundance or higher level of concern than Trigger 1), implement a change to the minimum gauge size, vent size, and maximum gauge size for all LCMAs in the GOM/GBK stock.
    - The management measures should include an increase to the minimum gauge size and a decrease to maximum gauge size from Option 3 in order to increase stock resiliency.

- **Sub-option 4B:** In addition to the measures specified in option 4A, standardize the V-notch definition to zero tolerance across LCMAs in the GOM/GBK stock.

The PDT noted that additional input is needed on several issues related to management options. For Option 3, the PDT suggested that standardizing the V-notch definition to 1/8" could be proposed as a sub-option, but would like the Law Enforcement Committee to comment on whether having a standard definition across LCMAs would be desirable, and whether there is a preference for a 1/8" or zero tolerance definition. It would also be useful to get input on whether areas besides Area 1 (which currently has a zero tolerance definition for V-notching) would want to move to a zero tolerance definition. For Option 4, the PDT talked about including sub-options for multiple sets of proposed measures, but concluded it is too early to determine if that would be appropriate.

The PDT agreed that a separate issue in the addendum should address where in LCMA 3 the management measures selected would apply. Additionally, the PDT discussed the possibility of including another issue that addresses whether or not conservation equivalency would be allowed. Currently, states are allowed to implement equivalent or more restrictive measures than those defined for each LCMA. However, if part of the intent of this addendum is to standardize measures with the goal of consistent protection of spawning stock biomass across management areas, as well as improving enforcement and concerns regarding the shipment and sale of lobsters across state lines, then it may be worth considering an option to specify that conservation equivalency could no longer be used to deviate from the measures established through this addendum. The PDT would like some input from the Board on this subject.

The PDT scheduled another meeting to review additional TC analyses and continue developing the addendum options.

Atlantic States Marine Fisheries Commission

Atlantic Coastal Cooperative Statistics Program Coordinating Council

May 4, 2021
9:00-10:30 a.m.
Webinar

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 Minutes from February 2021

3. Public Comment

4. Review Funding Decision Document and 2022 Request For Proposals *(J. Simpson)* **ACTION**

5. Program Updates (*G. White & J. Simpson*)

6. Other Business/Adjourn

This meeting will be held via webinar, click here for details.

DRAFT MINUTES OF THE

ATLANTIC COASTAL COOPERATIVE STATISTICS PROGRAM

COORDINATING COUNCIL

Webinar
February 3, 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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ATTENDANCE

Board Members

Bob Beal, ASMFC
Pat Keliher, ME
Cheri Patterson, NH
Dan McKiernan, MA
Jason McNamee, RI, Vice-Chair
Greg Wojcik, CT, proxy for J. Davis
Jim Gilmore, NY
Joe Cimino, NJ
Kris Kuhn, PA, proxy for T. Schaeffer
John Clark, DE
Lynn Fegley, MD, proxy for B. Anderson
Pat Geer, VA
Dee Lupton, NC, proxy for J. Batherson
Mel Bell, SC, proxy for P. Maier
Doug Haymans, GA
Erika Burgess, FL, proxy for J. McCawley
Derek Orner, NOAA
Marty Gary, PRFC
John Carmichael, SAFMC, Chair
Brandon Muffley, MAFMC, proxy for C. Moore
Sherry White, USFWS
Richard Cody, NOAA

Staff

Toni Kerns
Kristen Anstead
Lindsey Aubart
Tina Berger
Alex DiJohnson
Maya Drzewicki
Emilie Franke
Sarah Hylton
Chris Jacobs
Jeff Kipp
Laura Leach
Savannah Lewis
Kirby Rootes-Murdy
Sarah Murray
Joe Myers
Jennifer Ni
Marisa Powell
Mike Rinaldi
Julie Defilippi Simpson
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Karen Abrams, NOAA
Bill Anderson, MD (AA)
Max Appelman, NOAA
Mike Armstrong, MA DMF
Pat Augustine, Coram, NY
Rick Bellavance, Kingstown, RI
Alan Bianchi, NC DENR
David Borden, RI (GA)
Jeff Brust, NJ DEP
Mike Celestino, NJ DEP
Barry Clifford, NOAA
Allison Colden, CBF
Heather Corbett, NJ DEP
Nicole Lengyel Costa, RI DEM
Jessica Daher, NJ Dep
Bob Danielson, S. Setauket, NY
Maureen Davidson, NYS DEC
Justin Davis, CT (AA)
Randy Dean
Jeff Deem, Lorton, VA
Russell Dize, MD (GA)
John DePersenaire, RFA
Renee DiPippo
Chris Dollar, Queenstown, MD
Ray Draper, King George, VA
Warren Elliott, PA (LA)
Julie Evans
Cynthia Ferrio
James Fletcher, Wanchese Fish
Tom Fote, NJ (GA)
Rick Frenzel, Black Tree Inc
Alexa Galvan, VMRC
Lewis Gillingham, VMRC
Angela Giuliano, MD DNR
Bill Gorham, S. Shores, NC
Dan Hadler, NYS DEC
Jay Hermson, NOAA
Carol Hoffman, NYS DEC
Joseph Holbeche
Rachel Howland, NC DENR
Raymond Kane, MA (GA)
Adam Kenyon, VMRC
Kathy Knowlton, GA DNR
Mike Luisi, MD DNR
Chip Lynch, NOAA
John Maniscalco, NYS DEC
Jerry Mannen, NC (GA)
Genine McClair, MD DNR
Chris McDonough, SC DNR
John McMurray, NYS DEC
Mike Millard, US FWS
Roy Miller, DE (GA)
Pat Moran, MA Env. Police
Jerry Morgan, Madison, CT
Clinton Morgeson, VA DWR
Allison Murphy, NOAA
Kennedy Neill
Derek Orner, NOAA
Michael Pierdinock
Kelly Place, Williamsburg, VA

Guests (continued)

Craig Pugh, Leipsic, DE
Jill Ramsey, VMRC
Eric Reid, Kingstown, RI
Adam Rettig
Tim Sartwell, NOAA
CJ Schlick, NC DENR
Mike Schmidtke, SAFMC
Tara Scott, NOAA
McLean Seward, NC DENR
David Sikorski, CCA
Andrew Sinchuk, NYS DEC
Tom Sminkey, NOAA
Alan St. John
Michael Thompson, NC DENR
Douglas Vaughan, Beaufort, NC
Laura Versaggi, NJ DEP
Beth Versak, MD DNR
Ritchie White, NH (GA)
Kerry Whittaker, MMA
Meredith Whitten, NC DENR
Chris Wright, NOAA
Sarah York, NOAA
Renee Zobel, NH F&G

The Atlantic Coastal Cooperative Statistics Program Coordinating Council of the Atlantic States Marine Fisheries Commission convened via webinar; Wednesday, February 3, 2021 and was called to order at 11:15 a.m. by Chair John Carmichael.

CALL TO ORDER

APPROVAL OF AGENDA

CHAIR JOHN CARMICHAEL: To call up the agenda, our first order of business is to approve the agenda, and then we'll approve the minutes. We'll see if anybody has any comments on the agenda. All right, not hearing anything or any shouting of hands.

MR. MAX APPELMAN: Mr. Chair, this is Max Appelman. I just wanted to make sure I was caught in the attendance sitting in for NOAA Fisheries.

MR. GEOFF WHITE: Max, thanks very much. Is there anyone else that I missed that needs to identify themselves?

MS. JULIE DEFILIPPI SIMPSON: Geoff, I have hands from Jay McNamee and Bill Gorham.

MR. WHITE: Jay, welcome back.

DR. JAYSON McNAMEE: Hi, Geoff, I'm here, just wanted you to know.

MR. WHITE: Thank you, and Bill, go ahead.

MR. BILL GORHAM: Yes, Sir, here.

MR. WHITE: Perfect. Julie has already jumped in here, but just a minor housekeeping item. We do have Julie helping with raising hands as we go through this, and I didn't make a slide for the agenda or past minutes, but you've got the materials.

CHAIR CARMICHAEL: All right, thank you, Geoff. I'll say just Geoff, Julie, just jump in when you have to, to indicate a hand is raised. It sounds like we're up to date on everybody that's here, and sound check is all done so we're good there.

APPROVAL OF PROCEEDINGS

CHAIR CARMICHAEL: No comments on the agenda, so consider that approved, and the next item for consent is the minutes from October, 2020. Does anyone have any objections to approving those by consent?

MS. SIMPSON: John, I have Jerry Morgan's hand raised, and also Richard Cody.

CHAIR CARMICHAEL: Okay, go ahead, Jerry. Did Jerry comment?

MR. JERRY MORGAN: Yes, yes, I'm in.

MS. SIMPSON: Okay, thanks, Jerry.

CHAIR CARMICHAEL: Then Richard.

MR. RICHARD CODY: Yes, John, I just had a minor edit to the minutes for the October meeting, just related to the acronym SEFHIER that's all, it's just a small edit, nothing content related.

CHAIR CARMICHAEL: Okay great, thanks, Richard. Julie and Geoff, did you all note that and you'll verify the acronym.

MR. WHITE: Correct, I'll take care of that, Richard, thank you.

CHAIR CARMICHAEL: Any further hands?

MS. SIMPSON: You're good.

CHAIR CARMICHAEL: All right, thank you very much, then we'll consider the minutes approved with that edit and update to the SEFHIER acronym.

PUBLIC COMMENT

CHAIR CARMICHAEL: Then the next item is public comment, so if any members of the public would

like to make a comment, please raise your hands, and we'll recognize you.

MS. SIMPSON: I have no hands.

CHAIR CARMICHAEL: Then moving on into our first item of business, this will be Geoff going over the program and project funding items. Geoff, do you want to move into the presentation, please?

REVIEW PROGRAM AND PROJECT FUNDING

MR. WHITE: I've got it, thank you, John. Today we'll briefly review what our October primary motion was, in support of the funding, and a reminder to those who are on the call as well. The items were really to approve the proposals, but to have the Leadership Team review the ACCSP Administrative Grant before approval, and also discussing the savings of prior years, and to redirect those through the leadership team, and bring that back to the Coordinating Council. Those three areas of funding are our primary business today.

The first item with the change in John moving up to Chair in October, and Jason McNamee as Vice-Chair was reconstituting the ACCSP Leadership Team, and so the membership for everyone's awareness is listed on the screen. We had two calls in the middle of November and December, to make progress on the items from the October meeting.

For today, we've got three major bullets, and this is the order I'll be covering them. First part is really the 2016 to 2020 funding extension. We updated the projections through December, and we had some savings on things like VMS project, and overall encumbrances and costs for the program and staffing over the course of 2016 through it's actually February, 2021 that it ends, but the bulk of calendar year 2020. We projected about $324,000 remaining. Part of that is going to need to be spent on projects that were previously approved, and are just taking a little bit longer to complete.

Really, the highlight item there is the South Atlantic Council and North Carolina fish release application. They've been having meetings virtually, with a contractor right now. There are some App development pieces that need to get done, and instead of being able to complete that by February 28 this year, that has been extended with a timeline of June 30.

Maintaining that prior approval of a partner-ranked project is the first 95K. Another discussion item supported by the Leadership Team was completing kind of the New Jersey 2021 maintenance proposal, for their staff to have the full year, which adds a few months and about $9,000 cost.

Then the primary one is the SAFIS help desk support. When the Council met in October, it was unknown whether the NFWF proposal for 280K would be approved, and unfortunately that was not. In the meeting materials there was a little bit of a highlight on that, and the rationale that we received back from NFWF about, they thought it was a valid and useful task, but that the funding would not be best supported through the NFWF process.

Refocusing here the use of extension funds of about $220,000 for the SAFIS help desk, we have a portion of that that will be covered by the ACCSP 2021 Admin Grant. We're a little bit short, but the 220K we believe will support the process. There has been a few hundred help desk calls in January already, with the roll out of SEFHIER, and new SAFIS eTRIPS reporting applications and online systems.

That uptick in activity is certainly true right now, we're hopeful that the 220 will cover us through the remaining portion of the year. That takes up the kind of extension timeline, with specific projects that we'll be able to move forward on with the extension. That helps keep the granting pieces clean.

While that is the focus of this piece, I will add in that we've had, I think about almost 900 trips already submitted in calendar 2021 through eTRIPS. That is

a big nod to the success of all of the partners in the SEFHIER roll out, as well as other activities that are occurring in commercial and for-hire fisheries going up the coast. With that, I will pause and ask John to lead any discussion or questions on the Admin Grant extension.

CHAIR CARMICHAEL: All right, so thank you, Geoff. Anybody have any questions so far?

MS. SIMPSON: I have Richard Cody.

CHAIR CARMICHAEL: Sure, go ahead, Richard.
MR. CODY: Yes, Geoff, I was wondering, you mentioned about 900 trips so far reported in eTRIPS. That seems like quite a few, given how early we are in the year. Do you have a feel for how that compares to, you know with previous years productivity?

MR. WHITE: We looked at it briefly. It's definitely an uptick in what reports are coming in through eTRIPS, but of course SEFHIER added 6,000 fishermen, so it's a higher number, and we're aware of several hundred other trips coming through other vendors that we expect to have entered in this system in the next week or two that will cover January. It's a significant uptick, in terms of user base and trips coming in. On the other hand, it's certainly not stressing the computer systems.

MR. CODY: Yes, thanks.

CHAIR CARMICHAEL: Julie, any others?

MS. SIMPSON: I have no other hands.

CHAIR CARMICHAEL: All right, Geoff, I think you can move on to the next slide.

MR. WHITE: This is a highly shortened version of the long Admin Grant proposal that was provided in the supplemental materials. As you recall, the October Operations Committee and Advisors supported Option 1, included both their backfilling of the Data Team lead, and the addition of a Software Team member.

Alternate Option 2 was not to add a Software Team member at this time, and leave some additional funds there for contract software development and support. Through the discussions with the Leadership Team and some suggestions of where we could find some savings, and what happened with that SAFIS help desk, as we just talked about.

We came up with kind of an Option 3, which is kind of lowest cost overall, highlighted in green on the screen, the $2,122,916. That does backfill the Data Team lead position, which is fantastic. We've got that out and are working on an approach for that. It delays the software staff addition, pending some further justification of what the tradeoffs are between staff growth, capabilities to handle things in house.

What happens when we release all these different software products, and we're calling on partners to review those? Not every partner has time to review things at the schedule of releases. What is the kind of timing in the outreach, and the cascading handoffs that occur out to the partners because of that?

We reduced the help desk support by about $30,000 in Option 3, and again we saved a little bit of funding on some travel, and some reconfiguration of internet line fees, which had to do with implementing our FISMA regulations and requirements, in a more flexible and cost effective way. We're not losing capability; we're just finding a new way to do it that costs less. With that I will pause again, and ask if there are questions on the details here.

CHAIR CARMICHAEL: All righty, thank you Geoff. If you have questions, go ahead and raise your hand.

MS. SIMPSON: I have no hands raised.

CHAIR CARMICHAEL: Okay, Geoff, let's move on to the next one.

MR. WHITE: Okay, we'll take that as good news that we're doing our jobs right here. For looking forward to our third funding item. The 2021 project support item. Here we've filled in the Admin Grant at the leadership Option 3. We are expecting level funding through National Marine Fisheries Service, Sustainable Fisheries, and Office of Science and Technology.

A big bonus and thank you here to the state of Florida, who recognized that they were not able to complete the head boat sampling due to COVID in 2020, but also had a little bit of savings from prior years, and were able to de-obligate and return approximately $150,000 to the program. That allows kind of a redirection of.

The reason that South Carolina, the Southeast Fisheries Science Center portions are there, is we're trying to be efficient, and not bouncing money through too many accounting hops, and as it gone back to the Southeast Regional Office, kind of have that get pushed back out to other Southeast projects that are coming up to start in the next fiscal year.

The South Carolina one actually starts in, I want to say September, and so we do have time to redirect those types of things. Therefore, there is the potential and suggestion to support all of the maintenance and new proposals from last year, and the blue coloration is kind of a suggestion of how we technically go through it.

What we've done here is highlighted in yellow where the Admin Grant ended up. There is a GARFO administrative fee that gets added into that, or added to that. With the return funds from Florida, we highlighted the 3.56 funding level, and those light blue projects are the functional suggestion of how that would help out and redirect.

But that leaves us, if we focus our eyes on the column second from the far right, the 3.56 amount remaining. We have the capability to fund all of the maintenance and new projects, and we've heard from Rhode Island that they'll be able to be successful in the Economic Efficiency Project, with just a slight decrease in the funding there. With that I'll ask for any questions, and John, we've prepared your request for a motion when you're ready to move to the next slide.

CHAIR CARMICHAEL: Okay. Yes, sounds great. I did ask that we should probably get a motion to approve this Admin Grant, given that it wasn't approved in the earlier October motion. But we are able here, with this proposed Admin Grant level, as Geoff is showing, to achieve the other aspects of that motion, which is full funding of the projects for 2021. Julie, any questions? Any hands going up yet?

MS. SIMPSON: No, Sir.

CHAIR CARMICHAEL: All right, so I think it is good that looking closer into the Admin Grant and making a few of those changes, has allowed us to fully fund 2021, and I think resolve the issues raised by the Council back in October. If no questions to be had, I think go on to the next slide, which is a proposed motion. Hopefully someone will make this to officially wrap up the Admin Grant values.

MS. SIMPSON: Mr. Chair, I have a hand from Cheri Patterson.

CHAIR CARMICHAEL: Okay, Cheri.

MS. CHERI PATTERSON: Good morning, yes. I would like to make that motion if I can get a second. Let me read the motion. Motion to approve the 2016-2020 Administrative Grant extension tasks as presented, and approve the revised 2021 ACCSP proposal at $2,122,916.

MS. SIMPSON: I had a second hand go up by Mel Bell.

CHAIR CARMICHAEL: All right, thank you very much, Cheri and Mel. Is there any objection to the motion?

MS. SIMPSON: I have a hand raised from Lynn Fegley.

CHAIR CARMICHAEL: Yes Lynn, go ahead.

MS. FEGLEY: No, I'm sorry, my hand should be down. I actually raised it to make the motion or second. I'm going to try to lower it now, thank you.

CHAIR CARMICHAEL: All right, thanks, Lynn.

MS. SIMPSON: I have no other hands.

CHAIR CARMICHAEL: All right, so hearing no objections that motion stands approved. Thank you everybody, we have an Admin Grant approved.

MR. WHITE: Thank you, John. That really concludes our major items, but if you'll give me leeway, since we have a little bit of time. It was an intent not to go through a full program update, but I will note that last week we put out a Committee newsletter that had information on what the Committees have been and are about to be doing.

It included a fair amount of information on the program activities. I just call your attention to that, and if there are any questions, I think we've got time to entertain those. One of the other things we've done, as kind of a minor item. To prepare for the RFP and every year that ACCSP staff pulls together a calendar of events.

It includes all the different council and commission meetings, as well as the ACCSP items. This year, we're really trying to take work that we do and make it a bit more useful. We've put that calendar, instead of a static document that we tend to forget about, actually populated that onto the full ACCSP website calendar. It includes things like the beginning of our fiscal year, when the RFP dates are, as well as when the Commission meeting weeks, the Council meeting weeks, and ACCSP Committee meetings are slated for. In places where it's going to happen sometime that month, those meetings are listed as the first of that month, and will shift as the doodle polls and other things are coming up. Just a highlight on activities we're doing, but didn't want to take a full time for a presentation during this particular meeting.

CHAIR CARMICHAEL: Yes, Geoff, thanks. I think that effort was nice. It certainly shows the many, many things that are going on every week related to ACCSP, which is always a good reminder for those of us at this level. I think the reports you've been putting out about committee activities are pretty helpful, just to see at a glance what all is going on.

It allows people to dive into the things that are of more interest to them, and useful to them without necessarily occupying time here. I think that's been a good effort that you guys have put into that. It certainly helps us. Julie, do we have any questions on things so far? If not, Geoff, did you have anything else to add?

MR. WHITE: I think we're set. Maya, if you would move one slide forward. That would give us just our opportunity for questions. We'll look for hands from Julie.

MS. SIMPSON: Yes, I do have a hand from Bob Beal.

CHAIR CARMICHAEL: Okay, Bob.

EXECUTIVE DIRECTOR ROBERT E. BEAL: Since we have time, and would it really be a Coordinating Council meeting if I didn't chime in about my nervousness about future funding? I feel obligated to do that. You know I think looking forward, I think I call it the funding bottleneck in the future of, you know continued administrative support, and the Maine project for lobster reporting coming back to us next year, most likely.
You know we cobbled together money for the help desk this year, and we hope the help desk expenses are a lot lower next year, once the whole suite of 6,000 vessels kind of gets up to speed, and is able to

use all the tools, and they know how to do it. But the help desk is something that I'm concerned about, in that we have to find money to fund that. There are really only two sources.

One is coming out of the general funds available for ACCSP, which will likely mean less money available for maintenance, and/or new projects, or it will have to come out of the Admin Grant, which causes problems as well, or we knock on the door of the federal partners, and they maybe find some money to help us support that. I'm not being critical of the federal partners, it's just that help desk is really to support federal initiatives from the Councils, and some of the electronic reporting initiatives.

It's completely consistent with the direction of ACCSP, and it's a good thing. But I just wanted to keep my placeholder out there, for kind of concern over future funding. You know we're going to have to have some potentially tough decisions in the next couple years, on what the priorities are and where the funding that is available, you know where it should go. Not really a question, just sort of my, I'm the broken record on financial worries.

CHAIR CARMICHAEL: Yes, thanks Bob, thank you for that. We did talk about that some at the Management Group meeting, I forget officially what we call ourselves. But yes, I think everyone should be aware that next year could be pretty tough. I think all of us here know, depending on what budgets do in the future, a lot of things may get pretty tough. This year we've been able to pull off everything, Bob said next year might be a bit tougher. We just need to be prepared for that.

MS. SIMPSON: I have a hand now from Cheri Patterson.

CHAIR CARMICHAEL: Go ahead, Cheri.

MS. PATTERSON: What would be the benefit to having projects include help desk work in their budget, to support the help desk, especially when it pertains to these upcoming improvements to reporting and such? Would that be helpful? I know it's literally just taking money from ACCSP in the general pot.

But it still kind of holds those projects that are going to be needing a large support from the help desk initially, to kind of offset some of the just general help desk budget on an annual basis. It would just help support it during these tough times. I agree, I think lobster reporting is really going to be a big pull for the help desk coming up. Just a thought. Thanks.

CHAIR CARMICHAEL: Yes, that sounds reasonable. I wonder, Geoff, if maybe that isn't something to be considered by that funding group, and sort of routed up through the Ops Committee and others along the way. You know I think I see the point there of sort of keeping that with the project that is initiating it, and avoid having some great big lump sum as we're dealing with now.

MR. WHITE: Thanks, John, and Cheri, I very much appreciate that, and these are things that we've been struggling with. The thing like the help desk is a multi-partner, multi-project need, and its growth has been offered up as one of the things that goes with the ACCSP reporting tools, and yet I'm thinking more of making that its own ranked proposal for awareness, instead of putting it only inside of the Admin Grant.

But these types of tradeoffs are what we'll be working on between now and your May meeting, to provide a little more clarity on what the future tracking is, and the potential approach to putting that into, to creating the Admin Grant what does the staff support in the Admin Grant. What are the tradeoffs with the help desk, because it's difficult to put that into individual projects, when those projects might be short- or long-term funding?

But the help desk really supports every partner using SAFIs in kind of any way. Right now, that is focused on the trip reporting side. But this year

we'll be making changes to the dealer reporting side as well. Those are certainly on the table. I had been planning those items more for preparation for your May meeting.

MS. SIMPSON: Cheri, your hand is still up. Did you have a follow up?

MS. PATTERSON: Yes, I did, thank you. Geoff, now I understand that the help desk is going to be something that's necessary into infinity with the program. My thought was, if somebody is going to be presenting a proposal, like we're expecting through the Lobster Reporting Program, to have them include some help desk support, because of the uptick.

That's all. I'm not denying that the help desk is going to need to have stability funding. But when there comes a time when we know there is going to be a surge, it would be nice to have that, in my mind, into the proposal to help with the surge. Thanks.

MS. SIMPSON: Mr. Chair, I have another hand from Kathy Knowlton.

CHAIR CARMICHAEL: Okay, Geoff, I want to see, did you have any follow up to that? That sort of sounds like to me there is potential for two ways to look at this. You know one would sound like their support for is definitely getting the help desk out of the General Admin grant, and looking at it. Then I think you know Cheri is talking about including some of that initial surge that you anticipate from any new program, as part of grants. I think it would be good to have our other committees look at both of those avenues.

MR. WHITE: I agree. As with all things funding, a multi-pronged approach is usually what's best.

CHAIR CARMICHAEL: All right, thank you. Kathy.

MR. KATHY KNOWLTON: Hey, good morning. Geoff, I'll be really interested to hear more from you in May about a possibility of pulling the funding out for the help desk, to possibly be ranked on its own. First blush of thinking about that, that seems like that will be very difficult to rank it, in that it is kind of like how we have the component in like the plus two points, or whatever it is for metadata, when people specifically talk about how they are planning to handle metadata. It's just like an addition to being within a proposal.

Again, just hearing this for the first time today, and thinking about it, I really like Cheri's suggestion to start thinking of ways for proposals to concentrate on their needs, and how to goad that in, because I think it would be exceedingly difficult to rank something like the help desk, because like you say, it helps every partner. I'll be really interested in hearing about that. I know you've given it a lot more consideration, and I want to hold my mind open to hear the point. That is a pretty cool thing to start thinking about, thank you.

MS. SIMPSON: I now have a hand from Lynn Fegley.

CHAIR CARMICHAEL: All right, thank you, Kathy, and Lynn up next.

MS. FEGLEY: Yes, this is going to be a great conversation in May. I'm not asking this question for an answer now, but just maybe my understanding is not quite complete. But if a project was to place budget for the help desk within its own proposal. The question kind of becomes, you know the projects are on a step down, so if it got help desk need in their project, and then they get stepped down, it seems like at a certain point as those projects phase out, the help desk is going to fall flat again. You know that is just sort of one of the dynamics that I wonder, you know how that would all work.

MS. SIMPSON: I have a hand from Richard Cody.

CHAIR CARMICHAEL: Thanks Lynn, thanks for that Geoff. I think you're getting some good feedback

on issues to be addressed for May. Richard, if you want to go ahead.

MR. CODY: Yes, I just wanted to echo, I think Lynn's sentiment there. I think we would have to give careful consideration to the makeup of all the proposals. We have some changes coming, where some of the maintenance proposals are dropping off the radar for a year or so at least, coming up.

We might end up in a situation where the help desk funding could be very variable form year to year, depending on the makeup of the proposals. Then, I would imagine also that some states might have some thoughts on how much they use the help desk at this point. Relative to other states they may not use it quite as much, and why should they be penalized as part of their proposal. I think there are a lot of considerations for the May meeting.

CHAIR CARMICHAEL: Yes definitely, thank you, Richard.

MS. SIMPSON: Mr. Chair, Lynn's hand has been re-raised.

CHAIR CARMICHAEL: Okay Lynn, come back around?

MS. FEGLEY: No, I'm just confused, I'm so sorry. I did not mean for it to be up. Sorry, guys.

CHAIR CARMICHAEL: Yes, it's counter intuitive. We always struggle with this. You see it as a green arrow, you think your hand is up, but it tells you what your hand can do, not what your hand is doing. It's kind of weird that way. No worries.

MS. SIMPSON: I have no other hands this time.

CHAIR CARMICHAEL: Okay, Geoff, does that conclude our business?

MR. WHITE: Yes, Sir.

CHAIR CARMICHAEL: Does anyone have any Other Business to raise before the Council?

MS. SIMPSON: Mr. Chair, I have a hand from Sarah York.

CHAIR CARMICHAEL: Sorry, go ahead, Sarah.

MS. SARAH YORK: I just wanted to ask about the project partner grants for the ones that are underneath in the second table that says, includes carryover from maintenance projects. The one that does go into a deficit at the end of those, but those ones are also being funded. If you have a question, then I'll just for business, sorry.

MR. WHITE: That's all right. Sarah, could you go up, I think it's just one slide. Sorry, Maya. There we go. The item in red in the middle that says includes carryover. If you look at the top of the screen, the split between maintenance and new is a 75 percent, 25 percent. If $1,044,496 is not used for maintenance projects, then any remaining does move down into the new project in the lower half of the screen.

All the projects would be funded at this point. The actual timeline for distribution would be up to NOAA Grants Office. But only one project, the Rhode Island Economic Efficiency would be funded, not at $61,384, but at $5,000 less than that, so $56,334.

MS. YORK: Thank you very much.

MS. SIMPSON: I have no other raised hands.

ADJOURNMENT

CHAIR CARMICHAEL: Okay, I was just going to ask, thank you, Julie. Seeing there is no other business before the Committee, we stand adjourned. Thank you everybody for letting us get through this very efficiently this morning.

(Whereupon the meeting convened at 11:50 a.m. on Wednesday February 3, 2021.)

Atlantic States Marine Fisheries Commission

American Eel Management Board

May 4, 2021
10:45 – 11:45 a.m.
Webinar

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*) 10:45 a.m.
2. Board Consent 10:45 a.m.
   - Approval of Agenda
   - Approval of Proceedings from October 2019
3. Public Comment 10:50 a.m.
4. Review 2020 Commercial Yellow Eel Landings (*K. Rootes-Murdy*) 11:00 a.m.
   - Advisory Panel Report (*M. DeLucia*)
5. Progress Update on 2022 Benchmark Stock Assessment (*K. Anstead*) 11:30 a.m.
6. Elect Vice-Chair (*L. Fegley*) **Action** 11:40 a.m.
7. Other Business/Adjourn 11:45 a.m.

The meeting will be held via webinar, click here for details.

MEETING OVERVIEW

American Eel Management Board
Tuesday, May 4, 2021
10:45 – 11:45 a.m.
Webinar

Chair: Lynn Fegley (MD) Assumed Chairmanship: 10/19	Technical Committee Chair: Troy Tuckey (VIMS)	Law Enforcement Committee Representative: Beal (ME)
Vice Chair: VACANT	Advisory Panel Chair: Mari-Beth DeLucia (TNC)	Previous Board Meeting: October 29, 2019
Voting Members: ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, PRFC, VA, NC, SC, GA, FL, D.C, NMFS, USFWS (19 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from October 2019

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. Review 2020 Commercial Yellow Eel Landings (11:00-11:30 a.m.)

Background

- Addendum V (2018) outlines a process to annually evaluate yellow eel landings against the Coastwide Cap and determine whether management action is needed.
- Preliminary 2020 yellow eel landings were made available in March. The coastwide total (approximately 225,000 pounds) is the lowest in the time series. **(Briefing Materials)**

Presentations

- 2020 Commercial Yellow Eel Landings by K. Rootes-Murdy
- Advisory Panel Report by M. DeLucia

5. Progress Update on 2022 Benchmark Stock Assessment (11:30-11:40 a.m.)

Background

- In June 2020, the Board approved the Terms of Reference and the Stock Assessment Subcommittee (SAS) membership to complete the next benchmark stock assessment.
- A data workshop was conducted in December 2020 and the SAS has met multiple times to evaluate and pursue modelling approaches.

Presentations

- Progress Update on Benchmark Stock Assessment by K. Anstead

6. Elect Vice Chair (11:40-11:45 p.m.) Action
Background • Lynn Fegley's chairwomanship will end on October 19, 2021 • The vice chair seat is currently empty
Board Actions for Consideration • Elect Vice Chair

7. Other Business/Adjourn

American Eel

Activity level: Medium

Committee Overlap Score: Medium (SAS overlaps with BERP, Atlantic herring, horseshoe crab)

Committee Task List
• TC –July 2019: review of Maine's aquaculture proposal • TC – September 1st: Annual compliance reports due • 2022 Benchmark Stock Assessment

TC Members: Troy Tuckey (VIMS, TC Chair), Jordan Zimmerman (DE), Ellen Cosby (PRFC), Ryan Harrell (GA), Kimberly Bonvechio (FL), Bradford Chase (MA), Chris Adriance (DC), Robert Atwood (NH), Sheila Eyler (USFWS), Alex Haro (USGS), Wendy Morrison (NOAA), Carol Hoffman (NY), Todd Mathes (NC), Patrick McGee (RI), Jennifer Pyle (NJ), , Danielle Carty (SC), Keith Whiteford (MD), Gail Wippelhauser (ME), Tim Wildman (CT), Kirby Rootes-Murdy (ASMFC)

SAS Members: Sheila Eyler (USFWS, SAS Chair), Laura Lee (NC), John Sweka (USFWS), Troy Tuckey (VIMS), Jason Boucher (NOAA), Matt Cieri (ME), Keith Whiteford (MD), Kristen Anstead (ASMFC), Kirby Rootes-Murdy (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

AMERICAN EEL MANAGEMENT BOARD

Wentworth by the Sea
New Castle, New Hampshire
October 29, 2019

These minutes are draft and subject to approval by the American Eel Management Board.
The Board will review the minutes during its next meeting.

Draft Proceedings of the American Eel Management Board Meeting
October 2019

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ATTENDANCE

Board Members

Megan Ware, ME, proxy for P. Keliher (AA)
Steve Train, ME (GA)
Sen. David Miramant, ME (LA)
Cheri Patterson, NH, proxy for D. Grout (AA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
David Pierce, MA (AA)
Sarah Ferrara, MA, proxy for Rep. Peake (LA)
Raymond Kane, MA (GA)
Phil Edwards, RI, proxy for J. McNamee (AA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
David Borden, RI (GA)
Justin Davis, CT (AA)
Sen. Craig Miner, CT (LA)
Bill Hyatt, CT (GA)
Maureen Davidson, 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 Sen. Andrzejczak (LA)
Loren Lustig, PA (GA)
Andy Shiels, PA, proxy for T. Schaeffer (AA)
John Clark, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Lynn Fegley, MD, proxy for B. Anderson (AA)
Phil Langley, MD, proxy for Del. Stein (LA)
Robert Brown, MD, proxy for R. Dize (GA)
Pat Geer, VA, proxy for S. Bowman (AA)
Chris Batsavage, NC, proxy for S. Murphey (AA)
Jerry Mannen, NC (GA)
Mike Blanton, NC, proxy for Rep. Steinburg (LA)
Mel Bell, SC, proxy for R. Boyles (AA)
Malcolm Rhodes, SC (GA)
Sen. Ronnie Cromer, SC (LA)
Spud Woodward, GA (GA)
Doug Haymans, GA (AA)
Rep. Thad Altman, FL (LA)
Jim Estes, FL, proxy for J. McCawley (AA)
Marty Gary, PRFC
Chris Wright, NMFS
Mike Millard, USFWS

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

Ex-Officio Members

Staff

Bob Beal
Toni Kerns
Kirby Rootes-Murdy
Dustin Colson Leaning
Maya Drzewicki
Julie Defilippi Simpson

Guests

Bill Anderson, MD DNR
Lewis Gillingham, VMRC
Kris Kuhn, PA Fish & Boat
Arnold Leo, E. Hampton, NY
Chip Lynch, NOAA
Steve Murphy, NC (AA)
Glenn Normandeau, NH F&G
Jack Travelstead, CCA
Renee Zobel, NH F&G

The American Eel Management Board of the Atlantic States Marine Fisheries Commission convened in the Wentworth Ballroom of the Wentworth by the Sea Hotel, New Castle, New Hampshire; Tuesday, October 29, 2019, and was called to order at 1:00 o'clock p.m. by Chairman Martin Gary.

CALL TO ORDER

CHAIRMAN MARTIN GARY: Good afternoon, I'm Marty Gary your Chairman for the American Eel Board. Seated to my right is Kirby Rootes-Murdy, who will be back in a moment. He is the Senior Fishery Management Plan Coordinator, and liaison for this species. Our Vice-Chairman is Lynn Fegley from the state of Maryland.

Before we get going I would just like to, I know it's been said before and it will be said many, many times before our meeting week is over with, but I want to thank the New Hampshire delegation: Doug Grout, Cheri Patterson, Ritchie and Dennis Abbott for their hospitality and all the work they put in to bring us together under this great venue, in what's been a great meeting so far, and will be a wonderful meeting for the rest of the week.

Thank you to the New Hampshire delegation, and also thanks to Bob, Toni, and all the ASMFC staff, for all the hard work that they've done to put us in a position to succeed in our meeting. Thank you very much, ASMFC staff. I know Toni would like to say a couple words.

MS. TONI KERNS: I just wanted to introduce the Commission's newest staff member, Maya Drzewicki. She's right up here at the front of the table with Dustin, and she is the new Fisheries Administrative Assistant. She helps out the ISFMP, the Science Department, and ACCSP as well at times, so she's getting to know all the parts of ASMFC. If you see her around please welcome her to the family.

APPROVAL OF AGENDA

CHAIRMAN GARY: All right, excellent. Our first order of business is Approval of the Agenda. Note that there are no aquaculture plan proposals on the agenda today. It should make things easier. Are there any changes or modifications to the agenda? Seeing none we'll consider that approved.

APPROVAL OF PROCEEDINGS

CHAIRMAN GARY: Next order of business is to approve the proceedings from the August, 2019 meeting. Are there any modifications, changes to those proceedings? Seeing none, we'll consider those approved.

PUBLIC COMMENT

CHAIRMAN GARY: The next order of business is Public Comment. I didn't see anybody signed up, but is there anyone in the public that would like to speak to items that are not on the agenda? Okay seeing none, we'll move ahead.

CONSIDER APPROVAL OF COASTWIDE CAP OVERAGE POLICY

CHAIRMAN GARY: The next order of business is Consideration of Approval of Coastwide Cap Overage Policy. This will be a final action, depending on the discussion, and Kirby has a presentation for us, and Kirby I'll turn it over to you.

MR. KIRBY ROOTES-MURDY: As mentioned, we're going to go through the Draft Coastwide Cap Overage Policy today. I have a presentation I'll give you that provides a little bit of background on this policy. We'll review some of the details in the document, I'll answer any questions you guys have, and then it is for the Board to consider final action on it.

As background, this Board approved Addendum V in August of last year. That Addendum established a new coastwide cap for the yellow eel fishery. That's at 916,473 pounds. It also

established the new management trigger, whereas if landings exceed the cap by 10 percent or more for two years, then it triggers the need for mandatory action to reduce harvest back to the cap.

That 10 percent overage would get us up to a little over a million pounds. The Addendum also modified the FMP so there are no longer state allocations. Those states that harvest 1 percent or more of the coastwide yellow eel landings are responsible for the reduction. Through the rest of my presentation I'm going to refer to them as the 1 percent states.

Following that approval of Addendum V, there was a workgroup that was convened to help develop this coastwide cap overage policy. That Workgroup met seven times between late last year and up through earlier this month. In talking through this new coastwide cap level and the new management trigger, and how to manage the resource in a way that prevents overages from occurring, there were a couple of challenges that came to light pretty quickly.

The first is that with the new management trigger, the coastwide cap can be exceeded anywhere between 0 percent up to 9 percent, for multiple years without there being mandatory Board action required. A second challenge is that there is a lag in addressing an overage in a given year, due to the timing of when landings data becomes available.

We, this year for example, received landings data for 2018 if we wanted to address that it would take action now and those measures would likely go into place for 2020. There is always this lag. The Workgroup considered a number of different overage scenarios and drafted different reduction options, and thought through those.

In going through the document now, I want to just highlight some of the key points, because it was included in the briefing materials, and hopefully you've all had a chance to review it. But the key distinction the group raised is that with this new approach the Board is trying to manage to the coastwide cap, not the gray area in between, above the coastwide cap and under a 10 percent overage.

To do so, this requires proactively monitoring landings data, and encouraging voluntary action by states of this Board when an overage occurs. To help do that the Workgroup recommends that there should be a review of preliminary commercial yellow eel's landings from ACCSP to be made available annually by the spring meeting.

Now, in talking through this approach with the Workgroup members it became very clear that, in order to get that data together in time annually by the spring meeting, it's very important for all states to submit their data on time, so that it can go through ACCSP, have a QA/QC analysis done to ensure that they are as accurate as they can be, and the states can then work off of the best available data to respond to changes in landings trends. In terms of how the Workgroup thought through responding to cap overages, they put together this notion that a workgroup should be convened in those situation to further evaluate the overage, rather than trying to prescribe ahead of time a very specific, or maybe narrow approach for dealing with an overage.

There could be different situations that arise that need to be evaluated in those instances. The crux of this policy lays out for Years 1 and 2, after an overage has been determined through a Decision Tree how this management board should respond. To hit home the point about getting data in on time, and how important it is for evaluating the yellow eel fishery.

We worked with ACCSP to look at the past few years, in terms of when states got their landings data in, and went through the process of validating them. I've got 2016, 2017, 2018 up

on the screen. You can see that in each of those years you had some states that got the landings data in on time. Then other years you had situations where no states got the landings data in on time. It fluctuates year to year.

The key take home here, I think, is trying to just keep in mind that if we're going to move forward with an approach, where the Board is trying to evaluate this data by the spring meeting, it's really going to be contingent on having the data available, and in turn submit it on time. Otherwise, this Board would be trying to make potential management decisions on data that is not the best that it could be.

Next I'm going to go through the Decision Tree. It's laid out pretty clearly in this document, but I'm going to go through each of the years and each of the branches that are within it, and so it might take a little bit more time, but bear with me. Under Year 1, going from left to right on the screen, the first two scenarios are pretty straightforward. In a situation where the overage is less than 5 percent no action would be taken, but continue to monitor landings annually.

In a situation where the landings overage is between 5 and 9.9 percent, those 1 percent states that saw an increase in their harvest would be asked to take a voluntary reduction, to reduce harvest back to the cap. The furthest column over, those gray boxes, have some added complexity. It starts off with this question. Did the 1 percent states landings increase? There are then three potential responses and associated action.

If yes, all by 10 percent or greater, the 1 percent states would take an equal percentage reduction, it would be a voluntary action again to reduce harvest back to the cap. If it's yes, some exceeded or had their landings increase by 10 percent or greater, and others increased but by less than 10 percent, the Workgroup is proposing the reduction to be divided up the following way. All those 1 percent states take 50 percent of that reduction, and then the other 50 percent of that reduction goes to those 1 percent states whose landings increased by 10 percent or more.

It divides up the reduction into two halves. There is a base level reduction that all the states that are in the 1 percent take a reduction, and then the other 50 percent of it goes to those states that saw their landings increase by 10 percent or more. For the response in Year 2, if there is a 5 percent to 9.9 percent overage in Year 1, starting from left to right. If there is a greater than 5 percent overage in Year 2 for 1 percent states whose landings increased in Year 1 and 2, the idea would be to expand those voluntary reduction measures, and take them into Year 3. For 1 percent states whose landings increased in Year 1, but not Year 2, the idea would be to maintain those voluntary reductions from Year 2 into Year 3. For those 1 percent states whose landings increased in Year 2, but did not in Year 1, they would then implement voluntary measures in Year 3.

Moving over in a situation where there is a 0 to 5 percent overage in Year 2, the idea would be to just maintain those voluntary reduction measures from Year 2 into 3. Then the third column, if there is an underage in Year 2, the idea would be to consider maybe relaxing those measures into Year 3. The last one is what the response would be in Year 2 if there is a 10 percent of greater overage in Year 1.

Starting again from left to right, if there is a 10 percent or greater overage in Year 2, the idea here would be then to initiate an addendum to determine the best approach for trying to reduce harvest among those states through mandatory action. In the middle column, if that overage in Year 2 is 5 percent to 9.9 percent in Year 2, for the 1 percent state whose landings increased in Year 1 and 2, they would then expand those voluntary measures, and taking them into Year 3.

For the 1 percent states whose landings increased in Year 1 but not Year 2, they would maintain voluntary measures into Year 3. For 1 percent states whose landings increased in Year 2, but not in Year 1, they would implement voluntary measures in Year 3. In the last column, if there was no overage or less than 5 percent overage in Year 2, voluntary measures would be put into place for Year 3.

To really hit home, the time table that would play out under this new policy, if we were looking at this year, and we went back in time to the spring, excuse me, if we would go forward into 2020, and the Board was looking at landings data from this year, 2019. If there was an overage between 0 and10 percent of the cap, the Board would convene a workgroup.

During the summer of next year, the workgroup would review the overage relative to the Decision Tree, and develop a report with recommended actions for the Board to consider. In August of 2020 the Board would consider that report, and recommend voluntary actions as soon as possible. Voluntary measures implemented would try to be in place before the end of the year.

In spring 2021, the Board would review 2020 landings, and if it's determined that an overage of greater than 10 percent of the cap occurred the management trigger would be tripped, and the Board would initiate an addendum. Later that summer we would pull together that draft addendum, and we would go through our process of drafting it up, presenting it to this Board for consideration at the August meeting.

Public comment period would take place in the fall of 2021, and in October 2021, the Board would consider final action on that addendum, and potentially implement the provisions of it by January of 2022. Again, this speaks to the lag in being able to address overages, but this is based on the Working Group's recommendation. Probably the best approach to address overages in the future. One thing to keep in mind with this policy is we do have preliminary landings data available for 2018. That is why we've got an asterisk next to it. Landings in 2018 for the yellow eel fishery were approximately 781,615 pounds. This value includes landings from Massachusetts, which was not available when the FMP review was completed, so it's slightly higher than what the value is in that document.

But this value is an approximate 8 percent decrease from 2017. It's I believe the second lowest value in the time series, between 1998 and 2018. To wrap up, the Board today can consider approval of this Overage Policy. I've tried to outline, I think the most specific parts of it that are key for this Board to keep in mind. If this Board approves this policy today, it would be added to Addendum V as an appendix, and that would be modified on our website. With that I'll take any questions. Thank you.

CHAIRMAN GARY: Questions for Kirby? We'll start with Adam and then go to Emerson. Adam.

MR. ADAM NOWALSKY: Thanks to the Working Group for putting this together. What discussion did the Working Group have about if you pull up your example timeline again, the actual feasibility for states to put something in place in August of a given year for that current fishing year, and the expected compliance by fishermen with a voluntary measure?

MR. ROOTES-MURDY: Yes, thanks for the question. The Workgroup talked about this a little bit, and we have really just one example in recent years. In 2017 preliminary data indicated that we had gone over the previous coastwide cap. The state of Maryland took action to implement changes in their fishery for the fall.

We haven't really gone through what each of the state's ability is to quickly implement

something, because it varies across the coast, right. Some states have to go through a rulemaking process; some have to go through the state legislature. It really varies, depending on what state you're talking about.

That is one of the big challenges in trying to move quickly on this, the other is that keep in mind this would be voluntary measures that would be implemented. There is no requirement in the Addendum currently or in this Draft Policy that in a situation where an overage occurs, and where we haven't tripped the management trigger that management action is required.

CHAIRMAN GARY: Follow.

MR. NOWALSKY: Thank you for the opportunity for a follow up. I would certainly think yesterday's conversation should give us pause about any expectations about voluntary compliance. What would be a potential revised timeline if we did not approve this policy today, but went back to the states to see how feasible this even was on a coastwide basis? The states could take action, given where we are with landings relative to 2018 right now, with this not appearing to be something we would put in place, need to utilize in the short term.

MR. ROOTES-MURDY: Sorry Adam, can you repeat that question one more time. I'm a little confused by what you were asking.

MR. NOWALSKY: If we did not approve this policy today, but took the time to go back to the states and get the answer as to this timeline. If, in August of 2020, you were asked to take voluntary action and get the answer to, which of those states actually could do something? When would we next consider this as a policy?

MR. ROOTES-MURDY: Well I think as Toni mentioned in a previous meeting today, we haven't quite started thinking through all the boards that will be meeting at the winter meeting. I'm not sure when the next time this Board would meet. It would be kind of at the pleasure of when this Board thinks it needs to meet again.

But given that this Board also has membership across the coast and all are present here today, we could probably get that answer from all the states around the table, if you wanted to know that ASAP. But if you prefer we can go back and send out an e-mail and ask people to respond, and then we could follow up.

CHAIRMAN GARY: Thoughts on that Adam.

MR. NOWALSKY: My thought is that I would not vote in favor or approve by consent this policy without knowing those answers.

CHAIRMAN GARY: All right, Emerson Hasbrouck.

MR. EMERSON C. HASBROUCK: I actually have several questions, but I'll just start off with a couple of them. It was helpful to see the landings for the past three years, but what would be even more helpful to me is if you have it available, the landings by state for the last three years. That is one question. Kirby, you mentioned several times in your presentation that if the states report on time. You mentioned on time several times, but what is on time? What is the timeframe on that? Those are my two starting questions.

MR. ROOTES-MURDY: Thanks for the question, Emerson. To answer the first question, yes. I have available, not in an easy-to-see format. I have the landings data by state, so we have a good handle on which states in any given year harvested 1 percent or more of the coastwide total. If you're interested in what New York situation would be.

I mean for at least the last ten years New York has been a 1 percent state. They've harvested at least 1 percent of the coastwide total. To the

second question, I might have to turn to my counterpart in ACCSP, Julie our Deputy Director; she can answer the specific date that we would be asking for this data in 2020.

MS. JULIE DEFILIPPI SIMPSON: Hi, the date that is currently slated would be the end of the first week of March. In this year in 2019 the date was March 9, and in 2017 it was March 8. I do want to point out that when Kirby put up his timeline earlier with lateness, there was sort of that big jump in 2017. A lot of that came from the fact that that was the first year that we tried to push the deadline a little bit earlier. For the 2016 data the deadline was March 17. When it went from March 17 to March 8 that is when everyone missed it, and folks are getting better now. But this year's deadline was March 9, and that timeline is likely to remain in effect for at least a few years at this point.

CHAIRMAN GARY: Follow Emerson.

MR. HASBROUCK: Yes thank you, Mr. Chairman, and Julie thank you for clarifying that. Kirby, in terms of the landings by state, I already know that New York lands more than 1 percent of the landings. But I just wanted to get a sense of what the landings distribution is among the states. I know that New York is more than 1, but I don't know what the percentage has been the past couple of years, if it's 5 percent, 10 percent in other states that land a significant percentage of the quota, you know 25 percent or more.

MR. ROOTES-MURDY: To your fall question. Over the last ten years the states of New York through North Carolina have consistently harvested at least 1 percent or more of the coastwide total. You were saying you were interested in knowing which states harvested say 25 percent or more of the coastwide total, is that correct?

MR. HASBROUCK: It was a two-part question. One is what is the average percent that New York has been harvesting of the quota, and then yes other states that harvest a significant amount, and I'm not sure what significant is, because I'm not looking at a table that has all the landings in it. I just picked 25 percent out of the air. Maybe it's 30 percent, maybe it's 65 percent. You know whatever some of the states are that have "significant" landings.

MR. ROOTES-MURDY: Yes so over the last ten years New York has averaged approximately 3.67 percent of the coastwide total. With the exception of Maryland, there is no other state that is higher than 11 percent of the coastwide total for the last ten years.

CHAIRMAN GARY: Lynn Fegley.

MS. LYNN FEGLEY: I wanted to maybe try to clarify a little bit to Adam's question about the time by which states could put measures in place. If we got to the point in August 2020, where the Board recommended voluntary measures, it's my impression that a state could implement measures voluntarily for the next year, and the effect of this voluntary action is to stay ahead of a situation when you would trip a trigger.

If you look at the timeline, and we get to August 2020, where it says voluntary measures implemented ASAP for 2020. If a state and I may be stepping outside the bounds of a document here, I don't know I hope I'm not. But if a state put those measures in place, if they couldn't do it right away for 2020, but they did it for 2021, then if we fired a trigger that state would already be ahead of an addendum process.

What the point here is to try to get states onboard to take action before it becomes a mandatory addendum. If they can get ahead of the ball, because we have that lag, it's going to save time for reaction. That was sort of the thought process that we went through in the Workgroup, recognizing that not every state

could act within those few months at the end of a year.

CHAIRMAN GARY: Thanks Lynn for those thoughts. Also before we take additional questions, we tried our best to be as inclusive as we could. We had both low harvest states and high harvest states on the Workgroup, and as Kirby mentioned they put in considerable time, seven meetings. Most of those meetings ran multiple hours, so it's a complex issue. There was a lot of territory to cover.

But the Workgroup did their best, and again we had geographically a good spectrum from South Carolina to Maine, New Hampshire low harvest states, the Mid-Atlantic states, Maryland, Delaware, Virginia and North Carolina, those are those higher harvest states that Kirby referenced, were part of this. We didn't have everybody involved, but we had I thought high inclusiveness, in terms of developing this policy, so I just want to state that. Are there any more questions on the Policy Document for Kirby? Maureen.

MS. MAUREEN DAVIDSON: Kirby, this is just something I couldn't follow while you were giving your presentation. When a state exceeds, or we have a one-year overage, on the right hand column in the gray boxes, if some states exceeded by more than 10 percent and some states exceeded by less than 10 percent that's the bigger box.

It says that each 1 percent state takes a base voluntary reduction equal to 50 percent of the reduction needed to get to the cap. Are we talking about a standard number of pounds that represent the 50 percent, and each state would take an equal number of poundage from it, or is that poundage going to be a percent of the state's landings?

MR. ROOTES-MURDY: Yes, thanks for the question, it's a good one. I think my read of it is that it would be dependent on the volume of landings, right. I believe it would be somewhere in the ballpark if we had like 100,000 pounds and you have 50,000 pounds that needs to be reduced that is the base reduction that the 1 percent states have to take, right?

You've got to get to that reduced by 50,000 pounds collectively. The other 50,000 pounds would then be dealt with by those states that are harvesting 10 percent or more, or saw an increase in their harvest by 10 percent or more. Does that make sense?

MS. DAVIDSON: Yes, but I think what I'm asking is for the first group. Is it going to be a set poundage that each state will have to take, or is it going to be a percent of it?

MR. ROOTES-MURDY: I think that would have to be determined at the time. This Decision Tree doesn't specify whether it would be a percentage or poundage on that front.

MS. DAVIDSON: It would be determined at the time if we were to have the overage, thank you.

CHAIRMAN GARY: Additional questions for Kirby, Chris.

MR. CHRIS WRIGHT: If in the Decision Tree, if the states don't report or all the states don't report, is the default to do an addendum to address the overages? Do you have to have all the states reporting to be able to even move forward with the Decisions Trees?

MR. ROOTES-MURDY: I'm trying to understand the question. Yes, we need all states to report their landings. That allows us to evaluate whether the coastwide cap has been exceeded or not.

MR. WRIGHT: Then what is the default if they don't?

MR. ROOTES-MURDY: If the states don't report their landings?

MR. WRIGHT: Right, by the deadline.

MR. ROOTES-MURDY: Sorry, by the deadline or annually? I am not understanding.

MR. WRIGHT: It seems like you have to meet a specific time for the information to get put into the process in time to be effective to actually move forward, correct? I'm just trying to picture if they don't. Now if one or two states don't report what happens then? What is the default in either Year 1 or 2? Do you have to catch up? I don't know.

MR. ROOTES-MURDY: The key thing I would point out with this policy is that the Working Group recommended the spring meeting, so as to as quickly as possible try to implement voluntary measures if needed for that year. That is part of why that deadline is important. If the data isn't available by the spring meeting, then when that data is available we would report it out to the Board. It would just generally delay the process in this Board being able to take action.

CHAIRMAN GARY: Toni.

MS. KERNS: To the point, it is to the benefit of the states. It's for their own wellbeing, in terms of their eel fisheries, because no one wants to exceed the cap. Therefore, these voluntary measures are to prevent the trigger from being hit. It's not an individual state is exceeding, it's the coastwide quota being exceeded, and so everybody is holding each other accountable.

CHAIRMAN GARY: Thank you, Toni for the clarification. Time for a couple more questions, but just to let the Board know, there are three possible outcomes today. If the Board supports moving forward with this policy without any edits, and we can accept a motion to do so. If there are very minor edits we could also do that today.

But, if there are significant concerns by the Board we would have to come back to the Working Group, and that would delay the process, so just to make you aware of that. Are there any other questions? We have time for a couple more if you have them, Emerson, one last.

MR. HASBROUCK: Yes, if nobody else has a question. I still have a couple. Is it possible, under that box that Maureen was referring to on the right hand side of Year 1, the larger box? Yes, some by greater than 10 percent. Under that scenario, depending on what the overage is, is it possible that by spreading that 50 percent across all the 1 percent states that a state may take a reduction that is approximately equivalent to what its current harvest is?

MR. ROOTES-MURDY: I would have to look at the data, but I don't believe that would be the case given where the cap is at, what the overage scenarios could be. Yes I would have to double check.

CHAIRMAN GARY: One last one, Lynn Fegley.

MS. FEGLEY: I don't have a question Mr. Chair; I have a comment if that's okay. Yes, and to Emerson's point, I just want to remind the Board that the point to this was to try to develop an alternate scenario than developing a hard allocation that a state would be saddled with, and getting in a situation of creating winners and losers on allocation.

The idea here is to be flexible, and if we have to make a reduction to be able to, and it's stated in the document, to carefully review the pattern and the magnitude of the overage, in determining how to get back to the cap. That means if you have situations where some states are really shooting up, and other states aren't.

You can make a reduction to get back to the cap, recognizing that it is not a permanent allocation that we're going to be saddled with onto the future. The actions are voluntary, so we're all holding together, and trying to as Toni said, hold each other accountable. Recognizing that if we exceed the trigger and we do two years of 10 percent overage, then it's going to be an addendum, and it's no longer going to be voluntary.

Then we're going to have to determine how to get to that reduction. It's a little bit of a different way to do business. The Workgroup made a very conscious decision to your point, Emerson, not to be overly prescriptive, because when we get in a situation is when the Workgroup is going to have to convene, and really see how these Decision Trees are going to come together, and Emerson make sure that the scenario that you outlined doesn't happen.

CHAIRMAN GARY: At this point in time I would entertain a motion, Eric Reid.

MR. ERIC REID: Just one point. Of course if you looked at a three-year scenario, when you got to the end of your three year, one would drop out, and then you would have a different set of numbers for two years, right? **Okay with that being said do you want to entertain a motion, Mr. Chairman? I've got a three-page motion in honor of my good friend, Dr. Pierce, but I think it's been edited down to something a little bit more reasonable, so I think you have it. There it is. Move to approve the coastwide cap overage policy as presented today.**

CHAIRMAN GARY: Do we have a second? Cheri Patterson. Start off and see if this can go the easy way. Is there an objection to this motion? We do have an objection, so this is a final action so it will be a roll call vote. Is there a need to caucus? Yes, I would say about a two minute caucus. Okay we'll go ahead and read the motion into the record, and then Kirby will conduct the roll call vote. Move to approve the Coastwide Cap Overage Policy as presented today. The motion was made by Mr. Reid, seconded by Ms. Patterson, and Kirby, could you go ahead and conduct a roll call?

MR. ROOTES-MURDY: We'll start with the state of Maine.

SENATOR DAVID MIRAMANT: No.

MR. ROOTES-MURDY: New Hampshire.

MR. DENNIS ABBOTT: Yes.

MR. ROOTES-MURDY: Massachusetts.

MR. RAYMOND W. KANE: Yes.

MR. ROOTES-MURDY: Rhode Island.

RHODE ISLAND: Yes.

MR. ROOTES-MURDY: Connecticut.

CONNECTICUT: Yes.

MR. ROOTES-MURDY: New York.

MR. HASBROUCK: Yes.

MR. ROOTES-MURDY: New Jersey.

MS. HEATHER CORBETT: No.

MR. ROOTES-MURDY: Pennsylvania.

MR. LOREN W. LUSTIG: Yes.

MR. ROOTES-MURDY: Delaware.

MR. JOHN CLARK: Yes.

MR. ROOTES-MURDY: Maryland.

MS. FEGLEY: Yes.

MR. ROOTES-MURDY: District of Colombia is not present, Potomac River Fisheries Commission.

POTOMAC RIVER FISHERIES COMMISSION: Yes.

MR. ROOTES-MURDY: Virginia.

VIRGINIA: Yes.

MR. ROOTES-MURDY: North Carolina.

MR. CHRIS BATSAVAGE: Yes.

MR. ROOTES-MURDY: South Carolina.

DR. MALCOLM RHODES: Yes.

MR. ROOTES-MURDY: Georgia.

MR. DOUG HAYMANS: Yes.

MR. ROOTES-MURDY: Florida.

MR. JIM ESTES: Yes.

MR. ROOTES-MURDY: National Marine Fisheries Service.

MR. WRIGHT: Yes.

MR. ROOTES-MURDY: U.S. Fish and Wildlife Service.

U.S. FISH AND WILDLIFE SERVICE: Yes.

CHAIRMAN GARY: The motion passes 16 in favor, 2 opposed, no abstentions and no null votes. Thank you.

CONSIDER APPROVAL OF 2019 FISHERY MANAGEMENT PLAN REVIEW AND STATE COMPLIANCE REPORTS

CHAIRMAN GARY: Our next item up on the agenda is Consideration of Approval of 2019 Fishery Management Plan Review and State Compliance Reports, Kirby.

MR. ROOTES-MURDY: I'll go through this FMP review now. I just have an outline for you all, a review status of the stock, status of the fishery, state compliance with the FMP, and PRT recommendations. As we've discussed before, Addendum V was approved in 2018. Two aquaculture proposals were submitted and approved for the 2019 season.

Any state harvesting over 750 pounds of glass eel a year must implement a Fishery Independent Life Cycle Survey. Maine began implementing their survey in 2016. As the Board may remember, there was an update provided at the August meeting last year. They have continued to work on adjusting some of the issues they've encountered with the site selection for a few of those different life stage data points.

In terms of stock status as this Board is aware, the American eel stock status remains depleted. We have no reference points we're working under. In terms of the status of the commercial fishery, state reported landings for the yellow silver eels were approximately 780,615 pounds in 2018. As mentioned in my previous presentation that is approximately an 8 percent decrease from 2017 to 2018.

Delaware, Maryland, Potomac River Fisheries Commission and Virginia account for 82 percent of the harvest. Landings of glass eel were reported from Maine and South Carolina. Maine harvested 9,194 pounds; South Carolina's landings are confidential. In terms of status of the fishery for the recreational sector, since 2009 recreational data has not been included as part of compliance reports, given the unreliable nature of the MRIP survey design in targeting eel.

In reviewing the plan there was no changes to eel measures in 2018. There were no noted issues in terms of glass eel regulations for Maine or South Carolina. In terms of the yellow eel fishery regulations, as we've noted before

the coastwise cap was increased to 916,000 pounds through Addendum V. There is now a two-year-management trigger, and state-by-state quotas have been removed.

There were no noted issues in terms of yellow eel regulations from State Compliance Reports. In terms of the silver eel fishery there were no new changes in regulations. As noted, we didn't find any issues with state compliance reports there. As part of Addendum V Aquaculture Plan Proposals based on the Technical Committee's recommendations, additional information is requested from the states as part of those proposals annually, so that was modified, based on the Board's approval of Addendum V.

The only other issue that was notified but has been rectified is that we didn't receive a compliance report from Massachusetts by the time we had compiled the FMP review for this meeting, but we received it within the last week. In terms of de minimis status, the FMP stipulates that states may apply for de minimis status for each of the life stages of eels that they are targeting for the preceding two years, if their average commercial landings constitute less than 1 percent of the coastwide commercial landings.

New Hampshire, Massachusetts, Pennsylvania, South Carolina, Georgia, and Florida requested de minimis status for the yellow eel fishery, and they all met that threshold. South Carolina requested de minimis status for glass eels and met that as well. In terms of Plan Review Team recommendations, the PRT recommends that the Board consider state compliance as mentioned.

We had some standing items that were brought up last year, such as reconsidering the requirement that states provide an estimate of the percent of harvest that goes to food versus bait. This is a challenging estimate for the states to put together, in terms of information and compliance reports.

There was the note that states should work with law enforcement agencies to include information on the legal or undocumented harvest of eels. The PRT also requested that New York continue to try to work to separate out their yellow and silver eel landings where possible, and that states should try to continue to quantify where possible when upstream and downstream passage has been improved, and provide that information to the Technical Committee for evaluation. With that I'll take any questions, thank you.

CHAIRMAN GARY: Questions for Kirby. John Clark.

MR. CLARK: Can you just elaborate a little more on Maine's Life Cycle Survey, and why that seems to still be not making a lot of progress?

MR. ROOTES-MURDY: In terms of characterizing it, they have made progress. You know it was first implemented in 2016, as I noted. They, at the Board meeting in August of last year, they presented some of their preliminary information as part of the Technical Committee report.

They have been adjusting some of the sites that they were using over time, and I think that is just in an effort to capture the best data available. But we can provide you more information specific to what their estimates were if you want. It's also included in the state compliance reports that are compiled at the back.

CHAIRMAN GARY: There are no questions for Kirby? Barring none we'll entertain a motion, Cheri Patterson.

MS. CHERI PATTERSON: Move to accept the FMP Review and State Compliance Reports for American eel, and de minimis requests for

New Hampshire, Massachusetts, Pennsylvania, Georgia, and Florida requested de minimis status for their yellow eel fisheries, and de minimis status for both South Carolina's yellow eel and glass eel fishery. Accept and forward the PRTs recommendations.

CHAIRMAN GARY: Do we have a second to that motion? Lynn Fegley. Is there any objection to this motion? Seeing none the motion passes. Next up, is there any other business to bring before this Board? Dennis Abbott.

MR. ABBOTT: Before we adjourn I do have an announcement to make if you recognize me.

CHAIRMAN GARY: I'm sorry, go ahead Dennis.

MR. ABBOTT: Yes, I just wanted to remind everyone that there are still tee shirts available. If you have bought your $20.00 tee shirt, you can buy another one for $10.00; give you a chance at the raffle. All the items that principally Ritchie White collected from L.L. Bean, Kittery Trading Post, CCA, will all be raffled off tomorrow at lunchtime. For a good cause we urge you to get out there and buy another tee shirt, thank you.

ADJOURNMENT

CHAIRMAN GARY: Thank you, Dennis. I think that concludes the business of this Board, this concludes my tenure for Chairman, and I'll be turning over the reins for the next meeting to the very capable hands of Ms. Lynn Fegley of Maryland, and thank you for the privilege of Chairing this Board. (Applause) We're adjourned, thank you.

(Whereupon the meeting adjourned at 1:55 o'clock p.m. on October 29, 2019)

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: American Eel Management Board

FROM: Kirby Rootes-Murdy, Senior FMP Coordinator

DATE: April 13, 2021

SUBJECT: 2016-2020 Yellow Eel Landings

This memorandum serves as a review of (2016-2020) yellow eel landings information. The information is provided to aid the Board in annually evaluating landings relative to the coastwide cap (Cap).

Overview of Addendum V- Yellow Eel Fishery Management

Addendum V, approved in 2018, was initiated in part as a response to preliminary 2016 yellow eel landings exceeding the Cap of 907,671 pounds previously established in Addendum IV (2014). Starting with the 2019 fishing year, Addendum V implemented a Cap of 916,473 pounds as well as a new management trigger and Cap overage policy. Under Addendum V, the Cap is evaluated against a management trigger where if the Cap is exceeded by 10% (coastwide landings = 1,008,120 pounds or more) for two consecutive years then the Board will take management action. To prevent the management trigger from being met, Addendum V outlines a process for the Board to convene a workgroup (WG) that is tasked with determining whether voluntary action may be needed based on the magnitude of the overage and the trend in landings. In the event that landings exceed the Cap by 5% or more in one year, the WG will make recommendations to the Board on what type of voluntary action to reduce landings of states/jurisdictions that harvested 1% or more of the coastwide total in the year of the overage. As part of this proactive process, preliminary commercial landings from ACCSP are made available for the Board's consideration prior to the ASMFC Spring Meeting.

Summary of Recent Landings Trends

Preliminary yellow eel landings from ACCSP indicate that total coastwide landings in 2020 were 225,122 pounds - a new time series low (1998-present). Table 1 shows each jurisdiction's landings from 2016-2020. Coastwide landings have continued to decline every year since 2016. Maryland landings, which annually comprise more than 60% of the coastwide total from 2016-2020, saw an approximate 60% decline in landings from 2019 to 2020. New Jersey, which annually from 2016-2020 reported the second or third highest total for a jurisdiction, saw an approximate 70% decline in landings from 2019 to 2020.

Table 1. Jurisdiction yellow eel landings from 2016-2020

Year	2016	2017	2018	2019	2020
Maine	6,811	6,358	2,832	2,567	***C***
New Hampshire	Time series average of less than 400				
Massachusetts	1,705	592	375	1,577	**NA**
Rhode Island	2,651	2,968	3,988	4,056	1,425
Connecticut	2,445	905	3,268	5,275	2,783
New York	36,371	41,732	39,218	33,039	9,865
New Jersey	67,422	77,499	69,679	76,241	23,340
Delaware	44,558	29,945	31,378	13,628	1,942
Maryland	583,578	541,270	514,226	331,878	134,024
Potomac River Fisheries Commission	58,223	33,555	31,151	27,111	24,971
Virginia	96,336	97,328	57,281	34,247	21,916
North Carolina	39,911	24,752	18,058	8,140	3,291
South Carolina	Time series average of less than 400				
Georgia	Time series average of less than 400				
Florida	6,034	7,456	4,659	1,542	499
Total	946,110	864,360	776,131	539,301	225,122

To protect confidentiality, information for New Hampshire, South Carolina, and Georgia have been removed. Maine's 2020 landings are confidential and Massachusetts 2020 landings are not available.

A number of factors may be driving the decline in yellow eel landings in recent years, including international market demand for food fish, decline in demand for yellow eels as bait, a depleted stock, and the 2020 COVID-19 pandemic. The American Eel Advisory Panel will be convened later in April to provide feedback and insight into recent years landings trends.

ROY COOPER
Governor
DIONNE DELLI-GATTI
Secretary
JOHN G. BATHERSON
Acting Director

Comments

Section 216(c) of the President's Executive Order (EO) 14008, entitled "Executive Order on Tackling the Climate Crisis at Home and Abroad," requires the Secretary of Commerce, through the Administrator of the National Oceanic and Atmospheric Administration (NOAA), to initiate efforts to collect input from fishermen, regional ocean councils, fishery management councils, scientists, and other stakeholders on how to make fisheries and protected resources more resilient to climate change, including changes in management and conservation measures, and improvements in science, monitoring, and cooperative research. To assist NOAA's efforts to collect input on how best to achieve the objectives described in EO 14008, the North Carolina Department of Environmental Quality, Division of Marine Fisheries (DMF) provides the following comments regarding North Carolina's efforts to develop and implement strategies to address impacts from climate change on the state's coastal habitats and fisheries. Information is also provided summarizing additional resources needed to help carry out these strategies. DMF appreciates the opportunity to comment on this significant climate change issue.

The North Carolina Climate Risk Assessment and Resilience Plan 2020 (Resilience Plan) reflects a framework to guide state action, engage policymakers and stakeholders, and facilitate collaboration across the state and focus the state's attention on climate resilience actions and address underlying stressors such as the changing climate, aging infrastructure, socio-economic disparities, and competing development priorities. The Resilience Plan describes next steps for implementing and updating resilience initiatives and builds upon North Carolina's ongoing work in this area and establishes the North Carolina Resilience Strategy. This strategy includes four elements: (1) the North Carolina Climate Science Report; (2) State Agency Resilience Strategies; (3) Statewide Vulnerability Assessment and Resilience Strategies; and (4) the North Carolina Enhanced Hazard Mitigation Plan.

The Resilience Plan and resultant Resilience Strategies Report (2021) identify numerous approaches that the North Carolina Department of Environmental Quality (DEQ) and DMF are continuing to develop and implement to address impacts from climate change. Climate change impacts such as salinity changes and saltwater intrusion, increasing water temperatures, shifts in currents and tides, decreased water quality from increased storm runoff, and sea level rise all impact North Carolina's coastal habitats and marine organisms. Other threats from climate change include wetland loss due to sea level rise/development impacts which effects wetland migration, fisheries, water quality, and stormwater buffering capacity.

To make fisheries and coastal resources more resilient to climate change, DMF manages coastal habitats in conjunction with fisheries. DMF staff, working with the Albemarle-Pamlico National Estuary Partnership (APNEP) and other DEQ divisions, is currently working on the 2021 Coastal Habitats Protection Plan (CHPP) Amendment including five issue papers with resulting recommended resilience strategies to better manage for the continuing impacts from climate change. The 2021 CHPP Amendment will offer tools to begin addressing several recommended strategies outlined in several chapters of the Resiliency Plan.

To make fisheries more resilient to climate change, DMF is taking measures to better understand, manage and anticipate impacts from climate change and increases in variability of ecosystem factors

impacting the distribution of fish species and resulting management. These measures include developing fishery management strategies that are flexible and support easier entry into new fisheries and exit out of declining fisheries. Such action prevents overfishing and supports interstate and federal cooperative management, stock assessments, and fishery management plan guidelines through incorporation of climate change considerations in vision statements and/or strategic plans and fishery management plans. The DMF also maintains and restores oyster reefs. These reefs increase coastal resilience by helping protect critical wetlands through provision of habitat and displacement of wave energy which reduces shoreline erosion, increasing shoreline resiliency, and improves water quality through filtration.

Expanded submerged aquatic vegetation (SAV) monitoring can also help gauge overall ecosystem health. SAV is a critical habitat to many important fishery species and is also an ideal indicator habitat for water quality and climate changes because its distribution is highly responsive to changes in salinity, temperature, and water clarity. The expected changes to water conditions due to climate change are likely to result in reduced abundance of SAV. Regular monitoring to assess change in distribution and composition to address potential impacts to dependent fish species is critical to SAV assessment. Mapping SAV on a regular basis has been difficult due to the lack of dedicated funding.

The following are the recommended strategies outlined by applicable Chapters in the Resiliency Plan that may be germane to EO 14008 section 216(c) objectives. These strategies may be employed to make fisheries and coastal resources more resilient to climate change, including changes in management and conservation measures, and improvements in science, monitoring, and cooperative research.

I. Chapter 5C - Coastal Resources and Infrastructure

A. Coastal Habitat Protection - the CHPP can be used to better outline the effectiveness of the actions in sequestering carbon, improving resilience of coastal habitats through restoration and protection of coastal habitats, and improving resilience of coastal communities and ecosystems.

B. Coastal Habitat Conversation and Restoration - help facilitate coastal habitat restoration by assisting state, federal, and local governments with incorporating climate change considerations into their planning processes to increase resilience. Help build understanding of the benefits of protecting and restoring coastal habitats to help ensure stakeholders and the public are aware of the importance of these actions including resilient ecosystems and communities.

C. Map, Assess, and Monitor - the extent and condition of coastal habitats should be mapped to inform models and enable detection of change over time, and to provide the best available scientific information for formulating actionable conservation, protection, and restoration strategies.

D. Natural and Nature-based Solutions - nature-based solutions, such as living shoreline, have the potential to restore coastal ecosystems and increase resilience to natural disasters and should be used whenever possible.

E. Climate Change Integration - review existing guidelines and strategic plans to develop and integrate climate change adaptation and resiliency strategies within these documents and continue to monitor rule making authority for species of fish that may become more abundant in our waters as the ocean continues to get warmer.

II. Chapter 5F - Ecosystems

A. Mapping and Monitoring - monitoring will help detect change over time, provide the scientific basis for future projections, and help inform management, restoration, and conservation strategies.

B. Water Quality Improvement and Protection - degraded water quality is the leading driver of SAV habitat loss. Protecting and preserving the water quality of the rivers and sounds of North Carolina will directly benefit the SAV as well as other coastal habitats.

C. Translocation and Propagation - restoration of populations to places where they have been lost but which remain or have returned to suitable habitat can improve resilience to a species as a whole.

III. Chapter 5K - Water and Land Resources

A. Stormwater Control Measures – where there are issues with sanitary sewer overflows, implementation of distributed stormwater control measures can help reduce occurrence and severity of overflows.

IV. Appendix B - Natural and Working Lands Action Plan 3.6.1 Protect Coastal Habitats

Protect Strategy 1 - Provide incentives to stakeholders for coastal habitat protection.

Protect Strategy 2 - Facilitate migration of coastal habitats through protection of migration corridors.

Restore Strategy 1 - Prioritize climate change and sea level rise in coastal habitat restoration planning.

Robust monitoring programs are a necessary to enhance the science required to understand and adapt to changes in the timing of fish species presence and new species entering coastal waters as well as assess changes in coastal habitat distribution and density. Resources for monitoring programs in North Carolina have been reduced over the last several years. Human and budgetary resources are currently utilized at near maximum capacity. Federal funding could help support and expand coastwide habitat and fish monitoring programs in North Carolina.

SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

4055 Faber Place Drive, Suite 201, North Charleston SC 29405
Call: (843) 571-4366 | Toll-Free: (866) SAFMC-10 | Fax: (843) 769-4520 | Connect: www.safmc.net

Melvin Bell, Chair | Stephen J. Poland, Vice Chair
John Carmichael, Executive Director

April 20, 2021

Dr. Paul Doremus
Acting Assistant Administrator
NOAA Fisheries
1315 East West Highway
Silver Spring, MD 20910

Dear Dr. Doremus,

The South Atlantic Fishery Management Council (Council) appreciates this opportunity to comment on Section 216(c) of the *Executive Order on Tackling the Climate Crisis at Home and Abroad* (EO 14008) issued on January 27, 2021. Ensuring resilient fisheries requires managing fish stocks at sustainable levels, as the Council does now when setting catch limits consistent with the existing provisions of the Magnuson Stevens Act (MSA). However, the term "fisheries" encompasses more than just fish stocks; it also includes the harvesters and users of those stocks and their communities. Ensuring resiliency of the fishery overall requires the Council to balance social and economic considerations of our constituents with the biological considerations of our managed fish stocks. The following comments focus on information (and governance changes) the Council considers critical to achieving this balance.

Considerable improvement in basic scientific information is required in the South Atlantic Region to ensure resilient fisheries. This includes catch monitoring, population surveys, and social and economic characterizations of the fisheries. More timely analysis of data, such as stock assessments, is needed along with distribution of information to the Council through SAFE reports. Compatibility across NOAA Fisheries regions of basic fishery statistics and population surveys is critical to identifying and responding to climate change. Since a full accounting of data deficiencies is beyond the scope of this letter and these deficiencies have been addressed by the Council in previous letters as well as in the Research and Monitoring Plans submitted to NOAA Fisheries as required by MSA, only a few examples will be provided here.

Despite recreational activities being a large component of our fisheries, the Marine Recreational Information Program's (MRIP) estimates of catch for most species managed by the Council fail to meet MRIP's own standards for reliability. Excessive uncertainty and estimation error may very well mask subtle short-term indications of long-term phenomena such as climate change. Different NOAA Fisheries Regions can apply different methods to estimate essential parameters such as such as recreational landings weight, resulting in incomparable values for what is supposedly the same information. This too may mask climate change effects, while also creating

unnecessary challenges when managing stocks that cross regional boundaries and undermining constituent confidence in both science and management activities. NOAA Fisheries should complete the work of the MRIP Rare Event estimation group and implement changes to improve estimation of rare event species and resolve regional differences in calculating recreational statistics.

Reliable surveys of population abundance are only available for a handful of the 64 species managed by the Council. Research needs identified through the SEDAR assessment program indicate that available surveys suffer from inadequate effort and incomplete coverage over both time and space. Experiences assessing and managing stocks that cross the boundaries of Councils and NOAA Fisheries Regions, such as Blueline Tilefish, have revealed incompatibilities between survey efforts in the different regions that hinder assessment and management efforts. Despite the documented need for increased survey effort and importance of survey information to reliable stock assessments, funding continues to be an impediment in the Southeast. NOAA Fisheries should ensure compatibility of its surveys to ensure changes in stock distribution can be observed and detected. NOAA Fisheries should fully fund the Southeast Reef Fish Survey and restore full MARMAP funding to increase survey effort and coverage. NOAA Fisheries should increase funding available for Cooperative Research and direct it to support population monitoring to help address declining survey resources.

Ecosystem level impacts from climate change could include shifts in stock distribution and changes to underlying population parameters including natural mortality, recruitment, and growth. Therefore, estimates of fundamental MSA criteria such as Maximum Sustainable Yield (MSY), that typically rely upon long-term historical conditions, may not be valid under an altered climate. Setting harvest levels above long-term expected conditions may not be overly risky for a stock that is thriving or expanding its range due to climate change. NOAA Fisheries should re-evaluate guidance on MSY and associated catch levels to ensure Councils can respond to current stock conditions that may be different from historic trends. In particular, the influence of the earliest years in a time series used to estimate MSY should be critically evaluated if a stock shows signs of climate related change.

The MSA established the Regional Fishery Management Councils to enable constituent participation in Fishery Management Plan development and to account for social and economic needs of the States. Fish have never recognized political boundaries, so there are numerous examples of multiple Councils working together for the good of the resource and their constituents. Despite the best efforts of Councils to work together, issues can arise when states and constituents feel they are inadequately represented when a Council from another area imposes regulations on species in their area. Climate change will likely increase the need for inter-Council cooperation and expand the range of constituent voices a Council may need to include in its process. NOAA Fisheries should work with the Councils, within regions and nationally through the Council Coordination Committee, to identify and resolve governance restrictions that hinder inter-Council decision making and result in constituents feeling disenfranchised.

Ensuring adequate fishery monitoring, survey coverage, and compatible monitoring and survey efforts across regional boundaries will be critical to evaluating stock distribution changes in the

future. It will be exceedingly difficult for Councils to address distribution changes if perceived changes are not supported by the Best Scientific Information Available.

The comments included in this letter were discussed by the Council at its meeting devoted to this topic on March 29, 2021. The Council will continue to discuss this topic at its regularly scheduled meetings and may choose to submit additional comments, consistent with the statement, in your March 1, 2021 email announcing the comment period, that indicated NOAA Fisheries would continue to obtain input throughout 2021.

Sincerely,

Melvin Bell

SAFMC Chair

cc: Council Members & Staff
Monica Smit-Brunello, NOAA GC

LN#202104

U.S. Regional Fishery Management Councils

Caribbean
Miguel Rolon
Executive Director
Marcos Hanke
Chair

Gulf of Mexico
Dr. Carrie Simmons
Executive Director
Dr. Thomas Frazer
Chair

Mid Atlantic
Dr. Christopher Moore
Executive Director
Mike Luisi
Chair

New England
Thomas Nies
Executive Director
Dr. John Quinn
Chair

North Pacific
David Witherell
Executive Director
Simon Kinneen
Chair

Pacific
Chuck Tracy
Executive Director
Marc Gorelnik
Chair

South Atlantic
John Carmichael
Executive Director
Melvin Bell
Chair

Western Pacific
Kitty Simonds
Executive Director
Taotasi Archie Soliai
Chair

March 12, 2021

006924MAR2021

The Honorable Deborah Haaland
Presumptive Secretary of the Interior
Department of the Interior
1849 C Street NW
Washington, DC 20240

The Honorable Gina Raimondo
Secretary of Commerce
Department of Commerce
1401 Constitution Ave NW
Washington, DC 20230

Dear Ms. Haaland and Ms. Raimondo:

The Council Coordination Committee (CCC) appreciates the opportunity to provide our perspective on Section 216(a) of Executive Order (EO) 14008 on Tackling the Climate Crisis at Home and Abroad. The CCC consists of the senior leaders of all eight Regional Fishery Management Councils (RFMCs; Councils), and, as such, represents the RFMCs.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the foundation that guides the use of U.S. marine and anadromous fishery resources. The MSA gives the U.S. the strongest statutory framework in the world for the management of sustainable fisheries and associated ecosystems and the U.S. is recognized as a world leader in marine conservation and sustainable fishery management. The MSA charges the nation's eight RFMCs with the responsibility of achieving its goals and objectives, which are closely aligned with those of the Executive Order.

Section 216(a) of the EO directs you to submit a report to the National Climate Task Force by April 20 recommending steps to work with State, Tribal, and Territorial governments, fishermen, and other key stakeholders to achieve the goal of conserving at least 30 percent of our lands and waters by 2030. We believe the RFMCs have already made significant progress in achieving this goal and can be a valuable resource for advancing this and other goals of the EO for the following reasons:

- The RFMCs have been managing and conserving marine resources, including fish stocks and benthic habitats, as directed by the MSA, for over 40 years. As a result, the U.S. is widely recognized as a leader in sustainable fishing practices.
- RFMCs use a public, collaborative process to engage State and Federal agencies, Tribal representatives, fishermen, and other key stakeholders in the conservation and management of living marine resources using the best scientific information available.
- RFMCs are at the forefront of coping with climate change, adapting management to conserve resources while continuing to provide significant economic benefits and domestic food security to the nation.

- Ecosystem considerations are routinely used to inform management decisions, acknowledging the complex interactions between habitat, fishery resources, and human communities.

Section 216(a)(ii) requires the report to the Task Force to propose guidelines for determining whether lands and waters qualify for conservation, and to establish mechanisms to measure progress toward the 30 percent goal. As explicitly stated by the title of our authorizing legislation, the function of the RFMCs is to conserve fishery resources. Specifically, the MSA requires each Council:

- To have conservation and management measures to prevent overfishing, rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of fisheries.
- To describe and identify Essential Fish Habitat (EFH), minimize fishing impacts to EFH, and identify actions to encourage conservation and enhancement of EFH.

To achieve these conservation and management objectives, the Councils use a wide range of management tools, including ecosystem-based fishery management, management strategy evaluation, and climate change scenario planning, in addition to more traditional spatial management approaches. For example:

- More than 1,000 individual spatial habitat and fisheries conservation measures have been implemented, protecting more than 72 percent of the nation's ocean waters from fishing impacts, which helps to ensure preservation of ecosystem functions.
- All Councils use annual catch limits to prevent overfishing and achieve optimum yield from managed fisheries to achieve the greatest overall benefit to the nation.
- Every Council has or is developing a fishery ecosystem plan(s) to monitor ecosystem functions, incorporate ecosystem science into fishery management decisions, and identify research priorities to advance ecosystem management.

These provisions and examples of implementation of the MSA are entirely consistent with the following dictionary definition of conservation: controlled use and systematic protection of natural resources (Webster). Council management meets this definition[1] by managing for optimum yield and protecting habitats from fishing impacts. Therefore, the entire Exclusive Economic Zone (EEZ) under authority of the MSA should be classified as a conservation area for marine fishery resources, and at least 72 percent of that area should be classified as protected.

In summary, we submit that the MSA and its implementation through the RFMC process, as a measure of progress, already conserves and protects more that 30 percent of marine fishery resources and habitats. The MSA not only works well but is the gold standard worldwide for sustainable fishery conservation programs. Based on the success of the MSA, U.S. participation in Regional Fishing Management Organizations is helping other nations

[1] Other definitions relevant to conservation of marine resources include those in the MSA Section 3(5), the IUCN category VI, and UNCLOS Article 119.

recognize and make progress toward science-based conservation objectives consistent with the EO.

Further, should any additional needs for conservation of marine fishery resources be identified as part of the process of implementing this EO, they should be authorized only through the robust, open public process established by the MSA, which has been successfully used for over forty years to conserve and protect habitat, conserve fishery resources, and protect marine mammals and other listed species through sustainable, science-based management.

Thank you again for considering our comments; we hope they will be helpful in developing your report to the Task Force. Please feel free to contact Mr. Chuck Tracy, Pacific Fishery Management Council, Executive Director, and 2021 CCC coordinator, or any of the undersigned, for questions or clarifications. We welcome further engagement on this or other issues related to implementing the Executive Order.

Sincerely,

Marc Gorelnik, Chair
Pacific Fishery Management Council

Mike Luisi, Chair
Mid-Atlantic Fishery Management Council

Taotasi Archie Soliai, Chair
Western Pacific Fishery Management Council

Marcos Hanke, Chair
Caribbean Fishery Management Council

Dr. John Quinn, Chairman
New England Fishery Management Council

Melvin Bell, Chair
South Atlantic Fishery Management Council

Simon Kinneen, Chair
North Pacific Fishery Management Council

Dr. Thomas Frazer, Chair
Gulf of Mexico Fishery Management Council

cc: Mr. Thomas J. Vilsack, Secretary of Agriculture
Ms. Brenda Mallory, Presumptive Chair of the Council on Environmental Quality
Mr. Scott De la Vega, Acting Secretary of the Interior
Dr. Paul Doremus, Acting NOAA Assistant Administrator for Fisheries

Enclosure

Enclosure:

The following sections provide additional details regarding RFMC responsibilities and achievements relevant to Section 216(a) and other topics addressed in the Executive Order.

RFMCs have been effectively conserving marine resources for over 40 years.

The MSA includes 10 National Standards to guide management of our nation's marine fishery resources that require the RFMCs, in addition to preventing overfishing and rebuilding overfished stocks, to minimize bycatch and provide for the sustained participation of fishing communities. The National Standard guidelines require Councils to manage for optimum yield, which is a precautionary approach to ensure harvest does not exceed maximum sustainable yield.

More specifically, the RFMCs develop and implement fishery management and ecosystem plans for marine waters of the U.S. EEZ that:

- Establish conservation objectives and associated management measures for managed fish stocks
- Identify and protect habitat for managed fish species, coral reef, and deep sea coral ecosystems
- Describe and monitor marine ecosystem functions, and apply them in management
- Support coastal economies and communities, including disadvantaged, minority cultures and communities
- Conserve, manage, and protect forage fish for the benefit of marine mammals, birds, and ecosystem functions
- Establish conservation objectives and associated management measures that minimize bycatch of non-target species, including fish, marine mammals, and marine species listed under the Endangered Species Act
- Support U.S. engagement in Regional (international) Fishery Management Organizations (RFMOs)
- Provide a sustainable supply of seafood and fishing opportunity for U.S. citizens and contribute to domestic food security.

Most stocks are managed on annual or biennial regulatory cycles supported by ongoing scientific surveys to support stock assessments. Councils are also required to periodically review and update their fishery management and ecosystem plans, habitat protection plans, stock assessment and fishery evaluation reports, and their research and data needs reports. Each Council has a Scientific and Statistical Committee to independently review scientific information and methodologies to ensure conservation and management measures are based on the best scientific information available.

Fishery management plans and implementing actions address not only the MSA requirements, but also other statutes and EOs[2], and multi-lateral RFMOs[3]. All actions taken by the Councils are reviewed by, and if approved, implemented by the Department of Commerce to ensure compliance with other applicable law. These actions are also required under the MSA to have mandatory public review comment periods noticed in the *Federal Register*.

Ecosystem considerations are routinely used to inform management decisions.

The Councils understand that conserving marine ecosystems is essential to achieving our mandate under the MSA. In working towards this goal, the Councils have become pioneers at implementing ecosystem-based management, tailored to the needs of the unique ecosystems that each Council manages. within the EEZ.

Ecosystem-based management also involves managing the human element of the ecosystem, not just the 'natural' elements. The Councils manage commercial and recreational fishermen, and even though we do not manage for subsistence users, we recognize their importance and that their usage has been an element of these ecosystems for millennia. This process also fulfills another objective of the EO: to spur economic growth by sustainable practices, as evidenced by nearly a million jobs and $56 billion in value-added economic impact supported by the commercial, recreational, tribal and subsistence fisheries.

RFMCs are at the forefront of coping with climate change.

Our incorporation of ecosystem-based management places the Councils at the forefront of society's response to climate change. Fishermen are well aware that warming ocean temperatures are changing the distribution of fish and affecting their productivity - they see it every day in their catches. The RFMCs are actively adapting to the rapidly changing conditions caused by global warming. This response is essential if the benefits of sustainable fisheries are to be realized by future generations. Because of our experience, we are uniquely positioned to evaluate what is needed to achieve the goals of the EO.

RFMCs use a public, collaborative process in the conservation of living marine resources.

The RFMCs accomplish these functions through a process that is open to the public, inclusive of all stakeholders, fair, and with balanced representation. Council members include representatives from state fishery management agencies, National Marine Fisheries Service, U.S. Fish and Wildlife Service, treaty Indian Tribes, territories, U.S. Coast Guard, Department of State, and Department of Commerce-appointed stakeholders representing commercial and recreational fishing interests, environmental organizations, and academics. All Council meetings are noticed in the *Federal Register*, open to the public, and provide extensive opportunity for public comment.

[2] Including the Administrative Procedure Act, Coastal Zone Management Act, Endangered Species Act, Information Quality Act, Marine Mammal Protection Act, National Environmental Policy Act, National Marine Sanctuaries Act, Paperwork Reduction Act, Regulatory Flexibility Act and Executive Orders 12630, 12866, 12898, 13089, 13132, 13158, 13175, 13272.

[3] Including the Western and Central Pacific Fisheries Commission, Inter-American Tropical Tuna Commission, North Pacific Fisheries Commission, Pacific Salmon Commission, Northwest Atlantic Fisheries Organization, and others.

Atlantic States Marine Fisheries Commission

Atlantic Menhaden Management Board

May 4, 2021
2:15 – 3:45 p.m.
Webinar

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)*	2:15 p.m.
2. Board Consent • Approval of Agenda • Approval of Proceedings from February 2021	2:15 p.m.
3. Public Comment	2:20 p.m.
4. Consider Fishery Management Plan Review and State Compliance for the 2020 Fishing Year *(K. Rootes-Murdy)* **Action**	2:30 p.m.
5. Discuss Revisiting the Commercial Quota Provisions of Amendment 3 *(K. Rootes-Murdy)* **Action**	2:45 p.m.
6. Review Data Needs for Spatially Explicit Management of Atlantic Menhaden in the Chesapeake Bay *(J. Newhard)*	3:15 p.m.
7. Other Business/Adjourn	3:45 p.m.

The meeting will be held via webinar, click here for details.

MEETING OVERVIEW

Atlantic Menhaden Management Board
Tuesday, May 4, 2021
2:15 – 3:45 p.m.
Webinar

Chair: Spud Woodward (GA) Assumed Chairmanship: 03/20	Technical Committee Chair: Josh Newhard (USFWS)	Law Enforcement Committee Representative: Robert Kersey (MD)
Vice Chair: Mel Bell (SC)	Advisory Panel Chair: Meghan Lapp (RI)	Previous Board Meeting: February 2, 2021
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 February 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. Fishery Management Plan Review (2:30-2:45 p.m.) Action

Background

- State compliance reports were due April 1, 2021
- The Plan Review Team reviewed each state reports and compiled the annual FMP Review.
- Pennsylvania, South Carolina, Georgia, and Florida have requested and meet the requirements for *de minimis*.

Presentations

- Overview of Atlantic menhaden FMP Review by K. Rootes-Murdy (**Supplemental Materials**)

Board Actions for Consideration

- Accept 2020 FMP Review and State Compliance Report
- Approve *de minimis* requests for Pennsylvania, South Carolina, Georgia, and Florida

5. Discuss Revisiting Commercial Quota Provisions of Amendment 3 (2:45-3:15 p.m.) Action

Background

- Amendment 3 (2017), implemented in 2018, establishes that the Board will revisit quota allocations every three years following implementation.
- In February, the Board reviewed recent landings relative to commercial allocations and requested additional information to further discuss revisiting the current commercial allocations. **(Briefing Materials)**

Presentations

- Revisiting Commercial Allocations by K. Rootes-Murdy

Board Actions for Consideration

- Initiate development of a management document to revisit commercial quota allocations

6. Review Data Needs for Spatially Explicit Management of Atlantic Menhaden in the Chesapeake Bay (3:15-3:45 p.m.)

Background

- The 2019 Atlantic menhaden benchmark stock assessments outlined a research recommendation to 'develop a spatially-explicit model'.
- In February, the Board tasked the TC and Ecological Reference Points Work Group (ERP WG) with providing additional detail regarding data and modelling needs to develop a spatially-explicit model that could help inform management in the Chesapeake Bay.
- The TC and ERP WG met in March and discussed data needs and potential timelines depending on the management objectives the Board wants the next benchmark stock assessment to address. **(Supplemental Materials)**

Presentations

- TC and ERP WG review of Spatial and Regional Model Needs by J. Newhard

7. 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 – various taskings relating to management response to the 2019 benchmark stock assessments
- TC,SAS, ERP WG- begin work to complete 2022 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), Shanna Madsen (VMRC), Chris Swanson (FL), Ray Mroch (NMFS), Amy Schueller (NMFS), Alexei Sharov (MD), Jeff Tinsman (DE), Kristen Anstead (ASMFC), Kirby Rootes-Murdy (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), Kirby Rootes-Murdy (ASMFC), Joey Ballenger (SC)

ERP WG Members: Jason Boucher (DE), 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), Sara Murray (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ATLANTIC MENHADEN MANAGEMENT BOARD

Webinar
February 2, 2021

These minutes are draft and subject to approval by the Atlantic Menhaden Management Board.
The Board will review the minutes during its next meeting.

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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)
Rep. Sarah Peake, MA (LA)
Conor McManus, RI, proxy for Jason McNamee (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Rep. Sosnowski (LA)
Justin Davis, CT (AA)
Rob LaFrance, CT, proxy for B. Hyatt (GA)
Maureen Davidson, NY, proxy for J. Gilmore (AA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Joe Cimino, NJ (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)
Russell Dize, MD (GA)
Allison Colden, MD, proxy for Del. Stein (LA)
Steve Bowman, VA (AA)
Bryan Plumlee, VA (GA)
Shanna Madsen, VA, proxy for Sen. Mason (LA)
Chris Batsavage, NC, proxy for J. Batherson (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)
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
Amy Schueller, SASC Chair

Staff

Bob Beal
Toni Kerns
Kristen Anstead
Maya Drzewicki
Emilie Franke
Sarah Hylton
Chris Jacobs
Jeff Kipp
Dustin Colson Leaning
Savannah Lewis
Kirby Rootes-Murdy
Sarah Murray
Joe Myers
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Karen Abrams, NOAA
Fred Akers, Newtonville, NJ
Bill Anderson, MD (AA)
Pat Augustine, Coram, NY
Vincent Balzano, Saco, ME
David Behringer, NC DENR
Rick Bellavance, N. Kingston, RI
John Bello, CCA VA
Peter Benoit, Ofc. Sen. King
Alan Bianchi, NC DENR
Deidre Boelke, NEFMC
Ellen Bolen, VMRC
Jason Boucher, DE DFW
James Boulette
Rob Bourdon, MD DNR
Bonnie Brady
Delayne Brown, NH F&G
Jeff Brust, NJ DEP
Patrick Cassidy
Matt Cieri, ME DMR
Germaine Cloutier
Heather Corbett, NJ DEP
Derek Cox, FL FWC
Caitlin Craig, NYS DEC
B. Crockett, Advantus Strategies
Jane Crowther, Omega Protein
Jessica Daher, NJ DEP

Guests (continued)

Randy Dean
Jeff Deem, Lorton, VA
Monty Deihl, Ocean Fleet Svcs.
John DePersenaire, RFA
Greg DiDomenico, Cape May NJ
Chris Dollar, CBF
William Dunn
Julie Evans
Sarah Ferrara, MA DMF
Cynthia Ferrio, NOAA
James Fletcher, Wanchese Fish Co
James Flora
Tony Friedrich, SGA
David Frulla, ME
Thomas Fuda
Alexa Galvan, VMRC
Pat Geer, VMRC
Shaun Gehan, Gehan Law
Lewis Gillingham, VMRC
Jim Gilmore, NY (AA)
Angela Giuliano, MD DNR
Willy Goldsmith, SGA
Zack Greenberg, Pew Trusts
Pam Lyons Gromen, WildOceans
Emily Hall
Nathaniel Hancock, NC DENR
Brian Hardman
Hannah Hart, FL FWS
Marin Hawk, MSC
Jay Hermsen, NOAA
Helen Takade-Heumacher, FL FWS
Peter Himchak, Cooke Aqua
Carol Hoffman, NYS DEC
Harry Hornick, MD DNR
Edward Houde, UMCES
Asm. Eric Houghtaling, NJ (LA)
Rachel Howland, NC DENR
Peter Hughes, Atlantic Capes
Bill Hyatt, CT (GA)
Jeff Kaelin, Lund's Fisheries
Pat Keliher, ME (AA)
Greg Kenney, NYS DEC
Adam Kenyon, VMRC
Hannah LaClaire, *Maine Today*
Ben Landry, Ocean Fleet Svcs.
Wilson Laney, NCCF
Tom Lilly
Mike Luisi, MD DNR
Chip Lynch, NOAA
John Maniscalco, NYS DEC
Dan McKiernan, MA DMF
Jay McNamee, RI DEM
Steve Meyers, Williamsburg, VA
Chris Moore, CBF
Brandon Muffley, MAFMC
Allison Murphy, NOAA
Brian Neilan, NJ DEP
Kennedy Neill
Gerry O'Neill, Cape SeaFoods
Derek Orner, NOAA
Patrick Paquette, MA SBA
Olivia Phillips, VMRC
Janice Plante, NEFMC
Nick Popoff, FL FWS
Jill Ramsey, VMRC
Harry Rickabaugh, MD DNR
Mike Ruccio, NOAA
Jocelyn Runnebaum, TNC
CJ Schlick, NC DENR
Tara Scott, NOAA
McLean Seward, NC DENR
Krista Shipley, FL FWC
David Sikorski, CCA MD
Melissa Smith, ME DMR
Somers Smott, VMRC
George Stamboulis, NY IT
Mark Taylor
Pam Thames, NOAA
Chris Uraneck, ME DMR
Robert Vanasse
Douglas Vaughan, Beaufort, NC
Beth Versak, MD DNR
Meg Viviano, *Ches. Bay Magazine*
Mike Waine, ASA
Holly White, NC DENR
Kelly Whitmore, MA DMF
Kate Wilke, TNC
Angel Willey, MD DNR
Chris Wright, NOAA
Sarah York, NOAA
Phil Zalesak, Timbers, MD
Erik Zlokovitz, MD DNR
Rene Zobel, NH F & G

The Atlantic Menhaden Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Tuesday, February 2, 2021, and was called to order at 2:30 p.m. by Chair Spud Woodward.

CALL TO ORDER

CHAIR SPUD WOODWARD: Good afternoon, members of the Atlantic Menhaden Management Board. Greetings from sunny but cold and windy coastal Georgia; at least by our normal standards. This is Spud Woodward, your Chair, and I'm going to call our meeting to order.

APPROVAL OF AGENDA

CHAIR WOODWARD: Our first item of business is we have a draft agenda for consideration. Are there any requested modifications or changes to the agenda? If so, raise your hand so you can be identified.

MS. TONI KERNS: You have Allison Colden.

CHAIR WOODWARD: All right, go ahead, Allison.

DR. ALLISON COLDEN: Mr. Chair, if possible, I would like to request just a couple minutes under today's Other Business section to bring an idea to the Board about next steps related to improving our menhaden data and modeling.

CHAIR WOODWARD: Very good, I think we'll make time for that. Thank you, Allison, it's duly noted. Any other recommended or requested changes to the agenda? If not, any opposition to adopting the agenda?

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

CHAIR WOODWARD: All right, then we will adopt the agenda by consent.

APPROVAL OF PROCEEDINGS

CHAIR WOODWARD: Next item of business will be approval of the draft proceedings from our October, 2020 meeting. Are there any edits, modifications, changes to the proceedings as presented in the meeting materials?

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

CHAIR WOODWARD: All right, any opposition to adopting the proceedings as presented?

MS. KERNS: No opposition.

CHAIR WOODWARD: All right, we'll consider the proceedings adopted by consent.

PUBLIC COMMENT

CHAIR WOODWARD: Next, we have public comment. If there are members of the public that would like to make comment about the activities of the Menhaden Management Board, please raise your hand so you can be identified, and once we determine how many folks we have that want to comment, we'll make a decision about allocated time. What are we looking like, Toni?

MS. KERNS: I believe we have two hands raised, Phil and Tom Lilly. Tom Lilly put his hand down, but I think he indicated to Kirby he wanted to speak, so two.

CHAIR WOODWARD: All right, well we'll start with Phil Zalesak. Phil, you've got three minutes, and we'll let you know when you get to the end of those three minutes, so you can go right ahead.

MR. PHIL ZALESAK: Thank you, Chairman. The most important issue facing the Board is the overharvesting of Atlantic menhaden in the Chesapeake Bay by the reduction fishery. Why? This Board lowered the total allowable catch for Atlantic menhaden by 10 percent, from 216,000 metric tons to a little over 192,000 metric tons, to improve the survivability of striped bass, bluefish, and weakfish.

Since the Commission allocates over 78 percent of the total to Virginia, and Virginia allocates over 90 percent to the reduction fishery, the reduction fishery has allocated over 136,000 metric tons, or 71 percent of the total allowable catch of the entire Atlantic coast. Of this total, 51,000 metric tons can be harvested from the Virginia portion of the Chesapeake Bay, 51,000 metric tons is 26.5 percent of the Atlantic coast total allowable catch.

Clearly, overharvesting of Atlantic menhaden is occurring in the Chesapeake Bay. It gets worse! Omega Protein frequently positions its boats just outside the entrance of the Chesapeake Bay, so they can harvest migrating menhaden entering and exiting the Bay. What is the impact? The devastating decline of the commercial harvest continues in the Chesapeake Bay for important predator fish such as striped bass, bluefish, and weakfish.

In the last 22 years, the commercial harvest has declined 34 percent, 76 percent, and 98 percent respectively. The devastating decline in commercial fishermen continues in Maryland and Virginia. Now the last 20 years, Maryland and Virginia have lost a combined total of 668 commercial fishermen. That was a 32 percent decline for Maryland, and a 40 percent decline for Virginia.

Does this affect your state, 60 percent or more of the ocean-going striped bass that originate as spawn in the Chesapeake Bay and its tributaries, and the GDP associated with striped bass recreational fishing industry alone amounts to 7.7 billion dollars, and over 104,000 jobs, as reported in the 2019 striped bass fishery management report. Clearly, this is impacting your state's business face, along with Maryland and Virginia.

I therefore propose the following addendum to the current fishery management plan in the form of a motion, which does not take one fish from Omega Protein's quota. It reads as follows. The Atlantic Menhaden Reduction Fishery is limited to the Atlantic Ocean, outside the three nautical mile exclusive economic zone. Any Board member can make this proposal as a motion, and start the process for review. Atlantic menhaden need to recover for the benefit of recreational fishermen, non-reduction commercial fishermen, and last but not least the marine environment. Start the process, and give this issue the light of day for the public. Finally, the data just presented comes from the Commission or states augmentation. See my e-mail of noon today. I thank you for your time and consideration. Take care and be safe.

CHAIR WOODWARD: Thank you, Phil. I appreciate your comments. Tom Lilly, are you ready to make your comments?

MR. TOM LILLY: Yes, I am, Spud.

CHAIR WOODWARD: All right, go right ahead.

MR. LILLY: Could I have an extra minute just to reminisce a little bit, since I'm an aged person, and I might know a few things that might be important. Can I have an extra minute?

CHAIR WOODWARD: We'll let you have an extra minute, Tom, go ahead.

MR. LILLY: Okay, great. Listen, as you all know, I've been involved in this quite a while, and I got the chance to talk to quite a few of you. I want to say personally that I appreciate so much taking the time, if you looked at our new website, you know completely the direction we would like to see this Board go.

But, I would like to reminisce with you a little bit because, you know, I've found it so difficult to work with some of the managers, because they just haven't seen the Chesapeake Bay the way we knew it, say 15 or 20 years ago. Yes, you can describe it. You can write it down on paper. You can take pictures. But those are just words on paper and ink on paper

They don't in any way, it's so hard to convey that feeling of what it's like out there, and how important these menhaden are to the way we live on the water. I want to tell you a little quick story. About 15 years ago I lived in White Haven. It was a cold, December day, and the snow was blowing a little bit.

I have a 26-foot World Cat, and me and some friends slows up, heading down towards Tangier Sound. It's getting colder and the snow was blowing. I had a little bit of canvas on the boat. But anyway, I got out to mid river around 72, buoy 72, which is not that far above the Virginia line, looking down towards Tangier, Virginia. It's an amazing sight.

You can see a hundred boats, a hundred charter boats, many small boats looking up towards Cambridge way up north, hundreds and hundreds of large charter boats and smaller boats with guys like us, and huge schools of menhaden. I mean these are schools the size of a stadium, with gannet working them, noisy birds.

Captains maneuvering around these schools, planer boards out, 30 lines in the water, crowds of fishermen packing the cockpit. Some of these are big boats, they hold 12 fishermen, most of them are 6-pack boats. Guys in the back of the cockpit just waiting, and those lines are out, and bang, four lines go down. The mates are running around, they're trying to get all these lines in, there are fish tangled in the lines. It's just a Chinese cluster, you know what. It's just amazing. Fishermen start cranking, and they're pulling in these beautiful fat rockfish, and it's just an incredible sight. These guys are having the time of their lives, these fishermen. It's an experience they are never going to forget. There were probably 150,000 charter clients taken out that winter.

You just have to be there to enjoy it, and you'll want it to come back. That is the important thing. We want that back again for our kids and our grandchildren. That is a little bit of the reminiscing, and I'm trying to go through what we're after here, what we're trying to have you pay attention to. I know a lot of it is in the website, and I hope you've looked at it.

CHAIR WOODWARD: Tom, sorry to interrupt you, really need to get you to wrap it up, if you would. If you're going to repeat what Phil said, I think we've got it.

MR. LILLY: No, I'm not repeating anything of what Phil said. What I want to talk about is Chesapeake Bay's menhaden forage base being rebuilt. That is the menhaden coming in May and June. It takes a lot of menhaden to rebuild Chesapeake Bay's forage base, probably about 30,000 tons. There are 12–200-foot purse seiners after those fish.

The question I am trying so diligently to have you all consider is, does some protection need to be given to those few menhaden schools that are coming in, in May and June, that we need to rebuild forage base. You know if the forage base was being rebuilt adequately, if it had been the last ten years, we would not have all the problems that our Bay is experiencing, and has experienced, if there were adequate fish there.

You know the list of problems; they are right in Bob Beal's letter. He spells every one of them out. Malnourished rockfish, micro bacteria's, sharp declines in all the commercial catches, 50 percent declines in the watermen. I'm sure you've read Dr. Brian Watt's letter on ospreys. Ospreys are dying out in the main bay, because they are not getting menhaden.

They are dying out in front of my house. We're just asking the delegates. We're very, very proud of the delegates that have indicated that this is a discussion that will be going on in the future about protecting this forage base. There are very simple ways to do that. Let me give you one example.

CHAIR WOODWARD: Go ahead, I'm going to give you about 30 seconds, and we're going to have to move on.

MR. LILLY: They take about 30,000 tons of menhaden in May and June, okay. That is about the amount the forage base needs are taken away. Now, all you would have to do is have Omega Protein just fish north of Cape Charles, out in the ocean, for the first 60 days of that season. That means the fish migrating.

They would then be catching from the schools that have already passed Chesapeake Bay, and menhaden from the Carolinas would get into the Bay for the first time in decades, and it wouldn't interfere with their business at all. It would change Chesapeake Bay completely. That's what we're asking. Spud, thank you, and you all stay safe.

CHAIR WOODWARD: All right, Tom.

MS. KERNS: Spud, another hand went up, Pat Moran put his hand up during when Phil was talking.

CHAIR WOODWARD: All right, Mr. Moran, you have three minutes as well, so go ahead. I don't hear anything. Toni.

MS. KERNS: I've got to find him again. I don't see him on the webinar now.

CHAIR WOODWARD: Okay, well let's move along then. All right, before we get into our next agenda item, I just wanted to make a few clarifying comments about where we are. Amendment 3 requires the Board to review the allocations and the status of de minimis every three years. We are into the fourth year after the implementation of those allocations. They started in fishing year 2018. We are bound to review the allocation this year.

However, it is important to note that the Amendment did not specify what constitutes a review. It is up to the Board to decide what is a review, and to conduct the review that is satisfactory to the Board members. What we're doing today is the beginning of that process, and Kirby and others have compiled information about the performance of the fishery.

However, we do not have the information for fishing year 2020. We will not have that information until April, and it would not be available for this Board to consider until the May meeting. That is just some precautionary word, in terms of when we start having discussions in reaction to what Kirby is producing, while we do have time.

If there is a desire on the part of this Board to start a management action to change the allocations, it can be done in May, and we would have adequate time to have that action completed and in effect for the 2022 fishing year. Also, just as a little reminder that we're fishing this year under a different TAC, and we'll fish under that same TAC next year. That may have some bearing on how we interpret the information that is available to us. With that preface, I'll turn it over to you, Kirby.

REVIEW RECENT FISHERY PERFORMANCE RELATIVE TO COMMERCIAL ALLOCATIONS

MR. KIRBY ROOTES-MURDY: Great, thank you, Chair Woodward. I have a brief presentation. I'm going to go through a Review of Recent Fishery Performance Relative to Commercial Allocations, and then I'll take questions. First, some background to help frame the next few slides on landings and quota transfers.

Amendment 3 approved in 2017 and implemented in 2018, established the current quota allocations to manage the total allowable catch, the TAC is what we refer to it as. Each jurisdiction is allocated a 0.5 percent fixed minimum quota, and the remainder of the TAC is allocated based on a three-year-average of landings from 2009 to 2011.

Annually, jurisdictions have the option to relinquish their fixed minimum quota by December 1st of the preceding fishing year. Any quota relinquished by a jurisdiction is redistributed to other jurisdictions that have not relinquished the quota, based on landings data from 2009 through 2011. Any overage of quota allocation is determined based on

final allocations, so that includes the quota transfers. The overage amount is subtracted for that jurisdiction's quota allocations in the subsequent year on a pound-for-pound basis. Today I have three tables I'll present, two of which are in the memo, included in supplemental materials.

Back in the fall, we received a request for the following information. First, with each jurisdiction's landings as a percentage of the annual coastwide total, and quota transfers. For pulling this data together, we used total landings, which it is important to note includes directed bait, reduction landings, as well as incidental catch and landings occurring under the episodic set-aside program.

What is on the screen now is Table 1 from that memo. Looking at this table, it's important to understand that total landings data used to display a state's percentage of the coastwide total, encompasses more than a jurisdiction is allocated in a given year, due to quota transfers, episodic landings, and/or incidental catch.

Maine is a good example of this. In 2018 and 2019, Maine was the only state to opt into the episodic set-aside program, and landed 4.6 and 4.4 million pounds respectively. Similarly, for 2019, Maine was the only state that declared incidental catch landings, which totaled 10.7 million pounds.

Again, annual landing percentage is higher than what you're seeing as their Amendment 3 allocations in the table do not indicate a quota overage. Since the implementation of the Amendment, the TAC has not been exceeded, and that is inclusive of incidental catch and episodic landings.

Also, important to note, New Hampshire, Pennsylvania, South Carolina and Georgia's information have been removed from the table to protect confidentiality. Last, I'll just point out that the ESSA Program has been in place since 2013, and landings under this Program have changed quite a bit, in terms of volume and in distribution across the coast, in terms of which states are participating, between 2013 and 2019.

The next table I have on the screen shows how jurisdictions have performed with only their directed landings, relative to their annual quota, which accounts for both redistributed, relinquished quota, as well as quota transfers. A few points to take away from this slide. No jurisdiction exceeded their directed fishery quota in either 2018 or 2019.

Most jurisdictions varied in landings compared to their quota for both years. But some were consistent, so Florida and North Carolina landed less than 30 percent and 20 percent of their respective quotas in both years. Maryland consistently landed just over 40 percent of their quota, and only three states landed 90 percent or more of their quota for both years; Massachusetts, New Jersey, and Virginia.

Then this table is not in the memo. Moving on to the next slide, this is Table 2 from the memo, and here we have the quota transfers from 2018 through 2020. Not every jurisdiction transferred quota consistently during these three years. Only Maine, Connecticut, New York, Maryland, and Florida either gave or received quota every year during this time period. Those are bolded in the far-right column. For all three years the only jurisdictions to have a net increase and their quota were transferred, were Maine, New Hampshire, and Massachusetts. In 2018, a total of 5.4 million pounds of quota were transferred. In 2019 a total of 11.25 million pounds were transferred, which is obviously an increase from 2018 levels, and in 2020, 10.6 million pounds were transferred.

To wrap up, this presentation and the memo were provided as background information for the Board's consideration, as part of reviewing allocations in Amendment 3. This is an initial first step. The Board can request additional landings data moving forward. As Spud noted, preliminary 2020 landings will be available later this spring through state compliance reports.

Last, just a note that when looking across different types of landings that we have in this fishery, confidentiality may pose an issue in trying to fully display a state's information over a certain time period. It may present challenges in trying to fully understand how every state and each landing category performed. But with that I'll take any questions. Thank you.

CHAIR WOODWARD: Thank you, Kirby, I'm going to open it up for questions, so if you will raise your hand, we'll work through the list of folks that have questions. Toni, I'll look to you to give me a "heads up" here.

MS. KERNS: Yes, you have so far two people on the list, John Clark and Megan Ware.

CHAIR WOODWARD: All right, go ahead, John.

MR. JOHN CLARK: Thank you, Kirby. You mentioned relinquishment of quota or the TAC, Kirby, but it didn't show up in the table. I just think it would help people understand more how much of the tagged states are giving up, if they could see how much we've relinquished, because I know for Delaware it looked like we didn't do much transferring, and we certainly don't catch anywhere near our TAC. But we do relinquish most of our TAC every year. That would be something that might be helpful in seeing how the TAC is given up by different states. Thanks.

CHAIR WOODWARD: Go ahead, Kirby.

MR. ROOTES-MURDY: Just that I have that noted, appreciate it.

CHAIR WOODWARD: All right, Megan.

MS. MEGAN WARE: I just have a clarifying question on the second table that Kirby presented. I just wanted to understand, that is percent of, I guess total quota that a state ends up with at the end of the year. That would include transfers in the denominator. Is that correct?

MR. ROOTES-MURDY: Correct.

MS. WARE: Okay, thank you.

CHAIR WOODWARD: All right, any other questions for Kirby?

MS. KERNS: I have no hand raised, Mr. Chair.

CHAIR WOODWARD: Okay, any general comments about the fishery performance that Board members would like to make, to help inform this discussion. Like I said earlier, you know we don't have the 2020 information. We certainly don't have to do anything today, other than absorb this information. And provide guidance to Kirby about what else we may need in the future. Well, certainly we've got time, so I'll open it up if there are some general comments people would like to make.

MS. KERNS: You have Ms. Ware and Ms. Madsen.

CHAIR WOODWARD: Al right, go ahead, Megan.

MS. WARE: I appreciate you kind of outlining the timing on this conversation, because I do think we're quite early in the process, and there is some important information coming in May. My intent today is really just to signal that Maine is interested in a conversation about menhaden allocation. If it's okay, Mr. Chair, if I could take maybe a few minutes to just talk about the Maine fishery, and some of the challenges we've been facing.

CHAIR WOODWARD: Yes. Go right ahead.

MS. WARE: Thank you. I don't think this is a surprise to anyone, but over the last five years we've seen really an exponential increase in the volume of menhaden in our state waters. I think concurrent with this, we've seen a shift in the timing of when menhaden arrive, so they're showing up earlier and earlier in Maine.

Then they are also moving further and further east in Maine, so kind of closer and closer to Canada each year. The result of this is that our quota, first just doesn't match the resource in our area, but

certainly as the menhaden show up earlier, and they go up further up the coast, the quota we do have gets used earlier and earlier each year.

Really, the result of this, which is I think pretty well borne in Kirby's tables is that Maine is 100 percent reliant on episodic and quota transfers in the small-scale fishery. I think the memo shows that at this point we land about 5 percent of the quota, and we're allocated 0.5 percent of the quota.

Obviously, this has pretty vague implications for the management program that we use in the state, and we've tried very hard to stay within the bounds of the FMP, and have moved to implement measures that are significantly more conservative than what's in the FMP to stay within our quotas.

We have implemented daily electronic reporting so we can effectively monitor this fishery. We seem to implement increasingly strict trip limits each year. Originally, we were at 120,000 pounds. Last year we ended up at 6,000 pounds on July 2, and we stayed at that for the remainder of the year, so basically most of our menhaden fishery was that 6,000 pounds, and we applied that trip limit to transfer quota, as a way to kind of help grow the use of that quota, since it was so early in the year. We've also kind of borrowed some management measures from herring, going with days-out for menhaden in Maine, you know we didn't use to have that.

Last year we ended up, I think, at two landing days. Then I think ahead of all that is a high priority on the enforcement that we've tried to put in the state, just given that there is a rapidly changing fishery. To kind of help focus the conversation, I guess there are three challenges that I would highlight that Maine is facing.

The first one is pretty clear, it's just that we have essentially more menhaden than quota allocated, and since the fish are showing up earlier each year, this means we run through our quota quicker, and we enter the small-scale fishery earlier. That is not a position I completely love. We have become completely reliant on quota transfers.

I want to take this opportunity to thank all the states for their generous quota transfers. Every time we call on July 4th weekend, I'm really appreciative that people pick up the phone. But I will say it is near impossible to manage a fishery when we get quota transfers at different amounts, and at different times.

I think probably other states can empathize with this, but it just makes it impossible to plan out a season, and the result is we're always reactive to what quota we have in the piggy bank, as opposed to proactive. I think the third challenge, and this is somewhat created through Amendment 3. I actually think Amendment 3 was trying to be helpful in creating these different pockets of quota. We have the episodic quota, we transferred quota, we have access to small scale fishery.

But the problem is that each of these comes with a different set of characteristics or regulations, and we're just moving through these different phases of the fishery so quickly that it causes some pretty big management challenges. We're just constantly changing regulations, so that system isn't working too great. Again, just trying to signal that Maine is interested in a conversation on allocation.

I don't think that is a surprise to anyone. I don't have any motions today, because I do think we're quite early in this conversation. But if there are ways that we can help advance those conversations between now and May, whether that be through additional data requirements, or just conversations amongst ourselves, we would be supportive of that. Thank you.

CHAIR WOODWARD: Just for the members that may not be as knowledgeable about the fishery in Maine. The menhaden landings that are occurring, so what sort of a proportional use are those landings, you know in terms of where is it going? I think that might help some of our other.

MS. WARE: Yes, it's 100 percent for bait. We don't have a reduction fishery in Maine, so 100 percent of this is bait. I would confidently say it's all going to the lobster fishery. It has become quite an important bait source. I think there is some unique characteristics in Maine, so we do kind of have two different sets of participants in the menhaden fishery. We have, I think what most people would think of, which are your larger vessels that are part of the bait infrastructure in a state, and commercially sell that for bait. But we also have a group of smaller vessels, which tend to be lobster vessels, that want to go and catch bait for their own use. We kind of have these two distinct populations that have somewhat different goals of what they would like to see in the fishery, but it is all going as bait to the lobster fishery.

CHAIR WOODWARD: All right, thank you. Before I go to Shanna, does anybody have any other questions for Megan on anything that you think Maine could provide that might help us in future activities related to the review of the allocations? If so, now would be a good time to speak up, so that Kirby can attach to that.

MS. KERNS: Mr. Chair, you have several people that have put their hands up since asking for comment, and I don't know if these are direct questions to Megan or just folks that want to comment. But we have Lynn Fegley, Dennis Abbott, Roy Miller, and Cheri Patterson.

CHAIR WOODWARD: Okay, well I'll tell you, we'll just proceed with the questions, and if any of these are related back to Megan, then we'll just handle that as we go. Shanna Madsen, I think you're next in the queue.

MS. SHANNA MADSEN: If we do want to go back to having folks' comment on Megan's comments, I'm happy to let them go in front, because mine is sort of unrelated, and is sort of about the data streams that are coming into some of these conversations. I don't know if you would like to take it up now or wait.

CHAIR WOODWARD: Yes, just go ahead. We can always bounce back to Megan if we need to. Go ahead, Shanna.

MS. MADSEN: Great. My comment is sort of related to, I think some of the data streams that I saw both go into the projections, as well as the allocations. I guess my question is sort of generally more towards where are our data sources going to come from when we're having these allocation discussions?

I know that several states in the past have had some issues reconciling their landings data internally at the state level, through the ACCSP data warehouse, and kind of looking between the compliance reports and their data warehouse, try to get those two numbers to line up in a meaningful fashion.

For me, from my standpoint, I think it's really important to decide where our data streams are going to come from, when we're talking about allocations. I don't know if that is more of a question directed towards staff, in that I know that it takes a really long time to get these data validated and ready to come before the Board.

But I personally think it's really important to be using validated landings data, versus some of the compliance reports. I'm wondering if we continue this conversation, as sort of the signaling of if we'll continue to use compliance report data, or if we'll be using validated landings data.

CHAIR WOODWARD: Okay, good question, and I'm going to pass that one to Kirby, and maybe even Toni for a response.

MR. ROOTES-MURDY: Sure, thanks Chair. I can speak to what we used in the memo. It's a good point to bring up. We used the data that we get from state compliance reports. At least some caveats with that data that I think the Board should be aware of. That is what each state submits to us, you know when compliance reports are due later in the spring.

That data is inherently preliminary, we know that, we treat it as such. I know ACCSP doesn't prefer the term final, but you know validated landings that you would find through the ACCSP database for example 2020. I think generally my understanding is that would be available later than when the compliance reports are submitted.

They aren't arriving at the same time. That is the consideration for this Board, that if there is an interest in using landings data from the ACCSP data warehouse that that timetable for when that data would be available, for example to be looked at, or go into a management document. It would probably be different than if we were going off of the information compiled just in state compliance reports.

MS. KERNS: Mr. Chair, I'll just add that we'll make our best efforts to work through the ACCSP and the states. In some circumstances there is some information that the states have that the ACCSP does not have. In the end, when we're working through allocation management documents, the state has the final sign-off on their numbers, before we work through them.

In the end it has in the past always been the states final check, to make sure we have the correct data. But we are always working through the state and the ACCSP to validate those numbers. If the Board wants to have a different formalized process, we can definitely work through that as the document moves forward.

CHAIR WOODWARD: Thank you, Kirby and Toni. In terms of what would be available during, well before and during the spring meeting of this Board. We'll have compliance report data, but we won't necessarily have any differences between ACCSP warehouse and state data resolved.

We could have some issues there that theoretically we initiated a management action at that spring meeting, to revise allocations. We could, I guess perfect the document as we move forward. I guess that's a long way of saying, will we be facing delays that could affect our ability to implement changes for the 2022 fishing year?

MS. KERNS: We'll have to sit down and talk to ACCSP and the states on that, Spud, to give you a clear answer.

CHAIR WOODWARD: Okay, all right. Thank you, Shanna, for bringing that up. Obviously, when we get into allocation discussions, decimal points matter. We want to make sure that everybody is as confident as they can be in the information that we're using. Back to Lynn Fegley.

MS. LYNN FEGLEY: I just wanted to start by saying that I really am looking forward to talking about allocation. But in the meantime, I did have one question. I have a question and a comment, if I may, a question for Megan. Megan, I really appreciate the synopsis of what you guys are dealing with up there.

I was curious about effort in your fisheries, whether you have incoming effort to the menhaden fishery as people are transitioning over from herring, if you're seeing more people engaging more vessels. That is not something that I think you need to answer now, but I would just be sort of curious to see how your capacity is building for menhaden.

Then with that in mind, I kind of wanted to give the Board a little homework. Because allocation is so challenging, and it's so challenging for a fish like menhaden. You know Maryland, we are a very small player in this fishery, although the fishery is sort of the lynchpin of our watery communities.

We do see that these fish cycle north and south. About the time that Amendment 2 was put into play in 2013, I think, we were landing in the realm of about 11 to 13 million pounds of menhaden. We seem to go through these cycles, you can see it through time in our pound net landings that we have these big events, and then they go into a lower cycle, which is where we are now.

Whenever we're in a low cycle, New England seems to be in a high cycle. These fish seem to do the same, where they flux up and down the coast, and whether or not that fluctuation is going to change with climate change, you know who can say? But we get the sense that these fish are probably going to come back, because that's what has happened in history.

With that, I need to repeat that you know our fishery in Chesapeake Bay is prosecuted by gear that cannot move. They are passive gears, they fit in the water. They cannot chase the fish. They cannot go find the fish. They just are whatever passes by is what they get. It's a little bit awkward to put them on the same playing field as a gear that can really go out and run, chase the fish, find them and catch them.

The homework really is for everybody to maybe put some thinking caps on, think creatively, how do we handle allocation in a situation where the fish population does seem to slosh back and forth from north to east, and we have these very different sets of gears. Part of seeing these animals, and I'll just wrap that up, Mr. Chair, by saying I really would recommend.

I think it's very helpful to set up when we start down this road, I think a working group is helpful, as inclusive as we can possibly be, just so that we have a little more time to talk in a little more detail, about how we might want to approach this other than, you know around a big table under a parliamentary procedure.

CHAIR WOODWARD: Thank you, Lynn. It's comments like that that make me regret that I didn't become a forester, instead of a fisheries biologist, because bless their hearts, those trees do stay put until you cut them down, generally. Anyway, appreciate your comments. Dennis Abbott, you're next.

MR. DENNIS ABBOTT: Thank you, Mr. Woodward. It seems like you're a sucker for punishment though. You retired, and here you are back again, right in the middle of this cup of whatever it is. We have no sympathy for you today. Let me say, I have a couple comments and a couple of questions.

Megan made some very good points about issues that she is experiencing in Maine, and we're experiencing the same things here in New Hampshire. I don't know what would have happened, from my view point, if the population of menhaden hadn't drifted northward, at the same time where the herring population was collapsing.

I think several years ago, when the herring quotas were going down, there was a lot of concern that there would not be nearly enough lobster bait. Luckily, menhaden showed up, and sort of filled the breach to some degree. However, I was thinking, well I've been thinking for the past few days, I also had some thoughts after the first two speakers from the public spoke, Mr. Zalesak and Mr. Lilly.

As recently as last year, we incorporated ERPs, and ERPs in my opinion, this would be a question. Shouldn't they have a spatial component? You know it's one thing to say that we should be providing food for all the critters in the water, above the water and whatever. But if we're taking too many menhaden out of one localized spot, I don't think that we're doing much when it comes to ecological reference points, and managing you know, in that way, or does it not make a difference where we take the menhaden?

Does it make a difference if we're catching them in the Bay or whether we're catching them in the open ocean? Does the location where we're taking them, does that effect reproduction? As I understand it, menhaden are spawning in the open ocean, and then they follow a gyre into wherever they go.

What I'm trying to get at is, I think that whatever we do moving forward with allocations, should have some sort of a spatial component to them. Should we not be looking at dividing the allocations regionally? A number of years ago we put a cap in Chesapeake Bay, and we lowered it, and it surely led us down a path of problems.

But is the quota that we're taking out of the Bay a right number? Should there not be some sort of, I don't know what words to use, some sort of study to determine what would be a good number to be taking out of the Bay, when it comes to menhaden? Also, final comment would be, the folks from Maryland brought forward an issue, and they would like to see us do something about the Chesapeake Bay.

I have suggested to them offline that, you know it's a mess, it's a problem that started in Maryland. You know maybe Maryland should respond to them and initiate some action from that direction. But again, I think we have to look at spatially where we're taking menhaden from, thank you.

CHAIR WOODWARD: Thank you, Dennis, and I think maybe one of the elements. If we do go down the route of forming a workgroup to address allocation, and I know the term workgroup causes some folks angst, certainly. That is probably one of the things that they would look at, is if something better than state by state, you know should it be managed by regions. When you look at species like menhaden, you have to sort of be open minded about, you know what do you want to accomplish with an allocation scheme? Thank you, Dennis. All right, Roy Miller, you're next and then Cheri, you're on deck.

MR. ROY W. MILLER: I have a quick question for Megan. Megan, what gear type are we talking about in Maine? I presume, since we're talking about millions of pounds it is a directed fishery.

CHAIR WOODWARD: Go ahead, Megan.

MS. WARE: Yes, it is a directed fishery, primarily purse seine is the gear that is harvesting menhaden, there are also gillnets. I can get some more specific percentages if that is something you would be interested in; it would just take me a few minutes.

MR. MILLER: Well, Megan, I was most curious about the primary gear type, and you say it's mostly purse seine.

MS. WARE: Correct.

MR. MILLER: It's not a bycatch, it is a directed fishery then, okay thank you.

MS. WARE: Yes, and Mr. Chair, I'll say I'm happy to answer Ms. Fegley's questions too, but I can do that later in the queue. I have my hand up.

CHAIR WOODWARD: Well, I tell you what, why don't you just go ahead, while it's fresh on our mind. Go ahead.

MS. WARE: Okay, thank you. I think Lynn, I actually think there are two questions in your question. The first is, what are the impacts of the herring fishery really having some significant reductions, and then the second is kind of what are foot trends? I'll just start by saying, you know we have a pretty high capacity in Maine, as it is harvest menhaden. We're a big coast, and have a pretty big fleet. I do think herring is part of the conversation here.

You know we've had 90 percent reduction in those quotas over the last few years, so menhaden has become a critical bait source in Maine. That said, I don't think we're seeing a lot of what I would consider like primary herring boats transfer over to menhaden, because of vessel size restrictions. I don't think that is where, like we would see a burst in effort coming from. I think actually where we're seeing maybe burgeoning effort is in the small vessel groups that I talked about.

This is linked to herring, in the sense that it is lobstermen trying to catch their own bait, and menhaden is that bait source. We've actually created two separate licenses in Maine for menhaden, to try and tackle this issue of how do we manage really diverse universe for menhaden. We have a commercial and a non-commercial permit now. The non-commercial permit is intended for the lobster boats also that are trying to catch their own bait, and we cap them at a very low trip limit of

three barrels per trip, which I think a barrel is about 350 pounds, so a little over 1,000 pounds. But the positive there is that they get greater flexibility on the days they can fish.

For the commercial license, which again it's maybe the larger boats that people think of with menhaden. They will have a higher trip limit, but are pretty restricted on their landing days. We do see a lot of lobstermen kind of self-select into that lower trip limit, to be able to get more landing days, because that helps them plan menhaden days versus lobster days. Hopefully that gives a better picture in separate.

CHAIR WOODWARD: Thank you, Megan. All right, Cheri.

MS. CHERI PATTERSON: I just would like to echo more of what Megan has indicated on behalf of the state of New Hampshire. We are extremely thankful to all the states that have been willing to give up some quota, so that we can continue to provide our lobster industry with bait, considering we really don't have herring any longer in our wheelhouse for our lobster industry.

We have been very fortunate to have a few big boats that have been willing to come into state waters. To land, I should say, not to fish, and provide this needed bait source, as well as when they are out fishing for longer days in between landings. We have made adaptations to our rules to allow for smaller sort of purse seine, for example to fish in state waters, to still be able to supply smaller amounts.

But our lobster pot footprint in our state waters really prevent any other sort of mobile gear from fishing in our state waters. We are very reliant upon these bigger boats that are fishing in federal waters and such to land in New Hampshire, to help supply our major commercial fishing industry. Like Maine, we have become very reliant upon the graciousness of other states to transfer some quota up to us. Again, very thankful for that, and I am looking forward to this further discussion in our future.

CHAIR WOODWARD: Toni, do we have anybody else in the queue?

MS. KERNS: We have Ms. Meserve and Roy Miller.

CHAIR WOODWARD: All right, go ahead, Nichola.

MS. NICHOLA MESERVE: I'll just jump on and say that I'm also looking forward to this discussion of the allocations continuing, and I use allocations in the broad sense, to also incorporate looking at the episodic event set aside percentage, and the incidental catch and small-scale allowance.

Both of those measures are really intimately tied to the state allocations. In terms of what staff could also provide for the next meeting, it would be some additional information on which states are using the incidental catch and small-scale fishery allowance, and the episodic set aside. This has been one of the best of the default allocations in Amendment 3 is that there does seem to be a reduced dependence on the small-scale allowance, with a notable exception of Maine, I think. I would like some of that discussion to kind of focus on whether that is still an appropriate tool, a necessary tool. I think it's an area of the Plan that was subject to some criticism, in terms of it is a pool of landings that are not counted against the TAC. I think it's something that deserves just to be part of the discussion as we move forward talking about the allocations.

I would point out, you know in Massachusetts also, we appreciate the quota transfers, and have had an increased trend of using our quota in the last couple years. That has not been due to an increase in a number of vessels, or higher fish availability in just the last two years. But some changes in the Massachusetts regulations that have enabled the fleet to take more of that quota. I would anticipate us having similar high percentages of quota use moving forward, since we made some of those regulatory changes.

CHAIR WOODWARD: All right, Roy Miller.

MR. MILLER: Sorry, I just forgot to lower my hand, Mr. Chairman.

CHAIR WOODWARD: All right that's fine, any other hands raised, Toni? Any hands? Can you hear me?

EXECUTIVE DIRECTOR ROBERT E. BEAL: Spud, this is Bob. I think Toni had to step away for a minute.

CHAIR WOODWARD: Okay, any other hands raised? Can you see?

MR. ROOTES-MURDY: There don't appear to be any, Spud.

CHAIR WOODWARD: That's been good conversation. I guess I'll throw something out, I guess to you, Kirby, and sort of a response to what we've heard. It sounds like the Board could benefit from maybe a better understanding of what is going on in the Gulf of Maine, and then these New England states.

There may be something that we need to talk about preparing for the next meeting, to better understand how things have changed out there. We can see the numbers, but there is always a lot behind the numbers, in terms of how fisheries are changing and evolving, and that kind of thing. It may be useful. Last chance for comments on Review of Allocations, before I move into Other Business. Any hands?

MR. ROOTES-MURDY: Hey Spud, this is Kirby. I just wanted to circle back to some of the points people brought up of data they want to see.

CHAIR WOODWARD: Go ahead.

MR. ROOTES-MURDY: Thanks. I have the note about relinquished quota that John Clark had mentioned, and I've got the note that Nichola mentioned, about wanting to have a little bit more information regarding which states have been landing menhaden under the episodic set aside, and those that have been claiming incidental catch. But you know I think what would be helpful from a staff standpoint. If this is information that the Board wants to have at their disposal by the May meeting. You know I think what I would plan to do at this point, is I would be going off of compliance report information.

But, it would be good to know and this group doesn't have to make a decision at this point. But if there is that interest in having landings data from ACCSP to be used, that is definitely something that we should have clear at some point, so that we can get the ball rolling, and make sure we have a data request put in properly. What Toni had mentioned before, you know there is the validation process that ACCSP does.

We would need to make sure that all states have given the thumbs up for any landings data that goes into a management document that is validated. But the other thing that can get a little complicated is that ACCSP has this information broken out by gear type. But the way that these landings are categorized, as has been talked about, into these different bins of directed, reduction, episodic set aside, and incidental catch, are sometimes made really only clear through the compliance reports.

I think there may be this need to have some element of both reports, compliance reports and ACCSP data moving forward. But it would be good to know at some point what the Board wants to use if there is that interest in doing a more thorough review, and of what years in particular. Thanks.

CHAIR WOODWARD: I'll just bring up what I mentioned earlier, and that is if we do believe that we need to have ACCSP data from the warehouse, it could possibly delay us having the information we need at the May meeting for discussions. I guess that is where I'm sort of hung up on this.

If we commit to using ACCSP data warehouse information, are we going to hamstring ourselves, in terms of moving forward, and like you just mentioned, is there going to be sources of information that we don't have? How do we comingle compliance reports and ACCSP data

warehouse information, to make sure that what we have is the total and complete picture?

I don't know if there is any strong feeling from the Board. We're kind of leaving Kirby in a little bit of an ambiguous place here, I guess. Maybe this is something that you and I and Toni and all can discuss further. But I think the goal is to make sure that what we have available in May is the most complete and trustworthy information that is available.

MR. ROOTES-MURDY: You've got Geoff White and some of the staff in the queue.

MS. KERNS: I think Bob wanted to speak, Kirby.

CHAIR WOODWARD: Bob, go ahead.

EXECUTIVE DIRECTOR BEAL: No, I didn't have a comment.

CHAIR WOODWARD: All right well Geoff, go ahead, Geoff White.

MR. GEOFF WHITE: Thank you. I just wanted to let the Board know that the normal timeline for ACCSP consolidating the data and making it available as a validated dataset is April 15. Some of the points that Kirby brought up about dispositions will still be on the table, but the normal process and timeline is April 15, so they have already begun that for all species. It makes the timeline a little tight for your May meeting, but that is the goal that we're shooting for, for your awareness. That's it.

OTHER BUSINESS

CHAIR WOODWARD: Well, I'll just say this. We'll make sure we do our best to bring the most complete and trustworthy information back to the May meeting for further discussion. All right, we're going to move on to other business, unless there is anyone who wants to make a comment about the allocation review. We had a request from Allison to discuss a topic under other business, so Allison, I'm going to let you have the microphone.

IMPROVING MENHADEN DATA AND MONITORING

DR. COLDEN: Thanks, Mr. Chair, and thank you. I appreciate the opportunity to address you all as a Board directly. Hopefully also, you all were listening to Dennis's comments during the allocation discussion just a few minutes ago, because he pretty much laid out everything I wanted to discuss today. Kudos to that Dennis, thank you.

But basically, what I wanted to just talk about briefly is you know over the years, and as far back as the 2004 menhaden workshop report, the Technical Committee, ERP Workgroup, peer reviewers and others have brought forth many research recommendations to improve our understanding of menhaden populations and menhaden dynamics.

You know no doubt this Board, the Commission, the Technical groups have made significant progress on some of those recommendations, particularly as we all know the ecological reference points. For certain questions, like what we've already heard discussed today about forage base in Chesapeake Bay, where are these fish going? How long are they staying there when they get there?

Those types of questions continue to elude us on a general basis. What I wanted to discuss today, and what I would like to request, is possibly tasking the Technical Committee and the ERP Workgroup, if necessary, with identifying and prioritizing which data or data collection programs would be necessary to develop some more spatial components of the ecological model, obviously specifically in our interest within the Chesapeake Bay.

I think this is an important next step that would allow us as Board members to review such a report, discuss these data gaps, and either go back to our states, or possibly collectively try and seek some funding through the Commission to support these research priorities to continue advancing our

menhaden models, menhaden management, and finally get some of these research recommendations off the page and into reality.

I wanted to put that forward under other business today, Mr. Chair, just to have a discussion around this, and see if the Technical Committee could produce either a report or a memo for the Board, which prioritizes some of their research recommendations to answer these questions.

CHAIR WOODWARD: All right, thank you, Allison. I'll pass that to Kirby and Toni for some feedback.

MR. ROOTES-MURDY: Thank you, Chair. This might be a little bit of a team effort to try to answer this. I think it might be helpful first to turn to our TC Chair, Josh Newhard, if he's available. I think he might be on the line. If he's not, then the other person I was thinking that could be helpful to try to talk to your spatial element that Allison mentioned, would be Katie Drew, regarding the ERP model.

MR. JOSH NEWHARD: Hi everybody, I'm Josh Newhard. Yes, I can speak to it a little bit. I'm sure if Katie wants to hop in, then she can hop in in terms of the ERP. But a lot of what Allison brought up is currently, they are research priorities, and they are based on the last assessment, to develop long term to develop a spatially explicit model. Now of course it's not Chesapeake Bay specific, it's just spatially explicit.

Some data we have, some data we don't have. I can't necessarily speak; it's been a while. But I don't know if it's laid out exactly what we have and what's needed. You know in terms of developing a memo, that could be possible there. But I will say, at least a spatially explicit model is on the radar for both the single species assessment, as well as the ERP. It's a research priority for that as well.

CHAIR WOODWARD: Thank you, Josh. Katie, if you're on, do you want to add anything to that?

DR. KATIE DREW: No, I would just agree with Josh to emphasize that you know this is definitely information we've presented to the Board before, and we can certainly pull it together into a more comprehensive format, and the spatial component of the ERP model is sort of the next big project we want to take on with the ERP modeling.

I think it would be reasonable for the TC and the ERP to have maybe a call or a discussion about next steps and a timeline, and data availability, from our own sort of organizational and progress making standpoints, and then we can report back to the Board on what that timeline is looking like, in terms of having it a spatial or more fine-scale model for the ERPs for the next benchmark.

CHAIR WOODWARD: Thank you very much. Allison, I think it sounds like we've got some forward momentum, so we'll look into the future to hear back on this. But thank you for bringing it up. We certainly want to, as satisfied as we are to have crossed the threshold on ERPs, it's not the end of the journey by any means. It is 3:55, we're schedule to end at 4:00. Is there anything else for the good of the Board anyone has, raise your hand?

MS. KERNS: Spud, you had Bob Beal and Lynn Fegley with their hand up from Board members, and then Phil Zalesak also has his hand up from the public.

CHAIR WOODWARD: All right, go ahead, Bob, and Lynn, you're on deck.

EXECUTIVE DIRECTOR BEAL: Just very briefly, I want to talk about for the money side of Allison's question. We may not want to wait until after all the technical conversations happen to start looking around for some funding to cover some of these priorities. I think, well the Executive Committee tomorrow morning is going to be reviewing a letter to the Office of Management and Budget that has a number of ASMFC priorities in it for fiscal year '22.

There are a couple specific projects in that letter, but they are ongoing projects, so we possibly could add some menhaden research for the Chesapeake Bay into that letter, or we could just add it to the list of priorities that Deke and I, and the number of Board members take to Capitol Hill when we're talking to appropriations stat, and trying to get funding that way.

You know if this group is comfortable with that, I think you know we can bring this idea forward to the Executive Committee tomorrow morning, and they can decide what the best route is to try to chase down a few dollars to cover these research priorities. A number of them are pretty expensive, so we're not going to be able to cover these with little bits of money here and there. There are some pretty big chunks of money. I think starting that conversation with the appropriations folks. The sooner we start that the better.

CHAIR WOODWARD: Thank you, Bob, good point. I know several of us have looked at that letter multiple times, and you think we would have at least recognized that menhaden was conspicuously absent. I would imagine that there wouldn't be any opposition from the Menhaden Board for a discussion about that tomorrow, so we'll look for that. All right, Lynn Fegley.

MS. FEGLEY: Just really quick, and just to piggyback with Allison a little bit. You know the Board heard us today. We have stakeholders who are very concerned about, you know the Chesapeake Bay and the unique role that it plays. I think because of the high dollar on a lot of these projects, that is one of the reasons why priorities are going to be really important.

I think it's going to be also important for the TC, if they can, to help the Board understand how some of the lifted priorities in the stock assessment and the amendments might help elucidate what's happening with dynamics in the Bay. For example, you know there is a priority that has to do with a coastwide adult survey.

I'm probably not quoting that exactly right. But you know what happens in the Bay doesn't happen in a vacuum, so I suspect that some of these research priorities might take on a little bit more of a coastal, it might sound more coastal, but they may really help us understand Bay dynamics better.

I'm just sort of asking if it's possible to make that link, it would be helpful, and also to help us understand too, I know we've had some memos about it, we should go back and read them, where the aerial survey that was put together, the aerial survey design that was put together by Dr. Wilbur would fall in the priorities. Thank you for the time.

CHAIR WOODWARD: Thank you, Lynn. All right, we've got one minute, so Phil I'm going to allow you to use that one minute, and then we're going to adjourn. Go right ahead.

MR. ZALESAK: This is a focus regarding the Chesapeake Bay, but Chairman Spud, I've just got a question. Who is the lead on bringing something to the table in May, regarding spatial considerations, in specifically the Chesapeake Bay? Given that the Chesapeake reduction cap is mentioned, is stated, I should stay in the current fishery management plan.

Who is the lead to bring that sort of technical view to the table? Also, let me tell you, I talked to Michael Wilbur, and as I recall my last conversation, the estimate was between 250,000 and $450,000.00. We don't see to ever have money to go ahead and execute his fully vetted and approved approach by the Technical Committee. Who is the lead on this thing, in your mind?

CHAIR WOODWARD: Well, we as a Board depend on the Technical Committee to advise us on the scientific needs and priorities. As you've heard today, they've been tasked to come back to us and give us the kind of information we need, and also as you've heard from Bob Beal, we don't know how to get this put on the radar screen for funding.

Whether there will be information available to directly affect the allocation discussion, that remains to be seen. We're going to have a robust discussion about allocation, and hopefully produce an outcome that is satisfactory to everybody. But we are in the very infancy of that at this point.

MR. ZALESAK: I appreciate that.

CHAIR WOODWARD: All right, any other business to come before the Board? Do I have a motion to adjourn, someone raise their hand?

MS. KERNS: Many people, Mel Bell.

CHAIR WOODWARD: Okay, all right, very good, and we'll consider that seconded by acclamation.

ADJOURNMENT

CHAIR WOODWARD: All right, thanks everybody for your participation in the meeting, and have a good rest of the day, and I'll look forward to our next meeting in May, and we'll stand adjourned.

(Whereupon the meeting convened at 4:00 p.m. on Tuesday, February 2, 2021.)

Kirby Rootes-Murdy

From: Comments
Sent: Friday, March 26, 2021 10:12 AM
To: Kirby Rootes-Murdy
Subject: FW: [External] Menhaden Fisheries

Follow Up Flag: Follow up
Flag Status: Completed

From: Garrett Busic [mailto:garrettkbusic@gmail.com]
Sent: Saturday, March 20, 2021 9:10 PM
To: Comments <comments@asmfc.org>
Subject: [External] Menhaden Fisheries

To whom It may concern,

1) The ASMFC should postpone Amendment 7 to the Striped Bass Management Plan until a benchmark stock assessment is complete. There is no scientific justification for any of the changes being proposed. While the current management plan is not perfect, the bigger issue is that it has not been implemented effectively. The ASMFC needs to do a better job reducing fishing mortality--not change the goalposts in the middle of the game to account for management failures. This whole amendment should be put on ice until new science is available for management use.

2) The current biological reference points are adequate for the management of the striped bass fishery. The problem is that fishing mortality has never been at the right level to achieve the biomass target--not that the biomass target is wrong. Fishing mortality simply must be reduced.

3) This issue is important not only for striped bass but for menhaden too. If the striped bass reference points are lowered, then the new ecological management system for menhaden will allow a larger quota for the menhaden fishery, 75% of which goes to the foreign-owned reduction fishing fleet in Virginia.

The menhaden ecological reference points are defined in the following way:

ERP target: the maximum fishing mortality rate (F) 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 F on Atlantic menhaden that keeps Atlantic striped bass at their biomass threshold when striped bass are fished at their F target.

Because these menhaden reference points are keyed to the striped bass reference points, if the striped bass reference points are lowered, then a potential cascading effect could occur with fewer menhaden available to feed fewer striped bass.

4) If the ASMFC wants to do more to protect striped bass, without curtailing striped bass fishing mortality, then it should further cut the catch of the menhaden reduction fishing industry. According to the best available science: current menhaden reduction fishing undermines the striped bass population by as much as 28%. (https://www.tandfonline.com/doi/full/10.1080/19425120.2017.1360420)

-Atlantic herring are overfished. The Ecological Reference Points Working Group and the Menhaden Management Board at the ASMFC failed to take into account the Atlantic herring stock status when setting the menhaden quota last year. If they had, then the menhaden catch would have been substantially lower. That's because Atlantic herring serve as an alternative prey to menhaden for striped bass. The ASMFC must incorporate this stock status information next year during the update assessment process.

5) Unless the ASMFC is prepared to substantially reduce the fishing pressure on important forage species like menhaden, then the ASMFC should postpone this amendment until the Benchmark Stock Assessment is ready for management use in 2025 or later.

6) Thank you for your consideration of these critical ecosystem concerns.

- Garrett Busic

Kirby Rootes-Murdy

From: Comments
Sent: Friday, March 26, 2021 10:12 AM
To: Kirby Rootes-Murdy
Subject: FW: [External] "NO" on increasing the quota for Menhaden

Follow Up Flag: Follow up
Flag Status: Completed

From: Jim Gill [mailto:jimmygill@verizon.net]
Sent: Saturday, March 20, 2021 7:46 PM
To: Comments <comments@asmfc.org>
Subject: [External] "NO" on increasing the quota for Menhaden

It seems we have to fight your group from increasing the catch limit of Menhaden in the Chesapeake Bay again! It is no question all fish that depend on Menhaden as their main diet, is suffering. Please maintain the same limit or better yet, lower the quota on Menhaden.

Thank you

Jim Gill
Edgewater Md.
jimmygill@verizon.net

Kirby Rootes-Murdy

From: Tom Lilly <foragematters@aol.com>
Sent: Monday, April 19, 2021 1:10 PM
To: Tina Berger; Robert Beal; Kirby Rootes-Murdy; KURT GOTTSCHALL; Jeff Tinsman; Chris Swanson; Eddie Leonard; Dr. Matt Cieri; Alexei Sharov; joshua.newhard@fws.gov; Micah Dean; Jeff Brust; Caitlin Craig; DR. AMY SCHUELLER; RAY MROCH; Holly White; Jason E. Mcnamee; JOEY BALLENGER; ELLEN COSBY; shanna.madsen@mrc.vorginia.go
Subject: [External] Comment on more Chesapeake bay research
Attachments: 2020-08-25_220701 WATTS.pdf; 2020-09-05_160101 Cierci.pdf; single concept plan.pdf; 2021-03-08_094459 George Letter.pdf

Tina please circulate to the staff, the Commission, the policy board , the menhaden technical committee and board and confirm receipt. Thanks Tom Lilly 443 235 4465

To The Menhaden Delegates

This is my comment on whether there should be research on "spatial allocation" or Chesapeake Bay menhaden "abundance" ? Whether research proceeds or not should the delegates act now to protect Chesapeake bay by allocating a definite share of menhaden to the bay ecology? This is discussed by Bob Beal in his letter to Secretary Ross and recommended by Dr. Jacque Maguire, the commission's Chesapeake bay menhaden research consultant and other prominent avian and fisheries scientists (n.1) Dr.Maguire said;

"Whether there is enough (menhaden) for the increasing demands of striped bass and other predators, including the commercial and recreational fisheries, will be a difficult and possibly very expensive question to resolve. Time and area restrictions as well as zoning of the fisheries that are competing for menhaden might provide a more rapid mechanism to mitigate the possible negative consequences of competing fisheries and predators." (n.2)

Please keep in mind that in May Omega's nine purse seiners will begin catching the menhaden schools in the bay and headed to the bay targeting this essential forage needed to rebuild the bay's forage base. By using the time and area controls over the factory fishing that Dr. Maguire recommended, and every one of your states but Virginia has used, the ASMFC could be protecting this vital forage by simply requiring Omega fish in the well asessed US Atlantic zone north of Cape Charles. see scan ...single concept . Director Beal underlines the duty of the Delegates to act now due to the poor condition of bay fish and wildlife .... He says this is true even when there is uncertainty or research in progress (n.3) A bay cap does not protect from the intense fishing in the spring taking the menhaden at the time our large spawning striped bass and osprey babies need it the most. It can be defeated by Omega just catching the schools before they reach the bay. Don't you think this leaves time and area closures the best available option to protect the bay with or without more research? That option has been sitting on the table for 12 years now.

Dr. Maguire was correct when he predicted the negative consequences from not dealing with the conflict between the factory fishing and the other "interested groups". He was also right in suggesting an equitable effective allocation of menhaden using what was to become Amendment 3 holistic management. He realized the limitations of quantative research essentially "chasing its tail" due to the complexities, unknowns and conflicts inherent in the type of research now being

proposed. It has been 17 years since the ASMFC started on bay research and 12 years since the menhaden delegates were given Dr. Maquire's opinions but did not act on them.(n.2)

Is it now time for the managers to consider and enact measures to control the effects of the factory fishing to carry out the goals of Amendment 3 of allocating menhaden where they do the most ecologic, social and economic good? (n.5) The proposed *quantative* research is really not necessary or relevant at his point because the Commission was to have have moved on to *holistic* analysis under Amendment 3 . That values menhaden as a forage fish not as a mere commodity and examines the benefits to the environment and the people from conserving it. This *value to the Chesapeake bay and the entire Atlantic ecology* is spoken to page after page in Director Beal's letter. The facts and opinions in his letter are a persuasive holistic analysis the Commission can rely on for them to adopt the type of measures recommended by Dr. Maguire without additional research.

Just imagine how Chesapeake bay would be transformed and the benefits to the entire Atlantic coast that would follow if an additional 1,000 - 1,500 menhaden schools were free to come into the bay each month from May to November to feed the bay's 4,000 square miles of fish and wildlife. We know the difference it made in New York. Scan 4459.. We know who would benefit! click on menhaden project.org pgs 22-23 Thank you Tom Lilly Whitehaven MD

(n.1) Dr. Bryan Watts, William and Mary scan 0701, Dr. Matt Cierci scan 0101
(n.2) Page 3 par 1. Director Beal's letter to Secretary Ross . Just click on menhadenproject.org for full text.
(n.3) Page 4 par 2 Beal letter at page 8 menhadenproject.org
(n.4) Menhaden board meeting October 2009
(n.5) Amendment 3 Goal page 29 section 2.3

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The Center for Conservation Biology

William & Mary

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20 August 2020

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

From: Cieri, Matthew
Matthew.Cieri@maine.gov
Subject: Re: YOUR REMARK ??
Date: Aug 2, 2020 at 10:17:54 AM
To: Tom Lilly foragematters@aol.com

Hi Tom,

Yes, that is correct. That is what our work showed. At the current striped bass fishing mortality, striped bass won't rebuild no matter how low they set menhaden fishing mortality.

Any meaningful rebuilding of striped bass has include reductions in the striped bass fishing mortaiity from where it currentiy 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

From: Tom Lilly <foragematters@aol.com>
Sent: Sunday, August 2, 2020 12:06:20 AM
To: Cieri, Matthew <Matthew.Cieri@maine.gov>
Subject: YOUR REMARK ??

8/13 4536

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

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 Menhaden Management Board

FROM: Kirby Rootes-Murdy, Senior FMP Coordinator

DATE: April 16, 2021

SUBJECT: Recent Menhaden Quota and Landings Information

This memorandum provides additional menhaden quota and landings information as requested by the Management Board in February 2021, including relinquished quota from 2018-2021; total landings information through 2020; incidental catch landings from 2017-2020; and landings occurring under the Episodic-Set Aside Program (EESA) from 2018-2020. The following is compiled from annual state compliance reports and is provided to aid the Board in revisiting the quota allocations and management provisions established in Amendment 3 to the Atlantic Menhaden Fishery Management Plan (FMP).

Relinquished Quota

Under Amendment 3, on an annual basis jurisdictions have the option to relinquish part, or all, of their fixed minimum quota by December 1st of the preceding fishing year. Any quota relinquished by a jurisdiction is redistributed to other jurisdictions that have not relinquished their quota, based on landings data from 2009-2011.

Table 1 shows only three states relinquished quota from 2018-2021: Delaware, South Carolina, and Georgia. Delaware is the only state that relinquished quota every year during this time, averaging 1.9 million pounds annually. Georgia relinquished its full quota (2.35 million pounds) annually from 2018-2020.

Table 1. Relinquished Quota (in pounds) by Jurisdiction from 2018-2021

State	2018 Relinquished Quota	2019 Relinquished Quota	2020 Relinquished Quota	2021 Relinquished Quota
Delaware	2,000,000	2,000,000	2,100,000	1,700,000
South Carolina	2,347,183			
Georgia	2,357,183	2,357,183	2,357,183	
Total	6,704,366	4,357,183	4,457,183	1,700,000

Total Landings 2016-2020

Table 2 shows each jurisdiction's total landings as a percentage of the annual coastwide total, updated to include 2020 information. Total landings include directed bait and reduction

landings, incidental catch, and landings occurring under the EESA Program. Total landings may encompass more than a jurisdiction is allocated in a given year due to quota transfers, episodic landings or incidental catch and therefore do not necessarily indicate a quota overage. Since the implementation of the Amendment 3, the total allowable catch (TAC) has not been exceeded, including incidental catch and EESA landings. From 2016-2020 only Maine and Massachusetts have increased their percentage of the coastwide total every year during this time period. In 2020, Maine, Massachusetts, and New Jersey increased their percentage of the coastwide total.

Table 2. Jurisdiction total landings as a percentage of coastwide (CW) landings, 2016-2020. Total landings include directed bait and reduction landings, incidental catch, and harvest under EESA. Amendment 3 allocations for directed bait and reduction landings were implemented beginning in 2018.

State	Amendment 3 Directed Landings Allocations (%)	% of 2016 CW Landings	% of 2017 CW Landings	% of 2018 CW Landings	% of 2019 CW Landings	% of 2020 CW Landings
Maine	0.52%	1.2%	2.3%	3.5%	4.9%	6.3%
New Hampshire	0.50%				1.0%	
Massachusetts	1.27%	0.8%	1.0%	1.4%	1.5%	2.2%
Rhode Island	0.52%	0.1%	0.5%	0.2%	0.0%	0.0%
Connecticut	0.52%	0.0%	0.1%	0.2%	0.0%	0.0%
New York	0.69%	0.4%	0.4%	0.2%	0.3%	1.0%
New Jersey	10.87%	11.5%	12.2%	11.9%	11.0%	12.3%
Pennsylvania	0.50%					
Delaware	0.51%	0.0%	0.0%	0.0%	0.0%	0.0%
Maryland	1.89%	1.4%	0.8%	0.7%	0.7%	0.6%
PRFC	1.07%	0.6%	0.5%	0.8%	0.5%	0.5%
Virginia	78.66%	83.9%	82.1%	80.8%	79.9%	75.7%
North Carolina	0.96%	0.1%	0.2%	0.2%	0.1%	0.1%
South Carolina	0.50%					
Georgia	0.50%					
Florida	0.52%	0.1%	0.1%	0.1%	0.1%	0.1%

To protect confidentiality, information for New Hampshire, Pennsylvania, South Carolina, and Georgia have been removed.

Incidental Catch Landings

A bycatch allowance was first implemented under Amendment 2 in 2013, modified under Addendum I to Amendment 2 (2016), and has continued under Amendment 3. As outlined in Amendment 3, after a jurisdiction's allocation is met and its directed fishery is closed, menhaden landings can continue to occur as incidental catch under the following gear types:

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 fathom long and 8 fathom deep.

Non-directed gears: pound nets, anchored/stake gillnets, drift gill net, trawls, fishing weirs, fyke nets, and floating fish traps.

These 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. This is limited to one vessel trip per day. Jurisdictions do not have a cap on the total amount of incidental catch landed in a given year and landings do not count against its quota, nor does incidental catch count against the coastwide TAC.

Prior to 2017, several state's incidental catch landings are considered confidential, therefore only information from 2017-2020 are included in table 3 and discussed in this memo. Ten different jurisdictions have had incidental catch landings, with the highest number (7) of jurisdictions reporting incidental catch in a year occurring in 2017 and the lowest (1) occurring in 2019. The annual coastwide total incidental catch ranged from approximately 3.3 million pounds to 13.9 million pounds. A majority of incidental catch landings occur on trips that land either 1,000 pounds or less (37%), or greater than 5,000 pounds but less than 6,000 pounds (34%). The majority of incidental landings have been caught by purse seine (80%), followed by fixed gill nets (12%). The share of incidental catch landed using purse seine gear has increased from 57% in 2017 to approximately 88% in 2019 and 2020. Maine is the only state to have incidental catch every year. The highest amount of incidental catch occurred in 2020, where Maine landed the majority at 13.6 million pounds. From 2018 to 2019, incidental catch increased by 225%, with Maine being the only state with incidental catch in 2019. Incidental catch landings increased by 30% from 2019 to 2020 and included four states (Maine, Massachusetts, New York, and New Jersey).

Table 3. Incidental catch landings in pounds from 2017-2020. Only jurisdictions with incidental catch during this time period are included in the table.

State	2017 Incidental Catch	2018 Incidental Catch	2019 Incidental Catch	2020 Incidental Catch
Maine	5,373,940	2,995,145	10,750,929	13,605,497
Massachusetts	0	0	0	49,350
Rhode Island	135,748	0	0	0
Connecticut	126,986	0	0	0
New York	807,392	0	0	282,169
New Jersey	0	204,240	0	20,190
Delaware	29,285	0	0	0
PRFC	670,447	0	0	0
Virginia	0	110,281	0	0
Florida	263,643	0	0	0
Total	7,407,441	3,309,666	10,750,929	13,957,206

For the Board's review of the Amendment 3 allocation provisions, the Plan Review Team has made the following recommendations regarding the incidental catch program: (1) Re-evaluate the incidental catch program as it is currently used for management; (2) Provide clarity on the provision which requires a jurisdiction to close the directed fishery before reporting under the incidental catch provision. Specifically, the PRT recommends providing further clarity under the scenario where a jurisdiction that subdivides its quota and lands under the incidental catch provision once a quota has been met under the subdivided category vs once the jurisdiction's overall quota has been met.

Episodic Set Aside Program

The EESA Program was first implemented under Amendment 2 in 2013 and modified 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 1 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 (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 to menhaden management to allow 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 Commission; restrict harvest and landings to state waters; and implement a maximum daily trip limit no greater than 120,000 pounds per vessel.

EESA landings data prior to 2018 are confidential for some states, therefore only information from 2018-2020 is included in table 4 and discussed in this memo. In 2018 and 2019, Maine was the only jurisdiction to declare into the EESA program and landed approximately 4.6 and 4.4 million pounds, respectively. In 2020, Massachusetts in addition to Maine declared in to the EESA program and combined the two states landed approximately 4.5 million pounds. Similar to incidental catch landings, the majority of 2020 EESA landings for both states was caught by purse seine.

Table 4. EESA landings by state 2018-2020 in pounds

Year	State	EESA Landings	Coastwide Total
2018	Maine	4,636,020	-
2019	Maine	4,397,826	-
2020	Maine	4,223,729	4,585,214
	Massachusetts	361,485	

In the Board's review of the EESA provisions, the Board may consider the timeliness of final landings for the EESA as it relates to the provisions of the plan. While the plan requires real-

time monitoring these reported landings are preliminary and subject to change until after the end of the fishing year. The plan requires any unused ESSA quota to be redistributed back to the states on October 31st of the currently fishing year. If landings are not finalized until after the end of the fishing year, it is difficult to accurately redistribute any leftover ESSA quota in the middle of the fishing year.

Atlantic States Marine Fisheries Commission

Executive Committee

May 5, 2021
8:00 – 10:00 a.m.
Webinar

Draft Agenda

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 will be a closed session for Commissioners and Committee members only

1. Welcome/Introductions *(P. Keliher)*

2. Committee Consent
   - Approval of Agenda
   - Approval of Meeting Summary from February 3, 2021

3. Public Comment

4. Report of the Administrative Oversight Committee *(S. Woodward)*
   - Presentation of the FY 2022 Budget **Action**
   - Presentation of Statement of Investment Policy Guidelines **Action**

5. Update on Activities of the Allocation Subcommittee

6. Discuss Second Round of CARES Act Assistance *(R. Beal)*

7. Future Annual Meetings Update *(L. Leach)*
   - October 18-21, 2021 – Long Branch, New Jersey
   - 2022 – North Carolina
   - 2023 – Maryland
   - 2024 – Delaware

8. Other Business

9. Executive Director Performance Review **(Closed Session)**

10. Adjourn

The meeting will be held via webinar, click here for details.
Sustainable and Cooperative Management of Atlantic Coastal Fisheries

MEETING SUMMARY OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

EXECUTIVE COMMITTEE

Virtual via GoToMeeting
Arlington, VA
February 3, 2021

For Review & Action by the Executive Committee May 5, 2021

INDEX OF MOTIONS

ATTENDANCE

Committee Members

Pat Keliher, ME
Cheri Patterson, NH
Dennis Abbott, NH (LA Chair)
Dan McKiernan, MA
Jason McNamee, RI
Justin David, CT
Jim Gilmore, NY
Joe Cimino, NJ
Kris Kuhn, PA
John Clark, DE
Roy Miller, DE (GA Chair)
Bill Anderson, MD
Steve Bowman, VA
Chris Batsavage, proxy for John Batherson, NC
Mel Bell, proxy for Phil Maier, SC
Spud Woodward, GA

Other Commissioners/Proxies

David Borden, RI (GA)
Maureen Davidson, NY (AA Proxy)
Tom Fote, NJ (GA)
Pat Geer, VA (AA Proxy)
Bill Gorham, NC (LA Proxy)
Doug Haymans, GA (AA)
Asm. Eric Houghtaling, NJ (LA)
Bill Hyatt, CT (GA)
Raymond Kane, MA (GA)
Robert LaFrance, CT (GA Proxy)
Mike Luisi, MD DNR
Craig Pugh, DE (LA Proxy)
David Sikorski, MD (LA Proxy)
Megan Ware, ME (AA Proxy)
Ritchie White, NH (GA)

Staff

Bob Beal
Laura Leach
Pat Campfield
Emilie Franke
Chris Jacobs
Toni Kerns
Savannah Lewis
Kirby Rootes-Murdy
Mike Rinaldi
Julie Simpson
Caitlin Starks
Deke Tompkins
Geoff White

Others

Karen Abrams, NOAA
Max Appelman, NOAA
Pat Augustine, Coram, NY
Peter Benoit, Ofc. Sen. King, ME
Alan Bianchi. NC DENR
Ellen Bolen, VMRC
William Brantley, NC DENR
Jeff Brust, NJ DEP
Jack Buchanan, VIMS
Patrick Cassidy
Mike Celestino, NJ DEP
Rebecca Chapman, NC DENR
Richard Cody, NOAA
Alison Colden, CBF
Jessica Daher, NJ DEP
Vinny DelGozzo
Kelly Denit, NOAA
John DePersenaire, RFA
Renee DiPippo
Matthew Dooley
Ray Draper, King George, VA
Ben Duffin, NOAA
Julie Evans
Lynn Fegley, MD DNR
Cynthia Ferrio, NOAA
Alexa Galvan, VMRC
Angela Giuliano, MD DNR
Zach Greenberg, Pew Trusts
Melanie Griffin, MA DMF
Jon Hare, NOAA
Amalia Harrington, Univ. ME
Heidi Henninger, AOLA
Jay Hermsen, NOAA
Carol Hoffman, NYS DEC
Britt Kostraba
Wilson Laney
Dee Lupton, NC DENR
Chip Lynch, NOAA
Shanna Madsen, VMRC
Chris McDonough, SC DNR
Nichola Meserve, MA DMF
Steve Meyers
Mike Millard, FL FWS
Patrick Moran, MA Environmental Police
Katie Morgan, CBF
Allison Murphy, NOAA
Gerry O'Neill
Derek Orner, NOAA Fisheries
Joseph Parsons, Fredericksburg, VA
Kelly Place, Williamsburg, VA
Nick Popoff, ME DMR
Jill Ramsey, VMRC
Adam Rettig, NOAA
Brandi Salmon, NC DENR
CJ Schlick, NC DENR
Tara Scott, NOAA
Krista Shipley, FL FWC
Andrew Sinchuk, NYS DEC
Somers Smott, VMRC
Michael Thompson, NC DENR
Beth Versak, MD DNR
Mike Waine, ASA
DeVonte Weems
Sherry White, USFWS
Kerry Whittaker, MMA
Meredith Whitten, NC DENR
Chris Wright, NOAA
Sarah York, NOAA
Phil Zalesak, Tall Timbers, MD
Erik Zlokovitz, MD DNR

CALL TO ORDER

The Executive Committee of the Atlantic States Marine Fisheries Commission convened virtually via a GoToMeeting webinar February 3, 2021. The meeting was called to order at 8:00 a.m. by Chair Pat Keliher.

APPROVAL OF AGENDA

The agenda was approved, with the addition of finding a new approach to Black Sea Bass allocations.

APPROVAL OF PROCEEDINGS

The summary minutes from the October 21, 2020 meeting were approved as presented

PUBLIC COMMENT

There was no public comment.

CARES ACT UPDATE

Mr. Beal provided a brief overview of the second round of CARES assistance, and introduced Ms. Kelly Denit, Director of NOAA's Office of Sustainable Fisheries, to field questions. The appropriations language provides $300 million for fisheries, with $255 million allocated to marine coastal states. One significant change to the language is that there is a 1% minimum allocation to each state, meaning the ASMFC states will get at least $3 million each.

LEGISLATIVE & APPROPRIATIONS UPDATE

Mr. Beal gave an update on the legislative and appropriations front. With the change in Administrations in the presidency and in Congress, Committees will be reorganized with new leadership. The NOAA Assistant Administrator has not been announced yet, and the president has not submitted a budget yet. The Committee discussed a draft letter to Office of Management & Budget regarding funding priorities for the Atlantic states; a line will be added to the letter regarding Menhaden research.

ANNUAL MEETINGS UPDATE

Mrs. Leach reported the 80th Annual Meeting will be conducted in Long Branch, New Jersey October 17 – 22, 2021. Future meetings will be held: 2022 in North Carolina; 2023 in Maryland; and 2024 in Delaware.

OTHER BUSINESS

Mr. Gilmore requested a discussion on finding a new approach to Black Sea Bass allocation due to the changing of species distribution. The Committee discussed this topic at length, with the intent to continue the discussion on the bi-weekly Executive Committee calls.

ADJOURN

The Executive Committee adjourned at 9:50 a.m.

Atlantic States Marine Fisheries Commission

Shad and River Herring Management Board

May 5, 2021
10:30 – 11:30 a.m.
Webinar

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. Davis)* 10:30 a.m.

2. Board Consent 10:30 a.m.
   - Approval of Agenda
   - Approval of Proceedings from February 2021

3. Public Comment 10:35 a.m.

4. Review Technical Committee Progress on Board Tasks *(B. Neilan)* 10:45 a.m.
   - Consider Technical Guidance Document for Implementation of Amendments 2 and 3 to the Shad and River Herring Fishery Management Plan **Action**
   - Update on Methods to Evaluate Bycatch in Mixed-stock Fisheries in State Waters
   - Consider Technical Committee Recommendations on Addressing Fish Passage Performance **Action**

5. Consider Approval of Shad Habitat Plan Updates **Action** 11:15 a.m.
   - Review Technical Committee Recommendations *(B. Neilan)*

6. Other Business/Adjourn 11:30 a.m.

MEETING OVERVIEW

Shad and River Herring Management Board
May 5, 2021
10:30 a.m. – 11:30 a.m.
Webinar

Chair: Justin Davis (CT) Assumed Chairmanship: 2/21	Technical Committee Chair: Brian Neilan (NJ)	Law Enforcement Committee Representative: Gadomski (NY)
Vice Chair: VACANT	Advisory Panel Chair: Pam Lyons Gromen	Previous Board Meeting: February 4, 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 February 4, 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. Review Technical Committee Progress on Board Tasks (10:45-11:15 a.m.)

Background

- In February 2021, the Board reviewed the TC recommendations for improvements to Amendments 2 and 3 to the FMP, which provide additional criteria to guide the development of SFMPs and Alternative Management Plans. The Board agreed with the TC recommendations and tasked them to develop a technical guidance document for use in SFMP development and evaluation (**Briefing Materials**).
- The American Shad 2020 Benchmark Stock Assessment and Peer Review Report was accepted for management use in August 2020. The assessment found that American shad remain depleted on a coastwide basis, likely due to multiple factors, such as fishing mortality, inadequate fish passage at dams, predation, pollution, habitat degradation, and climate change. At the February 2021 meeting, based on the TC recommendation the Board tasked the TC with "developing methods to evaluate bycatch removals in directed mixed-stock fisheries in state waters in order to understand and reduce impacts to stocks outside the area where directed catch occurs." The TC has formed a work group to address this task and has started gathering relevant data.
- In February 2021 the TC also indicated that additional recommendations related to fish passage were being developed. In light of the assessment results, which showed that barriers to fish migration are significantly limiting access to habitat for American shad, the TC has

highlighted recommended Board actions to address fish passage impacts on population recovery (**Briefing Materials**).

Presentations

- Technical Committee Progress on Board Tasks by B. Neilan

Board actions for consideration at this meeting

- Consider approval of the Technical Guidance Document for Implementation of Amendments 2 and 3 to the Shad and River Herring Fishery Management Plan
- Consider sending letters to relevant agencies to request prioritization of TC recommended actions related to fish passage

5. Consider Approval of Shad Habitat Plan Updates (11:15-11:30 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.
- The states began the process of reviewing their American shad habitat plans and making updates in 2020, however, many states encountered delays due to COVID-19. At the February 2021 Board meeting the following habitat plan updates were approved: ME, NH, MD, NC, Savannah River, and GA.
- The following shad habitat plans were submitted for TC review and Board consideration at the May 2021 meeting: MA, RI, CT, Delaware River, SC, and FL (**Briefing Materials**). The remaining states will provide their updated plans to the TC for review before the next Board meeting.
- The Technical Committee reviewed these habitat plan updates via email and recommends Board approval (**Supplemental Materials**).

Presentations

- Shad Habitat Plan Updates for Board Consideration by B. Neilan

Board actions for consideration at this meeting

- Consider approval of updated shad habitat plans for MA, RI, CT, Delaware River, SC, and FL

6. Other Business/Adjourn

Shad and River Herring 2021 TC Tasks

Activity level: Medium

Committee Overlap Score: Medium (Multi-species committees for this Board)

Committee Task List
• Board task to develop methods to evaluate bycatch removals in directed mixed-stock fisheries in state waters • Spring 2021: Updates to state Shad Habitat Plans • 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), Rob Bourdon (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 (USFWS), Ruth Hass-Castro (NOAA)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

SHAD AND RIVER HERRING MANAGEMENT BOARD

Webinar
February 4, 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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ATTENDANCE

Board Members

Megan Ware, ME, proxy for P. Keliher (AA)
Cheri Patterson, NH (AA)
Ritchie White, NH (GA)
Mike Armstrong, MA (Chair)
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)
Robert LaFrance, CT, proxy for B. Hyatt (GA)
Maureen Davidson, NY, proxy for J. Gilmore (AA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Joe Cimino, NJ (AA)
Tom Fote, NJ (GA)
Adam Nowalsky, NJ, Legislative proxy (Chair)
Kris Kuhn, PA, proxy for T. Schaeffer (AA)
Loren Lustig, PA (GA)
G. Warren Elliott, PA (LA)
John Clark, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Lynn Fegley, MD, proxy for B. Anderson (AA)
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 J. Batherson (AA)
Ross Self, SC, proxy for P. Maier
Malcolm Rhodes, SC (GA)
Chris McDonough, SC, proxy for Sen. Cromer (LA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Erika Burgess, FL, proxy for J. McCawley (AA)
Marty Gary, PRFC
Max Appelman, NOAA
Mike Millard, US FWS

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

Ex-Officio Members

Brian Neilan, Technical Committee Chair
Larry Furlong, Law Enforcement Representative
Pam Lyons Gromen, Advisory Panel Chair

Staff

Bob Beal
Toni Kerns
Maya Drzewicki
Kristen Anstead
Pat Campfield
Emilie Franke
Lisa Havel
Chris Jacobs
Jeff Kipp
Laura Leach
Sarah Murray
Mike Rinaldi
Julie Simpson
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Karen Abrams, NOAA
Fred Akers
Katie Almeida
Bill Anderson, MD (AA)
Pat Augustine, Coram, NY
Michael Auriemma, NJ DEP
Jason Bartlett, ME DMR
John Bartolo
Mike Bednarski, VA DGIF
Dave Behringer, NC DENR
Mel Bell, SC DNR
Alan Bianchi, NC DNR
Rob Bourdon, MD DNR
Michael Brown, ME DMR

Guests (continued)

Delayne Brown, NH F&G
Jeff Brust, NJ DFW
Benson Chiles, Chiles Consulting
Richard Cody, NOAA
Allison Colden, CBF
Heather Corbett, NJ DEP
Rip Cunningham, TRCP
Jessica Daher, NJ DEP
Randy Dean
John DePersenaire, RFA
Greg DiDomenico
Chris Dollar, Queenstown, MD
Frazier Dougherty
Wes Eakin, NYS DEC
Julie Evans
Sheila Eyler, US FWS
Cynthia Ferrio, NOAA
James Fletcher, Wanchese Fish Co
Dawn Franco, GA DNR
Toni Friedrich, SGA
Alexa Galvan, VMRC
Matt Gates, CT DEEP
Lewis Gillingham, VMRC
Jim Gilmore, NYS DEC
Angela Giuliano, MD DNR
Zoe Goozner, Pew Trusts
Emily Hall, Seatuck
Helen Takade-Heumacher, FL FWS
Greg Hinks, NJ DEP
Carrie Hoover, MD DNR
Asm. Eric Houghtaling, NJ (LA)
Rachel Howland, NC DENR
Stephen Jackson, FL FWS
Jeff Kaelin, Lund's Fisheries
Desmond Kahn
Greg Kenney, NYS DEC
Adam Kenyon, VMRC
Craig King, ME DMR
Wilson Laney
Edward Leonard, GA DNR
Tom Little, NJ LEG
Chip Lynch, NOAA
John Maniscalco, NYS DEC
Genine McClair, MD DNR
Margaret McGinty, MD DNR
Dan McKiernan, MA (AA)
Nichola Meserve, MA DMF
Steve Meyers
Chris Moore, CBF
Patrick Moran, MA Env. Police
Jerry Morgan
Clinton Morgeson, VA DWR
Brandon Muffley, MAFMC
Kennedy Neill, Yorktown, VA
Gerry O'Neill, CapeSeafoods
Derek Orner, NOAA
Ian Park DE DFW
Alexis Park, MD DNR
Thomas Paulson, NC DENR
Rich Pendleton, NYS DEC
Nicholas Popoff, US FWS
Bill Post, SC DNR
Harry Rickabaugh, MD DNR
Andrew Sinchuk, NYS DEC
Brandi Salmon, NC DENR
Erik Schneider, RI DEM
McLean Seward, NC DENR
Thomas Sminkey, NOAA
Somers Smott, DMRC
Renee St. Amand, CT DEEP
John Sweka, FL FWS
Jim Uphoff, MD DNR
Chris Uraneck, ME DMR
Mike Waine, ASA
Holly White, NC DENR
Kerry Whittaker, MMA
Kate Wilke, TNC
Josh Winger, NC DENR
Chris Wright, NOAA
Sarah York, NOAA
Renee Zobel, NH F&G

The Shad and River Herring Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Thursday, February 4, 2021, and was called to order at 8:30 a.m. by Chair Michael Armstrong.

CALL TO ORDER

CHAIR MICHAEL ARMSTRONG: Good morning everyone, this is Mike Armstrong from Massachusetts, your Board Chair for today for the Shad and River Herring Board. We have three hours today, which is a good amount of time, but we do have a lot of items. It may go fast, but may generate a lot of discussion also.

APPROVAL OF AGENDA

CHAIR ARMSTRONG: First task is we have an Agenda, does anybody have amendments, additions?

MS. TONI KERNS: I don't see any hands for any changes or additions.

CHAIR ARMSTRONG: No hands, then we will consider the agenda approved by consensus.

APPROVAL OF PROCEEDINGS

CHAIR ARMSTRONG: You all have a copy of the proceedings from last meeting, any edits?

MS. KERNS: I do not see any hands for edits.

CHAIR ARMSTRONG: All right, thank you. We will consider the minutes from August 2020 accepted by consensus.

PUBLIC COMMENT

CHAIR ARMSTRONG: The next is Public Comment. Again, we solicit comments at the beginning of the meeting on items that will not be considered during the agenda. Are there any members of the public that would like to speak, and it needs to be brief, maybe a minute or so?

MS. KERNS: As a reminder for members of the public, in order to raise your hand, you click on the hand icon. When the red arrow is pointing down your hand is up, and I see no members of the public with their hands raised, Mr. Chairman.

CONSIDER MANAGEMENT RESPONSE TO THE 2020 SHAD BENCHMARK ASSESSMENT AND PEER REVIEW

CHAIR ARMSTRONG: All right, thank you, Toni. Moving to Item 4. Consider a Management Response to the 2020 Shad Benchmark Assessment and Peer Review.

TECHNICAL COMMITTEE RECOMMENDATIONS

CHAIR ARMSTRONG: First, we'll have a review of the Technical Committee advice by Brian Neilan, Brian, take it away.

MR. BRIAN NEILAN: Thank you, Mr. Chair, and good morning to the Board. You'll be hearing a couple presentations from me today. First will be Technical Committee recommendations on improving shad stocks. Just a quick outline of this presentation for today. First, we'll go over the background on the Board task, and both the specific and coastwide TC recommendations, and finally, the next steps for going forward.

Some background on the Board task. The American shad benchmark stock assessment and peer review was accepted by the Board back in August of 2020. The assessment found that American shad remained depleted on a coastwide basis, and found unfavorable stock status for several system-specific stocks. Given these findings, the Board tasked the TC with identifying potential paths forward to improve shad stocks along the coast, considering the results of the assessment. This is from the assessment results.

The TC decided to focus on systems with either unsustainable or depleted stock status, or systems that had fisheries, and had an unknown stock status. This table shows those systems, their stock statuses, and what type of fisheries are currently executed within them. There is an asterisk there for South Carolina.

South Carolina has several systems within it that were assessed, including the Winyah Bay, Santee Cooper, and eight basin systems. You all can see the coastwide finding as well, which is depleted. First,

we'll go over the TC system-specific recommendations, focusing on systems with unsustainable or depleted findings.

For each system we'll have a slide with the TCs recommendations, and then one slide with the rationale behind those recommendations. Starting with the Connecticut River, which was found to have an unsustainable adult mortality. The TC has recommended that agencies involved continue to monitor the Connecticut River's SFMP metrics, and implement appropriate management responses if any of the benchmarks are triggered.

Additionally, collaborative work with the Connecticut River Atlantic Salmon Commission partners should be undertaken, to realize continued passage and habitat improvements. The final recommendation for the Connecticut River would be to explore alternative survey methods, in order to provide the recreational effort and harvest estimates, which we currently don't have for the Connecticut River.

Here is their rationale for the Connecticut River recommendations. There is an increasing trend in adult shad counts at the fish lift over the past 12 to 15 years. The metrics from the Connecticut River's SFMP have continued to remain above target levels. Collecting accurate recreational effort and harvest data will help quantify the recreational fisheries effect on adult mortality.

Finally, given the relatively low harvest rates, it's believed that any changes to the fishery will have minimal effects on stock recovery. There were only about 5,500 pounds of shad landed in 2019, which I believe was the time series low, and it's been part of a continued declining trend in the recent past.

High downstream mortality at hydropower facilities and other associated factors is thought to be more likely the primary sources of mortality, rather than the fishery. That is the Connecticut River. For the Delaware River, which was also found to have an unsustainable adult mortality. The TC recommends no monitoring or management changes for the 2021 fishing season.

The Delaware River SFMP should be revised to include updated data methods, and results from the 2020 stock assessment. Finally, the Delaware SFMP should incorporate a management response to be triggered by an unsustainable adult mortality determination from the stock assessment, though mostly incorporating stock assessment work into their upcoming SFMP update. The rationale here is that the Delaware River SFMP is due to be updated by the end of 2021, as it's nearing the end of its five-year tenure. It didn't really make sense to change things this year, with possible changes coming up at the end of the year anyway.

This process will allow TC input and evaluation of potential management measures in the updated plan. That is the rationale for the Delaware River. We can go to the Potomac next. For the Potomac River, which had an unsustainable adult mortality finding. The TC recommends the continued prioritization of conservation of natural land cover throughout the lower Potomac watershed, as well as an expansion of commercial and recreational fisheries on non-native predators, such as blue catfish and flathead catfish.

These species are thought to be a significant source of mortality for both shad and river herring. Additionally, it's recommended that steps be taken to identify the contribution of Potomac River origin shad, and mixed-stock fisheries as well as in the ocean bycatch. This is in order to reduce or eliminate harvest of Potomac River origin shad in these fisheries.

Since this is kind of outside the Potomac's jurisdiction, it will require coordination between the states, ASMFC, and regional councils. For the rationale for the recommendations for the Potomac. It has been shown that there is an increase in trends in the Potomac Pound Net TPU Index. There is flying stock survey, as well as their juvenile survey, so you have increasing trends there, which is nice to see.

The ASMFC American Shad Restoration Target for the Potomac River was exceeded again in 2019, which is the ninth year in a row their restoration numbers have

been above the target. Officially, the TC is concerned with further restricting the limited bycatch fishery they have, and any brood stock removals for hatcheries.

That could result in reduced data availability for future assessment. That is where we get a lot of our biological aging data, and this would likely not have a significant impact on the stock. That is the rationale for the Potomac, move on to the Hudson. Here we had the recommendations for the Hudson River, which had a stock status finding of depleted.

The first recommendations, similar to the Potomac, is to identify stock composition and ocean bycatch in the mixed-stock fleet fisheries, and to seek to reduce or eliminate these sources of Hudson-specific mortality. Again, this will require coordination between the states, ASMFC, and the regional councils.

Also, New York should implement habitat restoration actions identified in the Hudson River Estuary Habitat Restoration Plan. The idea here is that will restore high quality spawning, nursery and refuge habitats. The final recommendation for the Hudson is to continue the fishery closure until the stock recovers to a level that could support sustainable harvest.

The rationale for the Hudson recommendations is that there is currently no fishery, so continue that closure. If there is no fishery there is obviously not a source of mortality there. That is why we have the emphasis on addressing habitat issues and out of basin harvest, and sources of mortality. The previous slides were systems with unsustainable or depleted status findings. The following systems have recreational harvest, commercial harvest, or both. During this assessment they had an unknown mortality or stock status determination. Starting with Maine, which allows the recreational harvest of 2 shads a day.

The recommendation is to work towards removing barriers to upstream passage, either through dam removal, fishway installation, or improving current fishways, in order to improve passage efficiency. The goal being to increase abundance, and provide opportunity at these fishways to collect biological data for aging and mortality estimates.

Their rationale for Maine, the rationale being there were insufficient data to make a stock status determination, given the data vetting criteria of the stock assessment. They just didn't have biological data to come up with a status, and there is currently limited potential to improve biological data using small run sizes. We need to work towards improving their data collection.

We have the Merrimac River. For the Merrimac River, where recreational harvest of three shad per day is allowed. The recommendations include addressing concerns with data time series and age sample sizes, in order to produce mortality estimates. The time series or sample sizes just didn't meet the minimums for this assessment to develop a mortality estimate.

Also, improving repeat spawning ratio data time series through ongoing shad scale collection and aging. Continue annual reviews of hydro-power dams, to identify passage impacts, and recommend improvements, possibly as part of FERC relicensing agreements and requirements. Lastly, it's recommended that a juvenile abundance index be developed to complement the adult indices.

The rationale for the Merrimac recommendations is that there was insufficient data to determine abundance status, due to low age samples in some years, preventing the calculation of mortality estimates. Just for a reference, the spawning runs sustainability benchmark has been achieved as of late, and is having an increasing trend on the Merrimac.

In North Carolina, with the Tar-Pamlico and Cape Fear Rivers, there were no recommended actions at this time. In the Tar-Pamlico system female relative F has remained well below the threshold since 2013. This is consistent with the decline in commercial landings. Female abundance index was below the threshold in the last two years.

In the Cape Fear there is an increasing trend in adult abundance, likely a sign of improved passage, and their SFMP. SFMP metrics for female relative abundance, and F has not exceeded thresholds since 2011 and 2012. Additionally, juvenile abundance sampling for striped bass was initiated in 2017, so that could possibly be a use for a juvenile shad abundance index in the future, in upcoming SFMPs and assessments.

For the rivers in South Carolina, where recreational and commercial harvest is permitted, there are no recommended changes to the monitoring or management requirements at this time, beyond continuing programs and sampling efforts currently underway in these systems. This is to expand timeseries to a length consistent with the stock assessment research recommendations. Additionally, it was recommended that paired otolith and scale samples should be collected. The rationale here for these recommendations in South Carolina, is that their conflicting trend in the Winyah Bay and Santee Coper systems and no trends in the eight-basin system in their adult abundance indices.

All data time series for their young of year electrofishing surveys will meet assessment thresholds for the next assessment. They were just too short to be used for this one. For the Savannah River, which allows recreational and commercial harvest. The recommendations are the same as the other South Carolina systems, including continuing the timeseries of the current surveys to meet minimum assessment requirements, collecting biological samples for aging.

Again, the same rationale for the Savannah River as the other South Carolina rivers, including conflicting trends in abundance indices, and that had shorter than required time series for the purposes of this assessment. For the Altamaha in Georgia, which allows commercial and recreational harvest, you see the same recommendations here, including continuing the timeseries to meet assessment minimums, and collecting biological samples for aging.

Similar rationales as well, with no detectable trends in adult abundance indices, and data time series that didn't quite meet the minimum as required for this assessment. In Florida, with the St. Johns River, where recreational harvest of shad is allowed, there are no recommended changes to the management and monitoring requirements, beyond improving monitoring data, by accounting for environmental variability effects.

I believe the catchability in their survey is heavily influenced by flooding, if it's a flood year, looking into accounting for flow rates in developing their indices, as well as using age data to identify year class and maturity schedule. Some of the rationale for the St. Johns, the young of year and spawning stock indices showed no trend, and an increasing trend respectively at a mean fork length of males and females, both showed increasing sizes over time.

Additional data otoliths for age composition and size at age will reach the timeseries threshold of ten years, and be available for the next assessment. Recreational harvest is the only known source of American shad removal within the St. Johns. Those were the system-specific recommendations. Now we're going to move on to the coastwide recommendations.

The first recommendation from the TC is further action is needed to improve fish passage and passage mortality poses a substantial threat to shad stocks, and limits recovery potential as evidenced through the stock assessment. The TC is currently preparing a memo with recommendations for the Board related to shad passage, it just wasn't quite ready for this meeting.

Going forward, paired otoliths and scale samples should be collected in all systems where it is possible. Otoliths are currently the preferred structure, but not necessarily everyone is collecting otoliths, due to a variety of reasons. States should aim to improve surveys to increase survey power to detect trends. Many datasets with sufficient time series were included from the final assessment, due to a lack of power to detect a 50 percent trend, changing trend up

or down over a ten-year period, which was the minimum criteria for this assessment. The TC also recommended that system-specific restoration targets should be developed where appropriate, and where we have the data to do so, or be revisited where they already exist, to provide measurable goals for evaluating recovery efforts. Additionally, the TC recommends the Board task them with developing alternative methods to evaluate bycatch rules, and removals in directed mixed-stock fisheries in state waters.

This is in order to understand and reduce impact to external stocks of directed mixed-stock fisheries, such as Hudson River shad caught in the Delaware Bay. The TC also identified two priority research recommendations, which they felt were related to this Board task. First, is conducting annual stock composition sampling through existing or new observer programs from all mixed stocks and bycatch fisheries.

Second, otoliths should be collected as the preferred age structure. Collection of otoliths presents a perceived impact due to the conservation of the stock, since it's a source of mortality that sort of sampling, or it's just generally not feasible. An annual subsample of paired otoliths and scales should be collected. They are looking at 100 plus samples to quantify error between structures.

Those are the priority research recommendations. Next steps, we have a Board action for consideration, mainly tasking the TC with developing alternative methods to evaluate bycatch removals in directed mixed stock fisheries in state waters. That is what we have for this presentation.

CHAIR ARMSTRONG: Thank you, Brian. I think what we're going to do, we'll move right into the Advisory Panel Report, and we can address questions to both Pam and Brian at the same time. But I would like to thank the Technical Committee, their task is always huge, because they have to go through so many systems separately. It's a whole different way of operating, and a lot more work, so thank you to the Technical Committee.

ADVISORY PANEL REPORT

CHAIR ARMSTRONG: We'll get the Advisory Report now from Pam Lyons Gromen. Pam.

MS. PAM LYONS GROMEN: Thank you, Mr. Chairman, and good morning everyone. I will be providing the Advisory Panel comments in response to the Technical Committee recommendations. The AP actually had a chance to meet twice since the Board last convened in August. We met in October, and we reviewed an initial draft of the TC recommendations.

Then we met again in January, to look at a near final draft, and that draft included more coastwide recommendations. The attendees that came to our AP meeting included representatives from New Hampshire, New York, New Jersey, Delaware, North Carolina, and our non-traditional stakeholders.

I'll just say that it was nice to have Dr. Ed Hale and Mr. Eric Roach, who are candidates for the AP, just jump right in and join us for these discussions. I'll start with the system-specific discussions and recommendations that we had. We talked about the Hudson River, which as you know the status is depleted. There was general support for the TC recommendation, although the high priority recommendation of reducing and eliminating ocean bycatch may be challenging, and it is unclear how this will be done. For the Delaware River Basin, and that status is on sustainable adult mortality. Concerns were raised about the surveys that were used to estimate the Delaware Bay mortality in the assessment. These were the Smithfield Beach Gillnet Survey, the Lewis Haul Seine Fishery Survey, and the Lehigh River Electrofishing Survey. Our representative from Delaware felt like none of these surveys really are adequately designed and executed for assessing mortality or stock status.

The recommendation was that the Delaware River Coop explore other existing monitoring surveys for assessing stock status, such as the DNRAC trawl survey, and to consider reprioritization addition or deletion of the currently used indices, to assess stock status in the Delaware Basin FMP.

For the Tar-Pamlico and Cape Fear, the status there again was unknown, but there are active fisheries. The TC recommendation for no changes to management was deemed acceptable by the AP, as long as no additional fishing pressure is added. But concerns were expressed that additional information for the Tar-Pamlico and the Cape Fear system could have been included in the assessment.

Otolith sampling, we had a good discussion about this, recognizing the importance in the research recommendation, that the sampling target should be better defined for the various data sources, that it's going to be specific stock, fishery independent versus dependent surveys, how they are going to be collected, in order to ensure that these otolith sampling can be completed to meet the assessment needs.

There was also concern raised about the recommendation to collect 100 otolith samples. It was unclear to us whether this was for a coastwide collection or for each system, or for each state, but may be challenging if this is 100 samples from each state. We had a pretty good discussion about the coastwide recommendations, and so this addresses the mixed-stock fisheries, and also the ocean bycatch.

The AP discussed the importance of the genetic data, to characterize stock composition in the Delaware Bay mixed-stock fishery, and in ocean bycatch. Genetic information is a major data gap in the assessment. All AP members agree that the Board should support, however possible, the USGS project to develop a genetic repository for alosine species. The AP also felt that the Commission should reach out to the Northeast Fishery Observer Program, to ask that they prioritize sampling of shad in federal fisheries bycatch.

Finally, the data from the shore-side monitoring program, which is performed by the Massachusetts Department of Marine Fisheries, should be incorporated in the next assessment to improve information on ocean bycatch. We talked about data gaps in the assessment, and the AP flagged the following issues as notable data gaps that are in need of the Board's attention.

That would be juvenile mortality estimates, information to quantify recreational effort, harvest, and incidental mortality on a coastwide spatial scale, noting that MRIP does not sample those upper stretches of tributaries that are important. Reporting of incidental catch in recreational and commercial fisheries from all systems, including the coastal waters. Bycatch should be documented and reported, even if the current stock status in a system is deemed sustainable. Finally, environmental information like climate, streamflow, and water quality. We spent a bit of time talking about climate change, because American shad have been classified as highly vulnerable to climate change, and this is an issue that needs to be prioritized and addressed in future work in assessments.

Communication between the Commission and federal partners about climate impacts could be improved to better define how information is shared between partners, and taken into account by fishery managers. An example that was raised was the American shad distribution shifts, which are currently mapped on the Mid-Atlantic Ocean Data Portal. They could be used traps for better understanding and mitigating the impacts caused by bycatch on mixed stocks and in the ocean. I believe that is my last slide. Yes, questions. That's the end, thank you, Mr. Chairman.

CHAIR ARMSTRONG: Thank you, Pam, and again thank the Advisory Panel for a really thorough review of this. At this time, does anyone have any questions for either Brian or Pam?

MS. KERNS: You have Lynn Fegley and Justin Davis, and then Joe Cimino.

CHAIR ARMSTRONG: Okay, Lynn Fegley.

MS. LYNN FEGLEY: Good morning everyone, and thank you, Pam, thank you both for the excellent presentations. It really is a lot of work to get through those. I just had two quick questions, Pam, about your presentation. The first was this confusion about

the 100 otolith samples, whether that's for each state or coastwide.

That seems like a pretty easy question for the TC to answer, so if we could get an answer to that, I think that would be helpful. My second question was, with the Advisory Panel's suggestion to within the Northeast Fishery Observer Program to prioritize the sampling of shad by catch. Does that mean prioritize for genetic sampling, or does that mean just prioritize the quantification and size structure and such? Thanks.

MS. LYONS GROMEN: Thank you for those questions. Yes, I believe that the discussion was about how when the Observer Program collects samples that they really do have to prioritize. They can't really take samples of everything. Shad may not be a priority for them at the moment, but if it was communicated to them, then they could collect shad for a variety of purposes. I believe it could be for otoliths.

It certainly could be looking at its size and age structure. But certainly, the genetics, the value of genetics and providing samples to the USGS for their catalogue they are putting together. That was all a big part of our discussion. I think the genetic material as we try to understand how ocean fisheries are impacting individual stock is very important. Thank you.

MS. CAITLIN STARKS: Brian, I don't know if you want to jump in and answer the second part of that question about the otolith sampling, or I can.

MR. NEILAN: Sure. I'm under the impression from the TC that it's going to be system-specific that 100 samples.

MS. STARKS: I can verify that as well.

CHAIR ARMSTRONG: All right, thank you, Brian. Toni, I missed the second person in line.

MS. KERNS: We have more people on the list.

CHAIR ARMSTRONG: Okay, so Justin was next?

MS. KERNS: I think so, and then Joe Cimino, Marty Gary, John McMurray, and Malcolm Rhodes.

CHAIR ARMSTRONG: Justin, go ahead.

DR. JUSTIN DAVIS: Thank you Brian and Pam for these presentations this morning. I've a question directed towards Brian, having to do with the recommendation by the TC to focus on further passage improvements along the coast, and the idea that passage mortality poses a substantial threat to shad stocks right now.

I guess I just wanted to clarify. Is the focus there on improving existing passage facilities at barriers along the coast, because the thought is that mortality occurring at those passage facilities is a problem, or is it more focusing on establishing new fish passage, or the combination of the two? The reason I'm asking is because it has been my experience here in Connecticut that establishing upstream passage at a dam, without providing for adequate downstream passage, or even establishing upstream passage.

It doesn't work well for shad, can actually be sort of a net negative. You would be better off just not having the passage in place, and subjecting the fish to the poorly constructed upstream passage, or putting them upstream where the juveniles can't get back downstream. I guess I just wanted to clarify what the TCs focus is there, thanks.

MR. NEILAN: Thanks for that question. Yes, I think the TC, it's going to be a combination of the two. Obviously putting in fish passage or removing dams, putting in fish passage generally where it's not already, is obviously going to be a good thing. But I know, like you said, a lot of fish passage structures, some are not efficient. I know in New Jersey some don't work at all. It's working towards setting possible, you know efficiency targets for moving shad both up, adults up, and reducing mortality of adults and juveniles going down.

CHAIR ARMSTRONG: Joe Cimino.

MR. JOE CIMINO: I kind of lost my question in the process. It was the same as the Aps and Lynn's

question regarding the otolith collection. If you will humor me, I may move it to a bit of a comment in that, perhaps the TC could review effective sample sizes for some of these systems. Maybe that 100 otolith number, which might be very difficult to get. You may find that another number is at least sufficient, so just kind of a recommendation for the future for that. Then when you're ready, I will have a motion. Thank you.

CHAIR ARMSTRONG: We'll come back to that motion. Marty Gary.

MR. MARTIN GARY: Thank you Brian and Pam for your presentations this morning. My question is also for Brian. I noticed on the slide that you put up, Brian, that it mentions the elimination and reduction of our bycatch fishery, but you didn't mention it, and I think I know why, because the TC had the discussion back in August of last year.

I had asked Dr. Limburg, who presented the Peer Review report what the value would be of that dataset, it's over two decades long. She indicated at that time that you wouldn't want to compromise that dataset. Those discussions, I was aware were engaged at the TC level, and it was decided that we would continue the bycatch.

But the Board was listed in the presentation, still, and I just wanted to be sure that was the case. We view the elimination and reduction of that as antithetical to increasing our knowledge base for this species in the Potomac. I just want to be sure, Brian, that was the conversation you all had at the TC. Thank you.

MR. NEILAN: Yes, that is what we're working towards. I guess the rationale here is, it's generally accepted that out of basin harvest is undesirable, but we don't have a grasp on what degree mixed-stock harvest is affecting out of basin fisheries, especially considering from the assessment that there is no responsive shad, or little to no responsive shad to the closing of the intercept fisheries. This is probably a number one topic right now in discussion among the TC. It's getting an understanding of these mixed-stock fisheries, and how to move forward with them in the future. I'm not sure if I answered your question there.

MR. GARY: Yes, I think so, Brian, thanks, and quick follow, Mr. Chairman. Just so everybody knows, Brian also mentioned that we have been plotting our CPUEs from that bycatch fishery against a target restoration rate. That target is based on catch per unit effort from my Walburg and Sykes Survey by the U.S. Fish and Wildlife Service. It may have been the predecessor of the U.S. Fish and Wildlife Service. This goes back into the 1940s.

It was deemed to be a good timeseries, a good survey to match up against. We've been exceeding that value for many years. The discussion was pretty perplexing to us, you know when the benchmark came out. But we understand all this uncertainty that is swirling around the species, especially in the adult phase and what may or may not be going on the coast, what may or may not be happening in terms of predation in the early life stages.

We have a prodigious blue catfish and base of blue catfish problem in the Potomac, as is in a lot of parts of the Chesapeake Bay. There are a number of factors that could be contributing, but we just saw the value of continuity of the bycatch fishery. My understanding of it is that the TC was in agreement that that would continue, so thank you.

CHAIR ARMSTRONG: I have John McMurray.

MR. JOHN G. McMURRAY: On the Hudson River system slide, the TC identified reducing or eliminating bycatch in mixed-use fisheries, as well as identifying stock composition of bycatch occurring in federal waters, and quantifying that in fact. The AP seemed to focus on this also. My question is how do you address bycatch in mixed-stock fisheries? How do you address ocean bycatch in federal waters, which seems to be the goal here? As you know, the Council attempted to do that, I think six, or maybe seven years ago with a bycatch cap. But are there other methods being discussed that I'm not aware of?

MR. NEILAN: I think yes, it is going to be certainly difficult, especially in the ocean bycatch fishery. I think right now we're at the kind of exploration of methods point, especially nailing down the genetics or teasing out the genetic composition on a stock-by-stock basis of each stock's representation. It is certainly easier to do within state waters.

Like in Delaware Bay there is currently a benchmark, a management trigger associated with the mixed-stock fishery that's taking place down there in the lower Bay through a genetic work and tagging work. It has been determined that 40 percent of the mixed-stock fishery in the lower Bay is Delaware Basin fish. A certain target has been made with a certain percentage of the total harvest exceeds the 60 percent of everything else.

There would be some management action in the lower Bay; closure of the fishery, gear restrictions, area restrictions. That's just kind of an example of what is currently being done, at least in a mixed-stock fishery. As far as the ocean bycatch, you mentioned catch caps. I'm not sure how effective they are, given how many stocks we're working with here. It's a difficult question, for sure.

MS. STARKS: If I could just follow up, Mr. Chair, this is Caitlin.

CHAIR ARMSTRONG: Please.

MS. STARKS: I just wanted to note also that the Technical Committee is recommending that they work on developing methods to evaluate bycatch, because they are currently recognizing that right now it's difficult, and they would like to try to be able to better understand what impact the Delaware Bay fishery, for example, is having on stocks outside of that system. But right now, they don't have a way of doing that. That is what that task is being recommended for.

MR. McMURRAY: Thanks for the answer. What about federal waters? How do you identify stock composition? Is there sampling going on or are you planning on doing that, or is that aspirational?

MR. NEILAN: I don't believe there is genetic sampling going on right now. That would be something that the Board here would have to work with the Council, in order to make that a priority going forward. I know the U.S. Fish and Geological Survey is working on creating a database for stock-specific genetic alosine sampling, and having that as a repository to compare against. But I don't believe there is any current genetic sampling on the ocean bycatch right now for shad.

CHAIR ARMSTRONG: Malcolm Rhodes next.

DR. MALCOLM RHODES: Pam and Brian, thank you and your Committees for the presentations, they were very insightful. Pam, I have a possibly quick question. At the end of your report, you stated that shad are highly vulnerable to climate change, and I was just wanting a little elucidation.

Given their history, is the concern that return to the natal rivers it's too warm, or it's too much stress on the passage through warmer waters, or is this an effect up in Nova Scotia, Bay of Fundy area? Just interesting trying to tease out where the highly vulnerable to climate change comes from. Thanks.

MS. LYONS-GROMEN: Sure, thank you for the question. The Northeast Fisheries Science Center led work to do a climate vulnerability assessment for stocks in the greater Atlantic, and river herring and shad species were part of that assessment. I believe it's mentioned in the shad benchmark assessment as a reference, but certainly it's available online.

Their conclusions were that American shad, alewife, and blueback herring were all highly vulnerable. They ranked species to their vulnerability of climate change, and these species rose to the top. That's where that comment came from. In terms of the Mid-Atlantic Ocean data portal, they took a lot of information about distribution of American shad, as well as the river herring species, and plotted it historically, and this is ocean distribution.

Then they projected out into the future, based on some work with Rutgers and the National Marine Fisheries Service, and I believe also Canada was part of that work as well. You can see some pretty startling changes over time, looking at the effects of climate and ocean warming, and how these species have changed their distribution in the ocean. That's where that comment came from.

Certainly, are some smaller bodies of work out there looking at individual systems, and how climate has impacted their migration into its system to spawn, and also shortens their time in the spawning runs, and they don't have as much time any longer. I believe that work is available. Anyway, there is a lot of work there, and I think the APs point was that this really needs to be looked at a big more, and considered when we decide on management strategies to help conserve and bring back our American shad. Thank you.

CHAIR ARMSTRONG: Toni, are there any other Board members with questions?

MS. KERNS: Yes, you have Roy Miller, David Borden, Lynn Fegley, and Justin Davis. Then you do have a couple members from the public that have had their hand up.

CHAIR ARMSTRONG: Roy Miller, go ahead.

MR. ROY W. MILLER: Thank you Brian and Pam for your reports. Pam, I was particularly impressed with the Aps recommendations for improving surveys in the Delaware River. Having said that, I would like to probe a little bit about confidence of the Technical Committee in the genetic origin data for the mixed-stock fishery in lower Delaware Bay. It is unclear to me whether we have enough data in hand to take any management action, or whether it's a call for additional samples and on our need for greater reliability on that data than what we have at present. Brian, you may be the wrong one to direct this to. I might need to direct it to members of the Delaware River Fish and Wildlife Cooperative. But I'm wondering if you have any information on that particular mixed-stock fishery to share with us, in terms of how confident you are in the conclusions regarding the mixed-stock fishery in lower Delaware Bay.

MR. NEILAN: I would be happy to answer any question. I'm on the Coop, so I have a little more knowledge there. There has been a small study for genetic sampling that the Coop started around 2017. At this point we have three years of data, genetic sampling data. We're collecting genetic samples basically from the mouth of the Bay all the way up to Smithfield Beach, which is way up almost to New York.

We currently are sampling. I don't think we have enough data quite yet to base any management decisions on. U.S. Fish and Wildlife Service and Northeast Fisheries Science Center is doing our genetic analysis. Just to kind of give you an idea of the preliminary years of data, genetic composition of the lower Bay seems to match up with the different tagging studies. New Jersey conducts a tagging study of striped bass in the lower Bay, and we tag shad incidentally, and I believe Wogman did a study as well.

At least preliminary wise the genetic sampling seems to match up with what has been found in the tagging surveys. But I don't think we have the timeseries, or just the quantity and quality of data yet to decide management decisions off this. That's certainly a major impetus behind the TC requesting the Board task the TC with developing methods to evaluate genetic sampling and evaluating bycatch removals, not just in Delaware Bay, but in other mixed fisheries and the ocean fishery as well.

MR. MILLER: Thank you, Brian.

CHAIR ARMSTRONG: David Borden.

MR. DAVID V. BORDEN: Good morning. There are a number of references to hydropower impacts on the shad population. For instance, in the Connecticut River. My question is, to what extent do the hydropower companies have to provide funding to state agencies to assist with the monitoring and remediation program?

I recognize that there is a whole FERC process that gets superimposed over this. But it seems to me that the state agencies that are represented on this call are being asked to share a disproportionate burden, in terms of monitoring and management. Maybe if that is the case, maybe we could consider at some point including suggestions or recommendations in a letter to appropriate parties to remedy that situation. We've got a new administration in Washington, and they might be receptive to that concept.

CHAIR ARMSTRONG: Brian, can you answer that?

MR. NEILAN: Sure, that has definitely been in something that the TC has talked about, either at the state permitting level, at the FERC licensing level, requesting mitigation monies as part of the licensing requirements or permitting process. It's going to be on a state-by-state basis. But I think there is certainly support for requesting that during the licensing process. Any kind of mitigating monies to increase passage, or increase sampling, whether it be biological or sampling surveys. Having these hydroelectric companies contribute monies as a continuance of their permitting.

MR. BORDEN: I think that would be useful. Thank you.

MS. STARKS: If I could follow up, this is Caitlin.

CHAIR ARMSTRONG: Yes, go ahead, Caitlin.

MS. STARKS: I just wanted to note that the Technical Committee is actually working on developing a memo with some recommendations related to passage for the Board to consider in the future, and will hopefully include some recommendations as to specific things that could be addressed in a letter, such as what you suggested.

CHAIR ARMSTRONG: Lynn Fegley.

MS. FEGLEY: While we're on the topic of letters. I wanted to just circle back around to John McMurray's point, and where I started with the Northeast Fisheries Observer Program, and wondering if we as a body should be sending a letter to the Council, asking for prioritization of shad in these ocean fisheries.

CHAIR ARMSTRONG: Justin Davis.

DR. DAVIS: I appreciate you giving me a second opportunity. My question is for Pam. I was interested to see in the AP recommendations a recommendation to focus on recreational harvest and incidental catch. I'm wondering, was that motivated by discussions amongst the AP that there is a thought that recreational harvest or incidental catch might be substantial enough in some systems.

That having a better handle on it would change our perception of what is or isn't contributing to declines of this species in various systems, or was it more just that is another data gap. It's one to consider taking a look at, but there is not a thought that it's really a substantial contributing factor?

MS. LYONS GROMEN: Yes, I think it was the latter. It was recognized more as a significant data gap. In some systems we wouldn't know if recreational catch was impacting the stock, because there isn't great information. I think it was also looking at more of a coastwide, you know looking at coastwide at trying to get a better handle on recreational catch, because MRIP does a poor job of sampling for these species because of its reach. Yes, your words, a data gap.

CHAIR ARMSTRONG: I think that's all I have on the list of Board members. Toni, anymore Board members?

MS. KERNS: You do have a couple more Board members that raised their hand, and still some members of the public. You have Cheri Patterson and John Clark.

CHAIR ARMSTRONG: Okay, go ahead, Cheri Patterson.

MS. CHERI PATTERSON: I also wanted to kind of follow on with Lynn's recommendation to get ahold of the Council. But we should also put this in front of the ACCSP Bycatch and Bio Committees, to have them

review that to move shad up the line for sampling, as a more critical species for the bycatch.

CHAIR ARMSTRONG: Thank you, Cheri, that's a good suggestion. John Clark.

MR. JOHN CLARK: Thank you Brian and Pam for the presentations. I want to follow up on the question that Roy Miller asked about the Delaware stock, Brian. It seems like we are putting in a lot of effort to quantifying what is going on with the mixed stock in the lower Bay there. Yet, you know just looking at Delaware and New Jersey's harvest in 2019, Delaware had about 2,400 pounds, New Jersey about 1,800 pounds, or 18,000 pounds rather.

This is a pretty minor fishery right now, and based on the comments from the Advisory Panel about that adequacy of the data we're getting on adult shad in the Delaware River. Does the TC feel that the efforts to evaluate and assess these stocks in the Delaware should be more focused on improving the surveys on the adults that are returning to spawn?

MR. NEILAN: Thanks, John, I think the focus right now is on better understanding the mixed-stock fishery. As you said, in 2019 New Jersey harvested, I think 18,000 pounds. That was our total harvest. In the mixed-stock fishery it was probably about half that. We think we need to move forward at looking to see if the juice is worth the squeeze.

If getting the correct data to figure out if reducing the fishery will have any impact at all on improving outlooks for other fisheries. But certainly, improving the power of our surveys is another priority. I think two of our main surveys just didn't quite meet it for the juveniles. As a result, weren't included in the assessment. At least within the Delaware Basin, those are the two priorities.

CHAIR ARMSTRONG: Okay, we're doing okay on time, so I would like to take a couple of public comments, if you could keep it brief and to the point, please? Toni, could you call out who.

MS. KERNS: Yes, we can do that. Jeff Kaelin and Jim Fletcher, and then after we do the public comment, Geoff White from ACCSP has a comment as well.

CHAIR ARMSTRONG: Jeff Kaelin, go ahead.

MR. JEFF KAELIN: Thank you, Mr. Chairman, members of the Board. I'm Jeff Kaelin; with Lunds Fisheries in Cape May, New Jersey, and I've been in the herring fishery since the early '80s, and we continue to operate in that fishery. Although, as everybody knows the quotas are a fraction of what they've been historically, due to recruitment problems. Likely coming from a warming ocean. One of the things that frustrated me, and looking at the information that we had before us at the AP, is there is really very, very little data that we could use to compare mortality effects, and specifically still haven't really seen any data from the bycatch avoidance network that have been in place for several years.

That data exists. I think the shad hatches and the herring midwater trawl fishery, and mackerel midwater trawl fishery are fairly low. I think the thing that is frustrating in these, we're not seeing any numbers that you can compare one against the other. In my experience for many, many years, working with the Science Center.

It was my recommendation that the Commission think about reaching out to the Observer Program at the Science Center to prioritize shad data collection going forward. There is going to be or already is an industry funded monitoring program established for the herring fishery. Of course, that quota has been reduced by 80 or 85 percent over the last couple of years.

The mackerel quota is a fraction of what it has been historically, so there is not a lot of effort in that fishery. But it's going to continue to be monitored through the IFM program that will include some kind of shoreside monitoring program that the Agency is supposed to establish, that would be used in combination with cameras on our boats.

For example, through an experimental fisheries program. There is data on shad catch in this offshore fishery that is available. But again, it's a frustration of mine, having been an AP member for many, many years that a lot of times we'll get some recommendations. But we don't have data to kind of compare the mortality effects of the various fisheries that may be affecting the shad stocks.

I just wanted to make that comment, and hopefully we can dig a little deeper for the next assessment, and look at some real numbers rather than perhaps just using the shorthand that, well, the offshore intercept fishery could be the smoking gun. I really don't think the data supports that, so I just encourage an evaluation of that existing information. We certainly would support any additional data collection that the Commission would want to see here. But again, a frustration that we're not seeing the data we already have. Thank you.

CHAIR ARMSTRONG: Thank you, Jeff, that is a good suggestion. There are data that do exist that could be summarized. It's hard, but it can be done. Toni, help me out. I can't read my own writing, to see who was the second number up there.

MS. KERNS: It was Jim Fletcher.

CHAIR ARMSTRONG: Jim Fletcher, okay go ahead, Jim.

MR. JIM FLETCHER: My question is on the otoliths to the 2 percent. Are we studying the otoliths with scanning electron microscopes? Because some countries, they are studying the otoliths of the fish with scanning electron microscopes, to get better age, but they are also discovering that they can show chemical contamination or where the fish pass through chemicals. My question is, are we using scanning electron microscopes to study the otoliths of shad, and then is it possible that we could get some report on the success of the Indian Tribes in Virginia that are using enhancement that may be able to be used in other areas? Thank you.

CHAIR ARMSTRONG: Thank you, Jim. Brian, would you like to take a crack at that?

MR. NEILAN: I'll give it a shot. As far as the microscopes that are being used. These otoliths are just being aged under low powered standard optical microscopes, just for aging purposes. Nobody is looking at scanning electron and trace elements for looking at origin. As far as the question about the Native Tribe, I don't really have any info on that.

CHAIR ARMSTRONG: All right, thank you. Back to the Board. Toni, any more hands?

MS. KERNS: Yes, you have Geoff White.

CHAIR ARMSTRONG: Oh yes, Geoff White, go ahead.

MR. GEOFF WHITE: Thank you, Toni, and thank you, Mike and the Board for indulging me. I just wanted to note, I appreciate Cheri's point about the ACCSP Biological and Bycatch meetings coming up. Those are February 17 and 18, and so for your staff members participating in that and updating those matrices on priorities, we look forward to your feedback during those meetings. That's it.

CHAIR ARMSTRONG: Thank you. All right, I think we'll move to discussion. We don't necessarily need a motion, but I've heard some things that maybe we want to do a motion to reinforce some things. If I can summarize what I heard is, shad continue to be depleted, but some of the problems are the data are very poor in many of the systems.

The systems that have been judged depleted or unsustainable, in most of the cases there is not much of a fishery left. In the one that is a concern unsustainable from Delaware, they are redoing their sustainable fishery management plan, so that the TC will get a crack at evaluating that. A lot of the concerns are about the data and data inadequacies, and about habitat problems, including passage.

I'll remind everyone that every state sent in a response to three questions that have risen about the

assessment, identifying areas of concern of the assessment. Identifying additional information that could provide more context to the assessment, and suggesting management or monitoring changes or restoration that would improve shad stocks, and every state provided a response to those. I'll open the floor to discussion or possibly motions.

I do, not to be heavy handed, but what I heard, and I don't know if we need a motion or not. We may want a letter to FERC or U.S. Fish and Wildlife regarding passage. We may want a letter to NMFS or the Councils, prioritizing bycatch. Let's see, we may want to charge the ASMFC Bycatch Committee to raise the prioritization of shad on their list. We may just do a general one, saying we recommend that all states address the TCs concern to the practicable. Then Brian, there was one, the TC asked us to do, which was charge them to develop methods to evaluate bycatch, and jump in, Brian. I think that was the tone of what was being asked. Anyway, that is what I heard, so I'll open the floor. Any discussion?

MS. KERNS: You have Joe Cimino from the Board and then one member of the public.

CHAIR ARMSTRONG: Go ahead, Joe.

MR. CIMINO: I was remiss in my first time at the microphone, not to thank the AP and the TC for the thorough work and review that they did there, and the great presentation by Brian and Pam, it is much appreciated. You did lay out a lot for us, and I would be interested in a discussion on something that Jeff Kaelin brought up too.

Not just to prioritize bycatch sampling and observer sampling, but to also prioritize collecting and analyzing the data that already exists. As a Council member, I tend to take that up with the Council as well. I would like to put a motion out there, because I think it's pretty simple. The TC has done a lot of work, but they are asking to do a little more.

I believe staff has the motion already written on that**. I would move to task the Technical Committee with developing methods to evaluate bycatch removals in directed mixed-stock fisheries in state waters in order to understand and reduce impacts to stocks outside the area where directed catch occurs.**

CHAIR ARMSTRONG: Okay, do we have a second of that motion?

MS. KERNS: Justin Davis.

CHAIR ARMSTRONG: Seconded by Dr. Davis. Go ahead, Joe.

MR. CIMINO: I don't need to spend a lot of time on this, since it was a TC "ask," and I think as I said, Brian did a great job presenting this, and Caitlin also, who has gone back to this several times.

CHAIR ARMSTRONG: Okay, any discussion, Board members?

MS. KERNS: I don't have any Board members with their hand up.

CHAIR ARMSTRONG: You had one member of the public?

MS. KERNS: Correct.

CHAIR ARMSTRONG: I'll take that.

MS. KERNS: Des Kahn.

MR. DESMOND KAHN: Thank you, Mr. Chairman. I would like to point out, and I have not had a chance to fully read the assessment yet. I apologize for that. I worked on the 2011 sustainability evaluation for the shad stock in the Delaware River, and during the course of that I had been aware from work on the Connecticut River that there was peer reviewed published research that clearly showed that the large build up in striped bass since say the early '90s, was associated with a steep decline in both the American shad and the blueback herring runs up the Connecticut River.

That research was supplemented by work conducted by actually Justin Davis on, I believe his PHD research, where a large-scale diet study was conducted on striped bass in the Connecticut River, and in the spring, I think they looked at, or they estimated roughly 100,000 bass in the Connecticut River in the spring, and they are not spawning.

What they are doing is eating, or what they were doing at that time is eating shad and herring, as the diet study made clear. I decided to take a look at the Delaware, and see if there was any evidence of something like that going on. I plotted the index of abundance of striped bass in the waters of the state of Delaware with the index of abundance of the shad run, well up in the Delaware River.

My jaw hit the floor! It was like a mirror image. There was a very significant negative correlation. When bass were in very low abundance in the '80s, the shad run in the Delaware River was booming. When bass started to increase in the '90s, the shad run in the Delaware declined. When bass were at their peak in 2000, the shad run was at a very low level in the Delaware.

Since then, when we've seen some small decline in the bass stock, you know the shad run has responded. It's very clear to me that there is a predation impact, and when you built up the stock of a predator like striped bass, which is as Dr. Victor Crecco pointed out years ago, striped bass is the only marine predator that can follow fish like river herring into fresh water, and shad also.

I just would like to point out that you know looking at bycatch, which we've just heard from Mr. Kaelin the midwater trawl fishery for Atlantic herring and mackerel have declined significantly. I think you're looking up the wrong tree there. If the Commission would come to grips, and do a serious study of the impact of striped bass on alosines, I think you would be really looking at what really seems to be controlling their abundance. Thank you very much.

CHAIR ARMSTRONG: Thank you, Des, interesting topic to ponder. We look forward to your publication on it. Back to the Board, any further discussion? Any hands, Toni?

MS. KERNS: I don't have any other hands raised.

CHAIR ARMSTRONG: All right, I'll call the question. I will go out on a limb and say, I think we can do this without a roll call. Are there any objections to this motion?

MS. KERNS: I see no hands raised in objection.

CHAIR ARMSTRONG: Okay, well, do we have to.

MS. KERNS: I think I just need you to say motion carries without objection.

CHAIR ARMSTRONG: The motion carries unanimously. All right, further discussion, considering a management response to the benchmark assessment, or motions.

MS. KERNS: Lynn Fegley.

CHAIR ARMSTRONG: Go ahead, Lynn.

MS. FEGLEY: With all respect to Des's comment, which is pretty interesting. I'll just put it out there, we do need a motion to communicate with the Council about prioritization of bycatch, and also to let the ACCSP move the shad up in its priority matrices. If we need a motion, I would make one. But if we can just do that by consent, so be it.

CHAIR ARMSTONG: Caitlin, what do you think?

MS. STARKS: Well, I'm actually going to defer to Toni on whether we need a motion on this one or not.

CHAIR ARMSTRONG: Okay.

MS. KERNS: I guess, Lynn, I just have a question to you. The NEFOP is clear to me letter to Northeast Fisheries Science Center and GARFO. But for the ACCSP, are you looking for a letter, or are you all just

agreeing as a Board that you will ask the staff that are attending that meeting to increase the prioritization level for shad at the meeting?

MS. FEGLEY: Yes, I think that is probably right. I think the latter, the ACCSP part we can probably handle internally with our staff. But it's the Council part that I think is more important.

MS. KERNS: Just so I'm clear, you're looking for a letter to go, who do you want the letter to go to outside of GARFO and the Science Center? Do you want it to go to the Councils as well?

MS. FEGLEY: Well, I guess I'm not entirely sure. I would imagine it would be to the Mid-Atlantic and the New England Council. I'm sure there is somebody better than I on that.

MS. KERNS: You have Megan Ware with her hand up.

CHAIR ARMSTRONG: Megan, go ahead.

MS. MEGAN WARE: I'm thinking that the Science Center and GARFO might be the most appropriate recipients to that letter. I'm just speaking up for the New England Council. There is not a shad fishery management plan for the New England Council. That recipient feels a little off to me. But if others disagree, please let me know.

MS. KERNS: You have a couple hands that have gone up since then, Mr. Chairman. I will read them slowly. We have Cheri Patterson, Max Appelman, and then you do have a member of the public, Jeff Kaelin who put his hand up.

CHAIR ARMSTRONG: Go ahead, Cheri Patterson.

MS. PATTERSON: I agree with Megan. I'm not quite sure the benefit of including the New England Fishery Management Council in the letter, but definitely NOAA Fisheries. I would make suer that they understand that we're concerned about mixed-stock fisheries, and appropriate sampling for shad.

As for ACCSP, I would recommend everybody on this Board to know who their Bycatch and Bio personnel are that go to ACCSP meetings, or it might be one now, I'm not sure. Just recommend that they have this conversation, in regards to shad sampling, because this would also elicit some new proposals for funding through the ACCSP program, to help with this concern.

CHAIR ARMSTRONG: Max Appelman.

MR. MAX APPELMAN: Hi Mr. Chair, thank you. Yes, so not opposed to sending a letter, but given the, I recognize that there is no formal motion up on the table right now. But recognizing the conversation here, and the content of what that letter would be, and who it would be written to. I would just want to make it clear that I would be abstaining if there was a motion to this effect. But again, not opposed to the letter. We certainly welcome any input, and would look forward to working with the Commission on these issues.

CHAIR ARMSTRONG: Thanks, Max. I'm going to hold off on public comment right now, we're dropping a little behind schedule. What I hear is we don't need a motion to charge ACCSP with prioritization, but we probably do, to do a letter. Toni, is that right, to do a letter to NMFS? Do you think it would be cleaner to have a motion?

MS. KERNS: Mr. Chair, I'm hoping you can hear me, because my computer is telling me I'm experiencing network connection problems.

CHAIR ARMSTRONG: I do hear you.

MS. KERNS: Okay, perfect. I just wanted to know who Lynn wanted to send the letter to. If there is unanimous consent amongst the Board, noting that NOAA Fisheries is abstaining, we can bring that recommendation to the Policy Board, and you don't have to write. We don't have to have a specific motion; we'll get something for you to bring to the Policy Board this afternoon. But Justin Davis does have his hand up, and I notice that now, we would send that letter to the Science Center and GARFO.

CHAIR ARMSTRONG: Justin Davis.

DR. DAVIS: I just wanted to make a general comment, if that's okay. It's not related to the letter, if that is all right at this point. I wanted to acknowledge the comments that Des Kahn made, I think making some really good points. My impression is that the issue of predation, and then what role it might be playing in shad and river herring, both the declines we experienced over the last 20 years, and then continued low production.

It's a difficult thing, I think for this Board to address, because it really gets to that ecosystem management problem. I think there might be a sense of sort of well, what can the Shad or the River Herring Board do to try to address an issue, where other animals out there in the ecosystem are potentially exerting this predatory pressure on these species.

What I think it just points to is that when we have deliberations on the Striped Bass Board, for instance, coming up over the next couple years on Amendment 7. We had some discussion at the Striped Bass Board this week about whether or not it was appropriate to sort of indicate to the public that the reference points that are currently in place might be unattainable, that they might be unreasonable.

I think we also need to sort of make it clear to the public that there are inherent tradeoffs there. That if we want to have a really abundance striped bass stock, that the tradeoff there is we may not then also be able to have abundant shad and river herring runs in some areas, because those fish are going to exert a lot of predatory pressure.

I think it just means we need to keep that in mind when we're talking about striped bass management, and management of some of these other predatory fish, that there is a tradeoff there that can negatively impact these fish. I just wanted to acknowledge Des' comments. I think they are good, and they are something that we need to keep in mind.

CHAIR ARMSTRONG: Thank you, Justin. I guess I'll just ask, and we'll try to do this by consensus. Are there any objections to asking staff to ask ACCSP to increase the priority of shad, and to write a letter to the appropriate people at NMFS, to ask for more bycatch sampling? Are there any objections to that?

MS. KERNS: No hands.

CHAIR ARMSTRONG: No hands, thank you, any null, and I believe we probably have one abstained, is that right, Max?

MS. KERNS: That's correct, Mr. Chair.

MR. APPELMAN: That's correct.

CHAIR ARMSTRONG: Okay, motion passes very unanimously with one abstained, however you want to say that. All right, is there more discussion or more motions to be made? I do believe there is one. Brian, I believe the TC asked us to charge them with developing some bycatch methods.

MR. NEILAN: Yes, I think Joe's motion captured that.

CHAIR ARMSTRONG: Yes, you're right. It's staring me right in the face. Thank you. Any further discussion on Item 4?

MS. KERNS: No additional hands are raised.

REVIEW TECHNICAL COMMITTEE RECOMMENDATIONS ON IMPROVEMENTS TO AMENDMENTS 2 AND 3

CHAIR ARMSTRONG: All right, then I think we'll move on to Item 5, which is to Review the Technical Committee Recommendations on Improvements to Amendments 2 and 3. Brian, you have a presentation on this.

MR. NEILAN: Yes. Again, my name is Brian Neilan from New Jersey, I'm the TC Chair on the TC. This presentation here will be Technical Committee recommendations on a recent Board task, specifically improvements to Amendments 2 and 3. Here is a quick run through of what this presentation will be touching on.

First, a little background on what the Board task was, and the TCs recommendations based on this task. Finally, the actions that the Board will need to consider. A little background. This task goes back to 2017, when the TC identified some inconsistencies between state management programs and the shad and river herring FMP.

Just for reference, Amendment 2 is River Herring Management, and Amendment 3 is Shad. In the fall of 2019, the TC presented a report on state inconsistencies, and recommendations for resolving each issue. This past summer the Board approved the state proposals to resolve any of these inconsistencies between the state plans and the coastwide FMP.

This is the current TC task we'll be working through today. After the states resolved the inconsistencies in their plans, the Board tasked the TC with developing improvements to Amendments 2 and 3, with regards to the following items. First, management and monitoring of rivers with low abundance and harvest of shad and river herring.

A standardization of sustainable fishery management plan requirements, in regards to contents of the plans. Metrics used for benchmarks, and management responses to the benchmark is triggered. Incorporation of stock assessment information into SFMPs, and their discussion on the timeline for renewing these plans.

Some clarification on de minimis requirements as they retain the SFMPs, and review at a number of years of data that are required before developing a metric for an SFMP. That is the task. Looking at Number 1, Management and Monitoring. Rivers with low abundance in harvest of shad and river herring.

The TC does not recommend any changes to the FMP to address commercial fisheries. Commercial fisheries will still require a standard SFMP, with commercial reporting, biological sampling, et cetera. The TC does recommend that the SFMP should clarify the management of recreational fisheries, that they should be dependent on the availability of harvest and monitoring information. Under Amendments 2 and 3 to the FMP, states may implement with Board approval, alternative management plans. We are referring to them as AMPs, for river herring and shad that differ from those required under the FMP. They must demonstrate that the proposed management program will not contribute to overfishing of the resource, or inhibit restoration of the resource.

The TC recommends that the above chart be used to determine when each type of management plan is appropriate, whether it be a standard SFMP, an alternative management plan, or if the states should be required to implement catch and release only regulations. This chart would be applied on a state by state or a system-by-system basis.

Just to reiterate, this would be applied to your recreational fisheries only. Looking at this chart that Caitlin developed. On the left there are the categories of recreational harvest, including known or suspected harvest, unknown recreational harvest, but concerned species presence, and no recreational harvest, and it's generally accepted that the species is absent from the system, or the systems outside the species generally accepted range.

Then on top there we have the categories of data to support a management plan, whether it would be sufficient fishery dependent or independent data, or insufficient data. Just to run through this chart here. If you have known or suspected recreational harvest of shad or river herring, using this chart you would be required to develop and improve SFMP, with appropriate sustainability metrics, monitoring and management responses.

Otherwise, you would implement catch and release only recommendations, if you didn't come up with an SFMP. For these purposes, known harvest is that which is recorded in official surveys or reports, where suspected harvest is identified through anecdotal information from fishermen, or historical information in systems that don't have an official monitoring of recreational harvest.

The TC would be responsible for determining whether monitoring data are sufficient, or insufficient for proposed uses. For systems with known populations of river herring and shad, but no known suspected recreational harvest, the state or jurisdiction using this chart would have the ability to either close or implement catch and release only regulations, allow recreational harvest under a Board approved SFMP, with the appropriate sustainability metrics.

Responses or 3, allow recreational harvest under Board approved alternative management plan. Any recreational harvest is confirmed through official avenues, at which point the state would be required to develop a standard SFMP. Using an alternative management plan would not require sustainability metrics. For systems with known small populations of river herring, shad, and no suspected harvest, but without system-specific monitoring.

The state would either close or implement catch and release only regulations, allow harvest under a Board approved SFMP with appropriate sustainability metrics, or again, allow recreational harvest under an AMP, until recreational harvest is confirmed. Finally, for systems with no known populations of river herring, and consequently no suspected harvest, and no fishery independent data. The state or jurisdiction would either close or implement catch and release only regulations, or allow recreational harvest under a Board approved AMP. If river herring or shad were to become present, the state must resubmit a proposal to the TC for an SFMP. If you have insufficient data and unknown harvest, or known harvest, and the species is known to be present. You would have to default to catch and release only under the use of this chart. This is how this chart would be applied for considering SFMPs, alternative management plan, or catch and release only regulations.

Standardization of SFMP requirements, in regards to metrics and management responses to triggers. The TC did not recommend additional requirements for the type of sustainability metrics that can be used in the SFMPs. The TC does recommend additional language be added to the FMP, to strengthen or clarify whether system-specific or state-specific plans in the following areas.

First, the level of detail required in the plans or management response to the stock falling below defined sustainability target or threshold. When a state may relax restrictions implemented in response to falling below the sustainability target or threshold, and management of interjurisdictional water bodies.

In regards to management responses, Amendment 2 states that if stock is below optimum level, the management plan must detail restrictions that will be enacted to allow for increase in spawning stock abundance and juvenile recruitment. In regards to Amendment 3 in shad, it includes wording that said “discussion of management measures to be taken if sustainable target is not achieved within an indicated timeframe.”

The TC recommends adding the following language to the FMP to clarify the language that details the type of restrictions that can be considered, allowing a plan to provide multiple options for restrictions. Basically, one option is a tiered approach to severity of response based on how far below a threshold is triggered.

The TC also recommends adding language requiring that a state must notify the Board in the next Annual Compliance Report if the stock falls below an SFMP threshold, and pursue implementation of the management response for the following calendar year. In regards to relaxing management restrictions, Amendments 2 and 3 say proposals to reopen closed fisheries may be submitted in the annual compliance report, and will be reviewed by the PDT, the TC, as well as the management board.

This one, the TC recommends adding specific language to clarify when a relaxing of the restrictions may be considered for approval. Specifically, if a state has implemented a management restriction in response to the stock falling below sustainability targets, the management restrictions must stay in place until the sustainability targets have been met for at least five consecutive years.

For 2C, in regards to interjurisdictional management guidance. Amendment 2 encourages cooperative development of SFMP targets. Amendment 3 seems to say both agencies should have plans, unless there is a cooperative involved. The TC recommends the following, cooperative development of one shared SFMP for the entire system. This would include consistent targets and metrics, and when possible, consistent management measures for fisheries permitted by jurisdictions in shared water bodies, similar to regional management approaches that are done in other ASMFC managed fisheries. For Item Number 3 for this Board task, incorporation of stock assessment information into SFMPs, and discussion of timeline for revealing plans.

There is concern among TC members that for many systems there is inconsistency between the information used to assess stock status through the stock assessment, and those used to develop sustainability metrics for the SFMPs. For example, some data sources are being used for benchmark development in SFMPs, but didn't meet the time series or power requirements used in the stock assessment or the benchmarks, and used in SFMPs are saying on thing about stock health. Then the assessment had a conflicting finding.

For these issues, the TC recommends compiling information on current monitoring programs by species and systems, and developing recommendations for improvements for use in SFMPs and assessments. Additionally, the TC recommends no change to the five-year timeline for renewing SFMPs and AMPs.

Issue 4 is in regards to clarification of de minimis requirements as they pertain to SFMPs. The current definition under Amendment 2 and 3 states, that states that report commercial landings of river herring or shad that are less than 1 percent of the coastwide commercial total, are exempted from subsampling informational and recreational catch for biological data.

This does not exempt states from the requirement to prohibit recreational harvest and possession, unless they have a Board approved management plan. This is a quick one that the TC does not recommend any changes to the current de minimis requirement, and an exemption for states with de minimis status.

The last issue, Issue Number 5 is in regards to the number of years of data required before developing a metric for an SFMP. As it sits now, Amendments 2 and 3 do not contain explicit requirements for timeseries length. After some discussion the TC recommended the minimum of 10 years of data required to establish a primary sustainability metric, through an SFMP or an AMP, for both shad and river herring.

With one caveat for river herring, river herring's shorter time series in the 7-to-9-year range would be considered by the TC on a case-by-case basis, if the state can provide additional information to justify the shorter time series. You know any sort of examples, exploitation rates, stock size, whatever they think can justify the use of a shorter time series.

One example of a shorter time series being used is in Maine. Last year they only had seven years of run counts of river herring, but the runs were strong, continually increasing, and they had very low proposed exploitation rate, and a high stock size target, so the TC felt given that information that they could go ahead with the shorter timeseries. That is the TCs recommendation for the original Board task.

In hashing out the recommendations for this Board task, the TC developed some additional recommendations beyond what was originally tasked by the Board. The TC felt that there is quite a bit of gray area, in regards to the use of AMPs, and recommends the following requirements if the states intend to develop an alternative management plan. The first recommendation is that the AMP will include a rationale or justification for why a standard SFMP cannot be used. That a justification that the proposed management program will be conservationally equivalent to catch and release only regulations.

An explanation of how the state will determine if and when the AMP is no longer appropriate. The data

source to risk and monitoring, and sort of potential catch or harvest. Any triggers for when you will switch from an AMP to a standard SFMP, and a description of a management response the triggers met.

One example, if a harvest is documented through a creel survey for three consecutive years, catch and release only regulations will be implemented state wide for the first specified systems, unless or until a standard SFMP is developed. Finally, if a management trigger in an AMP is met, the state must notify the Board in the next annual compliance report, and pursue implementation of a management response to that trigger in the following calendar year.

A few more additional recommendations. Another issue the TC discussed was the idea of allowing limited recreational harvest in systems with an SFMP or AMP using a low state wide bag limit. The TC does not recommend allowing any recreational harvest to occur on systems that are not managed through either an approved SFMP or an AMP. Unmonitored systems could experience unchecked recreational fishing pressure if this were the case, which would be detrimental to the small stocks.

Finally, the TC does recommend AMPs allowing statewide recreational bag limits or no recreational regulations must include a trigger to implement catch and release only regulations, or propose an SFMP. That was everything the TCs recommended on the Board task for the Board to consider. I think Caitlin is going to take over from here. Staff will be able to better describe the steps going forward for Board consideration.

MS. STARKS: These are a couple of different routes that the Board could consider, in response to these Technical Committee recommendations that Brian has gone over. The first is to consider initiating a management action, which I think would be an addendum to modify the FMP, according to the recommendations that the Technical Committee has made, where they have recommended adding language or clarifying certain portions of the FMP.

Then just as a note, I kind of put some tradeoffs with these two different options. The second option that I see as a path forward is to task the Technical Committee with developing a Technical Guidance Document that includes all these recommendations, and that would guide their development and evaluation of sustainable fishery management plans, or alternative management plans going forward.

The first route is, you know possibly more time and resources to do an addendum. It does possibly give the Board more enforceability of the requirements that are being recommended, since they would be written into the FMP. The second route may take a little less time. It would only involve the Technical Committee developing this guidance document. But it goes with less enforceability of those recommendations, it wouldn't actually be requirements written into the FMP. I just wanted to lay those out as some potential next steps for the Board, and I think that is all we have for this presentation.

CHAIR ARMSTRONG: All right, thank you, Caitlin. That is a lot of material to digest, and it's clear that Amendment 2 and 3 had some problems that need to be addressed. The question is, which route do we want to go? Do we want to do an addendum, or do we want to task the TC with developing a guidance document when evaluating sustainable fishery plans or alternative plans? Discussion, anybody have an opinion which way to go?

MS. KERNS: Mr. Chairman, you have Justin Davis, and David Borden.

CHAIR ARMSTRONG: Go ahead, Justin Davis.

DR. DAVIS: I guess I'll start off by thanking the TC for this tremendous amount of work. It always impresses me with this Board, and the technical work that goes on, TC tasks and stock assessments, just how much information there is to deal with and handle, because rather than sort of just having one coastal stock, we've essentially got this patchwork of stocks, multiple

stocks within each state up and down the coast, all with their own little ins and outs, and differing levels of available data and considerations.

This is a tremendous amount of work, and I really appreciate it. You know I guess my feeling, after looking at this, is that I would sort of prefer Option Number 2 here. I think it's great that we've made some effort to, and given some attention to potential inconsistencies between the two amendments, how we're managing the two species groups.

My impression of how the management program, prescribed by these amendments have been working since they've been put in place, is that there has been a nice balance between striving towards meeting all the requirements laid out by the FMP, and providing good data sources to help improve management.

While at the same time allowing some flexibility for states, because of those unique considerations and little ins and outs that I mentioned. I guess I prefer Option 2 here, to sort of maintain that kind of status quo or paradigm, you know with the idea that if we have a technical guidance document, that can certainly help the TC in guiding states in developing these plans and improving them, without potentially going through the time and effort of doing an addendum to the FMP, and working through all this in detail.

It seems to me like the TC has a good handle on the improvements that can be made, and by just developing a technical guidance document and letting them use that to guide them in evaluating these plans, that would be the best way forward. I would be willing to make a motion to that effect, if you're ready for that at this point, Mr. Chairman. But I'll also defer if you would like there to be an opportunity for more discussion.

CHAIR ARMSTRONG: Yes, Justin, let's hold off just a little bit, and I can get a couple more comments, and see if we're all heading in the same direction, if it's all right with you. David Borden. We can't hear you, David.

MS. KERNS: David, you are unmuted. We just can't hear you. Mr. Chairman, I don't know if while David is working out his sound problems, Doug Haymans also has his hand up.

CHAIR ARMSTRONG: Go ahead, Doug.

MR. DOUG HAYMANS: Thank you, Mr. Chairman, it's rare that I hear Toni call my name two times in a row like that. I would agree with Justin's comments, and would prefer that we look at Number 2 there. As a state with limited to no fisheries, especially in the river herring category.

I would prefer to be able to work within the ASFMC process, our Technical Committee representatives, and pleased with the direction the Technical Committee is working in right now. I would like to keep it that way, so my preference would be in agreeing with Justin, and I would support with a second his motion, when the time is appropriate.

CHAIR ARMSTRONG: Thank you, Doug, anymore comments? Toni.

MS. KERNS: I don't have anybody else's hand up. Cheri Patterson. Hold on, okay. I have Cheri Patterson, Chris Batsavage, and Roy Miller.

CHAIR ARMSTRONG: Okay, go ahead, Cheri.

MS. PATTERSON: I'm a little torn here. I understand that the technical guidance document would definitely require less time, but here is the problem I have, is it provides less enforceability of requirements. I think that it is important to note that we have these FMPs in place, in order to make sure that states are monitoring appropriately and consistently.

I'm not sure that that is occurring on a consistent basis. Just doing a technical guidance may not help with that sort of concern. I'm torn. I have a tendency to lean towards moving forward with an addendum, in order to correct anything in the current FMPs, as recommended by the TC, so that there is no question

within the TC when they do these marvelous reviews, as to what is required for them to review and management actions.

CHAIR ARMSTRONG: Thank you, Cheri, Chris Batsavage.

MR. CHRIS BATSAVAGE: I share many of the thoughts and comments that Cheri just made about which way to go. I'm also torn. I'm leaning more towards the addendum route. A question I have is, the recommendations given by the Technical Committee for clarifying these issues in Amendments 2 and 3. Would those invalidate any of the AMPs that are currently in place? Based on that I may have a follow up.

MS. STARKS: I think I can answer that, Mr. Chair. Chris, I don't believe that any of the current AMPs would go against the recommendations of the Technical Committee, and I think the Technical Committee had those in mind as they were developing these, as those alternative plans were being developed this past year, figuring out the best way to put those together. I think those are part of what the recommendations include. I don't think it would invalidate them.

MR. BATSAVAGE: Thank you for that, Caitlin. That is helpful, as far as helping me decide which side of the fence to lean on. I'm leaning more towards the addendum side at this point.

CHAIR ARMSTRONG: Roy Miller.

MR. MILLER: I think I'm leaning more with Chris and Cheri on this. If I could make a suggestion. If we decide to task the TC with developing a technical guidance document, then I would urge that this document be reviewed at regular intervals. Certainly, at every stock assessment update.

But if that is five years, then maybe we should review the performance in meeting and recommendations of the technical guidance document at three-year intervals, or something like that. I'm concerned about producing a report and then just having it sit on the shelf and gather dust.

CHAIR ARMSTRONG: We have Allison Colden.

DR. ALLISON COLDEN: Not to simply pile on here, but I'm sort of on the same line of thinking as the last few speakers, with regard to the greater enforceability of an addendum over a technical guidance document. The one thing that struck me from today's presentation was, you know the timeline of this discussion. These issues are first inconsistencies, the first identified in 2017.

You know we took action to address those inconsistencies in 2019, and this seems to me like the next logical step to sort of codify the changes that the states have already made, as well as the guidance that we've gotten today from the Technical Committee moving forward. I'm comforted by the answer to the previous question, as to whether or not this would immediately impact any of the existing SFMPs. I am also leaning in support of an addendum.

CHAIR ARMSTRONG: Any further discussion?

MS. KERNS: Lynn Fegley had her hand up before, but maybe Allison covered what she wanted to talk about, and then Megan Ware has her hand up.

CHAIR ARMSTRONG: I'll assume Lynn's okay, Megan, go ahead.

MS. WARE: I think this is a question for Caitlin, and just looking through the memo. It seems like some of the changes recommended are specific language changes in the FMP. Then some of them are more TC recommendations, or TC tasks. For example, Number 3 about the stock assessment information. I'm just trying to get a better sense of how something like Number 3 would be in an addendum, or maybe it wouldn't be.

MS. STARKS: I think with Number 3, I think you're referring to incorporating the stock assessment results into the requirements of an SFMP. I think that those could be taken out as options, if that makes sense. It could be an option to require the SFMPs to include the stock assessments metrics versus sustainability in the

SFMP, or an option to incorporate the information, but not make it a requirement that they be used as the sustainability metric set, each system is being evaluated again, if that makes sense.

CHAIR ARMSTRONG: Any further hands, Toni?

MS. KERNS: No other Board members, one member of the public.

CHAIR ARMSTRONG: I'm not going to take public comment until we have a motion to vote on. I'll go back to Justin. After hearing what you've heard, would you like to make a motion?

DR. DAVIS: Sure, I'll make a motion, just to get something up on the board to help focus discussion. I believe staff has that motion. **I move to task the Technical Committee with developing a technical guidance document to guide SFMP/AMP development and evaluation based on the recommendations presented today.**

MS. KERNS: You have a second by Doug Haymans.

CHAIR ARMSTRONG: Yes, we heard Doug. Discussion. I think you know there is clearly some people that are leaning towards addendum. I think, and I turn to Toni to step in if not. I think we just discuss this. We go ahead with a vote, and vote it up or down. If it goes down, we move to a new motion for an addendum. I think that is cleaner than trying to wordsmith this into something we can live with. Anyway, discussion on this motion. Justin, did you want to say anything else?

MS. KERNS: You have Cheri Patterson and Lynn Fegley.

CHAIR ARMSTRONG: Okay, before that Justin or Doug, do you want to say anything further?

DR. DAVIS: I guess I put the cart in front of the horse a little bit, by laying out my rationale for the motion before I actually made it. I won't add much further, other than to say I think there are arguments on both sides for doing it either way. I guess I'm just kind of thinking of the end result of either path, you know what it's going to mean for the overall management program.

I don't view the current situation as sort of being really deficient, that a lot of states are not doing things they should do. I think in some instance's states, for good reasons, are potentially asking for leeway or exceptions, but also putting effort into producing data that is helping in the management of these species.

I guess I just feel like looking at the slate of issues outlined in the memo that the TC put together, some of them don't seem like they need to be addressed through addendum. Some of them seem like if we initiated an addendum, it might put some states ultimately in a tough spot, where they might feel like they have to make a choice between complying with certain requirements that are not likely to substantially kind of add to the overall data picture for the species, or discontinuing their fisheries, given a lot of us are under resource limitations these days, and don't know how much we can devote to certain things. That is why I'm making this motion. I can see the argument on both sides, and I guess I'll just leave it at that.

CHAIR ARMSTRONG: Doug, anything further from you?

MR. HAYMANS: No sir, thank you. I absolutely agree with Justin's rationale there. We are one of those states that would be put in a hard spot if we had a mandated change for a fishery in some of our smaller rivers that are virtually nonexistent. But I agree with Justin's rationale and I continue my support.

CHAIR ARMSTRONG: Cheri Patterson.

MS. PATTERSON: I will be opposing this motion. I think the TCs recommendation is to go with an addendum. They're the ones that spend an inordinate amount of time to evaluate the FMP, and all of the conditions that they have to assess. I think it's only fair to go to the addendum process, and give them the guidance as to how to perform their work.

CHAIR ARMSTRONG: Lynn Fegley.

MS. FEGLEY: I pass, Mr. Chair, thank you.

CHAIR ARMSTRONG: All right, thank you. Further comment?

MS. KERNS: Erika Burgess.

CHAIR ARMSTRONG: Erika Burgess, please.

MS. ERIKA BURGESS: I just wanted to speak on behalf of the state of Florida in support of the comments made by Davis and Doug, thank you.

CHAIR ARMSTRONG: I'm going to do something a little unusual, but because I have such respect for science, I'm going to ask Brian if he thinks the TC has an overwhelming opinion on if we should go with this. Brian, not to put you on the spot, but I'll put you on the spot.

MR. NEILAN: No worries, Mr. Chair. I don't believe the TC has a general consensus for one or the other here. If you ask ten TC members, you would get ten different opinions. I think Caitlin did a good job of laying out the pros and cons. Initiating a management action to modify the FMP, with an addendum that will certainly make our job more easier when we're reviewing plans.

The requirements are more explicit, it's just a matter of did they check off their boxes or not. The second option here with tasking the TC with developing the guidance document, is more in line with how shad and river herring have been managed in the past, especially with AMPs. The recommendations from the TC here would kind of help shore up the AMP requirements a little better, make it a little more explicit. Unfortunately, I don't have one or the other for you. I don't know if Caitlin has anything else to add, but that's generally how I perceive the TCs opinion at this point.

CHAIR ARMSTRONG: Thank you, Brian, I think the Board is of the same mind. Further discussion.

MS. KERNS: You do not have any, Lynn Fegley has her hand up, and then you have two members of the public.

CHAIR ARMSTRONG: Okay, go ahead, Lynn.

MS. FEGLEY: I'm really pretty conflicted on this one, as you can probably tell by the fact that I keep putting my hand up and taking it down. What I wonder, we are one of those states where I have concerns about resources that could be demanded, based on requirements written within an addendum. I do have concerns about that. We got updated as the sustainable fishery management plans do at the end of the year.

But in thinking it through, I do think that there is some benefit to initiating an addendum. At that point, I think once it is in writing and we see, we can have a discussion at the Board when the draft comes before us. If there are states that feel as though they are going to get caught in a jam with resources, that maybe we can have a discussion when we see the draft. That is sort of where I'm falling down, I'll agree to support an addendum.

CHAIR ARMSTRONG: I'll take a couple of very brief comments from the public, but they need to be directed to this motion. Do you have some hands up, Toni?

MS. KERNS: We have Wilson Laney and then Des Kahn.

CHAIR ARMSTRONG: Go ahead, Wilson Laney.

DR. WILSON LANEY: As a member of the public, but also a longtime member of the Shad and River Herring Technical Committee, I would certainly, definitely lean towards the development of an addendum, and I think Ms. Fegley's comment about the fact that you all could take a strong look at it once it was drafted, and then have a further discussion about how it would impact the states, would certainly be a good way to go, because that preserves your compliance authority.

But also, it gives you the option of a drop back to a technical guidance document, if you thought that was appropriate. Just a couple of comments. I think,

should the Board pass this motion, the public perception, at least from my perspective, would not be all that great for several reasons. One is the colleagues of mine Hall et al in New England and other folks, who have taken a look at the potential increase in biomass of these species, shad and river herring, with appropriate management measures in place is huge.

Secondly, Dr. Kahn pointed out to you earlier, in a somewhat backwards sort of way, the importance of these species, this whole species complex for predators like striped bass, and not only striped bass, but I think bluefish, weakfish, and other predators in the ocean like bluefin tuna, and many other species that consume shad and river herring. I think from an ecosystem management perspective, you would be better served by an addendum as well, because that preserves your enforcement authority as Ms. Patterson and Ms. Fegley have noted.

I would certainly, as a member of the public, support that approach initially, and then possibly again, as Lynn pointed out. You could have the discussion once the addendum is developed. I really don't think, and I'll defer to staff on this point, and certainly to Brian and Pam. But I don't think it would take a whole lot more effort to develop a draft addendum, as opposed to a draft technical guidance document.

I think most of your concerns are what it might require of the states, in terms of additional sampling. I certainly understand that. I think the ecological importance of these species far outweighs their present importance as recreational or commercial species. But the future potential for both commercial and recreational fisheries is tremendous, if they were restored.

CHAIR ARMSTRONG: Thank you, Wilson. Des Kahn, to the motion, please.

DR. KAHN: Yes, thanks for the chance to speak. Briefly, what I would like to suggest is that the measures that we have been presented with, recommended measures, to a great extent involve things like restricting recreational landings and so forth. I don't think that is going to get at the problem.

The problem is not caused by fishing, as I understand, and I don't think the assessment came to that conclusion. The problem as I see it is increased stripe bass predation, as I mentioned. But the other thing, I would recommend the Commission, instead of restricting a problem that doesn't really have any effect, which is recreational landings, for example.

The Commission would be better served by working on reducing dams, and obstacles to spawning runs, which would really be able to build up these stocks, if they had restored the spawning areas that they had originally, you know before white people got here. That would be a far more productive use, in my opinion, of the Commission's resources.

CHAIR ARMSTRONG: Back to the Board, any final discussion before we vote?

MS. KERNS: I see no additional hands.

CHAIR ARMSTSRONG: All right, I know Massachusetts needs to caucus, so we'll take a minute or two to caucus, please.

MS. KERNS: Roy Miller raised his hand, sorry he got it up right as I was saying no hands. I don't know if he was looking for caucus.

MR. MILLER: Exactly, I was looking for a caucus.

CHAIR ARMSTRONG: Okay, let's do that, take two minutes. Okay, is everyone all set?

MS. KERNS: I can't see hands.

CHAIR ARMSTRONG: No hands, so I think we're all set. How do you want to do this vote, Toni or Caitlin? Just raise hands?

MS. KERNS: Yes. Mr. Chairman, if you can just ask for in favor, against, abstain and nulls, and I'll read out the states, and Caitlin will give you a count.

CHAIR ARMSTRONG: Okay. All those in favor of this motion, please raise your hand.

MS. KERNS: I'm going to let the hands settle for a second before I start calling out states. Okay, we have Georgia, Florida, Connecticut, South Carolina, New Jersey, New York, NOAA Fisheries, Maine, Pennsylvania, and Massachusetts.

CHAIR ARMSTRONG: Hands down, please.

MS. KERNS: I can clear the hands, Mike. We are all set.

CHAIR ARMSTRONG: Those opposed to this motion, please raise your hand.

MS. KERNS: We have Fish and Wildlife Service, Virginia, Delaware, North Carolina, Maryland, New Hampshire, PRFC, and Rhode Island. I'll clear those hands.

CHAIR ARMSTRONG: All right, any null votes?

MS. KERNS: I see no nulls.

CHAIR ARMSTRONG: Any abstentions?

MS. KERNS: I see no abstentions.

CHAIR ARMSTRONG: All right, and what is the count?

MS. STARKS: I believe I have nine in favor and eight opposed, no null, no abstentions, but DC is absent.

CHAIR ARMSTRONG: The motion passes 9 to 8. All right, is there any further discussion of Item 5, Technical Committee review of Amendment 2 and 3?

MS. KERNS: No hands up.

CHAIR ARMSTRONG: All right then we'll move on. We have a scheduled break. I guess, why don't we take five for biological break, so we'll be back at 10:57?

(Whereupon a recess was taken.)

CONSIDER SHAD HABITAT PLAN UPDATES

CHAIR ARMSTRONG: Moving on to Item 7, Consideration of Shad Habitat Plan Updates from the States. This is an action item, and Brian, take it away.

TECHNICAL COMMITTEE RECOMMENDATIONS

MR. NEILAN: Thank you again to the Board for so promptly considering the TCs recommendations so far. This one should be pretty quick. The Shad Habitat Plan Updates that states have submitted so far. A little background under Amendment 3 all states and jurisdictions are required to submit habitat plans for American shad, which are meant to contain a summary of information current and historical spawning and nursery habitat, threats to those habitats, and habitat restoration programs within each state.

In February of this past year the Board agreed that these plans should be updated every five years or so like SFMPs, and asked the states to update existing plans. Originally approved in 2014, and for the states with missing plans to submit their habitat plan. In this case it was the Merrimac and the Hudson.

We got six plan updates that were evaluated by the TC, and submitted in time for this Board meeting. We got plans from Maine, New Hampshire, Maryland, North Carolina, a system-specific plan for the Savannah River, and Georgia. For Maine, this is a quick one. They are currently in the process of coming up soon, or coming up soon for relicensing of hydroelectric dams on a few rivers in their state.

They are exploring looking into incorporating fish passage or monies for mitigation, as part of the FERC relicensing. There are no significant habitat improvements since the last plan, and it was mostly updating tables, graphs, figures, just to get it up to date since the last one. For New Hampshire, they removed references to the Great Dam and its fishways, since in 2016 they were both removed.

Since it had a fishway there, technically no gain in habitat, but I think it's fair to say that a complete removal of the dam is going to be beneficial to fish

migration regardless. Maryland updated their spawning and recalculated their spawning and rearing habitat estimates. They removed the, I might butcher this, Bloede Dam on the Patapsco River.

That removal was completed in 2019, and restored access to approximately 14 kilometers of potential riverine habitat. The Conowingo Dam remains the most significant barrier to the American shad migration in the state. Fish lifts operate there, but passage efficiency is poor. New requirements associated with pending relicensing of the dam should improve passage conditions, though upstream and downstream passage efficiency must be improved, not only at the Conowingo, but there is quite a few on the Susquehanna.

They've also added new information regarding water withdrawals, channelization and dredging, and competition and predation sections have been added to their habitat plan. Maryland feels the most significant threat to American shad in the state is habitat degradation associated with land use modifications in urban and suburban development.

The egg and larval stages of American shad are particularly vulnerable to these stressors. Rivers impacted by development are unlikely to host successful spawning runs, even with sufficient abundance. It's a general update for Maryland. North Carolina had a good number of updates to their plan in the habitat assessment sections they added some wording to be consistent with their SFMPs. They have formally designated all four of their strategic habitat areas in rule. They've added some new information to the threat's assessment section, to incorporate some information from the assessment.

They added new information about climate change issues, land use issues, and toxic and thermal discharge threats. Continuing with North Carolina, in regards to their habitat restoration program updates. The Milburnie Dam on the Neuse River was removed in 2017. The Corps has authorized a disposition study in 2019.

The fate of three dams is in question, pending the outcome of this study. They've also updated information on their hatchery product supplementation program, and their water quality improvement program. The Savannah River has a system-specific habitat plan. Some updates to this plan include status of the Savannah Harbor deepening, and plans to install fish passage at the New Savannah Bluff Lock and Dam, as some information on the navigation Lock at the Dam, which hasn't moved fish since 2013 has been updated and reiterated.

Additionally, efforts to control invasive predators such as flathead catfish are now linked to this plan, because they are seen as a source of mortality for shad and river herring. Georgia updated their plan as well. Some highlights include their removal of White Dam on the Middle Oconee River in 2018.

They've updated data on passage and removal efforts for invasive predators, again flatheads and blue cats, and they've also incorporated passage concerns from the stock assessment. Those are all the plans we had in time for this meeting. The Technical Committee reviewed all the plans that were submitted, and recommends that they all be approved. That would be Maine, New Hampshire, Maryland, North Carolina, the Savannah River and Georgia.

Next steps will be today, the Board considers approval of these plans, possible recommendations that their remaining states update any habitat plans that already exist, and that the Hudson and Merrimack submit new plans in time for the next Board meeting, which would be spring 2021, and the TC would evaluate those plans and proposed updates in time for that meeting. That is the Habitat Plan update.

CHAIR ARMSTRONG: Thank you, Brian, any questions for Brian?

MS. KERNS: I don't have any hands raised.

CHAIR ARMSTRONG: All right, seeing none, could I have a motion to approve the habitat plans that have been submitted so far.

MS. KERNS: You have Cheri Patterson.

CHAIR ARMSTRONG: Cheri.

MS. PATTERSON: Yes, thank you, Mr. Chair, is there a motion already crafted**? I move to approve the updated shad habitat plan submitted by Maine, New Hampshire, Maryland, North Carolina, South Carolina, and Georgia.**

CHAIR ARMSTRONG: A second please.

MS. KERNS: Doug Haymans.

CHAIR ARMSTRONG: Thank you, Doug. Any need to discuss this, Cheri?

MS. PATTERSON: No, I am following the TCs recommendation of the plans that have been submitted.

CHAIR ARMSTRONG: Further discussion on the motion.

MS. KERNS: No additional hands.

CHAIR ARMSTRONG: Then we'll move to the vote. I think we'll try to do this by consensus. Are there any objections to this motion?

MS. KERNS: I see no hands.

CHAIR ARMSTRONG: Any nulls?

MS. KERNS: No hands.

CHAIR ARMSTRONG: Abstentions?

MS. KERNS: No hands.

CHAIR ARMSTRONG: Motion passes unanimously. All right, any further discussion on this item?

CONSIDER A FISHERY MANAGEMENT PLAN REVIEW AND STATE COMPLIANCE FOR THE 2019 FISHING YEAR

CHAIR ARMSTRONG Seeing none, we'll move to Item 8, Consider a Fishery Management Plan Review and State Compliance for the 2019 Fishing Year. Caitlin.

MS. STARKS: I will quickly go through a review of the FMP Review and Compliance Reports for the 2019 fishing year. First, I'll cover the landings in 2019, then I'll go over passage, stocking efforts, protected species information, and de minimis requests, and then finally wrap up with the PRTs recommendations.

This table shows the state landings and coastwide totals for commercial shad and river herring, and this is directed landings and bycatch landings in 2019. All confidential data is excluded. For river herring the coastwide total was 3.22 million pounds, which is a 31 percent increase from 2018. For shad the total for 2019 directed commercial landings and bycatch is 273,450 pounds, and that is a 4 percent decrease from the landings in 2018.

As part of the requirements in Amendment 2 and 3, for river herring and shad passage counts are required on a few rivers in Maine, New Hampshire or Massachusetts, Rhode Island, Connecticut, Pennsylvania, Maryland and South Carolina. The coastwide total passage in 2019 at these locations was 6.5 million river herring, and 437,853 shad.

These represent a 31 decrease from 2018 for river herring, and a 32 percent decrease from 2018 for shad. During 2019, hatchery reared American shad fry were stocked in the states and rivers that are listed on the slide here. The total is just under 12 million American shad stocks, compared to the shad stock in 2018, which was 22.7 million.

That represents a decrease of 47 percent. There were a few states stocking efforts that did not occur in 2019 as opposed to previous years, and those included in Rhode Island, Virginia, North Carolina, and Georgia. For Virginia, the James River stocking efforts for shad ceased in 2018, however in 2019, they did stock 1.2 almost million river herring larvae in Harrison Lake, which is part of the James River system.

For sturgeon interactions in 2019, there were 139 interactions reported, with zero mortalities occurring in Connecticut, Potomac River, Virginia, North Carolina, South Carolina, and Georgia in the fisheries. Additionally, gill netters in New Jersey coastal waters reported 3,893 pounds of sturgeon discarded in 2019.

But information on the total number of fish and mortality is unknown. Then for Rhode Island their data for sturgeon interaction lags one year behind. We don't have numbers for 2019 at this point, but we do have 2018 numbers, and in 2018 they had 87 interactions reported. De minimis requests were submitted by Maine, New Hampshire, and Massachusetts and Florida for their shad fisheries, and New Hampshire and Florida also request de minimis for river herring.

Based on their commercial landings, they all meet the requirements and they qualify for de minimis status. Now I'll go over the PRTs report. After reviewing the annual compliance reports, the PRT highlighted a few items for the Board to consider. The first is just to remind the Board that in 2019 there were a few states that had allowed recreational fisheries, but hadn't implemented sustainable fishery management plans as required by Amendments 2 and 3.

However, these issues were resolved in August, 2020, when the Board approved new plans for Maine, South Carolina, Georgia, and Florida. Then other issues the PRT noted were that several states didn't report on all monitoring requirements that are listed under Amendments 2 and 3. The FMP review does provide a table of all of these issues by state.

But it's noted that a couple of states have been consistently missing some information for a few years, and the most common emissions are the characterization of other losses, characterization of recreational harvest, length and age frequency, and degree of repeat spawning. The PRT recommends that these states take a look at that table and take note of those required monitoring programs that were not reported on, and make sure to include those in their future compliance reports.

Additionally, most states did not submit their monitoring data in a separate Excel file along with their compliance report, but rather a lot of states included data in tables within the report. Amendment 3 does require state data to be submitted in an Excel file in a format that is based on the stock assessment needs.

This is relevant to the next item, so I'll just move on to that. The last several years, the PRT and the Technical Committee have continued to express some concerns with the difficulty of preparing and reviewing the compliance reports for these species, because they contain such a large quantity of information.

In an effort to streamline the reports, while making sure that all required information is still reported on an annual basis, the PRT is recommending using this basic outline for the reports, and having the body of the compliance report focus solely on answering the question of whether the state meets all of the requirements of the FMP for that fishing year or not.

There is more detail in the FMP review on the recommended changes that the PRT is asking for. But the main takeaway is that they are recommending moving the bulk of details from the body of the compliance reports, and instead moving things like monitoring results into the Excel spreadsheet, as recommended or required in Amendment 3.

That would accompany the compliance report, and then moving copies of regulations and detailed descriptions of the Fishery and Monitoring Program into appendices. Following this recommendation, the PRT is planning to develop a template, a new template for the compliance reports, which will be sent to the Board with a compliance report reminder this year, and staff will work with the states to make sure that this new template is being followed.

With that information, the action for the Board to consider today is approval of the shad and river herring FMP review for the 2019 fishing year, state compliance reports, and de minimis status requests for Maine, New Hampshire, Massachusetts and

Florida, as recommended by the PRT. That is the end of my presentation.

CHAIR ARMSTRONG: Thank you, Caitlin, any questions for Caitlin?

MS. KERNS: I don't see any hands raised. Mr. Chairman, I'm just going to really quickly, since I'm getting several e-mails about it. The vote count for the last vote was 10 in favor, not 9 in favor; just so it is corrected on the record.

CHAIR ARMSTRONG: Thank you. I'll say it again for the record. **The corrected vote count for the last motion we voted on was 10 to 8, not 9 to 8.** Anyway, let's see where we're at. Would someone have a motion to approve the review of the FMP, the state compliance reports and the de minimis requests?

MS. KERNS: We have John Clark.

CHAIR ARMSTRONG: Motion by John Clark, a second?

MS. KERNS: Cheri Patterson.

CHAIR ARMSTRONG: Cheri Patterson, thank you. Any discussion?

MR. CLARK: Do you need it read into the record, Mr. Chair?

CHAIR ARMSTRONG: Yes, please.

MR. CLARK: Okay, move to approve the fishery management plan review for the 2019 fishing year, state compliance reports and de minimis requests from Maine, New Hampshire, Massachusetts and Florida.

CHAIR ARMSTRONG: Thank you. Any discussion?

MS. KERNS: No. No discussion.

CHAIR ARMSTRONG: Are there any objections to approving this motion?

MS. KERNS: I see no objections.

CHAIR ARMSTRONG: Motion is approved by consensus.

REVIEW AND POPULATE THE ADVISORY PANEL MEMBERSHIP

CHAIR ARMSTRONG: Thank you, next item, last item is to review and populate the AP membership. Tina.

MS. TINA L. BERGER: Good morning everyone! Yes, I have two nominations to the Shad and River Herring Advisory Panel for your consideration and approval. They are Dr. Ed Hale of the University of Delaware Sea Grant, and Eric Roach, a recreational angler from New Hampshire. Thank you.

CHAIR ARMSTRONG: Toni, do we need a motion, or can we approve these appointees by consensus without a motion?

MS. KERNS: Good to have that motion, but you can approve that motion by just a verbal consensus. You have Justin Davis with his hand up.

CHAIR ARMSTRONG: Go ahead, Justin.

DR. DAVIS: I would move to approve nominations to the Shad and River Herring Advisory Panel for Dr. Ed Hale from Delaware, and Eric Roach from New Hampshire.

CHAIR ARMSTRONG: A second.

MS. KERNS: You have Roy Miller.

CHAIR ARMSTRONG: Thank you. Any discussion?
MS. KERNS: No discussion, no hands.

CHAIR ARMSTRONG: Is there any objection to approving this motion?

MS. KERNS: No hands.

CHAIR ARMSTRONG: The motion is approved by consensus. Leads us to the last item. Is there any Other Business to bring before this Board?

MS. KERNS: You have Doug Haymans with his hand up.

MR. HAYMANS: I don't know, this is simply a clarification for the statements made a moment ago about the vote. Just to clarify the record. You suggested that the 10-8 vote was for the motion previous, when in fact we had a motion and a vote over the Habitat Plan in between that, and the Technical Committee recommendation. I just wanted to make sure that it was clear that the 10-8 vote was regarding the Technical Committee, not the Habitat vote.

CHAIR ARMSTRONG: Thank you, Doug. That was an oversight. Let me state again, the motion was on Item 5, right that wound up being 10-8. Is that right, Caitlin?

MS. STARKS: Yes, Mr. Chair, on the motion to task the Technical Committee with developing a guidance document.

CHAIR ARMSTRONG: Yes, okay. Was that enough discussion for the record?

MS. KERNS: Great.

CHAIR ARMSTRONG: Any other business before the Board?

MS. KERNS: Tom Fote.

CHAIR ARMSTRONG: Go ahead, Tom.

MR. THOMAS P. FOTE: I make a motion to adjourn.

CHAIR ARMSTRONG: Do we have a second?

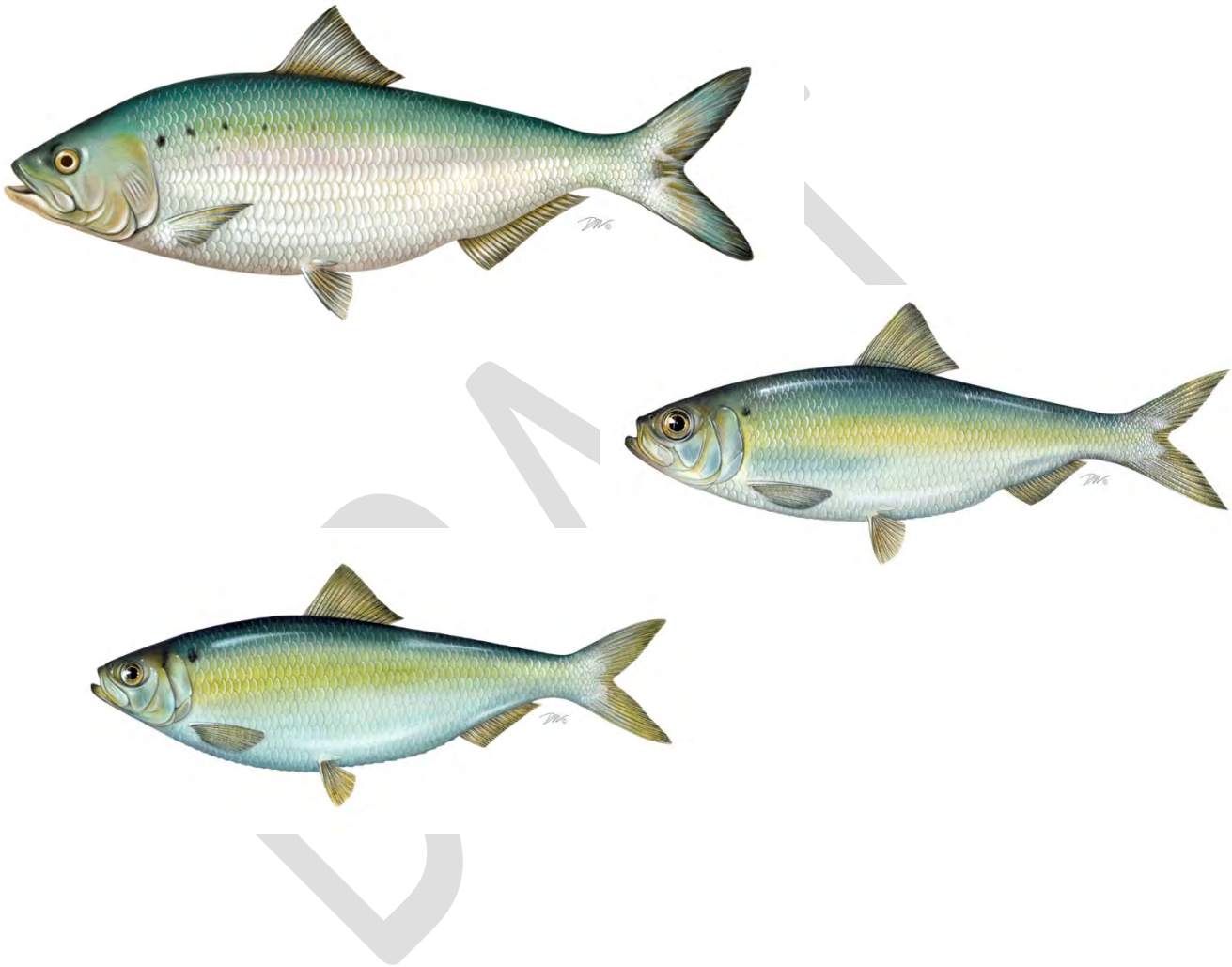
MS. KERNS: Allison Colden.

ADJOURNMENT

CHAIR ARMSTRONG: I assume there are no objections to adjourning. Seeing none; we are adjourned.

(Whereupon the meeting convened at 11:20 a.m. on February 4, 2021.)

Technical Guidance for Implementation of Amendments 2 and 3 to the Shad and River Herring Fishery Management Plan



March 2021

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

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I. INTRODUCTION

Shad and river herring are managed under the Atlantic States Marine Fisheries Commission's (Commission) Interstate Fishery Management Plan (FMP). River herring (alewife and blueback herring) are managed under Amendment 2 to the FMP (2009), while American shad are managed under Amendment 3 to the FMP (2010). The management unit covers state waters along the U.S. Atlantic coast from Maine to Florida, and includes all 15 Atlantic coastal states as well as the Potomac River Fisheries Commission (PRFC) and the District of Columbia (DC).

Amendment 2 was approved by the Shad and River Herring Management Board (Board) in May 2009 with the goal of restricting the harvest of river herring 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 for river herring have been approved by the Management Board for Maine, New Hampshire, Massachusetts, New York, and South Carolina. 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 Amendment 2 does for river herring. Specifically, Amendment 3 prohibits commercial and recreational harvest of shad in state waters after January 1, 2013, unless a state or jurisdiction has an SFMP reviewed by the Technical Committee and approved by the Board. Amendment 3 uses the same definition for a sustainable fishery as Amendment 2, and also allows for catch and release only fisheries in any river system (irrespective of an approved SFMP). SFMPs for shad 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. All states and jurisdictions are also required to produce American shad habitat plans, which identify local significant threats to American shad critical habitat and include a plan for mitigation and restoration.

In the fall of 2017, the Shad and River Herring Technical Committee (TC) identified several inconsistencies between state SFMPs and the requirements of Amendments 2 and 3. As a result, the Board tasked the TC with developing proposed improvements to Amendments 2 and 3 with regard to the five items:

1. Management and monitoring of rivers with low abundance and harvest of shad and river herring
2. Standardization of Sustainable Fishery Management Plan (SFMP) requirements: content, metrics, and management responses to triggers

3. Incorporation of stock assessment information into SFMPs and discussion on the timeline for renewing plans
4. Clarification of de minimis requirements as they pertain to SFMPs
5. Review of the number of years of data are required before developing a SFMP

The Board reviewed the TC recommendations in February 2021. The Board subsequently directed the TC to develop a technical guidance document to ensure that implementation of the Amendment 2 and 3 requirements related to the issues outlined above is consistent with the TC recommendations.

II. TECHNICAL GUIDANCE FOR IMPLEMENTATION OF AMENDMENTS 2 AND 3

The following sections include guidelines recommended by the Technical Committee for developing and evaluating state management programs for shad and river herring.

A. Guidance for Management and Monitoring of Rivers with Low Abundance and Harvest

Regardless of their size, commercial fisheries should continue to be addressed as indicated in the FMP (i.e. directed commercial harvest should always require an approved SFMP or Alternative Management Plan if appropriate).

With regard to recreational fisheries, the FMP is somewhat ambiguous as to the conditions that necessitate approval of an SFMP. Amendments 2 and 3 require that all recreational fisheries that do not have an approved sustainable management plan in place must be closed (or catch and release only). However, for a state that has no known recreational fishery targeting a particular species, but has historical records of that species' presence, the FMP is not clear on whether a lack of regulations restricting recreational harvest conforms to the requirements of the FMP.

To provide states with additional guidance on the management of recreational fisheries in systems with unknown or low abundance and harvest, the TC developed a framework for determining the appropriate management program for recreational fisheries based on harvest and monitoring information available for a given fishery or stock. The following matrix summarizes the framework, which is further explained below.

Recreational Harvest Information	**Monitoring Data to Support SFMP**	
	Sufficient	Insufficient
None (Species Absent)	1. NA	2. AMP
Unknown (Species Present)	3. SFMP	4. AMP/Catch & release
Known/ Suspected	5. SFMP	6. Catch & release

The status of information on recreational harvest and fisheries-independent (FI) monitoring data produce one scenario for species absence and five possible scenarios for a system where

shad or river herring species may be present. The Technical Committee should evaluate the appropriateness of a particular management approach (i.e. no regulations, catch and release regulations, Alternative Management Plan, or SFMP) for each of these scenarios according to the following characterization of harvest information and monitoring data. It should be noted that catch and release only regulations or other regulations that explicitly prohibit recreational harvest are acceptable in any of these scenarios, as per the FMP.

Scenario 1: The species is considered absent or functionally absent, and this is based on sufficient monitoring data to detect the species.

→ In this scenario, the species is considered "functionally absent" if it is documented at such low levels or encountered so infrequently that it is reasonable to assume current environmental or habitat conditions cannot support a population at any level. For systems that fit this description, there should be no recreational harvest of the species due to its absence, and that should be supported by monitoring data. Therefore, the TC concluded that no regulations for recreational fisheries are needed. If the species in question were to become present (e.g., population restoration) the state must notify the Board and pursue one of the management approaches described below.

Scenario 2: The species is thought to be functionally absent, but there are insufficient monitoring data to support or confirm this conclusion.

→ For systems that fit this scenario, where there is no known population of the species, and consequently no suspected recreational harvest, but where the FI data are not adequate to determine the validity of the assumption that the species is functionally absent, the TC agreed that a state or jurisdiction must take one of two approaches. The first approach is that the state or jurisdiction could implement regulations that prohibit harvest, (i.e. catch and release only regulations) as a precautionary measure. This approach may prevent possible harvest from occurring in the absence of appropriate monitoring. The second approach is that recreational harvest in the system could remain unregulated, or allowed (e.g., under statewide harvest regulations for the species) through a Board-approved Alternative Management Plan (AMP). Use of AMPs is described in more detail later in this document, but generally, the AMP should include a justification for maintaining an unregulated status or regulations that permit recreational harvest, such that it is clear to the Board's satisfaction that the proposed regulations, or lack thereof, will be conservationally equivalent to catch and release only regulations. If new information or monitoring data were to indicate that the species had become present, the state must notify the Board and resubmit the proposal to the TC with updated information and rationale for evaluation.

Scenario 3: The species is present but recreational harvest information is unavailable to determine whether harvest occurs. There are monitoring data that can be used to monitor trends in the population and/or develop SFMP metrics.

→ For systems with known populations of the species where recreational harvest is unable to be determined due to a lack of recreational monitoring, the state may use an SFMP as long as there are sufficient monitoring data to develop appropriate sustainability metrics, as determined by the TC. If there are sufficient system-specific FI monitoring data and/or data from commercial monitoring such that trends in abundance or indices of abundance (e.g., CPUE) could be monitored and a sustainability metric could be developed, management under a Board-approved SFMP with system-specific metrics would be appropriate. Additionally, an SFMP may also be appropriate for a system without sufficient system-specific monitoring data if the TC agrees it would be appropriate to use data from other systems to develop regional or statewide sustainability metrics. The TC is responsible for determining whether monitoring data are sufficient or insufficient for their proposed uses.

Scenario 4: The species is present, recreational harvest information is unavailable to determine whether harvest occurs, and there are insufficient monitoring data that can be used to monitor trends in the population and/or develop SFMP metrics.

→ For systems with known populations of the species where recreational harvest is unable to be determined due to a lack of recreational monitoring, and there are insufficient system-specific monitoring data or appropriate data from other systems (FI or rec/commercial FD), the state or jurisdiction must either prohibit harvest though catch and release only regulations or other measures, or allow recreational harvest under a Board-approved AMP. In the case that the TC does not think system-specific data or state-level data are appropriate for use in an SFMP, but may provide sufficient justification that allowing recreational harvest will not contribute to overfishing of the resource or inhibit restoration of the resource, then the state may propose an AMP to permit recreational harvest. However, if the TC does not believe there is adequate information to demonstrate that permitting recreational harvest will not contribute to overfishing or inhibit restoration of the resource, then catch and release only regulations are recommended.

Scenario 5: The species is present and recreational harvest is either known to occur or suspected. There are monitoring data that can be used to monitor trends in the population and/or develop SFMP metrics.

→ For systems with known populations of the species where recreational harvest is known or suspected, and where the TC agrees that there are sufficient monitoring data to develop appropriate sustainability metrics, management of recreational harvest under a Board-approved SFMP is appropriate. “Known” harvest is that which is recorded in official surveys or reports, whereas “suspected” harvest is identified through anecdotal or historic information in systems without official monitoring of recreational harvest. If there are sufficient system-specific FI monitoring data and/or data from commercial monitoring such that trends in abundance or indices of abundance (e.g., CPUE) could be monitored and a sustainability metric could be developed, defining system-specific sustainability metrics and targets/thresholds in the SFMP would be appropriate. Alternatively, if there are not adequate system-specific data to develop SFMP metrics, then an SFMP using data from

other systems to develop regional or statewide sustainability metrics may be appropriate. The TC is responsible for determining whether monitoring data are sufficient or insufficient for their proposed uses.

Scenario 6: The species is present and recreational harvest is either known to occur or suspected, but monitoring data are unavailable or insufficient for developing SFMP metrics.

→ For systems with known populations of the species where recreational harvest is known or suspected, if the TC does not agree that there are sufficient monitoring data to develop appropriate sustainability metrics, then recreational harvest should be explicitly prohibited under catch and release only regulations or other measures. This is consistent with Amendments 2 and 3, which require an approved SFMP that demonstrates the stock could support a recreational fishery that will not diminish potential future stock reproduction and recruitment in order to allow recreational harvest.

B. Standardization of Sustainable Fishery Management Plan Requirements

To increase consistency across states and jurisdictions in the content, metrics, and management responses to triggers that are included in SFMPs, the TC recommended guidelines for SFMPs related to the following three issues: 1) the level of detail required in SFMPs on the management response that would be implemented should the stock fall below a defined sustainability target or threshold; 2) when a state may relax restrictions implemented in response to a stock falling below the sustainability target/threshold; and 3) management of interjurisdictional waterbodies.

1. Management responses to SFMP triggers

Currently, Amendment 2 states that "If a stock is below optimum level the management plan must detail restrictions that will be enacted to allow for an increase in spawning stock abundance and juvenile recruitment" (p. 93). Amendment 3 includes an approved framework for SFMPs, which includes "discussion of management measure(s) to be taken if sustainable target is not achieved within indicated timeframe" (p. 41). However, the Amendments do not provide additional guidance on the level of detail that SFMPs should include when describing the management measures that will be taken should the stock fall below a defined sustainability target or threshold. To improve the strength and consistency of SFMPs for shad and river herring, the TC recommends that management responses in SFMPs and AMPs be developed and evaluated in accordance with the following guidance; the underlined portions are modified from the original language in the Amendments to provide more detail on acceptable management responses and the process for notifying the Board and implementing responses:

"*States and jurisdictions must also submit a sustainable fishery management plan (SFMP) that describes how the fishery will be conducted and annually monitored in order to show that the sustainability target(s) are being achieved. The frame of reference for determining the optimum level at which to set the sustainability target(s) will vary from system to*

system, but should be based on an appropriate time scale. States should develop their sustainability targets within this general framework. The Technical Committee is responsible for developing a standard optimum level and timeframe basis.

If a stock is at optimum levels, then that level will need to be sustained. The SFMP must detail restrictions that will be enacted to allow for an increase in spawning stock abundance and juvenile recruitment if a stock is, or falls below, the optimum level. Such restrictions may include any of the following: fishery closures, harvest or effort restrictions, catch and release only regulations (for recreational fisheries), season changes, area closures, gear restrictions, etc. A plan may provide multiple options for restrictions that will be enacted if a stock falls below the optimum level, however, each option should allow for an increase in spawning stock abundance and juvenile recruitment.

If a stock falls below the sustainability target or threshold identified in the SFMP, the state must notify the Board in the next annual compliance report, and pursue implementation of the specified management response for the following calendar year."

The TC did not recommend additional requirements or restrictions be placed on the type of sustainability metrics that can be used in SFMPs. The group agrees that states/jurisdictions should be able to propose the most appropriate metrics for their specific systems, which would then be subject to TC evaluation and Board approval.

2. Relaxing management restrictions

The TC also developed additional guidance on when a state may relax restrictions implemented in response to a stock falling below the sustainability target/threshold. Currently, Amendments 2 and 3 include language to this effect: "Proposals to reopen closed fisheries may be submitted as part of the annual Compliance Report, and will be subject to review by the Plan Development Team, Technical Committee and Management Board." In addition, the TC recommends states and jurisdictions adhere to the following standard for relaxing restrictions:

"*If a state has implemented a management restriction in response to the stock falling below the sustainability target(s), the management restriction must stay in place until the sustainability target(s) have been met for at least 5 consecutive years of sufficient data collection*."

3. Interjurisdictional management guidance

Regarding management of waterbodies shared by one or more jurisdictions, Amendments 2 and 3 provide limited guidance. Amendment 2 states, "Targets for river systems managed by more than one state/jurisdiction should be cooperatively developed" (p. 92). Amendment 3 states, "For states and jurisdictions which share a river or estuary, agencies should include those monitoring programs conducted or planned by the agencies, applicable agency regulations, and habitat and habitat threats applicable to the state or jurisdiction's waters. In shared water bodies where there is a management cooperative, the cooperative or a member state or jurisdiction can be appointed to write the Implementation Plan" (p. 40). To further

clarify and streamline the process for developing SFMPs for waterbodies shared by one or more jurisdictions, the TC recommends the states and jurisdictions adhere to the following guidance:

> "*Targets for river systems managed by more than one state or jurisdiction should be cooperatively developed, such that shared systems are not managed independently by each jurisdiction using unique targets and/or monitoring data. Instead, one shared management plan may be submitted cooperatively by multiple jurisdictions sharing one system, including details on management measures and monitoring for/by each jurisdiction. Alternatively, one jurisdiction may be appointed to submit the plan for a shared system; for example, if one state/jurisdiction is the primary source of fishery-dependent and/or fishery-independent data for a shared system, that state may include the shared system in their state management plan, and include information for the other jurisdictions which share the water body. When possible, fisheries conducted in shared water bodies by harvesters permitted by different jurisdictions should be subject to consistent management measures."*

C. Incorporation of Stock Assessment Information into SFMPs and Plan Renewal Timeline

The TC will continue to review information on required and ongoing monitoring efforts performed by states and jurisdictions for each species and system, and develop recommendations for improvements to data for use in SFMPs and assessments. Some concern has been expressed among TC members that for many systems there is inconsistency between the information used to assess stock status through the stock assessment and that used to develop sustainability metrics for SFMPs. However, the TC did not conclude that states/jurisdictions should be required to use the stock assessment information to develop sustainability metrics for SFMPs (e.g. benchmarks based on total adult mortality).

Amendments 2 and 3 require all SFMPs to be regularly reviewed, assessed and updated as needed on five-year basis. The TC discussed the timeline for updating plans and recommended maintaining the five-year timeline for renewing both SFMPs and AMPs.

D. Clarification of *De Minimis* Requirements as They Pertain to SFMPs

The TC recommends maintaining the current *de minimis* criteria and exemptions for states with *de minimis* status. Under Amendments 2 and 3, states that report commercial landings of river herring or American shad, respectively, that are less than 1% of the coastwide commercial total are exempted from sub-sampling commercial and recreational catch for biological data. *De minimis* states are still required to implement an approved SFMP or AMP consistent with the FMP requirements in order to maintain any commercial or recreational fishery where harvest is permitted.

E. Years of Data Required Before Developing an SFMP

The TC discussed how many years of data in a time-series are acceptable in order to establish a sustainability metric in an SFMP. The TC recommended development and evaluation of SFMP sustainability metrics consistent with the following standards for each species, based on species biology and statistical value:

- For shad, a minimum of ten years of data should be required to establish a primary sustainability metric in an SFMP or AMP. The TC may have some discretion in evaluating state proposals that include sustainability metrics derived from fewer than ten consecutive years of data.

- For river herring, the standard for acceptable time-series length for data being used to establish a sustainability metric should be ten consecutive years. If additional information is provided to justify the use of a shorter time-series for establishing an SFMP metric, the TC may accept a time series trend of 7-9 years, with consideration of exploitation rate, stock size, or other relevant factors.

F. Additional Recommendations for Implementation of the Shad and River Herring FMP

Beyond the five areas identified in the original Board task, the TC discussed two additional areas of the FMP that could benefit from additional guidance: the use of Alternative Management Plans (AMPs) and statewide recreational possession limits.

1. Use of Alternative Management Plans

The TC discussed the Amendments' characterization of the use of "alternative management" regimes or programs. Both Amendments essentially provide the same language, which states that the Management Board can approve an alternative management program proposed by a state or jurisdiction 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 measure contained in the amendment or any addenda prepared under adaptive management. The Amendments also indicate that the TC, under the direction of the Plan Review Team, will review any alternative management program proposals and provide the Management Board its evaluation of the adequacy of the proposals. However, the Amendments do not contain further guidance on when it is appropriate to apply an alternative management program or what type of information such a plan should include. In order to establish a more standard process for reviewing proposed AMPs, especially when applied to recreational fisheries, the TC developed the following guidelines:

- The TC recommends that AMPs include the following components:
    - A statement explaining why an SFMP cannot be used (e.g. data availability)
    - Justification that the proposed management program will have the same conservation value as the current FMP measures. For commercial fisheries, this is equivalent to the use of an SFMP as described in the FMP and in accordance with the additional guidance in this document. For recreational fisheries, this is permitting recreational harvest under an approved SFMP, or catch and release only regulations, consistent with the guidance provided in Section II.A of this document.
    - Explanation of how the state will determine if or when an AMP is no longer appropriate, including description of the data sources that will be monitored, and the trigger that will be used based on those data sources. For example, for a recreational AMP justified on the assumption that no harvest is occurring despite

being permitted, a condition such as three years of recorded recreational harvest, or a defined level of abundance from fishery-independent surveys could be used as a trigger to reevaluate the AMP.

- Description of the management response that will be implemented if this trigger is met. For example, if harvest is documented through a creel survey for three consecutive years, the AMP could specify that catch and release only regulations will be implemented statewide or for specified systems until an SFMP is developed and approved.
- If a management trigger identified in the AMP is met, the state must notify the Board in the next annual compliance report, and pursue implementation of the specified management response for the following calendar year.

2. Statewide recreational possession limits

The TC also discussed the use of statewide recreational possession limits for shad and river herring. In previous TC and Advisory Panel meetings, some TC and AP members had raised the question of whether it would be appropriate to allow limited recreational harvest in systems without an SFMP/AMP using a low statewide bag limit. Ultimately, the TC agreed that this would not comply with the requirement and intent of Amendments 2 and 3, and that any recreational harvest should be managed under an approved SFMP or AMP. The rationale is that unmonitored systems could experience unchecked recreational fishing pressure which could be detrimental to small stocks. If a state wishes to apply a statewide recreational bag limit, the state must have an approved SFMP or AMP, and all unmonitored systems must be subject to management responses (e.g. closures, harvest restrictions) that are triggered by available sustainability metrics. For example, if a state has a statewide recreational bag limit, the SFMP should require the closure of recreational harvest (e.g. catch and release only regulations) for all unmonitored systems if any of the approved SFMP metrics falls below the sustainability target. Additionally, the TC recommends that AMPs that include statewide recreational bag limits or no recreational regulations must include a trigger (e.g., observed recreational harvest, or an increase in a fishery-independent abundance index) to implement catch and release only regulations or to propose an SFMP (if sufficient data are available).

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 1, 2021**

SUBJECT: **Recommendations on Addressing Fish Passage Performance for American Shad and River Herring Restoration**

Background

The status and trends of American shad and river herring 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 and for river herring in 2012 and 2017. 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 assessments identify several factors that may play primary roles in the reported stock status and trends. In particular, the 2020 American Shad Stock Assessment and Peer Review Report (Assessment Report) provides the most detail on the role of barriers to migration, and includes the first quantitative assessment of associated habitat loss and population impacts from existing barriers.

The Assessment Report examines 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 quantified the impacts of barriers and fish passage in three sub-population areas based on shad life history and habitat (roughly New England, Mid-Atlantic, and South Atlantic). Simulation modelling was conducted to assess effects on spawner population size under three scenarios: 1) no barriers, 2) first barrier with no passage, and 3) realistic fish passage performance measures applied to barriers (i.e., upstream passage efficiency of 50%).

The analysis determined that overall, dams completely or partly block nearly 40% of the total historical American Shad habitat; within the northern iteroparous, southern iteroparous, and semelparous sub-regions of the coastwide metapopulation, respectively, American shad habitat is currently 42, 30, and 28% of what it was historically. The model results of the "no barriers" scenario yielded an estimated spawner production potential 1.7 times greater than that yielded by the scenario assuming no passage at the first barrier: 72.8 million versus 42.8 million fish. The results of the third model scenario, which applies "realistic" (i.e., current) fish passage efficiencies, resulted in a gain of less than 3 million fish, suggesting that current passage only provides a minimal improvement in spawner potential compared to no passage. Consequently, the Assessment Report concluded that "losses in [spawner production] potential are significant in each state and region."

Technical Committee Request

The Shad and River Herring TC feels strongly that the following actions are needed to reduce the negative effects of barriers to migration on shad, river herring, and other migratory fish populations along the Atlantic Coast to provide increased opportunities for population recovery:

1) Dam/barrier removals as the preferred approach to restore fish species habitat access for population restoration and for habitat restoration benefits. When dam removal is not an option,
2) The development and use of fish passage performance standards in river systems based on available data, fish passage modeling tools, and fish passage expertise is recommended. If the required information to develop performance standards are not available, we recommend and support their development for such purposes and applications.

The TC recommends the Commission send letters to the agencies with relevant authorities to request prioritization of these actions.

Rationale

The Assessment Report provides an extensive review of available literature and discussion on the topic of barriers and the many aspects of fish passage. Specifically, it highlights the issues with both outdated approaches and facilities designs/operations that are not effective by a variety of management measures (e.g., percentage of arriving fish passing) and lack of rigorous evaluations. Consequently, without changes in how fish passage objectives are generically defined as *safe, timely, and effective*, and evaluated, management and restoration goals are not likely to be achieved.

The most challenging aspect is the number of barriers fragmenting historic habitat in many systems which compounds any individual barrier/facility effects. Barriers and associated hydroelectric facilities may cause delays, injuries or stress, and mortality to both upstream and downstream migrants at both the juvenile and adult life stages. The cumulative effect barriers have on achieving ASMFC Management goals should be recognized as one of the largest and most pervasive obstacles to the recovery of American shad.

The Shad and River Herring FMP and recent stock assessments all speak to the important influence and problems associated with barriers, fish passage, and related impacts for these species. However, the ASMFC has been largely limited to addressing directed fisheries by requiring Sustainable Fishery Management Plans for commercial or recreational fisheries under Amendments 2 and 3. Over the next several years, an increased number of hydropower license expirations and relicensing projects will occur for federally licensed hydropower projects, which will affect Commission management and restoration goals for not only American shad and river herring, but also American eel and other anadromous species. Given that Federal Energy Regulatory Commission (FERC) license terms and conditions operate for 30-50 years, upcoming relicensing projects provide critical opportunities to ensure that the necessary passage and

protection measures, as well as adaptive management strategies, are established to meet fish restoration goals and objectives.

The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) both have fish passage prescription authority under the Federal Power Act. States also often have the ability to use a required Water Quality Certificate during relicensing to address fish passage. ASMFC relies on passage counts and population benchmarks to provide guidance for science-based management of shad and river herring. This quantitative approach needs to be applied to fish passage, and has been requested by FERC: "*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 Assessment Report provides a strong justification for the need and benefits of requiring science-based fish passage performance criteria to achieve management goals that are not possible with status quo approaches and unquantified performance standards. Improved passage performance is an achievable goal given the current state of knowledge on fish behavior, swimming performance, and fish passage engineering. Improved passage performance criteria will be essential to provide a basis for defining what is safe, effective and timely, considering that fish passage directly impacts the ability of the ASMFC to achieve its management goals and objectives.

American Shad Habitat Plan for Massachusetts Coastal Rivers

Submitted to:

Atlantic States Marine Fisheries Commission

Prepared by:

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January 2021

Introduction

American shad (*Alosa sapidissima*) habitat plans are required by the Atlantic States Marine Fisheries Commission through Amendment 3 of the Interstate Fishery Management Plan for Shad and River Herring. This report updates the first Massachusetts shad habitat plan reported in 2014 (MA DMF 2014).

American shad spawning runs in Massachusetts occur in two large rivers bordering multiple jurisdictions and six smaller sized coastal rivers. The Connecticut River and Merrimack River have relatively large runs of American shad that support recreational fisheries and are managed by multi-jurisdiction management plans (CRASC 1992; and MRTC 1997). The American shad habitat plans for the Connecticut River (CRASC 2014) and Merrimack River (MRTC 2010) are reported independently from this plan. The other coastal rivers with known spawning runs present are: Palmer River, Jones River, the Indian Head and South rivers in the North River watershed, Neponset River, and Charles River. The Taunton River had a robust shad run and fishery historically with recent evidence of a remnant run.

The principal threat identified for most shad runs in Massachusetts is **Barriers to Migration**. However, significant questions exist on the status of potential threats and issues such as water withdrawals and water quality impairment and require further investigation. The first MA shad habitat plan (MA DMF 2014) reported on the Palmer River and Charles River because among the six coastal runs they were identified as restoration priorities by the MA Division of Marine Fisheries (DMF). The Taunton River was included in the first shad habitat plan to encourage investigations on the population and habitat status. This update includes additional information on the Jones, North, South and Neponset rivers.

A synopsis of investigations on American shad spawning habitat requirements (Greene et al. 2009) reveals that although consensus is lacking, shad generally spawn well upstream of the tidal interface at mid-river runs in relatively shallow depths (< 4 m) with more apparent selection to water velocity (0.3 to 0.9 m/s) than to a specific substrate type.

Table 1. Massachusetts coastal rivers with American shad spawning runs.

River	Watershed	Total Drainage Area (km^2)	Present Migratory Access (rkm)	Present Spawning Habitat (rkm)	Restoration Potential (rkm)	Notes
Palmer River	Narragansett Bay	71	12.4	<5	10.5	with dam removal
Taunton River	Narragansett Bay	1456	62.0	45	0	no main stem barriers
Jones River	South Shore	77	12.0	8.5	0	recent restoration improvements
Indian Head River	South Shore	<100	6.0	2	5	with dam removal/and or passage improvements
South River	South Shore	<100	7.8	1	2	with dam removal/and or passage improvements
Neponset River	Boston Harbor	262	6.8	1	25	from 1970s DMF survey
Charles River	Boston Harbor	805	32.0	32	32	from 1970s DMF survey

Palmer River

Watershed Information. The Palmer River, located in Bristol County, MA, originates in the wetlands of northern Rehoboth (Figure 1) and flows south for approximately 27 river kilometers (rkm) through Swansea to its confluence with the Barrington River and discharges to Narragansett Bay in RI. Two impoundments created by dams are located along the course of the river: Shad Factory Pond and Perryville Pond. The former is a shallow 38-acre pond formed by a dam last rebuilt in 1912. The dam is located at 12.4 rkm with a drainage area of 71.2 km^2. Shad are known to spawn along an unknown proportion of the upper end of the river below the dam. Upstream of the dam, there is 10.5 rkm of potential spawning habitat before reaching the impassible Perryville Dam at 22.9 rkm. The habitat upstream of the Perryville Dam (Perryville Pond; 3.3 acres) has not been assessed but is thought to have low potential for shad. The watershed also supports spring spawning runs of white perch and river herring; and was documented in the 1970s as having spawning rainbow smelt and sea lamprey. The Palmer River presently has the last remaining recreational fishery for American shad in MA south of Cape Cod.

American Shad Status. No current population data are available. Fishery resource surveys were conducted by DMF and the MA Division of Fish and Wildlife (*MassWildilfe*) from 1968 to 1971 and by DMF in 1993. Water quality and creel information were collected in these surveys. Creel survey results are summarized in Table 1. In addition, shad were transplanted by DMF personnel from the Palmer River into the Mattapoisett River in 1968 (N = 78) and in 1969 (N = 80). Anecdotal reports suggest that recreational angling for shad continues in the Palmer River, although at low levels of catch and effort. Population and habitat monitoring were considered when the fish ladder was reconstructed at Shad Factory Pond in 2007; however, this work was not conducted.

Table 1. Summary of Palmer River shad creel surveys conducted between 1968 – 1971 and 1993.

Date	1968	1969	1970	1971	1993
No. Anglers	333	657	413	419	72
Total Catch	148	174	82	120	41
Hours Fished	660	1500	1297	915	108
Catch/Hour	0.22	0.12	0.06	0.13	0.38

Fish Ladder Specifications: A concrete weir and pool fish ladder was installed in 2007 by the Town of Rehoboth, Save the Bay, and several funding partners. The fish ladder was designed by the U.S. Fish and Wildlife Service (USFWS) and the project received technical assistance from the MA Office of Fishing and Boating Access and DMF. The fish ladder is approximately 320 ft. in length with 19 weirs and 16 ft x 3 ft pools. No monitoring of shad passage has been assessed at this location. The Perryville Dam in Rehoboth has no fishway and obstructs passage to unassessed habitat (Reback et al. 2004).

Regulatory Authority: The owner of the dam is responsible for repairing, operating, and maintaining the fish passage facilities as prescribed in M.G.L. Chapter 130 §19. Fish passage at the Shad Factory Pond fish ladder has been historically managed cooperatively by the Town of Rehoboth and the dam owner, the Bristol County Water Authority of Bristol, RI. Wetlands habitat and water quality protections are provided by M.G.L. Chapter 131 §40 and Commonwealth of Massachusetts Regulations (CMR) 10.00 and administered by the Massachusetts Department of Environmental Protection (*Mass*DEP).

Water Withdrawal Permissions: The Bristol County Water Authority maintains a water withdrawal registration (No. 4-26-247.05) issued by *Mass*DEP in the Narragansett Bay and Mt. Hope Bay Shore river basins to withdraw 2.7 million gallons per day (MGD) from three surface water sources (Swansea

Reservoir, Shad Factory Reservoir and Anawan Reservoir) for public water supply. Monthly withdrawal records are required for annual submission to *Mass*DEP.

Water Discharge Data: None currently. The West Branch of the Palmer River had a US Geological Survey gauge station (No. 01109200, drainage area 11.3 km^2) operating during 1962-1974. The monthly mean discharge in May for this period was 9.8 cfs; however, the short duration of the data series and long distance between the West Branch gauge location and Shad Factory Pond limit the data utility.

Water Quality Monitoring: *Mass*DEP assesses waterbodies by comparing water quality to Surface Water Quality Standards (SWQC), indentifying threats to habitats and recommending remedial actions (*Mass*DEP 2007). The Narragansett Bay watershed was last assessed during 2004-2008 (*Mass*DEP 2009); however, the Palmer River segment was listed as "Not Assessed" for its capacity to support aquatic life.

Shad Factory Pond Habitat Assessment. A habitat assessment of river herring spawning and nursery habitat in Shad Factory Pond was conducted by DMF and Save the Bay, a RI non-profit watershed organization, during 2016-2017 (Turner et al. *in Prep*). The assessment investigated water quality conditions in the pond and downstream fish passage conditions. Water quality criteria for dissolved oxygen, Secchi disc depth, pH, total nitrogen, and total phosphorus were exceeded in the lake. The assessment documented significant degradation in the pond due to high growth of the invasive water chestnut. The fishway at Shad Factory Pond had sufficient flow and depth for suitable passage during river herring migration periods. However, the degraded pond conditions would not provide suitable nursery habitat for river herring during summer months and not likely encourage shad passage to upstream riverine habitat.

ASMFC Shad Habitat Plan Framework

1.) Shad Habitat Assessment. No formal assessment of shad spawning and nursery habitat has been conducted in the Palmer River. Previous creel surveys documented a sportfishery for shad in the Palmer River that continues presently, although with low levels of participation, and with no evidence that shad are passing the fishway at Shad Factory Pond to upstream spawning habitat. Upstream of the dam, there is approximately 10.5 km of potential spawning habitat before reaching the impassible Perryville Dam at rkm 22.9. The habitat upstream of the Perryville Dam (Perryville Pond; 3.3 acres) has not been assessed but is thought to have low potential for diadromous species. Consideration was given to conducting shad electrofishing monitoring in the Palmer River during 2016-2017 although funding and staff limits did not allow this action to move forward.

2.) Threats Assessment. No formal threat assessments have been made for shad in the Palmer River watershed. A primary assumed threat to shad for this watershed is the Shad Factory Pond Dam as a **Barrier to Migration**. The fishway at Shad Factory Pond Dam was reconstructed in 2007 and specifically designed to pass shad. However, concerns have grown over water quality and invasive plant infestation in the pond. It is possible that present conditions prevent shad from migrating through the pond to potential upstream riverine habitat. Historically, a large shad commercial fishery occurred in the Palmer River. Belding (1921) reports that the initiation of trap fisheries in the tidal area of the Palmer River in the 1870s and 1880s quickly reduced the shad run to low levels of abundance by the 1910s. Historical overfishing and habitat quality are threats that should be considered along with migration barriers.

3.) Habitat Restoration Plan. Currently, DMF does not have an ongoing project or imminent plans to initiate a shad habitat restoration plan for the Palmer River. The Save the Bay has expressed an interest in investigating the feasibility of removing Shad Factory Pond Dam. If this concept moves forward, DMF would be supportive and potentially a partner in this restoration activity.

Recommended action:

Currently, DMF does not have an ongoing project or imminent plans to initiate an assessment of the Palmer River shad run. DMF did complete a habitat assessment of Shad Factory Pond in 2018 with results that support local interests in dam removal. We **recommend** the following actions for the Palmer River: (1) assessment of the amount and suitability of Palmer River habitat for shad spawning and rearing, (2) census counts of shad and river herring passing upstream into Shad Factory Pond, (3) passage efficiency at the Shad Factory Dam fishway and (4) the feasibility of fish passage improvements at the Perryville Dam.

Agency or Agencies with Regulatory Authority: Massachusetts DMF coastal waters diadromous fish, *MassWildlife* inland waters diadromous fish, and *Mass*DEP - wetlands and water quality protection.

Action actively being addressed by agency: The only action taken to date has been the preparation of an Operations and Maintenance Plan for the Shad Factory Dam fishway. A draft was sent to the dam owner in 2011 requesting comments. The dam owner did not respond to the inquiry.

Initial Habitat Goal: Conduct the shad spawning habitat assessment for the Palmer River upstream and downstream of Shad Factory Pond and assess species presence. If suitable upstream conditions are found, seek funding for passage efficiency studies at Shad Factory Pond and fish passage feasibility studies at Perryville Dam.

Timeline and Costs for Achieving Goals/Targets. None established. Funding is not presently available.

Possible metrics to evaluate progress: (1) comparison of water quality parameters to *Mass*DEP Surface Water Quality Criteria (SWQC) for supporting aquatic life; (2) census counts of shad and river herring into Shad Factory Pond using a locking box trap installed at the fish ladder exit; (3) passage efficiency evaluation using PIT tag study; (4) discharge range that provides suitable water depth and velocity in fishway and water depth and velocity at river habitats.

Potential setbacks/areas of concern: The watershed is part of an active water supply. The municipal needs for water compete directly with water needs for aquatic life, but the effects are unknown.

Other organizations: The Save the Bay was actively involved in the Shad Factory Pond habitat assessment and development of a dam removal project at that site. The Town of Rehoboth has expressed an interest in shad restoration in the Palmer River. The Bristol County Water Authority has an interest and responsibility to allow diadromous fish passage at Shad Factory Pond.

Taunton River

Watershed Information: The Taunton River is the largest river in southeastern Massachusetts and has no barriers that impede American shad passage along the 62 km main stem. The Taunton River includes a large drainage area (approximately 1,456 km^2) that is supported by numerous significant tributaries. The Taunton River, which is formed by the confluence of the Matfield and Town rivers in Bridgewater, passes the borders of more than 10 towns before reaching the tidal Mount Hope Bay which connects to Narragansett Bay (Figure 1). The watershed has a legacy of industrial pollution; yet is unique in Massachusetts with no dams along its entire main stem.

American Shad Status: Belding's (1921) anadromous fish survey of the early 20th century recognized historical shad runs in the Taunton River that were rendered commercially extinct due to industrial pollution. The next anadromous fish survey in the 1960s (Reback and DiCarlo, 1972) also cited pollution as the primary driver of low shad numbers in the Taunton system as opposed to dams. During this survey, additional work was done to identify shad habitat in the Taunton River. DMF surveyed the stream substrate from the Berkley Bridge in Dighton to the Jenkins Leatherboard Company dam in Bridgewater. The Berkley Bridge was the lower limit of salt water intrusion. They documented 45 rkm of potential spawning habitat in this stretch and highlighted the promising outlook for shad restoration. They also named the Segreganset River and Nemasket River as Taunton River tributaries with shad present. Reback and DiCarlo (1972) noted a shad stocking project in 1969 that transferred shad eggs from Connecticut River adults to the Nemasket River. The most recent DMF anadromous fish survey (Reback et al. 2004) echoes the potential for shad restoration in the Taunton River but recognized that shad stocking in the 1960s and 1970s with eggs and adults from the Connecticut River produced little evidence of success. Presently, the status of shad in the Taunton River watershed is unknown with some anecdotal reports of finding individual adult shad in the last decade.

Fish Ladder Specifications: No fishways in main stem Taunton River.

Regulatory Authority: In the absence of dams and fishways, the principal regulatory authority related to American shad is found with the state regulations of the DMF (coastal) and *MassWildlife* (inland). Wetlands habitat and water quality protections are provided by M.G.L. Chapter 131 §40 and CMR 10.00 and administered by *Mass*DEP.

Water Withdrawal Permissions: Three facilities have MA Water Management Act permits with authorized surface and groundwater withdrawals totaling 3.27 million gallons per day (MGD). Of these three facilities, the largest withdrawal at 3.03 MGD is for a municipal public water source.

Water Discharge Data: The main stem Taunton River has a USGS stream flow gauge in Bridgewater (No. 01108000, 676 km^2 drainage area). The average monthly discharge at the Bridgewater gauge station is 900 cfs for April and 554 cfs for May from the time series record of 1929-2020.

Water Quality Monitoring: *Mass*DEP assesses waterbodies by comparing water quality to Surface Water Quality Standards, identifying threats to habitats and recommending remedial actions (*Mass*DEP 2007). The Taunton River watershed was last assessed during 2004 (Rojko et al. 2005); with most of the potential main stem shad habitat listed as *Suitable* to support aquatic life or "Not Assessed".

ASMFC Shad Habitat Plan Framework

1.) Shad Habitat Assessment. The only assessment of shad spawning and nursery habitat in the Taunton River was conducted by DMF in the 1970s. This survey documented 45 rkm of potential spawning habitat in the Taunton River and highlighted the promising outlook for shad restoration. Recent exploratory work has been done in the Taunton River focusing on the documentation of shad presence.

2.) Threats Assessment. No formal threat assessments have been made for shad in the Taunton River watershed. As a river with the uncommon status in Massachusetts of no main stem dams, the threat of **Barrier to Migration** not a factor. Historical overfishing and industrial pollution were cited in past anadromous fish surveys as impacting shad populations in the Taunton River.

3.) Habitat Restoration Plan. DMF is currently working with the *MassWildlife* and the USFWS to prepare a scope for stocking shad in the Taunton River.

Recommended action:

Of the MA coastal rivers in this plan, the least information is known on the status of and threats to American shad in the Taunton River. DMF seeks more information on the presence of shad in the Taunton River, the status of potential shad habitat, and the influence of potential threats such as historical and present pollutant loading, and water quality impairment. We expect that a habitat survey and assessment would be useful for this watershed with methods potentially transferable to other watersheds in Massachusetts, but funding is not presently available. We **recommend** the following actions for the Taunton River: (1) assessment of the amount and suitability of habitat for shad spawning and rearing; and (2) continued monitoring to confirm the presence of a shad spawning run.

Agency or Agencies with Regulatory Authority: DMF coastal waters diadromous fish, *MassWildlife* inland waters diadromous fish, and *Mass*DEP - wetlands and water quality protection.

Action actively being addressed by agency: DMF is presently conducting river bank seining and boat electrofishing to document the presence of shad. Efforts are also underway to develop a cooperative shad stocking project with DMF, *MassWildlife* and the USFWS.

Initial Habitat Goal: No restoration actions are needed to expand habitat access in the Taunton River. Agency efforts will focus on confirming species status and developing a stocking plan in 2021.

Timeline and Costs for Achieving Goals/Targets. Juvenile American shad stocking is recommended for a six to eight years and would cost approximately $180,000-240,000 with partial reimbursement needed for the regional USFWS hatchery. Monitoring efforts would continue for at minimum of this duration to document changes in adult and juvenile American shad abundances in the river resulting from stocking efforts. Funding sources have not been identified presently.

Possible metrics to evaluate progress: (1) comparison of water quality parameters to MA SWQC for supporting aquatic life; and (2) discharge range that provides suitable water depth and velocity at river habitats.

Potential setbacks/areas of concern: The watershed is part of an active water supply and urbanized area with documented surface water quality and stormwater impairments. The municipal needs for water compete directly with water needs for aquatic life, but the effects are unknown.

Other organizations: The USFWS and *MassWildlife* are partners with ongoing shad monitoring and stocking plan development. Additionally, several towns have active river herring wardens that would likely take an interest and perhaps participate in future shad monitoring and restoration efforts as would The Nature Conservancy and the Taunton River Watershed Alliance, active non-profit groups that work to improve the aquatic resources of the Taunton River.

Jones River

Watershed Information. The Jones River flows for 12 rkm in a drainage area of 77 km^2 from Silver Lake in Kingston, MA, to Kingston Bay (Figure 2). At 634 acres, Silver Lake is the largest lake in the South Shore Drainage Area. The Jones River is the largest freshwater drainage flowing into Cape Cod Bay. Numerous dams have restricted diadromous fish passage in the Jones River watershed since the 18th century. The lowermost dam at Elm Street was removed in 2019. This dam had a 5-section Alaskan Steeppass fishway that was considered not favorable for shad passage. The next dam upstream at

Wapping Road had no fishway and was removed in 2011. The final dam at Forge Pond is the water control for the City of Brockton's water supply at Silver Lake. This dam had no fish passage until DMF installed a wood weir and pool fishway in 2019. The two dam removals and fishway installation in recent years greatly improved the potential for diadromous fish passage in the upper Jones River watershed.

American Shad Status. Accounts of shad in the Jones River mainly come from anecdotal reports of uncommon sportfishing catches, dead shad observed on the river bank, and schooling adult shad below the Elm Street Dam. Photographs of such accounts have been verified by DMF biologists in recent decades. Ten years of river herring counting at the Elm Street Dam fishway had not recorded observations of shad passing. A rainbow smelt fyke net monitoring series maintained by DMF at the tidal interface in the Jones River has caught two juvenile shad during a 17-year time series (DMF, unpublished information). No known sportfishery specifically targets shad in the Jones River. Collectively, these accounts suggest a remnant run with low numbers of shad presently in the Jones River.

Regulatory Authority. The owners of dams are responsible for repairing, operating, and maintaining the fish passage facilities in MA as prescribed in M.G.L. Chapter 130 §19. The City of Brockton signed a Memorandum of Agreement with DMF to install and operate a fishway at Forge Pond Dam in 2018. In 2019, a DMF Fishway Operation and Maintenance Plan was implemented for Forge Pond Dam. Wetlands habitat and water quality protections are provided by M.G.L. Chapter 131 §40 and CMR 10.00 and administered by the *Mass*DEP.

Water Withdrawal Permissions. The City of Brockton received State Legislation in 1899 to divert water from Silver Lake for their water supply. Their present Water Management Act registration allows the City to withdraw up to 11.1 MGD from Silver Lake and two connected reservoirs to provide nearly all water needs for over 150,000 citizens. This water supply activity routine results in no outflow from Silver Lake from July to October (Gomez and Sullivan 2013). Several cranberry bogs also have water withdrawal permissions in the watershed.

Water Discharge Data. The USGS maintains one stream flow gauge in the Jones River watershed in Kingston at Elm Street (No. 01105870, 4.3 rkm, 51.2 km^2 drainage area). The average monthly discharge at the Elm Street gauge is 56 cfs for April and 42 cfs for May from the time series record of 1966-2020.

Water Quality Monitoring. *Mass*DEP assesses waterbodies by comparing water quality to SWQC, identifying threats to habitats and recommending remedial actions (*Mass*DEP 2007). Recent assessments have listed Silver Lake as impaired due to flow alterations from water supply withdrawals.

Silver Lake Habitat Assessment. A habitat assessment of river herring spawning and nursery habitat in Silver Lake was conducted by DMF and the Jones River Watershed Association during 2008-2009 (Chase et al. 2013). The assessment investigated water quality conditions in the lake and downstream fish passage conditions. Water quality criteria for dissolved oxygen, pH, total nitrogen, and total phosphorus were exceeded in the lake. The most significant impairment documented was the lack of outflow at Forge Pond Dam during summer and early fall each year. No observations of shad were made during the assessment and no fish passage was possible at the two upper impassible dams at that time.

ASMFC Shad Habitat Plan Framework

1.) Shad Habitat Assessment. No formal assessment of shad spawning and nursery habitat has been conducted in the Jones River watershed. The removals of the Wapping Road Dam in 2011 and the Elm Street Dam in 2019 provide a significant opportunity for shad to increase access to upstream riverine habitat. The river gains flow moving downstream from groundwater and tributary contributions. The restored river channel from Elm Street to Wapping Road has riffle-pool conditions that appear suitable

for shad spawning. This reach is approximately 1.5 km. The next reach from Wapping Road to Grove Street has moderate suitability for approximately 5 km. The final reach of approximately 2 km from Grove Street to the Forge Pond Dam has limited suitability due to shallow depths and reduced flow. Freshwater inputs upgradient of Silver Lake are managed for water supply purposes and not likely to provide additional shad habitat for fish that may pass into Silver Lake.

2.) Threats Assessment. No formal threat assessments have been made for shad in the Jones River watershed. The primary assumed threat historically was **Barriers to Migration**. This has been largely mitigated by the removal of the two lower dams that limited access to suitable spawning habitat. A temporary wood fish ladder was installed at Forge Pond Dam, the only remaining dam on the Jones River in 2019. Plans are underway to design and install a permanent fishway at Forge Pond Dam with associated pond dredging, improved attraction flow, and improved design for upstream and downstream passage. However, Silver Lake is not expected to provide additional shad habitat.

The most significant threat to shad may be the large municipal **Water Withdrawal** at Silver Lake that can degrade the upper watershed nursery habitat for shad for most of the season when juvenile shad would occupy this area. In addition to lower flow and channel depth, the chronically reduced flow allows the creation of debris jams and encroachment of wetland shrubs in the river channel. Over time, these obstructions trap sediment, fragment river channel and block fish passage. Sea level rise could be a factor in this watershed as evidence of higher tidal influence at Elm Street observed during over 30 years of DMF monitoring and the recorded pulses of new and full moon tides at the USGS gauge station.

3.) Habitat Restoration Plan. Currently, DMF does not have an ongoing project or imminent plans to initiate an assessment of the Jones River shad run or conduct a habitat restoration plan. Two areas of interest are a shad spawning and nursery habitat assessment in the river reaches made available by the recent dam removals, and population monitoring in response to the dam removals for several species of diadromous fish. The shad run in the Jones River may be the smallest among coastal rivers in MA. Funding is not available presently for new shad investigations.

Agency or Agencies with Regulatory Authority. Massachusetts DMF coastal waters diadromous fish, *MassWildlife* - inland waters diadromous fish, and *Mass*DEP - wetlands and water quality protection.

Action actively being addressed by agency. A stream maintenance plan was drafted by DMF in 2019 and approved by the Kingston Conservation Commission. Presently, DMF is working with the Jones River Watershed Association to improve river channel that could benefit shad spawning and nursery habitat. A Fishway Operations and Maintenance Plan for Forge Pond Dam was prepared in 2019 with the first year of application in 2020. The Jones River smelt fyke net monitoring series will be maintained with the potential to document changes in shad catch over time in response to the recent dam removals.

Initial Habitat Goal. Conduct the shad spawning habitat assessment for the Jones River from Elm Street to Grove Street. Match habitat assessments to shad population monitoring

Timeline and Costs for Achieving Goals/Targets. None established. Funding is not presently available.

Other organizations. The Jones River Watershed Association has been actively involved in natural resource stewardship in the Jones River for decades. This association is interested in participating in diadromous fish habitat and population monitoring that could benefit shad.

North River

Watershed Information. The North River watershed is the largest watershed in the South Shore coastal drainage area in Massachusetts with several significant tributaries within six towns (Figure 2). It contains two known tributaries that support shad spawning runs and fisheries: the South River and Indian Head River. The North River is formed at the confluence of the Indian Head River and Herring Brook in Pembroke. The Indian Head River flows for over 3 km from Factory Pond before meeting Herring Brook. There are no dams on the main stem North River. Shad can reach the Elm Street Dam at the Pembroke and Hanover border on the Indian Head River where a 4 ft Denil fish ladder was constructed to allow shad passage. The South River flows for 5.5 km from the Veteran's Park Dam in Marshfield where shad passage is possible but uncertain at a weir and pool fish ladder on the dam.

American Shad Status

South River. The South River presently has a shad spawning run that attracts low levels of sportfishing activity. However, historical records of this fishery are scant. Belding (1921) does not reference shad in his survey and Reback and DiCarlo (1972) simply mention that shad were present in the river in the 1960s. Recent DMF electrofishing for shad has documented the continuance of a well-defined shad run in the South River that aggregate below the Veteran's Park Dam. The Town of Marshfield is leading a cooperative investigation on the potential of removing the dam and installing a nature-like fishway, with feasibility work underway in 2020.

Indian Head River. Belding (1921) made no reference to shad in the Indian Head River, while noting the presence of several active mill industries with impassable dams and ongoing discharges of industrial waste. Reback and DiCarlo (1972) described an excellent sportfishery for shad in the Indian Head River that continues presently to attract large numbers of anglers. They also highlighted deficiencies at the fishway at the Elm Street Dam and recommended reconstruction with an improved design and diversion wall to improve attraction. A 4 ft Denil fishway with a diversion wall was constructed soon after their survey in 1977. No fish passage monitoring occurs at the Elm Street Dam and the passage efficiency of shad at the Elm Street Dam fishway is unknown. DMF initiated a shad electrofishing monitoring study in 2017 in order to better document the shad run and evaluate the development of an index of abundance.

Ongoing Shad Monitoring. An exploratory study was initiated by DMF in 2016 to monitor the presence and abundance of American shad in the South River and Indian Head River. Monitoring and sampling is conducted in both rivers from the head of tide to the first obstruction, using stream electroshocking to collect spawning adult shad. Biological information, including sex, size, age, and genetic samples were collected from individual shad. Scales were collected from shad to provide information on age structure, repeat spawning, mortality, and survival. Anal fin samples were collected from each shad captured and archived for future genetic research. CPUE (catch-per-unit-effort) scores (N_{Shad}/minute) from samples collected at both streams were generated as daily catch rates and used to generate mean CPUE indices. Annual mean CPUE scores were generated as indices of spawning stock abundance. Additionally, stream habitat data was collected in this monitoring effort to characterize and describe riparian and in-water features of the sampling areas in both rivers. Stream maintenance was conducted in both rivers by DMF personnel to remove obstructions to fish passage each year prior to the start of the spawning run.

Sampling trips in the South River are conducted between the last week of April through June along a 1,390 m^2 transect beginning from the South River Elementary School to the base of the Veteran's Memorial Park Dam. Annual geometric mean CPUE scores are shown in Table 2A and Figure 3A, respectively. Results indicate CPUE scores declined from 2016 to 2018 and increased from 2018 to 2020.

Male shad were dominant in samples collected in all years (mean ratio: 2:1, Table 2A). Mean size of males has declined in the five years of monitoring, and the mean size of females increased between 2016 and 2018 but decreased from 2018 to 2020. Age samples of South River shad ranged from 3 – 9 years. Mean age of males has declined in the five years of monitoring, whereas the mean age of females increased from 2016 to 2018, then decreased from 2018 to 2020. Mortality (Z) and survivorship (S) were estimated using (the Chapman-Robson method), and Z ranged between 0.7 and 2.4 (with a corresponding S ranging between 0.1 and 0.5).

Sampling trips in the Indian Head River are conducted between the first week of May through June along a 5,560 m^2 transect beginning downstream from the Elm Street Bridge to the base of the Elm Street Dam. Annual geometric mean CPUE scores are shown in Table 2B and Figure 3B, respectively. Results indicate CPUE scores increased each year throughout the monitoring period. Male shad were dominant in samples collected in all years (mean ratio: 2:1, Table 2B). Mean size of males has declined in the five years of monitoring, whereas the mean size of females was stable throughout the monitoring period despite a decrease in size in 2019. Age samples of Indian Head River shad ranged from 3-9 years. Mean age of males declined from 2016 to 2018 and increased from 2018 to 2020. Mean age of females was stable from 2016 to 2018, decreased in 2019, then increased in 2020. Mortality estimates ranged between 0.5 and 1.4 and survivorship ranged between 0.2 and 0.6.

Table 2. Annual indices of abundance, expressed as arithmetic and geometric mean catch-per-unit-effort (CPUE) scores (N_{Shad}/minute) and population demographic data collected from American shad in the (A) South River; and (B) Indian Head River.

Year	N Male	N Female	Ratio M:F	A. Mean CPUE	G. Mean CPUE	Mean TL (mm)		Mean Age		Chapman-Robson	
						Male	Female	Male	Female	Z	S
2016	44	22	2.0:1.0	0.56	0.48	489	503	6.0	5.6	0.9	0.4
2017	58	21	2.8:1.0	0.42	0.29	482	521	5.6	6.1	1.5	0.2
2018*	38	20	1.9:1.0	0.26	0.24	480	521	5.6	6.1	2.4	0.1
2019	48	32	1.5:1.0	0.45	0.39	465	497	5.3	5.6	0.7	0.5
2020	51	31	1.6:1.0	0.54	0.47	454	492	5.0	5.3	1.0	0.4

* Estimates based on low sample size

B. Indian Head River

Year	N Male	N Female	Ratio M:F	A. Mean CPUE	G. Mean CPUE	Mean TL (mm)		Mean Age		Chapman-Robson	
						Male	Female	Male	Female	Z	S
2016	62	46	1.3:1.0	0.36	0.32	488	512	5.9	6.0	1.4	0.2
2017	88	29	3.0:1.0	0.39	0.36	488	512	5.7	6.0	1.4	0.2
2018	126	55	2.3:1.0	0.48	0.43	465	512	5.2	6.1	0.5	0.6
2019	86	32	2.7:1.0	0.55	0.48	474	499	5.5	5.5	0.6	0.5
2020	77	54	1.4:1.0	0.57	0.50	473	511	5.8	5.8	0.7	0.5

Fish Ladder Specifications. A stone and concrete weir and pool fish ladder is located on the South River at the Town of Marshfield's Veteran's Memorial Park Dam. The fish ladder is approximately 21 ft. in length with 4 weirs, including an entrance weir constructed by DMF in 2017. Visual counting conducted by volunteers of the North and South River Watershed Association have observed shad presence but no passage at his location. The Elm Street Dam, located on the Indian Head River, was last rebuilt in 1920 and subsequently repaired in 1977 by the Towns of Hanover and Pembroke. A concrete Denil fishway (109 ft. length, 4 ft. width, 33 baffles) was installed to allow upstream passage.

Regulatory Authority. The owners of dams are responsible for repairing, operating, and maintaining the fish passage facilities in MA as prescribed in M.G.L. Chapter 130 §19. The Elm Street Dam is owned jointly by the Towns of Pembroke and Hanover. Following repairs by the DMF Fishway Crew at this fishway in October 2020, DMF will prepare an O&M plan to guide improved management for the location. The Veteran's Memorial Park Dam is owned by the Town of Marshfield. This fishway was improved in 2017 with the addition of a concrete entrance box. Following that work an O&M plan was prepared for the Town of Marshfield. Wetlands habitat and water quality protections are provided by M.G.L. Chapter 131 §40 and CMR Regulations 10.00 and administered *Mass*DEP.

Water Withdrawal Permissions*.* The Pembroke Country Club is permitted to withdraw water from the upper Indian Head River from Factory Pond downstream to Ludhams Ford (Elm Street) Dam (Subwatershed Segment MA94-04). Their present Water Management Act registration allows them to withdraw up to 0.13 MGD. The Hanover Water Department is permitted to withdraw up to 1.38 MGD in the lower Indian Head River from Ludhams Ford Dam downstream to the confluence with Herring Brook (Subwatershed Segment MA94-22, *Mass*DEP 2006.

In the South River, the Marshfield Water and Sewer Department is permitted under the Water Management Act to withdraw up to 3.30 MGD (*Mass*DEP 2006). In the North River, the Pembroke Water Department is permitted to withdraw up to 1.26 MGD and the Abington-Rockland Water Treatment Plant is permitted under the Water Management Act to withdraw up to 2.21 MGD (*Mass*DEP 2006).

Water Discharge Data: The USGS maintains one stream flow gauge in the North River watershed in Hanover at the Elm Street Bridge (No. 01105730, 3.2 km, 78.5 km^2 drainage area). The average monthly discharge at the Hanover gauge station is 105 cfs for April and 67 cfs for May from the time series record of 1966-2020.

Water Quality Monitoring: *Mass*DEP assesses waterbodies by comparing water quality to SWQC, identifying threats to habitats, and recommending remedial actions (*Mass*DEP 2007). The North River watershed was last assessed in 2001 (*Mass*DEP 2006). The upper watershed of the Indian Head River (segment MA94-04) was assessed as impaired due to metals, nutrients, and organic enrichment/low DO. The lower Indian Head River watershed (segment MA94-22) did not have sufficient information to make assessments for any designated uses (*Mass*DEP 2003). The South River watershed did not have sufficient information to make assessments for any designated uses (*Mass*DEP 2003).

ASMFC Shad Habitat Plan Framework

1.) Shad Habitat Assessment. No formal assessment of shad spawning and nursery habitat has been conducted in the North River watershed. An active restoration project is underway to consider removing the Veteran's Memorial Park Dam in Marshfield and replace it with a nature-like fishway. Fish passage improvements for shad at this location could provide access to approximately 1 km of suitable shad spawning habitat before reaching Chandlers Pond. It is uncertain if shad would pass through Chandlers Pond and continue through the small tributary feeding into the pond. No project presently is ongoing to evaluate the removal of the Elm Street Dam on the Indian Head River. Such a project would certainly provide benefits to shad passage and access to increased spawning habitat. There is 4-5 km of potentially suitable shad spawning and nursery habitat between the Elm Street Dam and the next dam at Forge Pond in Hanson. This dam is presently impassible with legacy concerns over industrial sediments. Access to Forge Pond dam would also require bridge riprap modifications at Cross Street.

2.) Threats Assessment. No formal threat assessments have been made for shad in the North River. This river system contains the largest remaining shad populations in coastal MA rivers and supports ongoing sportfisheries. Two dams appear to limit upstream access for shad in the Indian Head and South

rivers. Therefore, **Barriers to Migration** are an ongoing threat to shad in this river system. However, these dams have been in place for centuries and anecdotal reports suggest higher shad fishery catch and participation in the 1960s and 1970s. It is likely that other threats are influential to the status of these two small shad runs. Increasing groundwater and surface **Water Withdrawal** as these coastal towns have been further developed in recent decades could be limiting surface flow and habitat quality in the rivers. This threat has not been assessed. The South River has experienced significant encroachment of wetland plants into the river channel between the Veteran's Memorial Park Dam and Chandler Pond in recent decades. This process has led to the deposition of large amounts of fine sediments and reduced channel definition in this river stretch.

3.) Habitat Restoration Plan. Currently, DMF does not have an ongoing project or imminent plans to initiate an assessment of the two North River shad run or conduct a habitat restoration plan. Two areas of interest are a shad spawning and nursery habitat assessment in both the Indian Head and South rivers. DMF will look for cooperative opportunities to pursue shad habitat assessments in this watershed with a priority given to the Indian Head River upstream of the Elm Street Dam. The DMF Diadromous Fish Habitat Restoration Priority List has the Cross Street Bridge location ranked 1st among 82 possible projects in the South Shore Coastal Drainage Area. This project would benefit shad if passage were improved at the Elm Street Dam. DMF staff will prioritize the initiation of an evaluation of this fish passage improvement project as opportunities occur. DMF drafted a South River Stream Maintenance Plan for the Town Marshfield in 2016 and has worked with Town staff and volunteers on numerous trips to remove debris jams and shrub overgrowth upstream of Veteran's Memorial Park Dam. This work revealed significant alteration of potential shad spawning pool and riffle habitat as wetland shrub plants choked the river channel and led to high sediment accumulation and channel braiding.

Agency or Agencies with Regulatory Authority. Massachusetts DMF coastal waters diadromous fish, *MassWildlife* inland waters diadromous fish, and *Mass*DEP - wetlands and water quality protection.

Action actively being addressed by agency. Fishway repairs were conducted by DMF at the Elm Street Dam on the Indian Head River in 2020, and stream maintenance is ongoing in the South River. DMF intends to continue with the shad electrofishing project in both rivers and look for opportunities to evaluate the potential shad habitat upstream of the Elm Street Dam in the Indian Head River.

Timeline and Costs for Achieving Goals/Targets. None established. Funding is not presently available.

Other organizations. The North and South River Watershed Association has been actively involved in natural resource stewardship in this watershed for decades. This association is interested in participating in diadromous fish habitat and population monitoring that could benefit shad. The Towns of Pembroke, Hanover and Marshfield have demonstrated similar interests and stewardship.

Neponset River

Watershed Information. The Neponset River originates at the Neponset Reservoir in Foxboro and flows for 45 km to Dorchester Bay (Figure 4). Fish passage is obstructed at the Lower Mills Dam (also called the Baker Chocolate Factory Dam) located at head-of-tide (6.8 rkm) on the Dorchester and Milton border. The Lower Mills Dam has a 7 ft spillway height and 79 ft spillway width that is connected to former mill buildings on both sides. The next dam upstream is the Tilestone and Hollingsworth Paper Company Dam at 11 rkm. This dam has a 9.5 ft spillway height, 151 ft spillway length with no fish passage facilities. DMF conducted a survey upstream of the two dams in 1995 and documented 25.3 km of suitable riverine habitat for shad and river herring spawning.

American Shad Status. Reback and DiCarlo (1972) recognized a substantial former shad fishery in the Neponset River that was eliminated by two dams in the lower watershed and launched efforts to restore passage in the 1990s. In anticipation of fish passage improvements at the two dams, DMF stocked 1,047 gravid adult shad from 1995 to 2001. Extensive multi-agency efforts have investigated dam removal and fishway options at the dams since 1994. Unfortunately, costly remediation of industrial contaminants has slowed momentum on the process: stalling what might be the shad restoration concept with the highest potential benefits among coastal MA rivers. Actual records on the recent presence of shad are limited. DMF monitoring for smelt spawning below the spillway of the Lower Mills Dam observed a few adult shad during late spring on several dates in the 1980s and 1990s.

Regulatory Authority. The owners of dams are responsible for repairing, operating, and maintaining the fish passage facilities in MA as prescribed in M.G.L. Chapter 130 §19. Both dams are owned by the MA Department of Conservation and Recreation (DCR). Wetlands habitat and water quality protections are provided by M.G.L. Chapter 131 §40 and CMR 10.00 and administered by *Mass*DEP.

Water Withdrawal Permissions. Several minor water withdrawals occur in the Neponset River watershed. However, municipal water supply for towns in the watershed is primarily provided by the Massachusetts Water Resource Authority, independent of the Neponset River.

Water Discharge Data. The USGS maintains a stream flow gauge in the Neponset River watershed in Milton at the Baker Dam (No. 011055566, 6.8 rkm, 262 km^2 drainage area). Flow data at this station is adjusted to account for tidal influence. The average monthly discharge at the Baker Dam gauge station is 580 cfs for April and 337 cfs for May from the time series record of 1996-2020.

Water Quality Monitoring. *Mass*DEP assesses waterbodies by comparing water quality to Surface Water Quality Standards (SWQC), identifying threats to habitats, and recommending remedial actions (*Mass*DEP 2007). The Neponset River watershed was last assessed during 2004; with a large percentage of the potential shad habitat listed as *Impaired* due to several stressors including low dissolved oxygen, very high levels of polychlorinated biphenyls (PCBs), and high nutrients.

ASMFC Shad Habitat Plan Framework

1.) Shad Habitat Assessment. A shad habitat assessment was conducted in the Neponset River during 1995 by DMF. This assessment found suitable habitat for shad and prompted restoration efforts in the watershed that have stalled due to concerns over project costs and contaminated sediments. The DMF Diadromous Fish Habitat Restoration Priority List has the Lower Mills location ranked 3rd (tied) among 111 possible projects in the Boston Harbor and North Shore region. Shad restoration potential is an important factor that contributes to this high rank as a restoration priority.

2.) Threats Assessment. No formal threat assessments have been made for shad in the Neponset River watershed. The primary threat is clearly **Barriers to Migration** given the two impassible dams in the lower watershed. Water flow does not appear to be a major threat given the stream flow gauge records of relatively high flow for the entire shad spawning and nursery habitat period. Sea level rise could be a factor in this watershed as evidence of higher tidal influence at Lower Mills has been observed during more than 30 years of DMF monitoring. The rising sea level could be a significant negative influence on rainbow smelt spawning habitat and other head-of-tide spawning fish. This impact likely does not influence shad; however, the impact to other species adds to the rational for providing fish passage at Lower Mills.

3.) Habitat Restoration Plan. Currently, DMF does not have an ongoing project or imminent plans to initiate an assessment of the Neponset River shad run or conduct a habitat restoration plan. The results

of the prior survey are likely still relevant, although updated information may benefit restoration goals. No funding is presently available for shad restoration planning or population monitoring.

Agency or Agencies with Regulatory Authority. Massachusetts DMF - coastal waters diadromous fish, *MassWildlife* - inland waters diadromous fish, and *Mass*DEP - wetlands and water quality protection.

Action actively being addressed by agency. None at the present time. In 2018 the dam owners, DCR, signaled some willingness to re-examine providing passage at the Baker Chocolate and Tilestone Dams. DMF intends to revisit the concept of fish passage improvements at the two dams at the next opportunity with DCR.

Timeline and Costs for Achieving Goals/Targets. None established. Funding is not presently available.

Other organizations. The Neponset River Watershed Association has been actively involved in natural resource stewardship in the Neponset River for decades. This association is interested in participating in diadromous fish habitat and population monitoring that could benefit shad. The DCR as dam owners, will be an essential partner in any restoration planning.

Charles River

Watershed Information: The Charles River is a relatively large coastal river in Massachusetts that provides habitat for diadromous fish for nearly 130 km as it flows to Boston Harbor (Figure 4) and borders the lands of 24 towns and cities. The drainage area of the primarily urbanized watershed is approximately 805 km^2. There are eight dams that fragment diadromous fish habitat in the Charles River. The upper two dams have no passageways and the lower six have passageways with most designed to pass shad but with unknown efficiency.

American Shad Status: Belding (1921) refers to the Charles River as one of the first rivers in Massachusetts to lose its shad and alewife fisheries due to pollution and dams. Reback and DiCarlo (1972) state that shad were not present in the Charles River at the time of their 1960s survey of anadromous fish; however, they note the high restoration potential and interest of DMF to pursue shad restoration. A river assessment was conducted by DMF in the late 1960s to determine the available potential spawning habitat. The survey covered a total of 98 rkm from the Charles River locks to Medway and documented approximately 64 rkm with suitable shad spawning habitat. This survey led to an effort to stock fertilized shad eggs in 1971. Intensive stocking of shad eggs occurred through much of the 1970s and sporadic stocking of mature adult shad continued from 1978 to 1992. The results of the stocking effort were not evaluated, although returning adult shad were captured in low numbers while collecting river herring for stocking below the Watertown Dam during the 1990s and 2000s (Reback et al. 2005). Shad stocking efforts were renewed in 2006 to apply improved culture techniques and oxytetracycline (OTC) marking to evaluate restoration responses.

Ongoing Shad Monitoring

Starting in 2006, a cooperative effort between DMF and the USFWS has made several concerted efforts to restore American shad to the Charles River. Restoration efforts have included stocking larvae into potential nursery habitat upstream of barriers, video monitoring of fishway passage, telemetry studies, and age validation work.

From 2006 – 2017, USFWS stocked an average of 2.2 million OTC-marked larvae in potential nursery habitat upstream of the Moody Street Dam (4th barrier). Gravid American shad were collected from the Merrimack River and cultured to fry stage at the USFWS Nashua or North Attleboro hatcheries. Starting in 2012, the two agencies conducted electrofishing downstream of the Watertown Dam (2nd barrier) in document the status of the shad run and restoration contributions. During 2012, weekly, spawning run electrofishing trips yielded a total of 30 adult shad. The otoliths of each adult were removed and examined for an OTC mark and were aged along with scales from each fish. Of the 30 adults retained, 25 were an age (3-6) that could have originated from the restoration efforts. Of those 25 fish, 15 possessed an OTC mark. It is unknown whether non-marked fish are the result of straying, hatchery product that lost or failed to incorporate an OTC mark, or remnant of a natural population. Since the resumption of stocking in 2006 an effort was made to identify if a remnant spawning run existed, using the Denil fishway at the Watertown Dam as a fish trap.

When the trap was operated, adult shad were prevented from passing through the upstream exit by way of tightly spaced vertical bars. The trapping approach had limitations, although did document the presence of low numbers of adult shad. In 2013 and 2014, DMF replaced this trap methodology with a video monitoring system. Video data documented over 350,000 river herring and 44 adult shad passing through the fishway in 2013 and over 310,000 river herring and 41 shad in 2014. In 2013 and 2014 only 58 (2013: 22, 2014: 36) adult American shad were captured while electrofishing, meaning the number of shad successfully utilizing the fishway exceeded the number sampled below and supports the possibility of natural reproduction occurring in the watershed. However, most shad on video appeared smaller and were likely males. The entrance of the Watertown Dam fishway is on the opposite side of the river from the thalweg, creating an attraction problem for shad. Shad would need to leave the thalweg well downstream of the fishway and follow flow on the river right bank or cross from the thalweg below the dam apron to river right over a large, shallow and turbulent area.

From 2008 to 2016 larval American shad reared in the USFWS North Attleboro National Fish Hatchery and stocked to the Charles River received oxytetracycline (OTC) marks. The initial years of marking were to help differentiate between natural and stocked American shad. This program was modified to incorporate an age validation that began in 2013. Limited age validation work has occurred for this species and additional studies in different watersheds will benefit coastwide management. Examination of larvae sacrificed to evaluate marking procedures indicated that OTC marks were present in most individuals but that larvae appeared to incorporate OTC better, leading to stronger marks, at older ages. Beginning in 2013, larvae received double or triple marks with varying days between marks. Variation of mark procedures between years allows marked fish to be assigned to a specific hatch year, thereby allowing for direct age validation. Recaptures of multiple marked fish began in 2017 but catches of marked shad were low until 2019 (2017 N = 17, 2018 N = 24, 2019 N = 32). Given the small sample sizes and the fact that counting daily growth rings can be difficult, there was some uncertainty in year class identification in samples from 2017 and 2018. The larger sample size and the increased abundance of triple marked samples in 2019 has increased our confidence that we can correctly identify year classes and validate our ages. Due to COVID related field work restrictions no sampling occurred in 2020.

In the springs of 2015 and 2016, DMF collaborated with USFWS Central New England Fisheries Conservation Office biologists to conduct an acoustic telemetry study on spawning adult shad. The goals of the study were to examine impediments to passage and restoration by understanding distribution of adult shad in the Charles River (Gahagan and Bailey 2020). A total of 98 adult American shad were tagged and acoustic arrays were maintained during 2015-2017. The study successfully used surgical implantation methods to track American shad over multiple years and achieved other study goals.

Fish Ladder Specifications: Detailed specifications on the Charles River fishways are provided in Reback et al. (2005). The first barrier in Boston Harbor is the Charles River Locks, built for navigation and flood control. A locking protocol is used to pass migrating fish at this location with specific timing provisions for the shad migration. The 2nd, 5th and 6th dams have large-width (4-6 ft) Denil fishways designed by the USFWS to pass river herring and shad. The 3rd barrier has been partially breached to allow fish passage. The 4th barrier at the Moody Street Dam is a hybrid ladder with a lower section of 4' Denil baffles leading to a large weir pool section with a 180° turn between the 2nd and 3rd weirs. The uppermost dams, the Metropolitan Circular Dam at 32.2 rkm and the Silk Mill Dam at 32.5 rkm have no fishways. Shad presently have access to approximately 32 rkm of potentially suitable habitat.

Regulatory Authority: The owner of the dam is responsible for repairing, operating, and maintaining the fish passage facilities as prescribed in M.G.L. Chapter 130 §19. Seven of the eight dams on the Charles River are owned by the Massachusetts Department of Conservation and Recreation. The Silk Mill Dam is privately owned. Wetlands habitat and water quality protections are provided by M.G.L. Chapter 131 §40 and CMR 10.00 and administered by the *Mass*DEP.

Water Withdrawal Permissions: With a large urban watershed that connects many towns, the Charles River is subject to complex water management. Communities in the metropolitan Boston area (inside Route 128) receive water from the Massachusetts Water Resources Authority's Quabbin Reservoir. Communities outside of Route 128 are allowed under 14 MA Water Management Act permits to withdraw water from groundwater wells and reservoirs.

Water Discharge Data: The importance of the Charles River for water resource management is reflected by the presence of 18 USGS stream flow gauges in the watershed. The Waltham stream flow gauge station (No. 01104500, 19.6 rkm, 650 km^2 drainage area) is on the main stem Charles River and is most proximate to the fishways. The average monthly discharge at the Waltham gauge station is 616 cfs for April and 366 cfs for May from the time series record of 1931-2020.

Water Quality Monitoring: *Mass*DEP assesses waterbodies by comparing water quality to Surface Water Quality Standards, indentifying threats to habitats and recommending remedial actions (*Mass*DEP 2007). The Charles River watershed was last assessed during 2002-2006 (*Mass*DEP 2008); with a large percentage of the potential shad habitat listed as *Impaired* due to several stressors including low dissolved oxygen, high nutrients, and invasive plant growth.

ASMFC Shad Habitat Plan Framework

1.) Shad Habitat Assessment. No formal assessment of shad spawning and nursery habitat has been conducted in the Charles River watershed since the late 1960s. The interest of maintaining shad passage in the Charles River has a long history that includes the installation of four large Denil fishways at dams that were designed for shad passage. Shad presently have access to approximately 32 rkm of potentially suitable habitat. There are no present plans to update Charles River shad habitat assessment plans. Should opportunities arise to consider updates on shad habitat information in the Charles River the river upstream of the impassible Metropolitan Circular and Silk Mill dams should be evaluated.

2.) Threats Assessment. No formal threat assessments have been made for shad in the Charles River. Historical **Barriers to Migration** and degraded water quality were identified in past DMF surveys as impacting shad in the Charles River. Much work was conducted to provide fish passage at 6 of the 8 dams during the 1970s and 1980s. The implementation of the Clean Water Act in the 1970s slowly reduced industrial pollution loads in the river. Presently, Barriers to Migration remains a significant threat due to inefficiencies at some of the fish passage facilities and the two remaining impassible dams. To this point, the results of the recent telemetry study showed that the New Boston Dam at the head of

tide and the Watertown Dam, the first obstruction within the freshwater segment of the river, both lead to migratory delays and likely cause additive mortality (Gahagan and Bailey 2020). New Boston Dam delayed pre- and post-spawn shad, with several post-spawn shad dying at the dam and lock structures. The Watertown Dam blocked most pre-spawn shad from ascending the river and fish that did pass experienced delays of multiple days.

The watershed is heavily urbanized with documented surface water quality and stormwater impairments. Stormwater is a concern as rain events quickly degraded water quality in the watershed. Invasive plant species are also a threat of concern; particularly water chestnut.

3.) Habitat Restoration Plan. Currently, DMF does not have an ongoing project to initiate a shad restoration plan in the Charles River watershed. We **recommend** the following actions for the Charles River as opportunities allow: (1) assessment of the amount and suitability of Charles River habitat for shad spawning and rearing; (2) further assessment of the passage efficiency at the Watertown Dam fishway and the Moody Street Dam; (3) evaluate the feasibility of providing fish passage at the two upstream impassible dams; (4) In coordination with MA DCR, prepare Fishway Operation and Maintenance Plans for the four upstream fishways at DCR dams with consideration for shad passage requirements; and (5) evaluate the feasibility of fish passage improvements through removal of the Watertown Dam. The Watertown Dam project is the top ranked location among 111 possible projects in the DMF Diadromous Fish Habitat Restoration Priority List for the Boston Harbor and North Shore region (Version-4, 2020). In 2018-2019, DMF participated in a Feasibility Study to examine the removal of the Watertown Dam. The study has not been finalized but the results suggest removal is a feasible option for improving fish passage. The impassible Metropolitan Circular Dam and Silk Mill Dam are tied for 15th on the DMF Diadromous Fish Habitat Restoration Priority List for the Boston Harbor and North Shore region. If passage were provided at these two dams an additional 32 rkm (per survey of 1969-1970) of potential shad spawning habitat could be gained.

Agency or Agencies with Regulatory Authority. Massachusetts DMF- coastal waters diadromous fish, *MassWildlife* - inland waters diadromous fish, and *Mass*DEP - wetlands and water quality protection.

Action actively being addressed by agency. Present activities included fishway O&M coordination with MA DCR, and an ongoing multi-agency dam removal feasibility study for the Watertown Dam.

Initial Habitat Goal. None established. Funding is not presently available.

Timeline and Costs for Achieving Goals/Targets. None established. Funding is not presently available.

Other organizations: DMF conducts most field work in cooperation with the USFWS and *MassWildlife*. The Charles River Watershed Association is also engaged in a wide range of activities to monitor and improve the aquatic life of the Charles River.

Related Activities

The following three ongoing DMF projects related to diadromous fish could benefit the interest of improving our knowledge of American shad habitat in the future:

1.) A DMF coast-wide anadromous fish passage survey was conducted in the early 2000s (Reback et al. 2005) with a focus on river herring and structural fishways. The datafile of this survey was used to prepare a DMF Diadromous Fish Habitat Restoration Priority List in 2008 with the same focus on river herring and structural fishways. The DMF priority list was updated in 2011, 2016 and 2020 (V-4) with increasing inclusion of information on other diadromous fish species and other habitat types. This datalayer can be improved in the future by adding shad habitat data. Additionally, plans are underway to update the coast-wide anadromous fish passage survey in 2021. This activity can also include more attention to shad spawning, nursery and migratory habitat.

2.) A GIS datalayer of diadromous fish habitat was developed in cooperation with the Massachusetts Department of Transportation in 2013 to provide tools for transportation and diadromous fish restoration planning. The GIS datalayer was focused on river herring migrations and depended on site information and species presence/absence information largely provided by the DMF coast-wide survey (Reback et al. 2005) and DMF Diadromous Fish Habitat Restoration Priority List. The GIS datalayer was updated in 2018 and included an expansion of information on additional diadromous fish species. The datalayer was updated again in 2020 with the objective to increase information on other species and habitat types. This datalayer can be improved in the future by adding shad habitat data.

3.) The DMF conducts habitat assessments for rainbow smelt and river herring to under a Quality Assurance Program Plan (QAPP) that relates habitat and water quality conditions to aquatic life and species life history thresholds (Chase 2010). The QAPP provides guidance that can be transferable to riverine shad habitat assessments and could be updated in the future to include Specific Operation Plans for shad habitat assessments.

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Figure 1. Palmer River and Taunton River in the Narragansett Bay Watershed. The green dots are dams that are passable to migratory fish, the red dots are impassible dams, and the yellow dots indicate improvements are recommended.

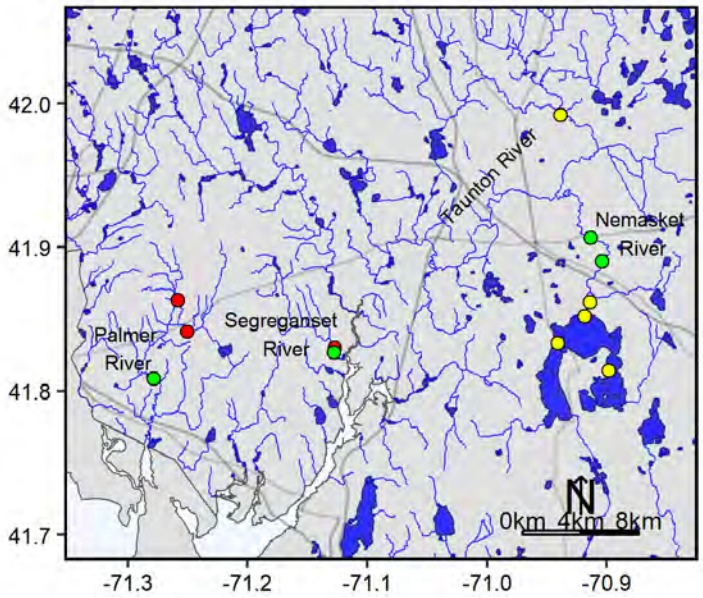


Figure 2. Jones River and North River watersheds in the South Shore Coastal Drainage Area. The green dots are dams that are passable to migratory fish, the red dots are impassible dams, and the yellow dots indicate improvements are recommended. The Indian Head River Dam is located at the green dot west of the North River title.

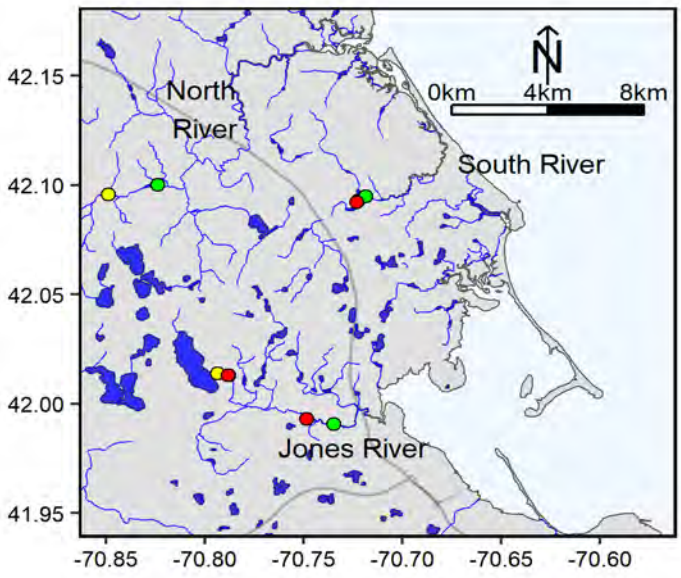
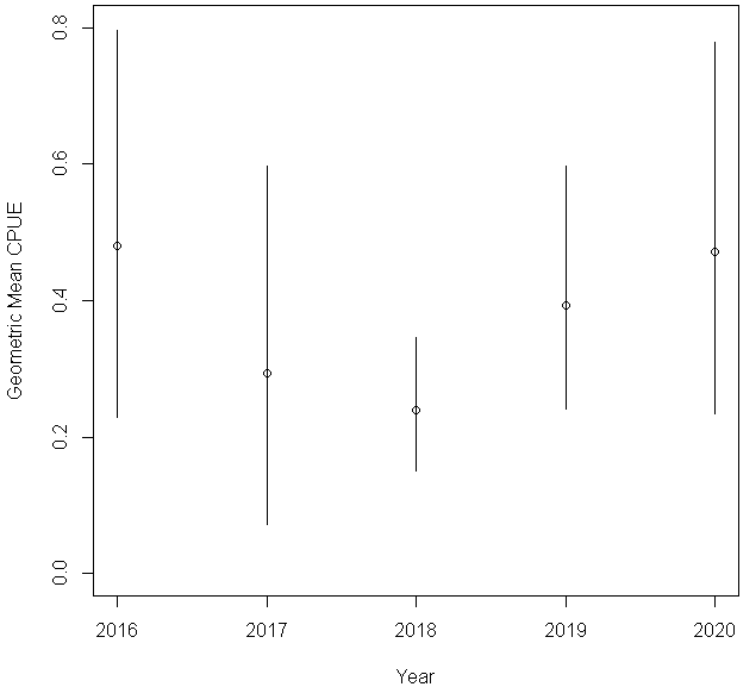


Figure 3. Annual Geometric Mean CPUE scores (+/- 95% C.I.) of American shad (N_{Shad}/minute) derived from electrofishing surveys conducted in the (A) South River; and (B) Indianhead River.

A. South



B. Indian Head

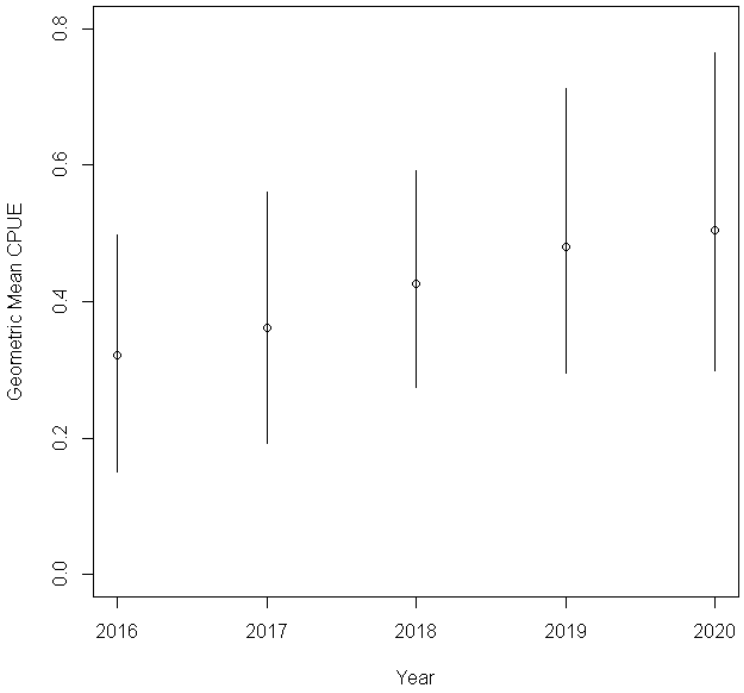
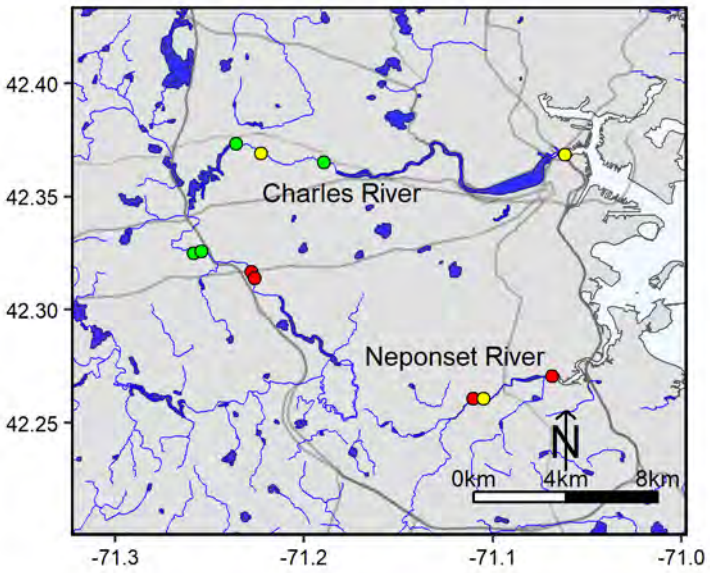
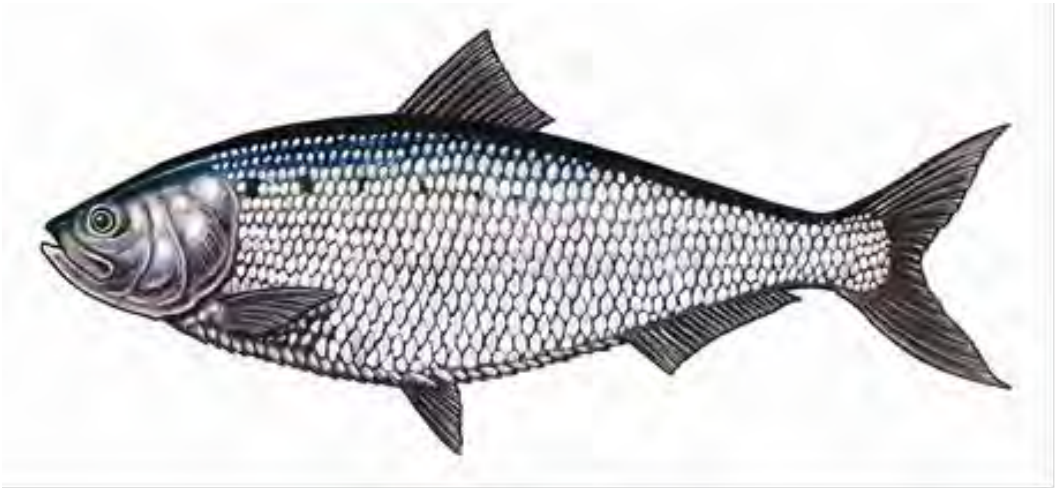


Figure 4. Charles River and Neponset River in the Boston Harbor Watershed. The green dots are dams that are passable to migratory fish, the red dots are impassible dams, and the yellow dots indicate improvements are recommended.



Rhode Island American Shad Habitat Plan

Submitted to the
Atlantic States Marine Fisheries Commission



Prepared by Patrick McGee & Phil Edwards
RI DEM Fish & Wildlife

January 2021

Rhode Island American Shad Fisheries Management Plan
Pawcatuck and Pawtuxet Rivers

Overview

Report submitted by the Rhode Island Department of Environmental Management, Division of Fish & Wildlife. This report provides river-specific information for the two known American shad runs in the state of Rhode Island, the Pawcatuck River and the Pawtuxet River. American shad restoration is an ongoing effort by the Division and its many partners. The Division continues to try to improve shad passage efficacy on these systems, while also seeking to expand passage to additional systems deemed to have the potential to provide suitable American shad habitat.

The 2020 Atlantic States Marine Fisheries Commission's American Shad Stock Assessment and Peer Review Report provides an extensive review of available literature and discussion on the topic of fish passage (ASMFC 2020). Specifically, it highlights the issues with lack of evaluation and performance from decades-old approaches, facilities designs/operations that are not effective, and therefore cannot reasonably be expected to achieve management and restoration goals without significant changes. The Assessment Report also provides an important quantitative modeling approach examining shad habitat and passage barriers, and the need to address status quo fish passage performance. The impacts of these barriers and status quo passage are described and also modeled as effects on spawner population size under three scenarios, 1) no barriers, 2) first barrier with no passage, and 3) realistic fish passage performance measures applied to barriers (e.g., upstream passage efficiency of 50%).

The Assessment Report used standardized data and modelling approaches that quantified the impacts of barriers and fish passage as significant in all three management areas examined based on shad life history and habitat (New England, Mid-Atlantic, and South Atlantic). The assessment determined that overall, dams completely or partly block nearly 40% of the total habitat once used by American Shad. The model results of the "no barriers" scenario yielded an estimated spawner production potential 1.7 times greater than that yielded by the scenario assuming no passage at the first barrier: 72.8 million versus 42.8 million fish. The results of the third model scenario, which applies "realistic" (i.e., current) fish passage efficiencies, resulted in a gain of less than 3 million fish. Conclusions include "losses in (spawner production) potential are significant in each state and region." The Assessment Report provides a strong justification for the need and benefits of requiring improved fish passage performance measures. Additionally, meeting such improved passage performance standards is now an achievable goal given the current state of knowledge on fish behavior, swimming performance, and fish passage engineering expertise.

Habitat Assessment: Pawcatuck River

Since the 1970s, RIDEM has accomplished substantial progress in the restoration of diadromous fish to the 308-mi^2 Pawcatuck River watershed. RIDEM has been successful to date at re-establishing low-levels of self-sustaining American shad and river herring populations in the lower reach of the Pawcatuck River watershed. This work has included installation of structural fishways (1970s), limited structural fishway improvements, broodstock enhancement, fry stocking programs and monitoring of both adult returns and juvenile recruitment (e.g., fish trap counts, juvenile seine surveys, electrofishing, and radio telemetry). Although the Pawcatuck River has historic diadromous fish runs, each of the lower three dams (White Rock, Potter Hill, and Bradford) and poorly functioning structural fishways greatly reduced the passage efficiency of anadromous fish from accessing valuable spawning and nursery habitat. Starting in 2013, the State of Rhode Island Department of Environmental Management (RIDEM), Division of Fish and Wildlife (DF&W) committed funds and initiated a process to assess specific passage problems (via U.S. Army Corps of Engineers (ACOE) Section 22 of the Water Resources Development Act) to document passage deficiencies and passage restoration alternatives at each of the first three dams on the Lower Pawcatuck River. In 2015 partners began completing fish passage improvements at the lower three dams utilizing a multi-million dollar USFWS Sandy Flood Resiliency funds and other sources to remove the White Rock Dam, improve the Potter Hill Fishway and construct a rock ramp fishway at the Bradford Dam.

Since 2010, there has been a substantial effort to improve fish passage at the dams located upstream of the three dams described above that are on the lower portion of the Pawcatuck River. This three phase upper Pawcatuck River fish passage restoration project was awarded a multi-million dollar NOAA American Recovery and Reinvestment Act and involves numerous funding and project partners. The first of the three-phase project was the 2010 removal of the Lower Shannock Falls which included the installation of rock weirs and bank stabilization. In 2012, a Denil fishway and state-of-the-art eel pass was constructed at the Horseshoe Falls Dam and in 2013 a rock ramp fishway was completed at the sixth obstruction-Kenyon Mill Dam. The fish passage restoration improvements at the first three fishways complemented the new fish passage restoration projects completed on the upper Pawcatuck River watershed. Currently DFW and partners are looking at fishway options to enhance fish passage at a small USGS gauging station located at the Cronan fishing area. The dam is passable at certain flows, but improvements will enhance fish passage.

The six fish passage projects described below will enhance diadromous fish passage to over 22 miles of the main stem Pawcatuck River, 48 miles of tributaries, and access to over 1,967 acres of ponds providing critical spawning and rearing habitat. The goal is to improve river connectivity for target fish species and provide passage between Little Narragansett Bay and the high-quality waters of upper Pawcatuck River. An increase in abundance of the target diadromous species, to be monitored and documented by RIDEM and partners over time, will ultimately serve as the metrics for performance of the proposed restoration projects. The long-term goal of the project is to restore self-sustaining populations of anadromous and catadromous fish species. The unimpeded access to riverine and lacustrine habitats is expected to potentially result in an annual shad run in the thousands and river herring runs in the hundreds of thousands in the watershed. In addition, RIDEM, USFWS, USGS, URI and other partners initiated a two-

year telemetry study in 2018 for shad and herring on the mainstem Pawcatuck River at each of the main fishways. Preliminary results show where radio tagged fish migrated to along the river and areas where migration delays may be occurring. The information will assist in prioritizing sites for fish passage improvements. Final fish telemetry results from the study are expected in 2020/2021.

Threats Assessment: Pawcatuck River

Barriers to Migration

Description:
Each of the three lowermost dams on the Pawcatuck River had a bypass system (breached canal and fish ladders) to provide fish passage for diadromous fish species including river herring and American shad. However, at each of these dams were known and documented problems with the bypass systems that could impact fish passage efficiency. The State of Rhode Island Department of Environmental Management, Division of Fish and Wildlife partnered and requested that the US Army Corps of Engineers (ACOE) provide planning assistance (Section 22 of the Water Resources Development Act of 1974) to determine the fish passage efficiency for species of diadromous fish at the three dam sites located on the lower Pawcatuck River in 2013. The study produced a detailed report that identified and documented the current conditions at each of the sites and determined the impact these conditions had on fish passage. Recommendations and preliminary plans for improving fish passage efficiency at each site were included in the report.

Action 1) White Rock Dam Removal

Description of Work: The study evaluated the White Rock Dam by-pass channel, which previously allowed for fish passage but had water flows at the existing dam which may have attracted anadromous fish towards a dead-end channel. The report revealed that even at adequate flows, the by-pass was inefficient at passing anadromous fish, and partners worked to remove the dam and restore the original river channel utilizing USFWS Sandy Resiliency Funds and other sources.

Agencies: Feasibility study by RIDEM, ACOE, TNC and WPWA.
Dam Removal-The Nature Conservancy (TNC) and USFWS, RIDEM, CTDEEP, WPWA, USACOE, CRMC, Griswold Textile, Fuss and O'Neil, Sumco and others.

Timeline/Progress: Report completion date 2013. Dam removal completed Fall 2015.

Action 2) Potter Hill Fishway Improvements

Description of Work: The feasibility study determined the fish passage efficiency of the 1970's constructed Potter Hill Denil fishway with current dam and false attraction flow conditions was poor. RIDEM and partners changed the baffles to decrease water velocities and improved the entrance channel utilizing a long-armed excavator.

Agencies: TNC, USFWS, RIDEM, US ACOE, TNC, WPWA and others.

Timeline/Progress: Completed October 2016

Action 3) Bradford Dam Rock Ramp Fishway

Description of Work: The feasibility study determined the fish passage efficiency of the 1970's Denil fishway with new modifications and current dam conditions was poor with numerous false attraction flow conditions. Recent modifications were made to the Bradford fishway to enhance American shad passage. Modifications included an extended fishway entrance and a decrease in the slope at the lower fishway section in 2008. The study determined the fishway was still inefficient to migratory fish and the best option was a rock ramp fishway funded by USFWS Sandy Resiliency Funds and other sources. The rock ramp fishway features a series of pools, constructed of natural stone weirs to facilitate fish passage.

Agencies: Feasibility study by RIDEM, ACOE, TNC and WPWA. Fishway modifications in 2008 by numerous partners. Rock Ramp in 2018 -TNC and USFWS, RIDEM, CTDEEP, WPWA, USACOE, CRMC, Bradford Dye, Fuss and O'Neil, Sumco and others.

Timeline/Progress: First fishway modifications completed 2008, Report 2013, Rock Ramp March 2018.

Action 4) Lower Shannock Falls Dam Removal

Description of Work: There has been a substantial effort to improve fish passage at dams located upstream of the three dams described above that are on the lower portion of the Pawcatuck River. This three phase upper Pawcatuck River fish passage restoration project was awarded a multi-million dollar NOAA American Recovery and Reinvestment Act grant due to its high level of restoration priority. The first of the three-phase project was the removal of the Lower Shannock Falls which included the installation of rock weirs and bank stabilization.

Agencies: Wood Pawcatuck Watershed Association (WPWA)-lead, NOAA, RIDEM, CRMC, USFWS, and many others project partners and funding sources.

Timeline/Progress: Completed, Fall 2010

Action 5) Horseshoe Falls Dam Denil Fishway

Description of Work: Construction of a new Denil fishway, juvenile bypass chute and self-regulating eel ramp.

Agencies: Wood Pawcatuck Watershed Association (WPWA)-lead, NOAA, RIDEM, CRMC, USFWS, and many others project partners and funding sources.

Timeline/Progress: Completed Fall 2012, RIDEM/Fish and Wildlife is currently operating and maintaining the Denil fishway and eel ramp.

6) Kenyon Mill Dam Rock Ramp Fishway

Description of Work: Removal of existing dam and installation of a new rock ramp fishway. The rock ramp fishway features a series of pools, constructed of natural stone weirs to facilitate fish passage.

Agencies: Wood Pawcatuck Watershed Association (WPWA)-lead, NOAA, RIDEM, CRMC, USFWS, Kenyon Mill Industries and many others project partners and funding sources.

Timeline/Progress: Completed March 2014.

Water Quality

Water Quality Restoration Program: RIDEM/Office of Water Resources administers the federal Clean Water Act program that undertakes studies and develops plans for restoring water quality known as "TMDLs". In collaboration with the State of Connecticut, RIDEM is undertaking a water quality study of the Pawcatuck River watershed to provide the technical basis for potential future actions to reduce nutrient pollutant to the downstream estuary. A previous TMDL for this watershed focused on bacterial pollution. http://www.dem.ri.gov/programs/water/quality/restoration-studies/ In the Pawtuxet River, implementation of a plan to upgrade wastewater treatment facilities to reduce nutrient pollutant loadings resulted in improved dissolved oxygen conditions in the Pawtuxet River that restored compliance with state water quality criteria (2008).

Water Quality Protection Programs: RIDEM/Office of Water Resources administers federal and state authorized programs which support a variety of actions to protect water quality and aquatic habitats. Programs include financial support for stormwater mitigation projects and other non-point pollution water quality protection actions including restoration of riparian buffers and stream connectivity as well as water quality monitoring and assessment, watershed planning and technical assistance activities.

Project Permit/Licensing Review Program: RIDEM/Office of Water Resources administers the federally delegated program for management of the point source discharge of pollutants (Rhode Island Pollutant Discharge Elimination System – RIPDES). This program encompasses sanitary, industrial and thermal discharges as well as stormwater runoff. http://www.dem.ri.gov/programs/water/permits/ripdes/ Additional RIDEM/OWR permitting programs also regulate and provide for the review of proposed water withdrawals and other hydromodifications, dredging projects, most land use development as well as other activities that would alter freshwater wetlands. http://www.dem.ri.gov/programs/water/permits/

Restoration Programs

RIDEM has partnered with the USFWS North Attleboro Fish Hatchery with the American shad fry stocking program. Each spring adults from the Connecticut River are delivered to the hatchery where they are allowed to naturally tank spawn. The fry are released throughout the summer into the upper reaches of the Pawcatuck River. The adult shad broodstock are allocated annually to RIDEM from the Connecticut River via CRASC approval

In the past, the state of Rhode Island has informally adopted a recovery target of 5,000 spawning adults, the restoration level recommended by Richard St. Pierre from the USFWS. Estimates for American shad carrying capacity per acre, were calculated from the models developed by St. Pierre, 1979; Hightower and Wong, 1997; and Weaver et al., 2003. These numbers are generally regarded as the benchmark for American shad restoration. The calculated target levels are greater than the past estimates of American shad observed at the Potter Hill fishway trap in any given year (1985-4,219 highest total).

Monitoring

Since 1979, American shad monitoring at the Potter Hill fishway trap in Ashaway, R.I is conducted using the standardized protocol described by O'Brien (1986). The trap located at the upstream end of the ladder is checked daily from late-March to July 1st. Data on the number of shad captured in the fishway trap, water temperature and water level are recorded daily. In addition, since 1986, weekly seining for juvenile shad and river herring is conducted in the lower Pawcatuck River from August to November. The five standard seine stations are sampled using the protocol established by O'Brien (1986). Juveniles of all anadromous species are enumerated, and lengths are measured. Presence and number of individuals of other species are also noted. Bottom water temperature, salinity and dissolved oxygen are measured.

Adult shad spawning stock size (SSS) and juvenile abundance indices (JAI's) are used as a guideline and metric to determine if the shad run on the Pawcatuck River is self-sustaining and restored. Target goals and baselines will be selected utilizing three year running averages and percentiles by RIDEM and partners following multiple years of increased SSS at the trap and seine survey JAI's. Since 2003, the SSS has been low.

Each year a sub-sample of adult shad are sampled at the fishway trap and growth, age, mortality, and percent of repeat spawner data is estimated to fulfil USFWS federal aid and ASMFC compliance requirements. American shad have been monitored since 1979 on the Pawcatuck River and numerous reports provide biological characteristic time series (Edwards, 1999, 2007. McGee, 2019).

Recommended Action(s)

- Explore passage improvements. Partners are currently working on improvement options at Potter Hill Dam and the Cronan gauge station.
- Continue Working with the USFWS and CRASC to stock American Shad fry into the Pawcatuck River.
- Collect genetic samples to identify origin of stock (hatchery reared).
- Continue monitoring via SSS counts and annual JAI surveys.

I. Habitat Assessment: Pawtuxet River

In 2011, the partial dam removal was completed at the Pawtuxet Falls Dam. The project included many partners including the Pawtuxet River Authority (PRA), NRCS, USFWS, NOAA, RIDEM, CRMC, Narragansett Bay Estuary Program (NBEP), Save the Bay, American Rivers, and many others. After an alternative analysis and review the partial dam removal option was considered the best alternative for American shad and river herring. Anadromous fish have access to over 7 miles of main stem river to the Pontiac Dam. The third obstruction is the Natick Pond dam. Feasibility for fish passage at both sites is at the preliminary stages. Since the dam being removed in 2011, RIFW has stocked adult broodstock river herring and has partnered with the USFWS North Attleboro Fish Hatchery to introduce American shad fry. Both stocking programs are planned to continue into the future.

Threats Assessment: Pawtuxet River

Barriers to Migration

Description:
In its *2002 Strategic Plan for the Restoration of Anadromous Fishes to Rhode Island's Coastal Streams* (Erkan 2002), the Rhode Island Department of Environmental Management (RIDEM) recognized the potential for significant expansion of river herring and American shad habitat by restoring fish passage to the mainstem Pawtuxet River. The plan identifies the first dam in Pawtuxet Village as an obstruction to migratory fish and with the removal opened over 7 miles of riverine habitat. Preliminary discussions have occurred for fish passage on the second obstruction, Pontiac Mills, which would open an additional 3 miles. Currently the 2002 plan is scheduled to be updated in 2020/2021. In addition, since 2001, RIDEM/Fish and Wildlife prepares an annual priority list of fish passage projects for river systems throughout the state. Since the inception, the Pawtuxet River fish passage projects have been a high priority (Edwards 2019).

Action 1) Partial dam removal at Pawtuxet Falls

Description of Work:
Partial dam removal at Pawtuxet Falls with a low channel slot to enhance migration during low water flows.

Agencies: NBEP, RIDEM, NRCS, NOAA, CRMC, PRA, Save the Bay, USFWS, American Rivers and many others.

Timeline/Progress: Completed during the Fall of 2011.

Water Quality

Water Quality Restoration Program: RIDEM/Office of Water Resources administers the federal Clean Water Act program that undertakes studies and develops plans for restoring water quality known as "TMDLs". In collaboration with the State of Connecticut, RIDEM has undertaken a water quality study of the Pawcatuck River watershed to provide the technical basis for potential future actions to reduce nutrient pollutant to the downstream estuary. A previous TMDL for this watershed focused on bacterial pollution. http://www.dem.ri.gov/programs/water/quality/restoration-studies/ In the Pawtuxet River, implementation of a plan to upgrade wastewater treatment facilities to reduce nutrient pollutant loadings resulted in improved dissolved oxygen conditions in the Pawtuxet River that restored compliance with state water quality criteria.

Water Quality Protection Programs: RIDEM/Office of Water Resources administers federal and state authorized programs which support a variety of actions to protect water quality and aquatic habitats. Programs include financial support for stormwater mitigation projects and other non-point pollution water quality protection actions including restoration of riparian buffers and stream connectivity as well as water quality monitoring and assessment, watershed planning and technical assistance activities.

Project Permit/Licensing Review Program: RIDEM/Office of Water Resources administers the federally delegated program for management of the point source discharge of pollutants (Rhode Island Pollutant Discharge Elimination System – RIPDES). This program encompasses sanitary, industrial and thermal discharges as well as stormwater runoff. http://www.dem.ri.gov/programs/water/permits/ripdes/ Additional RIDEM/OWR permitting programs also regulate and provide for the review of proposed water withdrawals and other hydromodifications, dredging projects, most land use development as well as other activities that would alter freshwater wetlands. http://www.dem.ri.gov/programs/water/permits/

Restoration Programs

RIDEM has partnered with the USFWS North Attleboro Fish Hatchery with the American shad fry stocking program. Each spring adults from the Connecticut River are delivered to the hatchery where they are allowed to naturally tank spawn. The fry are released throughout the summer into the upper reaches of the Pawtuxet River. The adult shad broodstock are allocated annually to RIDEM from the Connecticut River via CRASC approval.

Monitoring

Compared to the Pawcatuck River, the lower Pawtuxet River is a challenging system to monitor anadromous fish due to site access, lack of traditional fishways, and absence of past time series.

During the construction of the partial dam removal a maintenance and emergency access ramp was built and left in place allowing RIDEM to monitor the presence and absence of juvenile anadromous fish utilizing boat electrofishing techniques. Electrofishing surveys for adults in the spring and juveniles in the fall were conducted with success, as juvenile shad were sampled in the fall showing fry survived the summer months following stocking. Currently the new RIFW electrofishing boat cannot be launched from the ramp due to its size, erosion issues at the launch, and previous materials used at the launch. Repairs with required permits are planned for the ramp and in the future RIFW will conduct spring and fall electrofishing surveys for both adults and juveniles. RIDEM recently purchased a Smith Root SR-7 tote barge equipped with a 2.5 GPP electrofishing system. This equipment will be used to complete a spring adult shad survey and a fall juvenile abundance survey in order to initiate a monitoring time series in the Pawtuxet River. In combination with RIDEM Smith Root electrofishing boat equipped with a 7.5 GPP electrofishing at river locations where wading is not possible. Using a combination of the two types of equipment, RIDEM Fish and Wildlife will be able to adequately survey the Pawtuxet River and collect data on shad returns and reproductive success.

Adult shad CPUE and juvenile JAI's will be used as a guideline to determine if the shad run on the Pawtuxet River is self-sustaining and restored. Target goals and baselines will be selected by RIDEM and partners following a few years of monitoring spawning stock size CPUE and juvenile abundance indices via electrofishing techniques.

Recommended Action(s)

- Explore options for future passage installations and improvements.
- Fish passage options at the Pontiac Dam are being reviewed by partners, while passage options at the Natick Dam, and Pocassett tributary are also being explored.
- Continue Working with the USFWS and CRASC to stock American Shad fry into the Pawtuxet River.
- Address access issues in order to resume electrofishing surveys, including adult monitoring and JAI's.

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Figure 1: Location of the Pawcatuck River Fish Passage Restoration Sites.

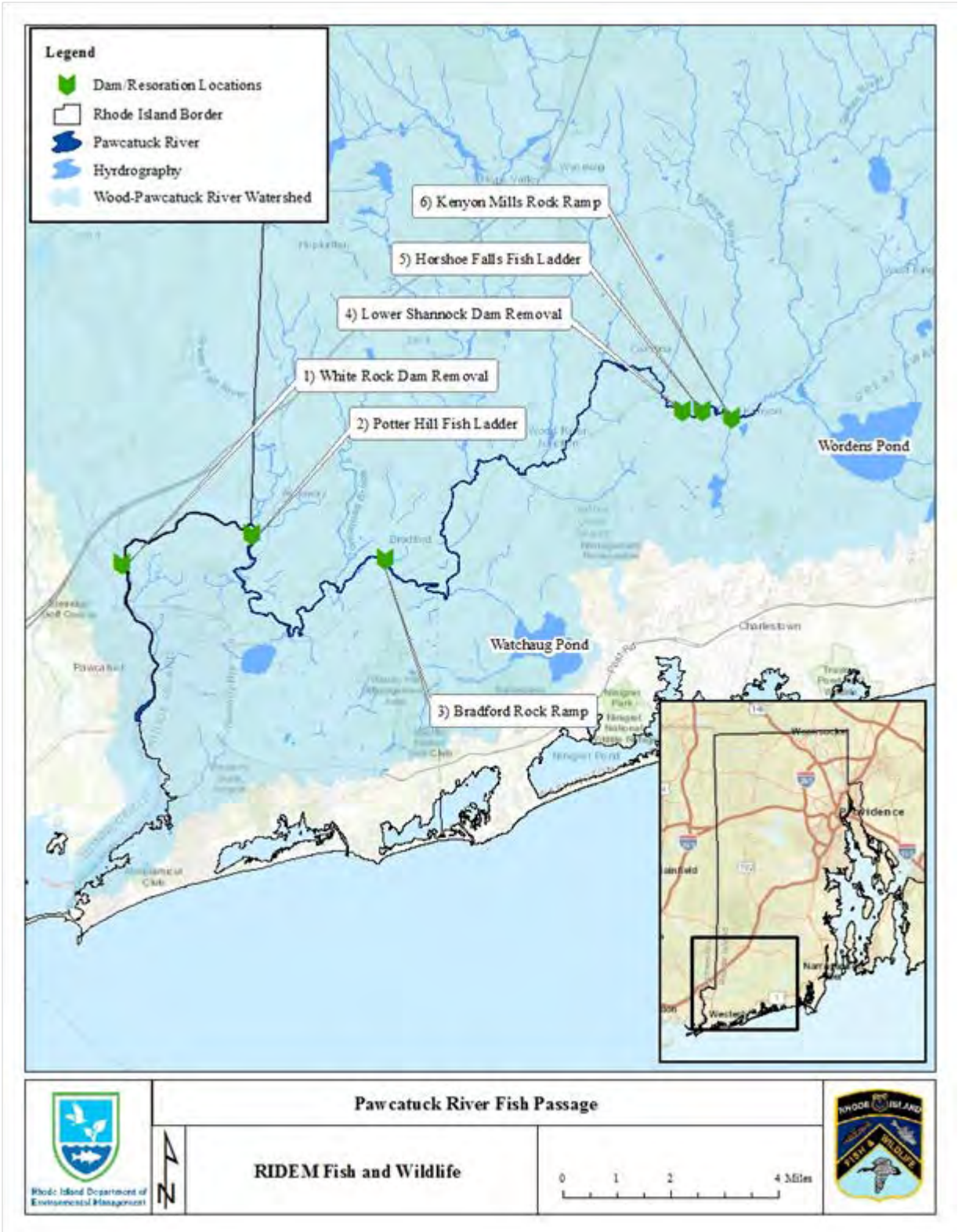
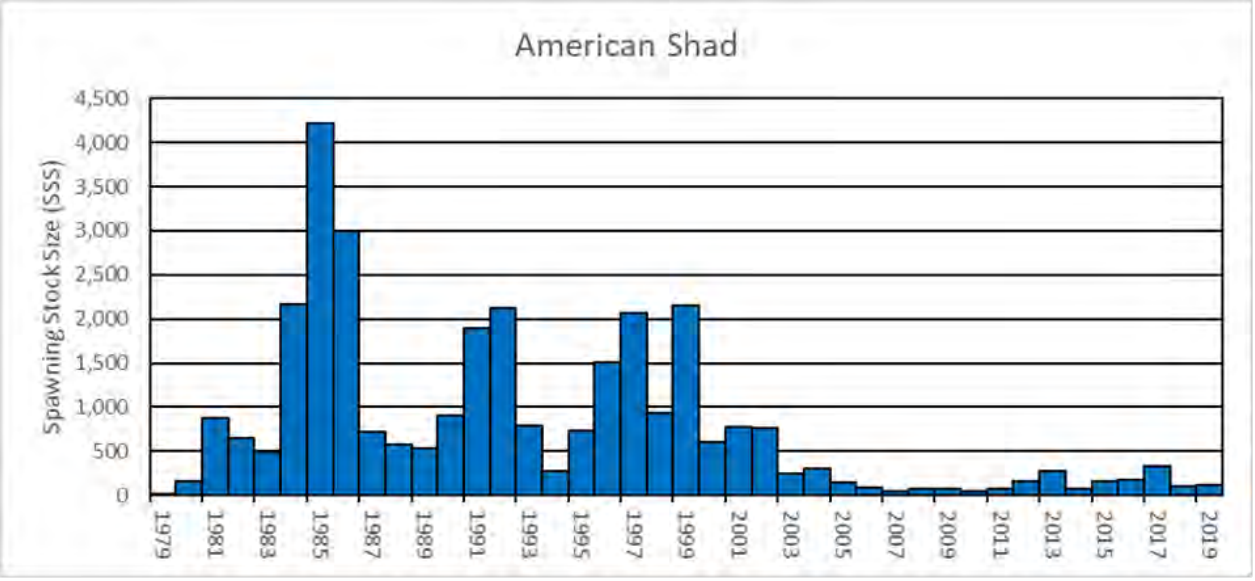


Figure 2: American shad spawning stock size from the Pawcatuck River.



Fishway Trap Counts Pawcatuck River				
Year	A. shad		Year	A. shad
1980	165		2000	608
1981	882		2001	774
1982	644		2002	768
1983	491		2003	243
1984	2,163		2004	301
1985	4,219		2005	151
1986	3,000		2006	92
1987	724		2007	44
1988	580		2008	70
1989	533		2009	69
1990	904		2010	44
1991	1,900		2011	78
1992	2,119		2012	156
1993	797		2013	279
1994	270		2014	72
1995	740		2015	159
1996	1,508		2016	169
1997	2,061		2017	331
1998	936		2018	103
1999	2,149		2019	115

Figure 3: Location of the Pawtuxet River Restoration Sites.

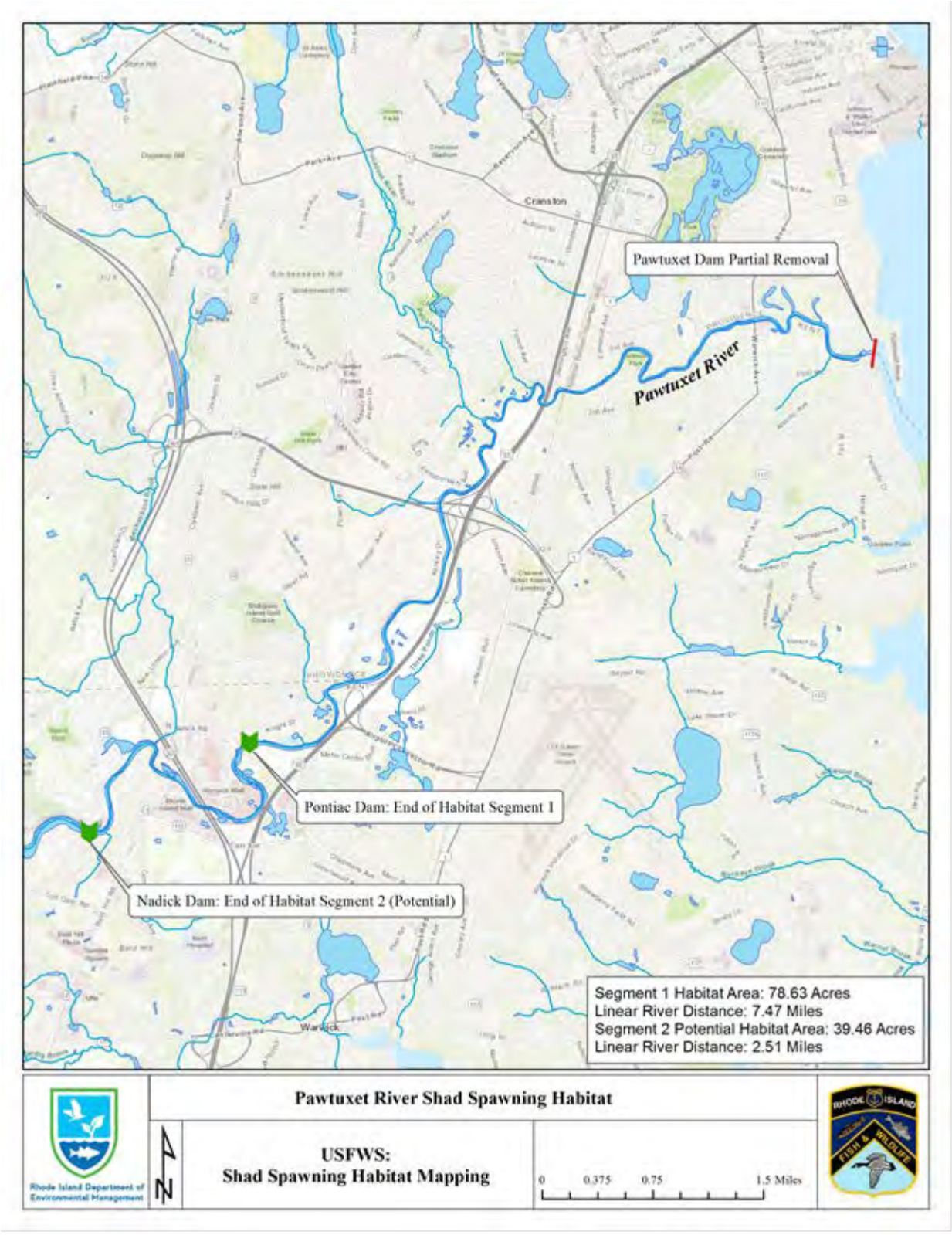


Table 1: Pawcatuck River segments and associated river miles.

Restoration Segments	**Segment ID**	**Distance (Miles)**
Route 1 (Westerly) to former White Rock Dam	1	2.26
Former White Rock Dam to Potter Hill Fish Ladder	2	3.34
Potter Hill Fish Ladder to Bradford Fish Ladder	3	7.12
Bradford Fish Ladder to former Lower Shannock Dam	4	12.02
Former Lower Shannock Dam to Horseshoe Falls Fish Ladder	5	0.48
Horseshoe Falls Fish Ladder to former Kenyon Mills Dam	6	0.87
Former Kenyon Mills Dam to Biscuit City Rd	7	0.73

Table 2: Pawcatuck River segments and associated river miles.

Habitat Segment	**Segment ID**	**Linear Distance (Miles)**	**Habitat (Acres)**
Mouth to Pontiac Dam	1	7.47	78.63
Pontiac Dam to Natick Dam (Potential)	2	2.51	39.46

State of Connecticut
American Shad Habitat Plan

Connecticut Department of Energy and Environmental Protection
Fisheries Division
Old Lyme, CT

April 2021

Introduction

The Atlantic States Marine Fisheries Commission (ASMFC) Amendment 3 to the Interstate Fishery Management Plan for American Shad requires all states to submit a Habitat Plan as part of their implementation plans, which also includes an approved Sustainable Fishing Management Plan (SFMP) for American Shad. The State of Connecticut submitted an initial Habitat plan that was approved in August of 2013. This document serves as an update to the 2013 plan. This update includes three sections: (1) Habitat Assessment, (2) Threats Assessment, and (3) Habitat Restoration Program. The Plan covers rivers and large streams in Connecticut that are known or suspected to have had American Shad runs. It is possible that some additional smaller rivers may have had American Shad, but historical documentation is lacking. There is no way to know if these small systems could historically have supported shad production or were benefactors of abundant adult shad from other nearby systems straying into these areas.

1) Habitat Assessment-Assess the habitat (historic and currently available) and impediments to full utilization of the habitat.

Spawning & Rearing Habitat

Connecticut has a variety of sources of information on aquatic habitat including: historical accounts, watershed management plans, maps, present-day fish survey data, and staff knowledge of the rivers and features (e.g. falls, dams, human infrastructure), that were reviewed to identify downstream and upstream endpoints to historic and present-day shad runs and spawning and nursery habitat. The length of these stream reaches were measured using GIS. Habitat categories were assigned broadly without any effort to identify and quantify small river stretches (e.g. 300 m plots). Moreover, there can be considerable overlap with shad spawning and rearing habitat but such overlap was not considered. All river stretches were categorized as either spawning or rearing habitat from an empirical standpoint. No physical studies were conducted to definitively characterize areas.

The determination of the geographic extent of historical shad runs in Connecticut rivers comes from knowledge of natural waterfalls that would have blocked runs, topographical features or abrupt changes in river gradient that would have impeded shad migrations . It is difficult to determine what kind of habitat (i.e. spawning, rearing, or neither) existed historically in some river stretches that are now inundated by the headponds of dams and have otherwise been

dramatically altered over the last centuries of human occupation and alterations. It was speculated that most of these impounded river stretches are currently categorized as rearing habitat. These stretches are also categorized as historic rearing habitat, although this assumption may not be accurate. Since most of the remaining large dams are not likely to be removed, when shad runs are given access to these areas, these impounded reaches provide some rearing habitat to the species, albeit with much changed criteria. Quantifying historic status of those systems where future changes are not likely, are irrelevant and not considered further.

The results of the spawning and rearing habitat calculations are summarized in Table 2 for those systems worth consideration. Historically, American Shad had access to 589 km of riverine habitat in Connecticut. Currently, the species has access to 359 km. For spawning habitat, the historical habitat is estimated to have included 244 km, while currently there are 141 km. For rearing habitat, the historical habitat is estimated to have included 384 km, while currently there are 262 km.

2) Threats Assessment-Inventory and assess the critical threats to habitat quality, quantity, access, and utilization.

a. Barriers to migration inventory and assessment-

i. *Inventory of dams*

Dams and other structures are known to block shad migrations and limit the amount of accessible habitat. In almost all these cases, dam construction preceded any kind of meaningful quantification of fish abundance and no new dams have been constructed within the last 50 years.

The New England District of the US Army Corps of Engineers (USACE) operates flood risk management dams for the entire CT River watershed that are located on the tributaries. Quarterly update reports are published for each of the six New England states, including Connecticut. The CTDEEP Bureau of Water Protection and Land Reuse's Water Planning & Management Division, maintains a computerized inventory of dams in Connecticut. There are over 4,000 dams in Connecticut and all of the rivers that supported historic shad runs have had one or more dams built on them. In those cases where the lowermost dams are close to saltwater, shad populations unique to those systems were eradicated. It may not be possible to restore shad runs to all of these systems or prove conclusively that these systems historically had self-sustaining runs. Some observed shad “runs” in smaller streams may have been a result of increased straying when abundance was high in larger, neighboring systems. In recent years it has been the policy of the CTDEEP that for restoring anadromous fish runs, dam removal is the most effective means to restore systems to a natural state. Shad are notoriously difficult to pass up fishways (Gephard and McMenemy 2004) and when a dam is removed, the need for a fishway is avoided. Even with functional fishways in these systems, threats to shad remain. First, there are inevitable issues associated with fishways: locating, ascending, fatigue while

ascending, obstructions caused by debris in the fishway, or flow rates above or below the prescribed range of flows for the fishway design (Haro & Castro-Santos 2012). With rivers with multiple dams, delays could be additive, resulting in hours to weeks of lost migratory time. Some fishways may cause significant injuries and result in mortality, thus reducing the true number of spawning fish. There are also significant threats to shad during the downstream migration. Spent adults may not have access to, be able to find, or use downstream passageways, resulting in injury or death and thus reducing the repeat spawning segment of the population. Fish not using downstream passage devices, or if there are none, have to utilize the spillway or turbine passage and may suffer injury or mortality. Repeat spawners are among the most valuable components of the spawning run as they are generally older, larger fish that produce both higher number and better quality of eggs.

The CTDEEP has worked with The Nature Conservancy and the Northeast Association of Fish and Wildlife Administrators on the Northeast Aquatic Connectivity Project (Martin and Apse 2011) to inventory and analyze Connecticut dams for their impact on connectivity to anadromous fish habitat. These databases are available, but are not included herein. They have been assessed to estimate their potential impact on shad runs. The results of that assessment lists dams that block shad runs and impact CTDEEP plans to restore shad runs (Table 3).

ii. *Inventory of other human-induced physical structures*

It is recognized that things other than dams can create migratory barriers to shad. No inventory of alternative barriers is provided because there are no known impassable culverts in Connecticut that block shad migrations. Culverts are a concern for fragmenting habitat for some anadromous and freshwater resident species. In general, these impassable culverts are more common in headwater streams and smaller rivers, well upstream of the range of American Shad, which tends to stay in larger rivers.

iii. *Inventory of altered water quality and quantity*

Historically, rivers and streams throughout New England were known to have greatly degraded water quality (Mullaney 2004). Hypoxia of water bodies was a concern during the era of heavy industrialization and pollution. Rivers or stretches of rivers containing degraded water quality may have served as temporary impediments or actually blocked shad migration. The Connecticut River, once famously referred to as America's "best landscaped sewer," has a long history of poor water quality due to heavy industrial expansion of textiles, heavy metal processing, logging and sewage (Mullaney 2004; Mullens and Bristow 2003). Water quality issues, discussed in subsequent sections, can include: low dissolved oxygen, low flow rates, and plumes of toxic or heated effluent. CT DEEP has developed regulations and has completed classifications for stream flow throughout the state.

The CT DEEP Long Island Sound Trawl Survey compared catches of marine species in the Narrows portion of Western Long Island Sound with levels of Dissolved oxygen (DO). American shad were not observed at sites where DO was below 2mg/L (Howell and Simpson 1994).

Connecticut has been progressive in the development of water quality management following some the dismal times of heavily polluted waters. An example is the development of Connecticut's Clean Water Act (1967), which was 5 years ahead of the Federal Clean Water Act of 1972.

The impetus for modern day American Shad studies by the CT DEEP is the continuation of efforts from a legislative demand to study the effects of heated water from a Nuclear Power Plant (Merriman and Thorpe 2004). The initial concern was that the plume of heated water, which could stretch across the river could impede and or block the annual shad spawning run. This was found not to be the case.

Modern day pollutants are also known to include a wide variety of subtances: road salts, microplastics, and pharmaceuticals. Pharmaceuticals may act as hormone and endocrine disruptors (Lara-Martín et al. 2014) that could impact and or preclude normal spawning or successful recruitment of future year classes. These potentially limiting factors, and other 'modern' concerns including nuisance aquatic species, and climate change and their potential impacts on shad stocks have not yet been adequately addressed, but need to be considered when considering the additional time, effort and money to be spent on shad restoration efforts.

iv. *Assess barriers to migration in the watershed*

Impingment/entrainment at dams- In addition to creating delays to the downstream migration, downstream migrants may be drawn into industrial intakes or impinged and killed. One issue is the turbine intake for hydroelectric projects which may have the strongest water flows at the dam. Turbines will kill the majority of adult shad that attempt to pass downstream through this system. Turbine mortality of young-of-year shad is more variable, but could potentially be significant in some systems. Other types of intakes include: pumped storage projects, irrigation, cooling water systems, and drinking water intakes. Most life stages, particularly smaller younger life stages like larval fish drawn into these intakes experience 100% mortality, and these impacts can be significant.

b. <u>Water withdrawals inventory and assessment</u>

In addition to potentially injuring or killing migrants by damaging the fish or drawing them into industrial filters and processes, water withdrawals can also impact migrations or access to spawning habitat, by reducing the available stream flow in the river. Withdrawals from a large river like the Connecticut are relatively minor when compared to overall river flow, and are thought to have minimal impacts in modern times. Withdrawals from small to medium sized rivers can be substantial and may drastically reduce the available water during the summer rearing period. Permitted water withdrawls from the Quinnipiac River combined with drought conditions dried up several streams during the summer of 1999 (Ahearn 2000). Water reduction in these smaller systems can also result in the rapid warming of the remaining river water.

The CT DEEP Water Diversion Program regulates activities that change water flow from any water bodies throughout the state. The Water Diversion Policy Act is codified in the both the CT General Statutes and within the Regulations of Connecticut State Agencies. Water diversions are identified and mapped by regions (East, Central, and West) in the state and can be found on the CT DEEP website.

c. Toxic and thermal discharges

While historically a substantial issue, since the passage of the clean water act, these types of discharges have not been permitted into CT waters. All discharges into Connecticut waters are carefully regulated by the CTDEEP. There may be episodic events, such as the 2019 accidental release of tens of thousands of gallons of PFAS chemicals into the Farmington River during a fire emergency at Bradley International Airport in June of 2019 (Hartford Courant 2019) or from other accidents, but these are not scheduled events and can not be prevented.

The Long Island Sound Study Comprehensive Conservation and Management Plan (LISS CCMP 2015) discusses the inventory of natural and man-made toxic substances in LIS. Overall, the quality of LIS waters is good with respect to toxic substances. Contributions of toxic substances in LIS can often originate from the major rivers. One of the documented substances of concern is PCBs, which is discussed in the atmospheric deposition section of the document. Sewage treatment plants are likely the second largest source of toxic substances.

Both the Connecticut and Quinebaug are examples of rivers that receive thermal discharges. Past research has determined that these discharges were not shown to have a negative impact on American shad. The CT DEEP Water Monitoring Group's Healthy Waters Initiative monitors water termperatures at wadeable river and streams throughout Connecticut. The state of Connecticut reviews municipal and industrial discharge permits to reduce the amounts of toxic pollutants to continue reductions of toxic materials in the waters. The USGS has gaging stations throughout CT that monitor streamflow and water quality parameters.

d. Channelization and dredging

The US Army Corps of Engineers of New England District oversees Connecticut Navigation projects. Channelization, stream straightening, burying sections of streams, and other projects that alter the morphology of streams are rarely proposed in Connecticut anymore and such activities are strictly regulated. The Fisheries Division has ample opportunity to comment on permit applications and would recommend denial of any permits that would adversely impact diadromous species, including American Shad.

The Port in New Haven Harbor (NHH) is the largest port in Connecticut and includes the mouth of the Quinnipiac River. Estimates of freight traffic in 2016 rank it as 24 percent of commerce by water in New England and 81 percent of commerce by water in Connecticut (USACOE 2021). The main channel is maintained at a depth of 35-40 deep to accommodate navigation.

Because of inefficiencies in large vessels transiting the harbor, USACOE is considering navigation improvements. The Environmental Impact Statements have been finalized for Essential fish habitat assessments for NHH.

e. Land use inventory and assessment

Connecticut has a long history of agricultural use that resulted in large amounts of deforestation through the 1850s (Yearsley et al. 2019). The soil of the Connecticut River floodplain was idea for agriculture. In the 20th century, much of the agricultural land has been converted to urban/sububrban land cover and forest. Information on Connecticut's geospatial data on on land use, including impervious surfaces, is available within CT DEEP GIS open data website.

The University of Connecticut (UCONN) Center for Land Use Education & Research (CLEAR) Connecticut's Changing Landscape Project (CCLP), analyzed changes to the state's landscape spanning 30 years of data from 1985-2015. During this timeframe, nearly 5 percent of state land was converted to development, with losses to forest and agricultural land. Analyses of land cover classifcications includes agricultural areas, riparian corridors, core forest and water shed imperviousness. There is public map viewer available that was designed to be useful for state and local governments (Arnold et al. 2020). In Connecticut, land use decision making occurs primarily at the municipal level. Connecticut has 169 municipal entities, each with its own land use plan and regulations.

Analysis of riparian areas analysis aids in the understanding and identification of streambank stabilization and sediment trapping. Since 1972, Connecticut implemented state legislation through the Inlands Wetlands and Watercourses Act. The law outlines the regulatory process to require municipal regulation and review of activities that affect inland riparian and wetland areas for environmental impacts

Connecticut is fortunate in that there still remains a high proportion of forested land in the state. Forest is the largest land cover class in Connecticut, followed by developed land, turf and grass and agricultural fields. The data analysis from the CCLP shows that, over the 30 years from 1985 to 2015, forest and farmland are being replaced by development. Analysis of impervious cover modelling for over 7,000 watersheds in CT shows an increase that is greater than 10%. Watersheds in western portions of the state have the highest percentages of impervious land cover. Much of the Quinnipiac, Housatonic and Thames Rivers have more than 25% of impervious land cover (Arnold et al. 2020).

While Connecticut has strong environmental laws, there are challenges with documenting and mitigating land use because regulations are decentralized. From 1985–2015, the state's population increased by about 12% (from 3.20 million to 3.59 million), while development increased by about 21%. Related to the health of the state's water resources are the estimates of watershed impervious cover that was generated from the CCLP land cover model. For the growth of the developed land category, the 30-year timespan shows that impervious cover at

the small watershed scale continues to increase. This has resulted in 1,907 basin level watersheds reaching impervious levels of over 10%, a level widely considered to be harmful to water quality (Bellucci et al.2013). Reducing the amount and impact of impervious cover is a major focus of the state's newly enhanced General Stormwater Permit, a program of the federal Clean Water Act .

f. Atmospheric deposition assessment

There are documented impacts of atmospheric deposition, including the western portion of Connecctcut, where nitrogen pollution occurs from New York city to Long Island Sound. As a result, western LIS has been impacted by low dissolved oxygen levels, fish kills and algal blooms. Through efforts to protect LIS, human generated nitrogen pollution has been reduced over the last several decades. Mercury has also been documented as a large source of contamination to waters in Western CT along with sulfur and other trace metals (LISS 2015).

The Housatonic River has historically been and remains heavily contaminated with PCBs that orginated from the GE facility in Pittlfield MA. PCBs are present in large quantities in river sediment and floodplain soil with estimates range from between 100,000 to nearly 600,000 pounds (EPA 2020). The PCBs in sediment moves over dams and travels downstream into Connecticut. The PCBs are persistent in the environment and resistant to biodegradation. As a result, the rate of natural degradation of the type of PCBs in the Housatonic River is very slow. Without cleanup, it would take decades or possibly hundreds of years, before PCB concentrations would decrease. PCBs have been measured at very high concentrations in biota in the Housatonic River watershed, resulting in consumption advisories for fish in CT. The EPA negotiated a settlement agreement cleanup plan that includes Connecticut. Cleanup efforts have been underway and long term monitoring continues at several locations.

One of CT DEEP's management strategies to reduce nitrogen loading was to implement a trading program among the Water Pollution Control Facilities (WPCFs) throughout the state that are regulated under a general permit for Nitrogen discharge. When the state was out of compliance with TMDL allocations, 45 towns were required to purchase credits to remain in compliance. High water events and cold weather affect operations of WPCFs which contributes to increased levels of nitrogen being discharged. Revenue funds are expended towards nitrogen removal projects (CT DEEP 2018).

g. Climate change

Climate change impacts may have already resulted in faunal changes in distribution and abundance, but these changes have not yet been well quantified or analyzed in Connecticut rivers. The CT DEEP Long Island Sound Trawl Survey data was analyzed for changes in fish assemblage shifts as a result of changing water temperatures. Analyses of seasonal catches of cold-adapted marine species were negatively correlated with increasing bottom temperatures while warm-adapted species exhibited a positive correlation (Howell and Auster 2012).

Warming waters could modify the onset and duration of the American Shad spawning season, potentially greatly truncating it or causing a shift between the critical first feeding period and the availability of desired prey items. Shad stocks persist along a large latitudinal gradient, so it's unclear how warming trends will affect natal stocks on a coastwide basis. The rate of post-spawning mortality, and subsequently repeat spawning rate (iteroparity), is known to have a clinal trend. Dramatic declines in repeat spawning rates that have already been noted such that the annual spawning population are less robust and dependent upon fewer yearclasses in the run. This puts the stock at greater risk of spawning failure from one or more poor yearclasses. Additional climate change impacts could result in a further altered population structure, reduction in total annual egg deposition, and subsequent decline in run size or complete loss of the stock of American Shad in this system.

The River Sub-working group to Connecticut's Governor's Council on Climate Change (GC3) has identified important Climate challenges including: disruption to connectivity, shifts in geographic ranges of species, warming water temperatures, changes in flow regimes and precipitation patterns, increased frequency and intensity of heavy precipitation, runoff, and peak streamflow, increased frequency and intensity of droughts and flooding, disturbances to the geomorphic stability of rivers through the disruption of natural sediment processes, impacts to the migration of fish and wildlife species, sea level rise combined with increased frequency and intensity of storm surges and hurricanes.

h. <u>Competition and predation by invasive and managed species</u>

There are many non-native fish species in Connecticut, including non-native predators in the Connecticut River where there is a strong sustained shad run. While these species may cause some diminishment in numbers of shad, the impacts have not been quantified and the role of competition and predation in the context of human-induced impacts is unclear. Opportunities to study competition and predation by invasive and managed species or to extirpate non-native species is extremely limited. Past research using empirical monitoring and diet studies has determined that native species (e.g. striped bass) can have substantial predation impacts on adult alosine stocks (Davis et al. 2012; Savoy and Crecco 2004). Therefore, it would be reasonable to assume that there are additional predation impacts on shad stocks in Connecticut, particularly at the juvenile stage.

3) Habitat Restoration Program

For threats deemed to be of critical importance to the restoration of American Shad, each state should develop a program of actions to improve, enhance, and /or restore habitat quality and quantity, habitat access, habitat utilization and migration pathways.

The geographic scope of Connecticut's American Shad restoration efforts is summarized in Table 4, which lists the rivers, the targeted habitat and quantifies projected spawning and nursery habitat by river. This updated plan also reports on the progress made toward the CTDEEP's goals for habitat connectivity since the plan was first written in 2013.

Currently, shad have access to 383.8 km of habitat (2013= 360 km). The CTDEEP plan for restoration seeks to reconnect habitat and increase that to 610 km of habitat. The amount of historic habitat is estimated to have been 641.8 km.

The CTDEEP is pursuing the restoration of shad runs in a number of Connecticut streams. The Connecticut River is the best known shad river in the state and hosts one of the largest and most stable American Shad runs on the East Coast. It supports both recreational and commercial fisheries for shad. CTDEEP has an approved Sustainability Fishing Management Plan for this population. There are no barrier dams on the mainstem of the Connecticut River in Connecticut, the water quality is generally good, and the current levels of harvest are sustainable. Efforts to increase the size of the river population and the distribution of adult pre-spawners throughout the basin have been ongoing since 1976 when the first effective fish passage at the Holyoke Dam took place (Henry 1976). Since then, numerous structural and operational changes at Holyoke now result in 60% of the annual population being passed above Holyoke. CTDEEP participates with the other Connecticut River Basin States through the Connecticut River Atlantic Salmon Commission (CRASC). CRASC is a multi-state/federal partnership established by an act of the US Congress to specifically manage Atlantic Salmon (https://www.cga.ct.gov/Current/pub/chap_494.htm), but has expanded management efforts to other diadromous species throughout the basin. The American Shad population in the Connecticut River has not reached the restoration goals established by CRASC, despite more than 40 years of significant effort, suggesting that there are additional impacts in the Basin to consider.

The CTDEEP had been working to restore shad runs to three Connecticut River tributaries within Connecticut: the Farmington, Mattabesset, and Scantic rivers, by fishway construction, dam removals and trucking prespawn adults. It has been noted in this document and in ASMFC documents, that shad are a large river, mainstem species. Ecologically, this is one way to ensure adequate separation among the three con-specifics that co-occur in many East Coast systems, American Shad predominately spawning in the mainstem and river herring (collectively) spawning in tributaries. It has never been conclusively documented that there are genetically distinct populations of American shad within Connecticut River tributaries; it is possible that all American shad spawning in the Connecticut River are from a single genetic population, and the abundance of spawners in any one tributary in a given year is simply a product of variation in adult shad behavior and prevailing environmental conditions.

Adult shad abundance in those systems where numbers are collected show some correlation with mainstem abundance, i.e. a simple percentage. If annual run size to these systems was correlated to juvenile production in those sytems in previous years (i.e. strong natal site fidelity), we would expect to see systematic increases in abundance as new areas colonized typically have good production until reaching carrying capacity. Fishway counts do not indicate this in the Farmington River system where we have data since 1976. The failure of this system to produce increases in this population could be a result of ineffective shad passage (upstream and downstream) at the first dam (Rainbow Dam) known from direct observation and or other factors including the Farmington River not being optimal American Shad habitat. Estimates of

the numbers of shad from the Scantic system don't exist and counts of shad began recently (2013) on the Mattabesset River system.

In addition to the Connecticut River, the CTDEEP seeks to restore and enhance runs of American Shad in a number of other rivers that flow into Long Island Sound. It should be noted that some of these systems may have lost whatever stocks were natal to these systems and that any remenant run size is believed to be reduced from the historic abundance.Whether adult shad transplanted from a large river system (Connecticut River) will establish annual runs in these smaller systems remains unknown. Each of these rivers is reported in this document. The CTDEEP has not submitted a SFMP for any of these other rivers and has prohibited harvest of shad in each of these other rivers until the populations have grown to the level where a SFMP could be considered. In all cases, the impediment to full utilization of historic habitat is the presence of barrier dams.

Water quality improvement

The CT DEEP GIS open data website contains data layers that include estuaries that have been assessed in compliance with sections 305(b) and 2020(d) of the federal Clean Water Act. 305 (b), which requires each state to monitor assess and report on the quality of water relative to attainment of designated uses establisted by the state's water quality standards. States are required to compile a list identifying waters not meeting water quality standards and assign a Total Maximum Daily Load (TMDL) priority ranking to each impaired waterbody.

Connecticut's permit programs and monitoring for direct and indirect sources of water quality impairment, have resulted in large reductions in water pollution over the past several decades. These improvements to water quality in Connecticut streams have progressed to the point where it is unlikely to be a major impediment to restoring American Shad runs. Some streams could benefit from further improvement of water quality and improvements could increase survival of young-of-year shad. However, our assessment concludes that such reduced water quality is not a significant obstacle to shad in recolonizing historic habitat.

Barrier removal and fish passage program

Connecticut is a heavily dammed state with over 3,000 dams within its borders—the exact number is unknown (Kennedy et al. 2018). These dams were a major factor of the demise of all diadromous fish runs in the state and remain a significant challenge in restoring these runs. Some runs of American Shad have been totally eliminated or reduced to very few fish. Migratory barriers remain a significant threat to American Shad populations in some systems in Connecticut.

The CTDEEP fish passage program has historically sought to either remove a dam, or failing removal, build a fishway around the dam. The removal of a dam precludes the need for a fishway and reduces problems with downstream passage. In theory, this restores native habitat (perhaps historic spawning habitat long since inundated) and reduces impoundments that often

favor non-native predators. However, many dams cannot be removed for a variety of reasons, most notably because they are still valued (e.g. hydroelectric projects). For these dams, the CTDEEP seeks the provision of fishways, either through a voluntary process or through regulatory processes. The CTDEEP is acutely engaged in all licensing and re-licensing procedures for hydroelectric projects in Connecticut by the Federal Energy Regulatory Commission (FERC). The CTDEEP works very closely with the U.S. Fish & Wildlife Service (USFWS) in these procedures. In addition, the State of Connecticut has statutes that authorize the CTDEEP to require a fishway at dams not regulated by FERC. However, most fish passage projects in Connecticut are not pursued through any regulatory process but instead follow a voluntary process. The CTDEEP works with many municipalities and non-governmental organizations (NGOs) like watershed groups, land trusts, fishing clubs, and larger conservation organizations in a coordinated regional approach in which the NGO sponsors the project, crafts all the necessary agreements, applies for grants to pay for design and construction, and oversees the construction while the CTDEEP provides continuous technical oversight. In a typical year, two or three fish passage projects are implemented in Connecticut and some of them benefit American shad.

Impingment/entrainment at dams-

This problem is addressed at regulated hydroelectric projects through the FERC licensing process. It is important to note that not all hydroelectric projects located in rivers targeted for shad restoration are regulated (licensed) by FERC and therefore fall outside this process. The most common source of this threat comes from hydroelectric projects and lack of suitable downstream passage. The CTDEEP works with the USFWS and FERC, and licensees during the licensing process to ensure the best state-of-the-art downstream fishway facilities are installed, maintained and operated at hydroelectric dams. Intakes for other industrial uses are assessed during the permitting process and the CT DEEP dictates the design and operation of these intakes to minimize impact on American Shad.

Water withdrawals

All water withdrawals from Connecticut streams of significant size must be permitted by the CTDEEP. The Connecticut Water Planning Council has published a comprehensive Water Plan (2017) for the state that includes a broad range of estimated Desired Ecological Flow levels basin-wide.

Project permit/licensing review program

The Fisheries Division Habitat Conservation and Enhancement (HCE) Program, routinely comments on permit applications and evaluates such applications on their potential impact on diadromous fish runs, including American Shad. Connecticut has more recent streamflow regulations that have tightened the regulation of water withdrawals and releases. CT DEEP Permit reviews include examination of CT DEEP GIS Open Data Website and the CT Natural Diversity Database

In the Quinnipiac River, existing water withdrawals have begun to impact the minimum flow levels during the summer rearing period. The CTDEEP has taken steps to eliminate some withdrawals and limit future withdrawals to protect fish habitat.

Programs to avoid, minimize, or mitigate associated impacts to American shad migration and utilization of historic habitat from climate change

Part of the mission of the CTDEEP is to guide the state into a more environmentally-responsive approach to generating and using energy. However, a potential impact of climate change to American Shad runs could include increasing water temperatures reducing the rate of repeat spawning, which would impact the stock's population structure and resiliency. Although this impact cannot be entirely avoided if the streams in the state experience temperature increases, the proposed monitoring within GC3 plans, will identify and potentially mitigate this impact to some extent

Climate change is a larger challenge that Connecticut will address at the State level, through the Governor's Council on Climate Change (GC3). In 2019, Connecticut's Governor Ned Lamont issued an Executive Order reestablishing and expanding the membership and responsibilities of the GC3. A primary objective to the GC3 includes developing and implementation adaptation strategies to assess and prepare for impacts of climate change including areas of natural resources. Proposed topics that could improve fish habitat include: exploring water rights options that protect fish and wildlife, support fish, wildlife, and ecological needs when balancing economic and social needs in decision-making processes, evaluate approaches to research, monitor, and address coastal acidification impacts to natural resources. More specific priority actions for rivers include advancing connectivity among habitats and addressing climate challenges.

Adult Shad Transplantation program

Some runs have been extirpated or reduced, but fish passage projects have recently or will soon reconnect critical shad habitat to Long Island Sound. This represents an opportunity to re-create a shad run where one may have existed in the past. Once 'opened', a run of shad in a system may expand if the run has not been extirpated or if strays from the Connecticut River or other systems recolonize the system. Whether these fish will successfully restore the run of shad to the river and how long this process could take remains unknown. To accelerate the pace of restoration, some systems are 're-seeded' by stocking pre-spawn adult shad

Due to the strong run size of shad to the Connecticut River and the presence of modern trapping facilities at the first dam at Holyoke, MA, the CTDEEP implemented an active transplantation program in which pre-spawned adults from the Connecticut River were collected at the Holyoke Dam Fishlift, placed in a specially-designed transport tank truck, and driven to the restoration rivers, where they are released. Success of relocation of pre-spawn shad may vary for a number of reasons, including fish dropping downstream prior to spawning,

delayed mortality due to handling and transport stess. Additionally, the collection method includes taking an opportunistic sample, with an unknown sex ratio, after the fish come out of the elevator lift cycle. The fish are diverted to a holding tank, where they are transferred to the truck tank. The shad are then released into new habitat that may not have been thoroughly evaluated for successful spawning and juvenile rearing habitat. There are also inherent risks asscociated with moving fish and water between watersheds including pathogens and species not native species. to the watershed targeted for shad restoration.

In recent years, shad moved throughout the Shetucket River were taken from the first dam on the Shetucket River (Greeneville Dam) so that currently shad transplanted throughout the Shetucket-Quinebaug river basin originate from the Shetucket River. Prior to this (1998-2010) Holyoke origin pre-spawn shad were trucked to the basin. The amount of fish transplanted into each river varies from year-to-year but typically ranges between 80 and 200 adult shad per river. The CTDEEP had conductedthese transplantation activities except for some transplantation in the Shetucket River that is conducted by the City of Norwich, Department of Public Utilities, which operates two hydroelectric projects with fishways. They had transplanted some shad using their own truck under the guidance of the CTDEEP. A list of rivers with recent transplantation programs is shown in Table 5.

Habitat Improvement program- The Fisheries Division HCE Program seeks to protect and restore fish habitat statewide. This work includes staff assigned to review permit applications for marine activities, such as dredging, dock construction, etc. This program staff works closely with the Diadromous Fish Program and routinely reviews permit applications with consideration of the impacts to diadromous species, including American Shad. Not only are conditions placed in permits to avoid or reduce any impacts to American Shad habitat and runs but sometimes habitat can be improved beyond its current condition due to mitigation agreements. Staff also proactively works with municipalities and NGOs on restoration projects to improve habitat for diadromous species. One example is the Moosup River Project in which six migratory barriers will be addressed in this system shad river. This project is funded through a mitigation fund provided by an upstream power plant and is supported by a partnership between the CTDEEP, three federal agencies, a municipality and an NGOs.

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Table 1. List of rivers in Connecticut thought to have supported historical runs of American Shad.

Map #	Name*	Present-day Connecticut town(s) at mouth of river
1	Housatonic River	Stratford & Milford
2	Naugatuck River	Derby
3	Pomperaug River	Southbury
4	Shepaug River	Southbury and Bridgewater
5	Quinnipiac River	New Haven
6	Connecticut River	Old Saybrook & Old Lyme
7	Mattabesset River	Middletown & Cromwell
8	Farmington River	Windsor
9	Pequabuck River	Farmington
10	Scantic River	East Windsor
11	Shetucket River	Norwich
12	Quinebaug River	Norwich
13	Willimantic River	Windham

*left justified rivers are mainstem; indented streams are tributaries

Table 2. Assessment of historic and current habitat for American Shad in Connecticut. **Boldface** text identify rivers in which progress toward the goals have been achieved since the 2013 plan.

							Habitat distance (Length in Kilometers)					
	Historic			Current			spawning		rearing- estuarine**		rearing- in-river	
River*	upstream end point	Town	Total km	Upstream end point	Town	Total km	historic^	current	historic	current	historic^	current
Housatonic	Great Falls	New Milford	46.9	Derby Dam	Shelton	21.1	21.7	1.4	19.4	19.4	21.6	0.9
Naugatuck	junction of E & W branches	Torrington	63.7	Tingue Dam	Seymour	9.7	24.3	3.5	0	0	19.6	6.2
Pomperaug	Gradient change	Woodbury	5.2	no run to mouth	n.a.	0	9.2	0	0	0	17	0
Shepaug	Roxbury Falls	Roxbury	6.4	no run to mouth	n.a.	0	1	0	0	0	5.4	0
Quinnipiac	**Interstate 84**	**Southington**	**47.8**	**Nickson Dam**	**Plainville**	**43**	**14.2**	**14**	**10.9**	**10.9**	**22.7**	**22.7**
Connecticut	MA state line	Enfield	108	MA state line	Enfield	108	32.3	32.3	24.3	24.3	51.4	51.4
Mattabesset	CT Route 71	Berlin	36.3	Kensington Dam	Berlin	36.3	15.65	15.65	0	0	20.65	20.65
Farmington	Satans Kingdom	New Hartford	80.8	Lower Collinsville Dam	Avon	60.3	46.4	29.8	0	0	33.4	29
Pequabuck	Middle Street	Bristol	15.9	Middle Street Dam	Bristol	15.94	4.9	4.9	0	0	11	11
Scantic	**Durkee Road**	**Somers**	**34.8**	**Somersville Dam**	**Somers**	**21.1**	**10.25**	**12.8**	**0**	**0**	**21.95**	**11.2**
Shetucket	**Willi-Natchaug conf.**	**Windham**	**28**	**Willi-Natchaug conf.**	**Windham**	**28**	**12.9**	**12.9**	**24.1**	**24.1**	**15.6**	**15.6**
Willimantic	source	Staffford Springs	37.7	AmerThread#1 dam	Windham	1.2	20.8	1.2	0	0	18.1	0
Natchaug	falls at Mansfield Hollow	Mansfield	5.8	Willimantic Res dam	Windham	2.5	2.5	2.3	0	0	3.3	3.3
Quinebaug	Cargill Falls	Putnam	57.5	Aspinook Dam	Griswold	11.9	21.2	9.8	0	9	36.3	2.1
Moosup	confluence w/Quanduck Bk	Sterling	14.5	no run to mouth	n.a.	0	7	0	0	0	7.5	0
Totals			589.3			359.0	244.3	140.6	78.7	87.7	305.5	174.1

*left justified rivers are mainstem; indented rivers are tributaries

**estuarine habitat is only listed for the river in which it is located even though runs in upstream tributaries (e.g. the Naugatuck) may benefit from such habitat. Estuarine habitat within the Thames River (all estuary) is included under the Shetucket River, its main freshwater tributary.

^ "historic" habitat refers to existing habitat within the historic range. For example, historically a river stretch may have included free-flowing habitat suitable for spawning. When the habitat is inundated by a dam, the habitat is classified as rearing. When shad are reconnected to historic habitat in the future, it would be considered rearing habitat. Regardless, it is difficult to categorize historic habitat type in impounded systems.

Table 3. An inventory of key dams that block existing or planned runs of American Shad in Connecticut. Boldface text indicates change from 2013 Plan.

River	dam*	purpose	current fish passage	plans for future fish passage	comments
Housatonic	Derby	hydroelectric	none	fishway	currently under design
	Stevenson	hydroelectric	none	fishlift	FERC required timetable
	Shepaug	Hydroelectric	None	Fishlift	FERC required timetable
Naugatuck	Kinneytown	hydroelectric	Denil	monitoring	currently passes shad
	Tingue	**none**	**Bypass channel**	**repairs**	**Work about to begin**
	Plume-Atwood	none	none	removal	No plans at this time
Quinnipiac	Wallace	industrial water	Denil	monitoring	currently passes shad
	Hanover Pond	**town park**	**Denil**	**monitoring**	**currently passes shad**
	Carpenters	**none**	**full**	**none**	**Removed in 2016**
	Clark Brothers	**none**	**full**	**none**	**Removed in 2016**
Connecticut	Enfield	none	full	none	No longer exists
Mattabesset	StanChem	fire protection	Denil	monitoring	passes shad
Farmington	**Rainbow**	**hydroelectric**	**vertical slot**	**fish lift**	Poor shad passage/Trap and Truck Facility designed
	Spoonville	none	full	none	dam removed in 2012
	Winchell-Smith	none	partial barrier	removal	project on hold
	Lower Collinsville	none	none	removal	Currently under design
	Upper Collinsville	future hydro	none	Denil	Currently under construction
Scantic	**Springborn**	**none**	**full**	**none**	**Removed in 2018**

Table 3 Continued. An inventory of key dams that block existing or planned runs of American Shad in Connecticut. Boldface text indicates change from 2013 Plan.

River	dam*	purpose	current fish passage	plans for future fish passage	comments
Shetucket	Greeneville	hydroelectric	fishlift	monitoring	currently passes shad
	Taftville	hydroelectric	Denil	continued monitoring	currently passes shad
	Occum	hydroelectric	Denil	continued monitoring	currently passes shad
	Scotland	**hydroelectric**	**none**	**fish lift**	**Constructed in 2018**
Willimantic	4 willimantic dams	hydroelectric	none	none	will consider restoring if other parties remove dams
Natchaug	Willimantic Water Works	water supply	none	none	restoration plans end at base of dam
Quinebaug	Tunnel	hydroelectric	Fishlift	continued monitoring	currently passes shad
	Aspinook	hydroelectric	None	fishlift	currently relicensing
	Rajak	hydroelectric	None	uncertain	future relicensing
	Rogers	uncertain	None	uncertain	will investigate after Rajak
Moosup	**Lower Kaman**	**none**	**Full**	**none**	**Removed in 2014**
	Upper Kaman	none	None	removal	Project planned
	Griswold Rubber	**comic relief**	**Full**	**none**	**Removed in 2016**
	Brunswick #1	**none**	**Full**	**none**	**Removed in 2017**
	Brunswick #2	none	None	Denil	future hydro development

Table 4. Summary of plans to restore and enhance runs of American shad in Connecticut with quantification of habitat types. **Boldface font indicates change from 2013 plan**. Underlined font indicates planned habitat connectivity work is completed. *left justified streams flow into Long Island Sound; indented streams are tributaries of the left justified stream listed above. Habitat distance (Length in Kilometers).

Existing				Targeted for Restoration			spawning		rearing- in-river	
River*	Upstream end point	Town	Total km	upstream end point	Town	Total km	current	targeted	current	targeted
Housatonic	Derby Dam	Shelton	21.1	Bulls Bridge Dam	New Milford	68.5	1.4	33.4	0.9	25.1
Naugatuck	Tingue Dam	Seymour	9.7	Thomaston F.C.D.	Thomaston	49.1	3.5	24.3	6.2	19.6
Pomperaug	no run to mouth	n.a.	0	mouth of Nonewaug	Woodbury	26.3	0	9.2	0	17
Shepaug	no run to mouth	n.a.	0	Roxbury Falls	Roxbury	6.4	0	5.4	0	6.15
Quinnipiac	**Nickson Dam**	**Plainville**	**47**	**Nickson Dam**	**Plainville**	**47.8**	**14**	**14**	**22**	**22**
Connecticut	state line	Enfield	108	state line	Enfield	108	32.3	32.3	51.4	51.4
Mattabesset	Kensington Dam	Berlin	36.3	Kensington Dam	Berlin	36.3	15.65	15.65	20.65	20.65
Farmington	Lower Collinsville Dam	Avon	60.3	Confluence Nepaug River	Hartland	76.3	29.8	41.9	29	33.4
Pequabuck	Middle Street Dam	Bristol	12.4	Middel Street Dam.	Bristol	15.9	3.1	3.1	9.3	9.3
Scantic	**Somersville Dam**	**Somers**	**25.6**	**Durkee Road**	**Somers**	**30.3**	**12.8**	**12.8**	**12.8**	**12.8**
Shetucket	**Willi-Natchaug conf.**	**Windham**	**28**	**Willi-Natchaug conf.**	**Windham**	**28**	**8.2**	**12.9**	**10.2**	**15.6**
Willimantic	**AmerThread Dam#1**	**Windham**	**1.2**	**AmerThread Dam#1**	**Windham**	**1.2**	**0**	**1.2**	**0**	**0**
Natchaug	**Willimantic Res Dam**	**Windham**	**4.2**	**Willimantic Reservoir**	**Windham**	**4.2**	**0**	**1.5**	**0**	**1.9**
Quinebaug	Aspinook Dam	Griswold	11.9	Cargill Falls	Putnam	57.5	9.8	21.2	2.1	36.3
Moosup	no run to mouth	n.a.	0	confluence w/Quanduck Bk	Sterling	14.5	0	7	0	7.5
totals			383.8			570.3	130.6	235.9	164.6	278.7

Table 5. Connecticut rivers that received transplanted American shad as part of the restoration effort.

River	Source of fish	Comments
Naugatuck	Connecticut River	Released above two dams
Quinnipiac	Connecticut River	Released above two dams
Mattabessett	Connecticut River	Released above one dam
Farmington	Connecticut River	Released above Rainbow Dam
Shetucket	Shetucket River	Fish from Greeneville Dam
Quinebaug	Shetucket River	Fish from Greeneville Dam

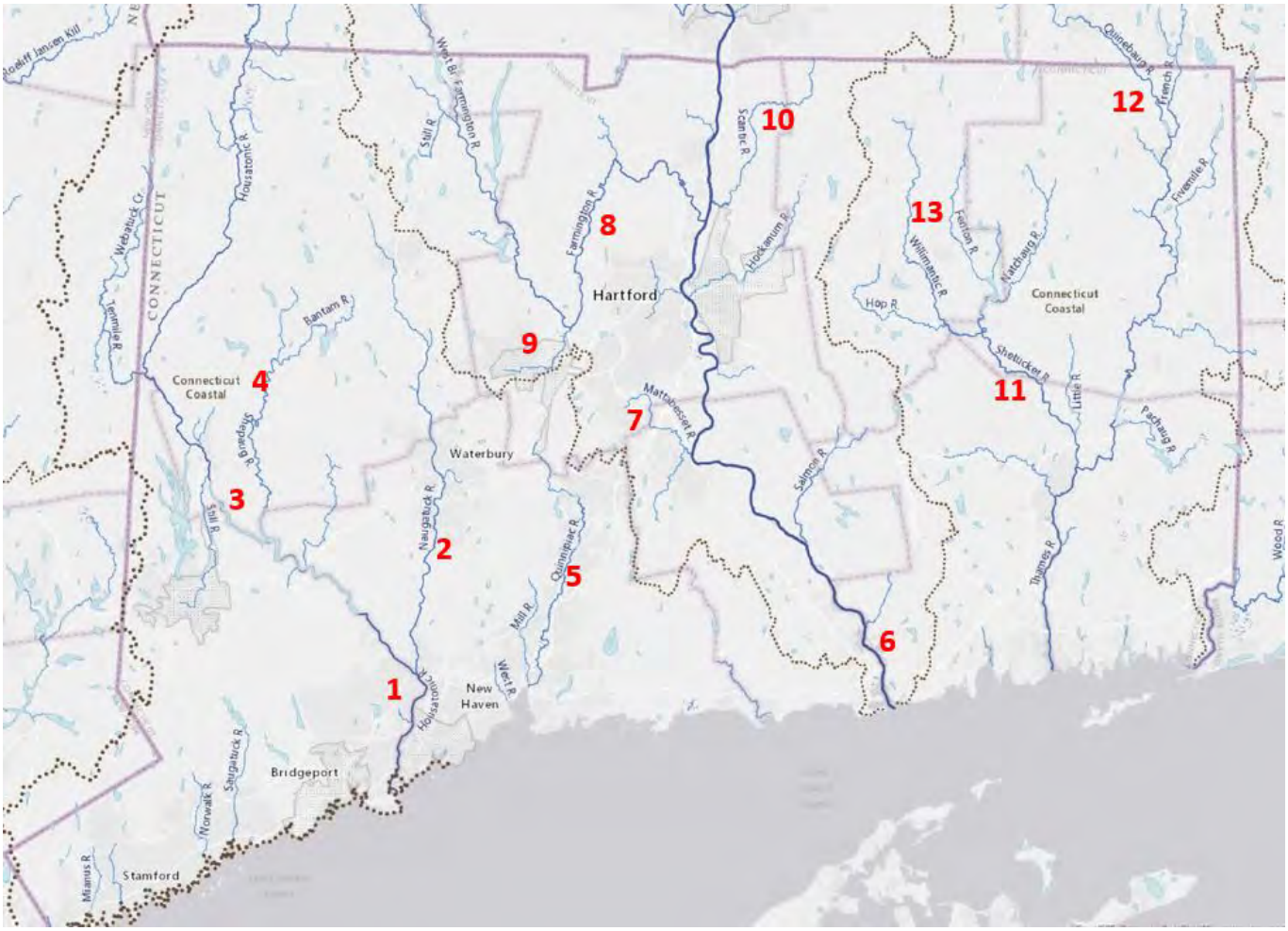
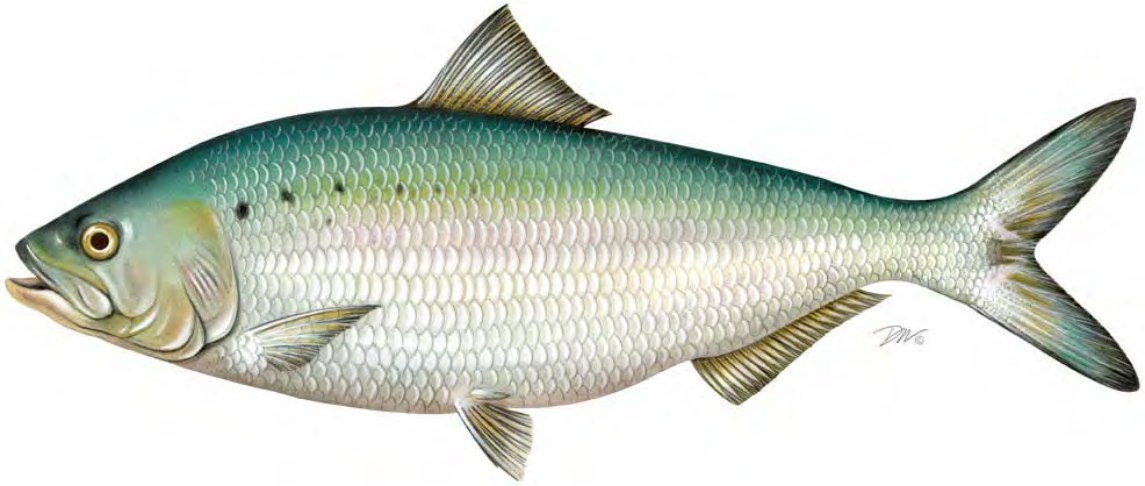


Figure 1. Map of existing runs of American shad, Connecticut. Numbers correspond to the numbers next to river names of existing runs (including those extended by fishways) in Table 1.

The Delaware River Basin Fish and Wildlife Management Cooperative

American Shad Habitat Plan for the Delaware River



Prepared by:
The Nature Conservancy for the Delaware River Basin Fish and Wildlife Management Cooperative

Submitted to the Atlantic States Marine Fisheries Commission as a requirement of Amendment 3 to the Interstate Management Plan for Shad and River Herring

American Shad Habitat Plan
for the Delaware River

Prepared by:

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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 State Division of Fish, Wildlife and Marine Resources • U. S. Fish and Wildlife Service • National Marine Fisheries Service

For:

The Atlantic States Marine Fisheries Commission
Shad and River Herring Management Board

January 7, 2021

Members of the Delaware River Basin Fish and Wildlife Management Cooperative wish to express our deepest gratitude to Mari-Beth DeLucia and Lyndon DeSalvo of The Nature Conservancy. Simply stated, their exemplary contributions to the management of American Shad will form the foundation for the restoration of American Shad to the Delaware River Basin.

Thank you.

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 American Shad stocks in their jurisdiction. This report contains specific information for the Delaware River and its tributaries as it relates to habitat for American Shad in New York, Pennsylvania, New Jersey, and Delaware and provides an update to the 2014 American Shad Habitat Plan (Plan) for the Delaware River Watershed.

Recognition of the need to improve water quality and conserve the valuable resources of the Delaware River Basin led to the formation of the Delaware River Basin Commission (DRBC) in 1961. The passage of the Clean Water Act in 1972, which established water quality standards to reduce municipal and industrial discharges, eventually led to improved water quality and the near elimination of the pollution block on the lower Delaware River. In 1978, two sections of the river covering 181 km (113 mi) were designated as National Wild and Scenic Rivers to be administered by the National Park Service (NPS): 117 km (73 mi) as the Upper Delaware Scenic and Recreational River, and 64 km (40 mi) as the Middle Delaware National Scenic and Recreational River. In year 2000, three additional sections of the mainstem river covering a total of 63 km (39 mi.) were designated the Lower Delaware Scenic and Recreational River, also administered by the National Park Service.

The Delaware River Basin Fish and Wildlife Management Cooperative (Co-Op) is responsible for the management of diadromous fishes inclusive of the American Shad. The Co-Op was established by Charter in 1973 and is comprised of U. S. Fish & Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Delaware Department of Natural Resources and Environmental Control (DNREC), Pennsylvania Fish and Boat Commission (PFBC), Pennsylvania Game Commission (PGC), New York Division of Fish, Wildlife, and Marine Resources (NYDEC), and New Jersey Division of Fish and Wildlife (NJDFW). A coordinator from the USFWS serves as secretary to the Co-Op and acts as a liaison and technical specialist primarily on aquatic issues to the National Park Service (NPS), the DRBC, the Delaware Estuary Program, and the USFWS's Delaware Bay Estuary Project.

Signed into law in December 2016, the Delaware River Basin Conservation Act (Act) recognized the basin as "a natural treasure of great cultural, environmental, ecological, and economic importance" (H.R. 1772). The Act established the Delaware River Basin Restoration Program to support efforts to implement conservation, stewardship, and enhancement projects throughout the Delaware River Basin and has included funding for the conservation and restoration of fish and wildlife habitat. As of fiscal year (FY) 2020, over $20 million have been appropriated for the Delaware River Basin Conservation Act. The Nature Conservancy was awarded funding through this program to develop a restoration roadmap for American Shad and River Herring in the Delaware River Basin. Results from this project will inform future updates to this Plan, with an anticipated final report in 2021.

Background

The 531 kilometer-long (330 mile-long) Delaware River is unique along the Atlantic Coast in that it is free flowing along its entire length. It drains an area of 36,568 km^2 (14,119 mi^2) in four U.S. states: Delaware, New Jersey, New York, and Pennsylvania (Fig. 1). American Shad and other migratory fish have access to the entire mainstem river and far up into its headwaters where in other similar East Coast aquatic systems they have long been extirpated.

Figure 1: Delaware River and tributaries.

Historically, American Shad spawned throughout the main stem freshwater Delaware River and its tributaries as well as tributaries connected to the Delaware Bay (Stevenson 1899) (Fig 1). The location of the salt front would have determined the extent of the potential spawning habitat in the freshwater tidal section of the river in any given year. It was presumed that the principal spawning area prior to 1900 was located south of Philadelphia just above Gloucester, N.J. (rkm 157, rm 97) (U. S. Fish Commissioners, 1887; Cable, 1945; Walford, 1951; Mansueti and Kolb, 1953). Furthermore, the Howell family fishery, in existence for 200 years at Woodbury, N.J., kept catch records before 1830s documenting annual American Shad hauls of greater than 130,000 fish at rkm 150 (rm 93) (Harding 1999).

As early as the 1800s, exploitation, pollution, and dams in the upper Delaware River and tributaries were having a significant impact on the shad population in the Delaware. The construction of the extensive canals and locks in the late 1800s along the main stem Delaware, Lehigh, and Schuylkill

rivers extirpated American Shad from historic spawning and nursery habitats. In 1828, a 16-ft dam was built across the Delaware River at Lackawaxen, PA. by the Delaware and Hudson Canal Company, remaining for approximately 80 years. Until dismantled, this dam decimated the upper river spawning run according to reports in the New York Times (NYT 1889). By the 1820s, fishermen noted the drastic decline in the size of shad and eight-pounders, which were once common, became hard to find by the early 1900s. As a result of exploitation and habitat loss, the shad fishery collapsed and led to the closure of the Gloucester fishery, which had been in existence for 200 years (Harding 1999)

During the 1940s and 1950s, heavy organic loading around Philadelphia caused severe declines in dissolved oxygen (D.O.) from late spring to early fall, blocking fish migrations through this area during this period (Hardy 1999). A remnant of the American Shad run in the Delaware River survived by migrating upstream early in the season, when water temperatures were low and flows were high, before the D.O. block set up. These fish that arrived earlier in the season migrated farther up the Delaware River to spawn. Out-migrating juveniles survived by moving downriver late in the season during high flows and low temperatures, thus avoiding the low oxygen waters present around Philadelphia earlier in the fall. During the 1960s, the Tri-State Shad Surveys as described by Chittenden (1976) showed that the greatest numbers of adults were captured from Minisink Island near Milford, Pa. (rkm 392) up to Skinners Falls near Narrowsburg, N.Y. (rkm 475); none were captured downstream from Manunka Chunk (rkm 325). Pollution continued to be a major factor until passage of the Federal Clean Water Act in 1972 and subsequent improvement to water quality in the 1980s.

Main Stem Habitat Assessment

Characterization of the spatial distribution of spawning and nursery habitats for American Shad within the non-tidal Delaware River is poorly understood. Presently, much of the non-tidal river above Trenton, N.J. supports high quality habitats (by current standards) and three quarters of this section of the Delaware River is included in the National Wild and Scenic Rivers System. Annual monitoring of spawning American Shad at Smithfield Beach (rkm 351, rm 218), spanning multiple decades (1996 – present), certainly indicate this reach supportive of spawning adults (DRBFWMC 2017). It is unknown if observations at Smithfield Beach are representative of the entire non-tidal river. Subsequent catches of young-of-the-year American Shad via annual beach seine monitoring throughout the non-tidal reaches suggests, at least, a broad spatial nursery habitat utilization of the non-tidal river reaches (DRBFWMC 2017). American Shad spawn primarily in the middle and upper Delaware mainstem spanning approximately 236 river kilometers (147 river miles) from near Easton, Pa. (rkm 296, rm 184) to Hancock, N.Y. (rkm 532, rm 330) (Chittenden 1976). . American Shad also appear to be using the lower non-tidal reaches and freshwater tidal reaches of the Delaware River with early life stages of shad present in the estuary (PSEG Nuclear, LLC 2018).

The tidal section of the river is densely populated and home to one of the largest freshwater ports in the world. Losses of freshwater tidal wetlands and other riparian habitat in this area are significant (Partnership for the Delaware Estuary 2017). However, overall water quality has been

improving in recent years and the near elimination of the D. O. block has prompted initiation of potentially upgrading the Delaware Estuary designated use (DRBC 2015, 2020). Ichthyoplankton surveys completed in 2018 captured larval American Shad in all zones of the estuary from Trenton (rkm 214, rm 133) down to roughly rkm 56 (rm 35) and American Shad eggs from Trenton to the mouth of the Schuylkill River (rkm 149, rm 92) (PSEG Nuclear, LLC 2018).

Tributary Habitat Assessment

Historically, shad utilized many, if not all, medium to large tributaries for spawning in addition to the main stem habitat. Although the main stem Delaware River is free of physical barriers, many important tributaries that once supported large runs of American Shad are blocked or have reduced access and/or degraded habitat. In addition to legacy mill dams, the building of multiple canal systems (Delaware and Raritan, Lehigh Coal and Navigation, etc.) during the 19th century extirpated shad from many main stem tributaries. Many of these canal systems still preclude shad from utilizing historic spawning and nursery grounds.

Using historical and current information, a brief description of known historic and/or current status of spawning runs in all tributaries, as well as known habitat impacts can be found in Table 1: beginning in the headwaters and moving downstream. Figure 2 highlights the known spawning runs as of 2020.

A summary of the habitat status of major shad tributaries by state is below.

Table 1: Delaware River Tributaries with known current and/or historic American Shad spawning runs

Delaware River Tributaries	RKM	Historic (Pre-1950) Shad Run	Current Shad Run	Relevant Barriers	Comments	Data Sources
West Branch Delaware (NY)	532	Y (24km)	N	Cannonsville Dam (NY_119-2889)	Historic runs up to at least Deposit, NY. Cold tailwaters from NYC reservoirs create unsuitable conditions for shad.	Sykes & Lehman 1957; Bishop 1935; Gay 1892; Mansueti & Kolb 1953; Chittenden 1976
East Branch Delaware (NY)	532	Y (68km)	Y	Pepacton Dam (NY_146-1429)	Historic runs as far upstream as Downsville and within 30 miles of headwaters. Am. Shad present in East Branch during 1959-62 surveying and persist present day to East Branch, NY into the Beaver Kill. Cold tailwater from NYC reservoir and distance upstream probably varies with water temperatures.	Sykes & Lehman 1957; Bishop 1935; PA Fisheries Report 1896; PFBC Del River Mgmt Plan 2011;
Beaver Kill (NY)	East Branch Tributary	Y	Y (6km)	None	Chittenden (1976) reported shad 6km up Beaver Kill; and others reported shad 1km up Little Beaver Kill (tributary). Excellent water quality and undammed on its mainstem.	Chittenden 1976; Bishop 1935;
Lackawaxen River (PA)	447	Y	Y	Woolen Mill Dam (PA_64-053); Lake Wallenpaupack Dam (PA_52-051)	Thousands of shad noted in Lackawaxen in 1891 following installation of fishway at Lackawaxen Dam, as far as 25-30 miles above dam. Current fishing log mentions shad throughout Pike County section of Lackawaxen - likely a minor run today. Flow alteration due to releases from Lake Wallenpaupack that create cold tailwaters unsuitable for shad.	Gay 1892; Co-Op Fishways Review 1985; http://www.angelfire.com/pa/pikesportsmen/pcfsc4.1.htm; https://riverreporter.com/stories/loving-the-lackwaxen,18155
Mongaup River (NY)	420	Y	Y (7.5km)	Rio Dam (NY_149-0086); Mongaup Falls Dam (NY_148-0130)	Hydroelectric dams (currently in process of relicensing for 2022). Supports minor run in lower reach below Rio Dam. Mongaup Falls was almost certainly a natural barrier prior to hydroelectric dams. Estimated 237 Am. Shad were counted during American eel surveying in 2018.	Eagle Creek RE relicensing report 2020; National Park Service (Jessica Newbern - pers. comm.)

Neversink River (NY)	408	Y	Y (24km)	None	Small seine fishery in early 1800s. All historic mainstream habitat accessible and shad spawning run confirmed. Cuddebackville Dam removed in 2004 at RKM 16. High quality habitat.	Academy of Natural Sciences 2008 Neversink Shad Study; Gumaer 1890; The Nature Conservancy
Flat Brook (NJ)	362	Y (10km)	?	None	Minor historic run.	NJ Outdoors 1961
Brodhead Creek (PA)	343	?	Y	Brodhead Creek Dam (PA_1195188); Mill Creek Rd Dam in East Stroudsburg; McMichael Creek Mill Dam (PA_45-029)	Current fishing logs mention shad in lower reaches. Brodhead Creek Dam is breached and shad able to pass upstream to Mill Creek Rd Dam in East Stroudsburg. Exceptional water quality; prone to flooding.	http://www.paflyfish.com/forums/Open-Forums/Warm-Water---Salt-Water-Fly-Fishing/Shad-on-the-Brodhead/16,46369.html
Paulins Kill (NJ)	333	Y	Y (16km)	Paulina Lake Dam (NJ_NJ00170); County Line Dam (NJ_21-33)	Historic shad run documented in 1700s prior to damming of river. Current shad run up to Paulina Lake dam following removal of Columbia Lake Dam in 2018. TNC and partners looking to remove next two dams, the Paulina Lake and County Line.	NJ Freshwater Fisheries Report 2019; The Nature Conservancy; Cummings 1964
Pequest River (NJ)	318	?	Y	E.R. Collins & Sons Dam (NJ_24-28); E.R. Collins & Sons Dam (NJ_24-29); No Name Dam (NJ_24-31); Cedar Grove Dam (NJ_24-32)	Shad are in lower Pequest near confluence with Delaware River. Lower dams in Belvidere block shad and cause flooding issues.	https://www.nj.gov/dep/newsrel/2005/05_0061.htm
Lehigh River (PA)	295	Y (58km+)	Y (38km)	Easton Dam (PA_48-012); Chain Dam (PA_48-013); Hamilton Street Dam (PA_39-009); Cementon Dam (PA_39-060); Francis E. Walter Dam (PA_PA00008)	Historic fisheries with large run prior to construction of dams and canals. Current shad distribution possible to Cementon Dam (38km) where there is no fish passage. Lower three dams have fishways, but they are ineffective. Additional habitat impacts include lack of riparian vegetation (lower section); sediment deposition (lower section); metal contaminants. Easton averaged 1,459 shad passing fish ladder from 2004-2018 (Post 2012 data is estimated from electro-fishing below dam). Shad juveniles present.	2012 PFBC Next Steps in American Shad Restoration in PA; 2007 PFBC Lehigh River Management Plan; PFBC

Musconetcong River (NJ)	281	?	Y (9.5km)	Warren Mill Dam (NJ_NJ00765); Bloomsbury Dam (NJ_24-6); Asbury Mill Dam (NJ_NJ00581); Beattys Mill Dam (NJ_24-36)	Five dams removed between 2008-2016 by Musconetcong Watershed Partnership. Support from state and dam owner for removal of Warren Mill Dam, which has been reported as a safety hazard since 1981 and has shad at base. Cost of ~$20M to remove due to sediment buildup behind dam. Upstream designated as Wild and Scenic River.	https://www.state.nj.us/dep/nrr/restoration/bloomsbury-dam.html; USFWS (Danielle Mcculloch - pers. comm.);
Crosswicks Creek (NJ)	206	Y	Y	Gropp Lake Dam (NJ_NJ00235); Walnford Dam (NJ_28-21); Yardville Dam (NJ_28-15)	Crosswicks was clear for fish passage in mainstem in late 1800s. Creek is generally in good condition. Shad run is in lower section of river and confirmed at Route 206 in 2007.	Zich 1978; Fowler 1900; NJDEP 2012;
Blacks Creek (NJ)	206	Y	Y	Dunns Mill Dam (NJ_28-11)	Shad confirmed at West Burlington St in 2007.	NJDEP 2012;
Assiscunk Creek (NJ)	191	Y	Y	None	Water quality generally good and no dams evident in watershed. Shad confirmed at Rt 130 in 2004.	Zich 1978; NJDEP 2005, 2012;
Neshaminy Creek (PA)	186	Y	Y	Hulmeville Park Dam (PA_09-084); Neshaminy Falls Dam (PA_09-003; Spring Garden (PA_09-083); Neshaminy Weir Dam (PA_09-167)	Gay 1892 writes that shad frequent this stream. Shad run up to base of Hulmeville Park Dam and spawn in lower section of river. YOY shad documented in 2014 and 2017. Creek is susceptible to flooding, sewage discharge, and sediment and nutrient loading.	Gay 1892; Coop Fishways Review 1985; PFBC Darby + Neshaminy LMB Survey 2014; PFBC (Tyler Grabowski, John Buzzar - pers. comm.)
Rancocas Creek (NJ)	179	Y (25km+)	Y (2014)	Mill Dam (NJ00540); Smithville Dam (NJ_NJ00043); Cedar Lake Dam (NJ_31-13); Vincentown Mill Dam (NJ_NJ00396); Kirbys Mill Dam (NJ_NJ00634)	Listed as good shad river in 1896 PA Fisheries Report with runs 15-20 miles up. Shad in Rancocas between Centerton and Rancocas Park around 1950. Largest watershed in south central NJ. 2013 and 2014 NJ DEP Freshwater Fisheries seine samples found juvenile shad in Rancocas. Mill Dam at Mt Holly is impassable.	NJDEP; PA Fisheries Report 1896; Mansueti & Kolb 1953;
Pennsauken Creek (NJ)	169	?	Y	Moorestown Dam (NJ_NJ00635)	Small watershed with impacts from nutrients, PCBs.	NJDEP 2012
Cooper River (NJ)	163	Y	Y	Cooper River Parkway (Kaighn Ave) Dam (NJ_NJ00393); Cooper River Lake Dam (Cuthbert Ave); Wallworth Pond Dam (NJ_31-58); Evans Pond Dam (NJ_NJ00394)	Listed as good shad river in 1896 PA Fisheries Report. Fish ladder at Cooper River Lake with confirmed shad.	Zich 1978; NJFW 2012; PA Fisheries Report 1896; NJ F&W (Brian Neilan - pers. comm.)

Big Timber Creek (NJ)	154	Y (25km+)	Y	Blackwood Lake Dam (NJ_NJ00800); Laurel Springs Dam (NJ_NJ00400)	Listed as great shad river in 1896 PA Fisheries Report with runs 15-20 miles up and fisheries.10,400 shad yield in 1896. Historic water quality issues, development, Tidal Gate at Glendora. No dams before split into South and North branches.	Zich 1978; Fowler 1900; NJDEP 2012; PA Fisheries Report 1896; Stevenson 1898; NJDEP (Brian Neilan - pers. comm.)
Schuylkill River (PA)	149	Y (193km+)	Y (120km)	Fairmount Dam (PA_51-002); Flat Rock Dam (PA_PA00896); Norristown Dam (PA_46-001); Black Rock Dam (PA_46_027) - *all have fish passage however passage only currently monitored at Fairmount;* New Kernsville Dam (PA_PA00723); Auburn Dam (PA_PA00670)	Shad historically migrated 193km up the Schuylkill to Pottsville, PA and the river was estimated to support historic runs in the hundreds of thousands. Passage issues at lower four dams with fishways. Documented passage at Fairmount averaged1,460 annually between 2009-2019, with flooding or mechanical breakdowns in certain years serving to lower the average. Invasive species (Flathead Catfish; Northern Snakeheads) prey on migrating Alosines below Fairmount Dam. Single digit passage of shad at Black Rock Dam (2011-18). Juvenile shad present.	2018 Del R Shad & RH Compliance Report; 2012 PFBC Next Steps in American Shad Restoration in PA; 1985 Co-Op Fishways Review; PFBC (Ben Lorson, Josh Tryninewski - pers. comm.); PWD (Joe Perillo - pers. comm.)
Wissahickon Creek (PA)	Schuylkill Tributary	Y (Ambler, PA)	N	Grant Street Dam (PA_51-019); Robeson-Vandaren Mill Upper (PA_51-018)	History of Ambler document notes shad fishing as far as Ambler, PA. Habitat impacts include elevated nutrients, siltation, low DO, oil & grease, pathogens, non-native and invasive riparian species. Two dams right near confluence with Schuylkill. Flooding an issue.	2002 study; 2010 Wissahickon Creek Feasibility Study; Early History of Ambler, 1682-1888
Perkiomen Creek (PA)	Schuylkill Tributary	Y	?	Wetherill Dam (PA_46-050); Indian Head Dam (PA_46-051)	Historic fishery located at mouth of Perkiomen Creek. Wetherill Dam used for water supply and is barrier to passage.	PA Fisheries Report 1896;
Pickering Creek (PA)	Schuylkill Tributary	Y	N	Pickering Creek Dam (PA_1194555)	Fishery at mouth of Pickering Creek in 1730s. Pickering Creek Dam (water supply) completely cuts off watershed.	PA Fisheries Report 1896;
French Creek (PA)	Schuylkill Tributary	Y	?	Phoenixville Dam (PA_15-200)	Shad fishery mentioned in 1896 PA Fisheries report.	PA Fisheries Report 1896;
Woodbury Creek (NJ)	147	Y	N	Woodbury Creek Dam (NJ_NJ00398) - *has fish passage*	Listed as good shad river in 1896 PA Fisheries Report. Lowermost dam has fish ladder. Smaller watershed.	Zich 1978; NJDEP 2012; PA Fisheries Report 1896;
Mantua Creek (NJ)	144	Y	Y	Bethel Lake Dam (NJ_NJ00406)	2,000 shad reported in 1896; Zich confirmed them in Mount Royal in lower section of Mantua Creek. Shad occupy lower part of river.	Zich 1978, Fowler 1900; NJDEP 2012; Stevenson 1898;

Darby Creek (PA)	138	?	Y*	None	Barriers have been removed. Northern Snakeheads present in Darby. Shad found at 84th St Bridge in John Heinz National Wildlife Refuge in 2010. *Likely minor/limited to lower part.	PFBC Darby and Neshaminy Survey 2014; PFBC (Mike Kauffman, John Buzzar - pers. comm.); NOAA 2014;
Chester Creek (PA)	133.5	Y	Y	Rockdale Dam (PA_23-004); Llewellen Mill Dam (PA_23-012); Cotton Mill Dam (PA_1209034); Lenni Dam (PA_1194411)	Shad noted as plentiful in account from 1683. 2007/2008 PFBC Surveys: numerous American Shad fingerlings, one striped bass fingerling, and blue crabs in Chester Creek. American Shad utilize the Chester/Upland portion of Chester Creek as nursery water. Chester Creek had been previously unknown as American Shad nursery water.	PA Fisheries Report 1896; PA Fish and Boast Commission 2007-2008 Fisheries Report: https://pfbc.pa.gov/images/fisheries/afm/2008/6x09_08wwcw.htm
Repaupo Creek (NJ)	132.5	Y	?	Warrington Mill Dam (NJ_NJ00114)	Shown as historic run in 1985 Coop Fishways Report. Flood gate at mouth.	1985 Co-Op Fishways Review;
Raccoon Creek (NJ)	128	Y	Y	Mullica Hill Pond Dam (NJ_NJ00639) - *has fish passage*	Historic shad fishery, with 4,800 shad reported in 1896. American Shad confirmed at Rt 130 in 1994.	Zich 1978, Fowler 1900; NJDEP 2012; PA Fisheries Report 1896; Stevenson 1898;
Oldmans Creek (NJ)	122	Y	N	Harrisonville Dam (NJ_NJ00105)	Listed as good shad river in 1896 PA Fisheries Report. No shad found in recent sampling.	Zich 1978; NJDEP 2012; PA Fisheries Report 1896;
Christina River (DE)	113	Y	Y	Christina Lake Dam (DE_18); *aka Smalleys Pond Dam*; Cooch's Mill Dam (DE_24)	Historic fisheries, with 2,900 shad in 1896. Haul seine sampling in 2019 produced 21 American Shad in Christina River. Dams in key tributaries to Christina, and at Smalleys Pond (though shallow reaches below the spillway are presumed impassable by shad). Juvenile shad present.	DNREC 2019;
Brandywine Creek (DE)	Christina Tributary	Y	Y	Broom Street Dam (DE_13); Dam #3/O'Neill (DE_12); Alapocas Run Park Dam (DE_11); Brandywine Falls Dam (DE_10); DuPont Dam (DE_8/DE_9); Breck's Mill/Walker's Mill Dam (DE_7); Lower Hagley Dam (DE_6); Upper Hagley Dam (DE_emadd02); Eleutherian Dam (DE_5); Brandywine Creek/Rocklands Mill Dam (DE_101)	Historically supported very large shad runs. YOY shad were first found downstream of West St. dam (#1) on Brandywine Creek in 2017, when 386 YOY were sampled. Following West St. dam removal, YOY shad were found below Broom Street Dam (#2) in 2020 sampling. Dam removals and fishways planned for remaining 10 dams. Algal buildup due to dams.	DNREC 2019; Gay 1892; Brandywine Shad 2020 (pers. comm.)

White Clay Creek (DE)	Christina Tributary	Y	Y (6.5km)	Red Mill Dam (DE_23); Karpinski Park Dam (DE_emadd05); Paper Mill Dam (DE_22); Newark Intake Dam (DE_emadd06); Creek Road Dam (DE_emadd07); Deerfield Dam (DE_emadd08); White Clay Creek Preserve (PA_15-377)	Historic shad run. Byrnes Mill Dam removed in 2014 but reports that shallow depths and sediment might still impede fish passage here, especially during low tides. No shad present between removed Byrnes Mill Dam and existing Red Mill Dam in 2016+2017 during sampling. Dam removals and fishways planned for next four dams, with high potential for improving passage. Virtually the entire White Clay Creek watershed (306 km = 190 miles of streams) protected under the Wild & Scenic Rivers Act (since 2000).	DNREC 2019; Shad Restoration White Clay Creek 2010; DNREC (Mike Stangl - pers. comm.)
Salem River (NJ)	94	Y	N?	Flood gates.	Listed as good shad river, with 8,000 shad in 1896. Multiple flood gates near confluence with Delaware.	Zich 1978; NJFW 2012; Stevenson 1898; PA Fisheries Report 1896;
Alloway Creek (NJ)	87	Y	N?	Alloway Lake Dam (NJ_NJ00038), Elkinton Pond Dam (NJ_NJ00102)	300 shad yield in 1896.	Zich 1978; NJDEP 2012; Stevenson 1898;
Appoquinimink River (DE)	82	Y	?	Noxontown Pond Dam (DE_36); Silver Lake Dam (DE_35) - *have fish passage*	350 shad yield in 1896. Two YOY American shad were caught in Appoquinimink in 2017 approximately 1.2 km downriver of the Appoquinimink spillway. No shad reported in fish ladders, but Steeppass design is intended for river herring. Water quality: DO, nutrients.	DNREC 2020; DNREC (Mike Stangl - pers. comm.)
Blackbird Creek (DE)	81	Y	N?	Blackbird Pond Dam (DE_38)	Current status unknown. Water quality: DO, nutrients	
Duck Creek / Smyrna River (DE)	72	Y	N?	Duck Creek Pond (DE_40), Lake Como Dam (DE_41)	Current Status unknown. Fisheries on Duck Creek at Smyrna and Walker in 1896 yielded 1,500 shad. Water quality: DO, nutrients	Stevenson 1899;
Cohansey Creek (NJ)	61	Y	N?	Sunset Lake Dam (NJ_NJ00063) - *has fish passage;* Seeley's Mill Pond Dam (NJ_NJ00065)	Cohansey used to be third largest shad fishery in the state, after Hudson and Delaware. 21,850 shad yield in 1896. No current shad run.	1872 Fish Commissioners Report, Zichs 1978, ASMFC RH Stock Assessment 2017, Stevenson 1898; Brian Neilan (pers. comm.)
Leipsic River (DE)	55	Y	N?	Garrisons Lake Dam (DE_43) - *has fish passage*, Masseys Mill Pond Dam (DE_42)	Current status unknown. Fisheries from mouth to city of Leipsic yielded about 3,000 shad in 1896. Water quality: nutrients DO. No shad recorded at Garrisons Lake Dam, but fish ladder is steeppass designed for river herring.	DNREC 2020; Stevenson 1899;
Little River (DE)	45	Y	?	None	Current status unknown. Considered an important shad stream in 1940s. Undammed.	

St. Jones River (DE)	38	Y	Y*	Silver Lake Dam (DE_45); Moores Lake Dam (DE_47) - *have fish passage*	Fisheries in 1896 at Lebanon, Cherrytree Landing, and Dover took about 3,000 shad. In 2012, 2 American shad were found in in steeppass fish ladder at Moores Lake, designed for passing river herring. Water quality: nutrients, DO.	DNREC 2020; Stevenson 1899;
Murderkill River (DE)	37	Y	N?	Courseys Pond Dam (DE_54); McColleys Pond Dam (DE_55); McGinnis Pond Dam (DE_51) - *have fish passage*	Fisheries at Fredericka in 1896 yielded 8,700 shad. Current status unknown, but no shad recorded at steeppass fish ladders designed for river herring. Water quality: nutrients, DO.	DNREC 2020; Stevenson 1899;
Maurice River (NJ)	34	Y	Y	Union Lake Dam (NJ_NJ00448); Willow Grove Dam (NJ_NJ00040); Rainbow Lake Dam (NJ_NJ00751) - *have fish passage*	Historically supported extensive shad fisheries. Current status unclear - juveniles caught in seine 2013-15, but none in 2016. Shad believed to be present in lower section of river. Union Lake Dam has fish passage but is ineffective at passing alosines. Approximately 35 miles protected under the Wild & Scenic Rivers act (since 1993).	NJDEP 2012; 2019 Del Riv Basin Shad and RH Compliance Report; NJDEP (Brian Neilan - pers. comm.)
Mispillion River (DE)	19	Y	N?	Silver Lake Dam (DE_61) - *has fish passage;* Haven Lake Dam (DE_60); Marshall Millpond Dam (DE_62)	Current Status Unknown. Shad fishery in 1896 at and around Milford, DE yielded 50,000 shad. Water quality: nutrients, DO. No shad found at Silver Lake, but fish ladder is steeppass designed for river herring..	DNREC 2020; Stevenson 1899;
Broadkill River (DE)	0	Y	Y*	Wagamons Pond Dam (DE_69) - *has fish passage;* Diamond Pond Dam (DE_68); Red Mill Pond Dam (DE_71)	Shad were not present before being stocked here in 1880s (Stevenson 1899). *No shad in recent samples, but anglers reported American shad in Wagamons Pond spillway in 1998. Wagamons Pond fish ladder is steeppass designed for river herring. Water quality: DO, nutrients.	DNREC, 2020; Stevenson 1899; Mansueti & Kolb 1953; Jones 1999

Figure 2. Current American Shad runs in the Delaware River basin (as of 2020).

New York

The major spawning tributaries for shad in New York were the East and West Branches of the Delaware and the Neversink River. Most of the East and West Branches of the Delaware no longer support shad spawning runs due to the cold-water releases from the New York City reservoirs and direct loss of habitat due to the reservoirs themselves (Chittenden 1976). Fishways on these dams were deemed to be impractical due to the limited potential spawning areas above the reservoirs and the anticipated high cost of construction (DRBFWMC 1985). Shad historically migrated 68 km (42 miles) up the East Branch to the former town of Shavertown (Bishop 1936), which is now submerged beneath New York City's Pepacton Reservoir. There have been reports from fishermen of shad as far as 25 km (15.5 mi) up the East Branch, to the confluence with the Beaver Kill (Saunter 2001). Chittenden (1976) reported that shad ran 6 km (3.7 mi) up the Beaver Kill, an East Branch tributary, but it is unclear whether they spawn there. Other reports have shad going as far as a mile up into the Little Beaver Kill, a tributary of the Beaver Kill (McPhee 2005).

In the early 1800s, the shad run in the Neversink River was large enough to support a seine fishery in the lower part of the river and it is believed that shad went upstream approximately 24km (15 miles) to the Neversink Gorge, which is the natural barrier due to gradient on this river (Gumaer 1890). Following the removal of the Southwest Cuddebackville Dam in 2004, shad now have access to their full historic habitat in the Neversink River and are not impacted by cold-water releases from the Neversink Reservoir due to the large distance from the reservoir.

The lower section of the Mongaup River also supports a current shad run to the base of the Rio Dam. Located 7.4 rkm (4.6 rm) upstream of the confluence with the Delaware River, Rio Dam is the lowermost of three hydroelectric dams owned and operated by Eagle Creek Renewable Energy. Mongaup Falls Dam is approximately 7 rkm (4.5 rm) further upstream and the falls, now submerged, were almost certainly a natural barrier for American Shad prior to the development of the hydroelectric dams in the 1920s.

Pennsylvania

Two of the largest shad spawning tributaries in the Delaware River Basin are wholly located within Pennsylvania; the Schuylkill River has a drainage area of 5,180 km^2 and the Lehigh River has a drainage area of 3,484 km^2. The Schuylkill River is the largest tributary to the Delaware River with a point of entry at 149 rkm in the upper tidal estuary, in Philadelphia. Shad historically migrated 193 km (120 miles) upstream to Pottsville, Pa. and the runs were estimated to be in the hundreds of thousands. In 1820, the Fairmount Dam was constructed nine miles from the mouth of the Schuylkill River, effectively eliminating shad runs in the tributary for 150 years. In the last two decades, several main stem dams have been removed and others have added fish passage, which has theoretically enabled access to the New Kernsville Dam (rkm 160), though the current run is only estimated to Reading, Pa (rkm 120).

Located upriver in the non-tidal reach of the Delaware River, the Lehigh River enters the Delaware River at Easton, Pa. (rkm 294). Prior to the construction of a series of dams for supporting the Lehigh Coal and Navigation Canal system in the early 1800s, shad migrated at least 58 km (36 miles) upriver to Palmerton, Pa. where native Lenape Indians annually harvested shad at the confluence of the Aquashicola Creek. Although no written record has been found

documenting the occurrence of shad further upriver of Palmerton, Pa., it is reasonable to assume they continued their migrations for some distance upriver. Construction of the Easton Dam (0 rkm) in 1829, at the confluence of the Lehigh and Delaware rivers, extirpated shad from the Lehigh River basin for 165 years until the subsequent installation of a fishway in 1994. Shad currently have access to the Cementon (Northampton) Dam at rkm 38, though ineffective passage at the three downstream dams limits the run size. In addition to physical barriers, water quality is also an issue in the Lehigh River due to impacts from several large municipalities that have discharges to the drainage and historic inputs from a former metal smelting operation.

At rkm 447, the Lackawaxen River was also a historically significant shad tributary and is believed to have a current run, according to anecdotal accounts from fishermen. Presently, Brookfield Energy is required to maintain an experimental trout tailwater via reservoir releases from Lake Wallenpaupack, as per FERC re-license agreement (FERC Proj. # 487, May 19, 2004). The target reach is from Kimbles Road Bridge (rkm 16, rm 10) down river to Rowland Road Bridge (rkm 6.4, rm 4). The program seeks, to prevent maximum instantaneous temperatures from exceeded 23.8 ^{o}C (75 ^{o}F) under most meteorological and hydrological conditions, and to prevent instantaneous stream temperatures from exceeding 25.0 ^{o}C (77 ^{o}F) during more severe meteorological and hydrological events. Annual performance evaluations indicated tailwater temperatures tended to vary but remain more characteristic of a transitional thermal habitat (> 21.1 ^{o}C (70 ^{o}F)) rather than reflective of a well-defined cold-water thermal habitat (< 18.8 ^{o}C (66 ^{o}F)). Efficacy of this program is anticipated to be evaluated in 2023.

Several other tributaries to the Delaware River within Pennsylvania are also known to have American Shad runs. Recent sampling in the Chester and Neshaminy Creeks have confirmed American Shad fingerlings in these tributaries and both are known to support nurseries in their lower reaches. Since American Shad were documented in the Darby Creek (rkm 138) within the John Heinz National Wildlife Refuge at Tinicum in 2010, four dams have been removed in the lower portion of the waterway enabling access to over 10 miles that were previously blocked (John Buzzar, pers. comm.).

New Jersey

In New Jersey, most tributaries that were tidally influenced had runs of American Shad that could support fisheries. In 1896, the Cohansey River (rkm 61) ranked third in New Jersey as a shad-producing stream, surpassed only by the Hudson and Delaware rivers, and shad were known to run 20 miles upstream to Bridgeton (Stevenson 1899). The Maurice River, which discharges into the Delaware Bay at rkm 34, similarly supported extensive shad fisheries until the construction of a dam at the present-day Union Lake in the 1860s. While the current Union Lake Dam does have a fish ladder, no shad have been documented passing here and they are recorded intermittently in the tidal Maurice River below the dam.

Several other tidal tributaries were also noted as supporting extensive shad runs at the end of the 19th century, including the Salem River (rkm 94), Oldmans Creek (rkm 122), Raccoon Creek (rkm 128), Woodbury Creek (rkm 147), Big Timber Creek (rkm 154), Cooper River (rkm 163), and Rancocas Creek (rkm 179) (PA State Commissioners of Fisheries 1896). In the Big Timber and the Rancocas creeks, shad were known to run 15 to 20 miles upstream and extended into the northern and southern branches of both these tributaries (PA State Commissioners of Fisheries

1896). An anadromous clupeid inventory by the New Jersey Division of Fish & Wildlife from 2002-2007 compiled previous run information and confirmed shad in many of these historically significant tributaries, though in large part their numbers and known extent have been greatly reduced. In these systems, shad face many habitat impacts including dams, canals, tidal gates, water quality, and predation by invasive species, particularly Flathead Catfish and Northern Snakeheads.

American Shad have also been confirmed in a few non-tidal New Jersey tributaries in recent years following dam removal and restoration efforts. With the removal of the lowermost barriers on the Paulins Kill and Musconetcong River, shad have begun occupying these systems and accessing newly available habitat. Currently, shad have access to 17 km of the Paulins Kill to the Paulina Lake Dam and 9 km of the Musconetcong River to the Warren Glen Dam. The lower reach of the Pequest River (rkm 318) near its confluence with the Delaware River is also documented to have shad present.

Delaware

In the late 1600s, the Christina watershed, including the White Clay and Brandywine creeks, supported tens of thousands of American Shad. However, as early as the 1700s, the Brandywine Lenape Native Americans were complaining to commissioners in Pennsylvania that dams were preventing the rockfish and shad from "coming up" as formerly and causing great injury to their people (Weslager 1989, Schutt 2007). The proliferation of dams and water pollution effectively eliminated the run in the watershed up until recently, when efforts to improve water quality and remove dams have succeeded in reopening previously inaccessible reaches within this system. In July 2020, sampling below Broom Street Dam (Dam #2) in Wilmington confirmed American Shad were spawning in this section that had been opened up with the removal of the West Street Dam in 2019. Shad are also known to access the Christina River beyond its confluence with the White Clay Creek and the White Clay to the former Byrnes Mill Dam site (DNREC 2020).

Historically, shad were found in most Delaware tributaries, with fisheries established in the Mispillion, Murderkill, St. Jones, Leipsic, and Smyrna Rivers (Mansueti and Kolb 1953, Stevenson 1899). The current status of shad in most of the tributaries that are found in State of Delaware is unknown, but few have been caught in any of these streams during the past century and it is unlikely that many of them currently support spawning runs. An eDNA study is planned for 2021 to assess presence of alosines, including American Shad, below Delaware fish ladders to better understand current distribution and the effectiveness of the steeppass ladders, which were designed to pass river herring. Dissolved oxygen and nutrient issues continue to impact many of these tributaries that once supported shad runs (DNREC 2005).

Nursery Habitat

Juvenile American Shad are presumed to remain in the rearing area of their natal river. It is unknown if juveniles remain fidel to a specific nursery reach or tend to disburse among suitable nursery habitats. Chittenden (1976) found the chief nursery in 1966 was apparently located

upstream from Dingmans Ferry (rkm 385, rm 239) and was especially centered near Tusten, N.Y. and Lordville, N.Y. Subsequent annual beach seine monitoring by Co-Op members throughout the Delaware River support greatest catches typically occurring at Milford Beach (rkm 394) and Water Gap (rkm 339), but variation of site specific seine efficacy may also strongly dictate observed catch totals. Ross and Johnson (1997) found relatively general habitat use by juvenile shad in the mainstem upper Delaware River with some affinity for riffles and submerged aquatic vegetation (SAV); but no overall effect of habitat type on shad were determined (Ross et al. 1997), indicating that juveniles use a wide variety of habitat types to their advantage. Furthermore, the specific environmental and/or biological ques for outmigration are also poorly understood. Yet, it is generally accepted that juveniles out-migrate from nursery areas to marine waters during fall months as water temperatures decrease (Limburg et al. 2003).

In the upper Delaware River, prior to the construction of the New York City Delaware Reservoirs, Chittenden (1969) reported that juvenile shad were repeatedly captured in the West Branch of the Delaware River. In 1964 and 1966, after cold water releases began, Chittenden was unable to document juvenile shad in the West Branch. In other studies Miller (1975) and Chittenden (1972) both demonstrated that juvenile shad are adversely impacted by cold water releases in the West Branch and would abandon the affected areas. The East Branch is utilized as nursery habitat though the extent probably varies with temperature in any given year and warrants further study. Juvenile American Shad do not appear to be as tolerant to temperature changes as American Shad eggs and actively avoid temperature extremes, if possible. Laboratory tests suggest that juveniles can tolerate temperature increases between 1° and 4°C above ambient temperature, but beyond that they will avoid changes if given a choice (Moss 1970).

Historically the tidal Delaware River and Estuary were probably an important nursery area with thousands of acres of saltwater and freshwater tidal marshes of highly productive systems with extensive food and shelter for juvenile shad. More than 145,000 hectares of brackish and salt marshes remain in the Delaware Estuary, roughly half in Delaware and half in New Jersey. However, only five percent of freshwater tidal marshes in the Delaware River Basin remain (Kreeger et al. 2010). Concentrated between Wilmington, Del. and Trenton, N.J., the condition of these marshes reflects the effects of negative impacts of intensive land conversion and industrial activities in this urban corridor (Simpson et al. 1983). Residential and commercial development has left only fragments of freshwater tidal marsh fringing the freshwater tidal reaches of the Delaware River and its tributaries in this section of the basin.

Very little is known about nursery habitat in tributaries to the Delaware River. The continued extirpation of shad from various tributaries throughout the basin preclude understanding for their importance to American Shad, forcing inferences to be drawn from anecdotal historical references. However, observations upstream of recently removed barriers suggests that shad will return and utilize tributary habitat if unimpeded. For example, young-of-year shad were documented in 2020 upstream of the removed West Street Dam on the Brandywine Creek and are also known to utilize the main stem of the Christina River. In 2019 NJFW biologists documented the return of American Shad to the Paulins Kill after the removal 109-year-old Columbia Lake Dam (NJDEP 2019). In 2008, PFBC biologists have also documented that American Shad utilize the Chester/Upland

portion of Chester Creek and lower section of Neshaminy Creek as nursery waters.

Threat Assessment

Despite significant improvements to water quality and fish passage in the Delaware River Basin over the last decade or more, there has been a lack of a corresponding rebound in numbers of American Shad. The 2020 ASMFC Stock Assessment for American Shad determined that adult mortality was unsustainable in the Delaware River population. An assessment of solely the threats to freshwater and brackish habitat is insufficient. A holistic approach to addressing the cumulative impacts of a variety of stressors is needed across all of this species' life cycles.

Barriers to Migration:

Although the Delaware River is free flowing along its mainstem, there are over 1,500 dams and other barriers on its tributaries that greatly impact aquatic connectivity throughout the basin. A list of barriers relevant to American Shad based on current and historic spawning runs is included here in Table 2.

Table 2. Relevant Barriers to American Shad migration in the Delaware River Basin.

Dam Name	Dam ID	Stream Name (NHD)	HUC-12 Name	Barrier Status	Fishway Type
Cannonsville Dam	NY_119-2889	West Branch Delaware River	Cannonsville Reservoir	Complete	
Pepacton Dam	NY_146-1429	East Branch Delaware River	Trout Brook-East Branch Delaware River	Complete	
Woolen Mill Dam	PA_64-053	Lackawaxen River	Belmont Lake-West Branch Lackawaxen River	Complete	
Lake Wallenpaupack	PA_52-051	Wallenpaupack Creek	Lake Wallenpaupack-Wallenpaupack Creek	Complete	
Rio Dam	NY_149-0086	Mongaup River	Rio Reservoir-Mongaup River	Complete	
Mongaup Falls Dam	NY_148-0130	Mongaup River	Rio Reservoir-Mongaup River	Complete	
Brodhead Creek Dam	PA_1195188	Brodhead Creek	Lower Brodhead Creek	Breached	
Mill Creek Road Dam	?	Brodhead Creek	Lower Brodhead Creek	Complete	
McMichael Creek Mill Dam	PA_45-029	McMichael Creek	Lower McMichael Creek	Complete	
Paulina Lake Dam	NJ_NJ00170	Paulins Kill	Middle Paulins Kill River	Complete (to be removed)	
County Line Dam	NJ_21-33	Paulins Kill	Middle Paulins Kill River	Complete (to be removed)	
E.R. Collins & Son Dam	NJ_24-28	Pequest River	Lower Pequest River	Complete	
E.R. Collins & Son Dam	NJ_24-29	Pequest River	Lower Pequest River	Complete	
No Name Dam	NJ_24-31	Pequest River	Lower Pequest River	Complete	
Cedar Grove Dam	NJ_24-32	Pequest River	Lower Pequest River	Complete	
Easton Dam	PA_48-012	Lehigh River	Lehigh River-Delaware River	Fishway	Vertical slot

Dam Name	Dam ID	Stream Name (NHD)	HUC-12 Name	Barrier Status	Fishway Type
Chain Dam	PA_48-013	Lehigh River	Lehigh River-Delaware River	Fishway	Vertical slot
Hamilton Street Dam	PA_39-009	Lehigh River	Lehigh River-Delaware River	Fishway	Vertical slot
Cementon Dam	PA_39-060	Lehigh River	Fireline Creek-Lehigh River	Complete	
Warren Mill Dam	NJ_NJ00765	Musconetcong River	Lower Musconetcong River	Complete (to be removed)	
Bloomsbury Graphite Dam	NJ_24-6	Musconetcong River	Lower Musconetcong River	Complete (to be removed)	
Asbury Mill Dam	NJ_NJ00581	Musconetcong River	Lower Musconetcong River	Complete	
Gropps Lake Dam	NJ_NJ00235	Back Brook	Lower Crosswicks Creek	Fishway	Steeppass*
Walnford Dam	NJ_28-21	Crosswicks Creek	Lower Crosswicks Creek	Unknown, assumed complete	
Yardville Dam	NJ_28-15	Doctors Creek	Doctors Creek	Unknown, assumed complete	
Dunns Mill Dam	NJ_28-11	Blacks Creek	Blacks Creek	Unknown, assumed complete	
Hulmeville Dam	PA_09-084	Neshaminy Creek	Core Creek-Neshaminy Creek	Complete	
Neshaminy Falls Dam	PA_09-003	Neshaminy Creek	Core Creek-Neshaminy Creek	Complete	
Spring Garden Dam	PA_09-083	Neshaminy Creek	Mill Creek-Neshaminy Creek	Complete	
Neshaminy Weir	PA_09-167	Neshaminy Creek	Mill Creek-Neshaminy Creek	Complete	
Mill Dam	NJ_NJ00540	North Branch Rancocas Creek	Powells Run-North Branch Rancocas Creek	Complete	
Smithville Dam	NJ_NJ00043	North Branch Rancocas Creek	Powells Run-North Branch Rancocas Creek	Fishway	Steeppass*
Cedar Lake Dam	NJ_31-13	South Branch Rancocas Creek	Jade Run-South Branch Rancocas Creek	Unknown, assumed complete	
Kirbys Mill Dam	NJ_NJ00634	SW Branch South Branch Rancocas Creek	Little Creek-Southwest Branch Rancocas Creek	Complete	
Vincentown Mill Dam	NJ_NJ00396	South Branch Rancocas Creek	Jade Run-South Branch Rancocas Creek	Fishway	Steeppass?
Moorestown Dam	NJ_NJ00635	North Branch Pennsauken Creek	Pennsauken Creek	Complete	
Cooper River Parkway (Kaighn Ave) Dam	NJ_NJ00393	Cooper River	Cooper River	Fishway	Flood gate
Cooper River Lake Dam (Cuthbert Ave)	?	Cooper River	Cooper River	Fishway	Flood gate
Wallworth Pond Dam	NJ_31-58	Cooper River	Cooper River	Fishway	Steeppass*
Evans Pond Dam	NJ_NJ00394	Cooper River	Cooper River	Fishway	Steeppass*
Laurel Springs Dam	NJ_NJ00400	North Branch Big Timber Creek	North Branch Big Timber Creek	Unknown, assumed complete	
Blackwood Lake Dam	NJ_NJ00800	South Branch Big Timber Creek	South Branch Big Timber Creek	Complete	
Fairmount Dam	PA_51-002	Schuylkill River	City of Philadelphia-Schuylkill River	Fishway	Vertical slot
Flat Rock Dam	PA_PA00896	Schuylkill River	Plymouth Creek-Schuylkill River	Fishway	Vertical slot
Norristown Dam	PA_46-001	Schuylkill River	Plymouth Creek-Schuylkill River	Fishway	Denil
Black Rock Dam	PA_46-027	Schuylkill River	Mingo Creek-Schuylkill River	Fishway	Denil
Kernsville Dam	PA_PA00723	Schuylkill River	Pigeon Creek-Schuylkill River	Complete (to be removed)	
Auburn Dam	PA_PA00670	Schuylkill River	Mahannon Creek-Schuylkill River	Complete	
Grant Street	PA_51-019	Wissahickon Creek	Lower Wissahickon Creek	Complete	
Robeson-Vandaren Mill Upper Dam	PA_51-018	Wissahickon Creek	Lower Wissahickon Creek	Complete	
Wetherill Dam	PA_46-050	Perkiomen Creek	Lower Perkiomen Creek	Complete	
Indian Head	PA_46-051	Perkiomen Creek	Lower Perkiomen Creek	Complete	
Pickering Creek Dam	PA_1194555	Pickering Creek	Pickering Creek	Complete	
Phoenixville Dam	PA_15-200	French Creek	Lower French Creek	Complete	
Woodbury Creek Dam	NJ_NJ00398	Woodbury Creek	Woodbury Creek	Fishway	Steeppass*

Dam Name	Dam ID	Stream Name (NHD)	HUC-12 Name	Barrier Status	Fishway Type
Bethel Lake Dam	NJ_NJ00406	Mantua Creek	Mantua Creek	Complete	
Rockdale Dam	PA_23-004	Chester Creek	Chester Creek	Complete	
Cotton Mill Dam	PA_1209034	Chester Creek	Chester Creek	Unknown, assumed complete	
Lenni Dam	PA_1194411	Chester Creek	Chester Creek	Unknown, assumed complete	
Warrington Mill Dam	NJ_NJ00114	Repaupo Creek	Repaupo Creek-Delaware River	Complete	
Mullica Hill Pond Dam	NJ_NJ00639	Raccoon Creek	Raccoon Creek	Fishway	Steeppass*
Harrisonville Dam	NJ_NJ00105	Oldmans Creek	Oldmans Creek-Delaware River	Complete	
Christiana Lake Dam	DE_18	Christina River	Middle Christina River	Complete	
Coochs Mill Dam	DE_24	Christina River	Upper Christina River	Unknown, assumed complete	
Broom Street Dam	DE_13	Brandywine Creek	Lower Brandywine Creek	Complete	
Dam #3 (O'Neill)	DE_12	Brandywine Creek	Lower Brandywine Creek	Breached	
Alapocas Run Park Dam	DE_11	Brandywine Creek	Lower Brandywine Creek	Breached	
Brandywine Falls Dam	DE_10	Brandywine Creek	Lower Brandywine Creek	Complete	
DuPont Dam	DE_9	Brandywine Creek	Lower Brandywine Creek	Breached	
DuPont Dam	DE_8	Brandywine Creek	Lower Brandywine Creek	Breached	
Breck's Mill/Walker's Mill Dam	DE_7	Brandywine Creek	Lower Brandywine Creek	Complete	
Lower Hagley Dam	DE_6	Brandywine Creek	Lower Brandywine Creek	Complete	
Upper Hagley Dam	DE_emadd02	Brandywine Creek	Lower Brandywine Creek	Breached	
Eleutherian Dam	DE_5	Brandywine Creek	Lower Brandywine Creek	Complete	
Brandywine Creek Dam	DE_101	Brandywine Creek	Middle Brandywine Creek	Breached	
Red Mill Dam	DE_23	White Clay Creek	Upper White Clay Creek	Complete (to be removed)	
Karpinski Park Dam	DE_emadd05	White Clay Creek	Upper White Clay Creek	Complete	
Paper Mill Dam	DE_22	White Clay Creek	Upper White Clay Creek	Complete (to be removed)	
Newark Intake Dam	DE_emadd06	White Clay Creek	Upper White Clay Creek	Complete	
Creek Road Dam	DE_emadd07	White Clay Creek	Upper White Clay Creek	Complete	
Deerfield Dam	DE_emadd08	White Clay Creek	Upper White Clay Creek	Complete	
White Clay Creek Preserve	PA_15-377	White Clay Creek	Upper White Clay Creek	Complete	
Alloway Lake Dam	NJ_NJ00038	Alloway Creek	Upper Alloway Creek	Fishway	Steeppass*
Elkinton Pond Dam	NJ_NJ00102	Deep Run	Upper Alloway Creek	Complete	
Noxontown Pond Dam	DE_36	Appoquinimink River	Drawyer Creek-Appoquinimink River	Fishway	Steeppass*
Silver Lake Dam	DE_35	Deep Creek	Drawyer Creek-Appoquinimink River	Fishway	Steeppass*
Blackbird Pond Dam	DE_38	Blackbird Creek	Blackbird Creek	Complete	
Duck Creek Pond Dam	DE_40	Smyrna River	Duck Creek	Complete	
Lake Como Dam	DE_41	Mill Creek	Duck Creek	Complete	
Sunset Lake Dam	NJ_NJ00063	Cohansey River	Middle Cohansey River	Fishway	Steeppass*
Seeleys Mill Pond Dam	NJ_NJ00065	Cohansey River	Upper Cohansey River	Unknown, assumed complete	
Garrisons Lake Dam	DE_43	Leipsic River	Upper Leipsic River	Fishway	Steeppass*
Masseys Mill Pond Dam	DE_42	Leipsic River	Upper Leipsic River	Complete	
Silver Lake Dam - Dover	DE_45	Saint Jones River	Upper Saint Jones River	Fishway	Steeppass*
Moores Lake Dam	DE_47	Isaac Branch	Isaac Branch	Fishway	Steeppass*
Courseys Pond Dam	DE_54	Murderkill River	Spring Branch-Murderkill River	Fishway	Steeppass*
McColleys Pond Dam	DE_55	Browns Branch	Browns Branch	Fishway	Steeppass*
McGinnis Pond Dam	DE_51	Hudson Branch	Spring Creek	Fishway	Steeppass*

Dam Name	Dam ID	Stream Name (NHD)	HUC-12 Name	Barrier Status	Fishway Type
Union Lake Dam	NJ_NJ00448	Maurice River	Union Lake-Maurice River	Fishway	Denil
Willow Grove Dam	NJ_NJ00040	Maurice River	Burnt Mill Branch-Maurice River	Fishway	Steeppass*
Rainbow Lake Dam	NJ_NJ00751	Muddy Run	Lower Muddy Run	Unknown, assumed complete	
Silver Lake Dam - Milford	DE_61	Mispillion River	Upper Mispillion River	Fishway	Steeppass*
Haven Lake Dam	DE_60	Mispillion River	Upper Mispillion River	Complete	
Marshall Millpond Dam	DE_62	Mispillion River	Middle Mispillion River	Complete	
Wagamons Pond Dam	DE_69	Broadkill River	Round Pole Branch-Broadkill River	Fishway	Steeppass*
Diamond Pond Dam	DE_68	Ingram Branch	Round Pole Branch-Broadkill River	Complete	
Red Mill Pond Dam	DE_71	Old Mill Creek/Martin Branch	Canary Creek-Broadkill River	Complete	

* Steeppass fish ladders in the State of Delaware are designed to pass river herring and not American Shad. American Shad are not able to effectively pass steeppass fishways greater than 20 m in length with a 27.3% slope (Slatick and Basham 1985)

Figure 3. American Shad distribution and relevant barriers to migration in the Delaware River Basin.

Climate Change

Stream flow and temperature provide significant cues for shad migration and spawning in streams. Changes in the timing of peak spring flow have already been documented in the last 50 years (Frumhoff et al. 2007). A recent analysis of flow data in the upper Delaware River by Moberg et al. (2009) found that, at the Cooks Falls reference gauge on the Beaver Kill, the mean annual flow has increased from 532 to 597 cfs (12%) between the pre- and post-reservoir periods. Median monthly flows have increased in summer, fall, and winter months, and have decreased during spring months (March-June). Low and high flows, including 3-, 7-, and 30-day events, have increased by 4 to 54%. In general, the post-reservoir period was wetter than the pre-reservoir period, as represented by both monthly median flows and the magnitude of low and high flow events. This pattern is consistent with long-term climatic trends published by Burns et al. (2007).

Over their history, diadromous fish, in general, have shown to be resilient and adaptable to environmental changes and stressors. Large ranges, diverse habitats and extremely abundant populations account for this resilience (McDowall 2001). With the current status of American Shad stocks at historic lows, changes in flow, temperature, and extreme flooding are likely a more significant threat to the status of this species than if populations of shad were near historical abundances and if their full range of habitats were available. In the Delaware River Basin, the shad population should be managed in a way that promotes and protects a diverse age structure and habitat utilization. A population that utilizes the full extent of the main stem as well as numerous tributaries of different size classes may have greater reproductive potential to protect against negative impacts from environmental disturbances (Hillborn et al. 2003, Schindler et al. 2010). A diverse age structure and behavioral patterns within a population of migratory fish can help mitigate against stochastic or anthropomorphic effects and take advantage of ideal conditions for population recruitment (Kerr et al. 2010, Secor 2007).

Tropic dynamics/Invasive species

In the past, the American Shad in the Delaware River Basin coexisted with fewer types of predatory fish than occur today. Since the late 1800s, several species of piscivorous fish have been introduced and subsequently naturalized in the Delaware River Basin, including: Largemouth Bass, Walleye, Smallmouth Bass, Channel Catfish, Muskellunge, Rainbow Trout, and Brown Trout representing some of the most desirable present-day gamefishes. Others including Flathead Catfish, Northern Snakehead, and Asian Swamp Eels have also become established in parts of the watershed. Furthermore, confirmed separate angler catches of Blue Catfish (N = 1 in NJ; N = 1 in PA) in the freshwater reaches of the Delaware Estuary in 2020 is suggestive of their presence likely as initial migrants into the Delaware River Basin via the C&D Canal.

Presumed increased predation by the indigenous (e.g., Striped Bass, White Perch) and naturalized invasive piscivores may be having an adverse impact on the shad population. American Shad are broadcast spawners, using a predator saturation strategy for survival of eggs, larval and juveniles. The increased predation coupled with severely reduced habitat range, potentially reduce survivability to adults. While unquantifiable, as an interesting speculation, would an average year-class production observed in present day, have been considered poor production in pre-colonial

times, prior to the introduction of invasive species and imposed habitat limitations? By extension, would present day exceptional juvenile production, have been considered average in pre-colonial times? The converse, however, is of paramount importance, to what extent of juvenile production is needed to surpass present day predator saturation to enable shad population growth? And can it be expected present day habitat availability be able to support the necessary numbers of juvenile shad?

This type of threat is difficult to address and highlights the importance in ecosystem-based management in fisheries. Future studies such as stomach analysis on naturalized non-native species and the development of ecosystem level fish population models are critical to understanding if shad populations are being impacted by abundant predator populations. Because the non-native piscivores have become widely established in the river system and prized by numerous groups of anglers, eradication of these species is unlikely.

Flow Alteration

River flows on the Delaware River have long been manipulated by the combined outflow from three New York City Delaware Reservoirs. Management of these reservoirs is linked to a 1954 U. S. Supreme Court Decree, which provides for the supply of up to 800 million gallons per day of water to the New York City metropolitan area (283 U.S. 805, 1954). The Decree stipulates the use of reservoir releases for maintaining a river flow objective of 1,750 cfs at Montague, NJ. Over the years since the 1954 Decree, reservoir releases have been managed through a series of evolving programs based on unanimous agreement by the Parties to the Decree (States of New Jersey, New York and Delaware, Commonwealth of Pennsylvania, and New York City).

The "Flexible Flow Management Program" (FFMP) is the current framework for managing diversions and releases from New York City's Delaware Reservoirs. This program was designed by the Parties to the Decree to support multiple flow management objectives, including water supply; drought mitigation; flood mitigation; protection of the tailwater fisheries; a diverse array of habitat needs in the mainstem, estuary and bay; recreational goals; and salinity repulsion in the Delaware Estuary related to maintaining adequate water quality for municipal water supply withdrawals from the estuary. Additionally, the FFMP was structured, in part, to provide a more natural flow regime and a more adaptive means than the previous operating regimes for managing releases and diversions from these reservoirs, inclusive of improved modeling tools.

Insight relative to the Delaware River Basin water management practices to aquatic community processes have been previously evaluated (DePhilip and Moberg 2013, TNC 2017). Findings were suggestive water management strongly influenced aquatic communities by mitigating seasonal flow regimes. The 2017 Flexible Flow Management Plan structure, in part, attempts to retain natural flow regimes to the greatest extent practical, while being supportive of recognized down basin objectives (FFMP 2017). The recent changes include a thermal mitigation protocol to allow for additional reservoir releases during periods of thermal stress, which has been instituted during the summers of 2019 and 2020. Yet, significant alteration of basin water supply sources usage has high likelihood capacity to diminish resiliency of ecological meso-habitat functionality. Over management of flowing systems can reduce or eliminate natural cues/habitat that aquatic organisms rely upon to complete various stages of their life cycles.

Within the upper Delaware River Basin, the New York City Delaware Reservoirs tailwaters are specifically managed for sustaining cold-water aquatic community. Managed tailwaters encompass the East and West Branches and the Delaware River down river to Callicoon, NY (rkm 487). Thus, American Shad are considered extirpated from the West Branch and upper reaches of the East Branch (above the Beaver Kill). Yet the Delaware River main stem reach, Hancock, NY (rkm 531) to Callicoon, NY, is considered transitional to warm-water aquatic communities. This designation is presumed to support the continuance of connectivity for American Shad spawning adults and YOY access to the lower reaches of the East Branch Delaware River where they are presently known to occur. The influences of the FFMP release management upon American Shad is encapsulated in the Decision Support System (DSS) and its successor the Riverine Environmental Flow Decision Support System (REFDSS) (Bovee et al. 2007). These are Habitat Suitability Index (HSI) models coupled with Instream Flow Incremental Methodology for evaluating flow regimes upon habitat availability in the upper Delaware River. This type of modeling capability has not been extended further down river for the remainder of the Delaware River.

Impingement and Entrainment

Nearly 10 percent of Americans rely on the waters of the Delaware River Basin for drinking and industrial use (DRBC 1998). Power generating facilities, refineries, and other industries rely on withdrawal of surface water from the Delaware River 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 – I) or taken further into the cooling system (entrainment – E). Both I&E can result in the death of fish and other organisms. Larger individuals typically become impinged and smaller organisms such as eggs and larvae typically become entrained. Impingement does not necessarily result in 100% mortality of affected organisms, but entrainment is considered 100% lethal. 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 I&E are ongoing throughout the calendar year.

There are several large water intake systems at energy projects on the Delaware River. The Co-Op acquired 316b reports for five companies with cooling water intake structures (CWIS) on the Delaware River or its tributaries plus Annual Biological Monitoring Reports for the Salem Generating Station. These reports indicated that individual projects can entrain millions of American Shad eggs and larvae annually and impinge tens of thousands of juveniles (J. Mohler pers. comm.). In a river system with numerous intake facilities that occur in spawning and nursery grounds for American Shad, the cumulative impacts to the population could be substantial.

Impingement data for other important fisheries suggest that impacts may be occurring on Striped Bass and Weakfish populations, reducing the number of fish that would later be available for recreational and commercial fishing. Recent estimates derived by staff from the DNREC, Division of Fish & Wildlife (DFW) suggest that losses of early life stages of Striped Bass translate into losses of Adult Equivalents that rivals or even exceeds current commercial and recreational harvest in Delaware (Ed Hale, DFW, pers. comm.). Losses of large numbers of forage species also reduce the food resources available in the river, further impacting fish communities in the Delaware

River. Reporting of I&E losses are inconsistent. Consistent periodical assessments would aid in providing a better characterization of loss to this type of mortality.

Restoration

Over the last decade, there have been increased efforts to restore access to historic habitat for American Shad via dam removal and improved fish passage throughout the Delaware River Basin. Multiple partnerships are actively seeking to address barriers in key tributaries, and, in some instances, shad have returned to newly accessible reaches of river within the first year. While the Delaware River population has not come close to previously set restoration targets, it is clear that shad will return to restored habitat if given the opportunity. This section offers a brief overview of recent restoration efforts across the basin and highlights upcoming dam removal projects (also noted in Table 2).

The PFBC has maintained an American Shad Restoration Program since 1985. The original intent of the program envisioned returning an annual self-sustaining, wild adult spawning runs into the Lehigh and Schuylkill rivers. After 35 years of restoration efforts, including improved fish passage and hatchery stocking programs, this has not materialized as expected, and the current runs are far below previous restoration targets. The Lehigh River shad spawning runs remain well below the original expectations of successfully passing 165,000 – 465,000 wild shad annually (PFBC 1988). Similarly, annual spawning runs into the Schuylkill River also fall well short of original restoration goal of an annual run size of 300,000 – 850,000 wild shad (PFBC 1988). It is important to note, however, that these estimates are based on historic runs and available habitat within each basin and do not account for the depressed American shad population across the Delaware River basin and along the entire Atlantic Coast.

Within the Lehigh River, the wild component has been increasing, best represented in 2015, with wild shad composed over two-thirds of the Lehigh River spawning run; whereas, returning shad into the Schuylkill River are mostly (> 95%) originating from hatchery stocked shad fry. Thus, the hatchery component remains integral to both river spawning runs.

It is the conclusion of PFBC, American Shad passage into the Lehigh and Schuylkill rivers are inefficient and inadequate to support the restoration of a self-sustaining population. Yet without maintenance fry shad stockings, any future spawning run into either tributary would most likely be nominal. The PFBC will continue maintenance shad fry stockings to encourage annual spawning runs in both tributaries. Yet, PFBC will also investigate the feasibility of alternative methodology for possibly increasing the magnitude of annual hatchery stockings.

The Schuylkill River is the largest tributary to the Delaware River and historically supported American Shad runs in the hundreds of thousands. However, the numerous dams that have been built for various reasons since colonial days effectively extirpated American Shad from the river until recent times. The Fairmount Dam fish ladder, initially installed in the 1970s, underwent major renovation in 2008 and the new fish ladder has the capacity to pass 200,000 to 250,000 shad yearly, according to USFWS, but reaching these numbers would require a significant increase in the overall Delaware River Basin shad population. Between 2009 and 2018, approximately 1,500 shad have been observed passing annually, a significant improvement over the few shad that

passed prior to the renovation, but still far below expectations.

Fish passage at the lower four remaining dams on the Schuylkill River could be significantly improved. In addition to depressed basin-wide population, lower than expected passage counts at the Fairmount fish ladder are likely due to issues with the attraction flow, turbulence between pools and at the observation window, and observed predation at the entrance and within the fishway. Passage through the Fairmount Dam fishway will continue to be monitored by the Philadelphia Water Department (PWD). Upstream of Fairmount, many of the dams on the mainstem of the Schuylkill River are either breached or have been removed in the last couple decades. Figure 2 depicts the remaining six dams on the Schuylkill River and whether they have fish passage. The Flat Rock, Norristown (Swede Street), and Black Rock dams all have had fishways added, but technical issues, limited maintenance, and lack of monitoring means that these dams still serve as significant barriers to upstream migration. The New Kernsville Dam, owned by Pennsylvaina Department of Environmental Protection (PA DEP) and located in Hamburg, Pa. at rkm 161, is slated for removal with an estimated completion date in 2022.

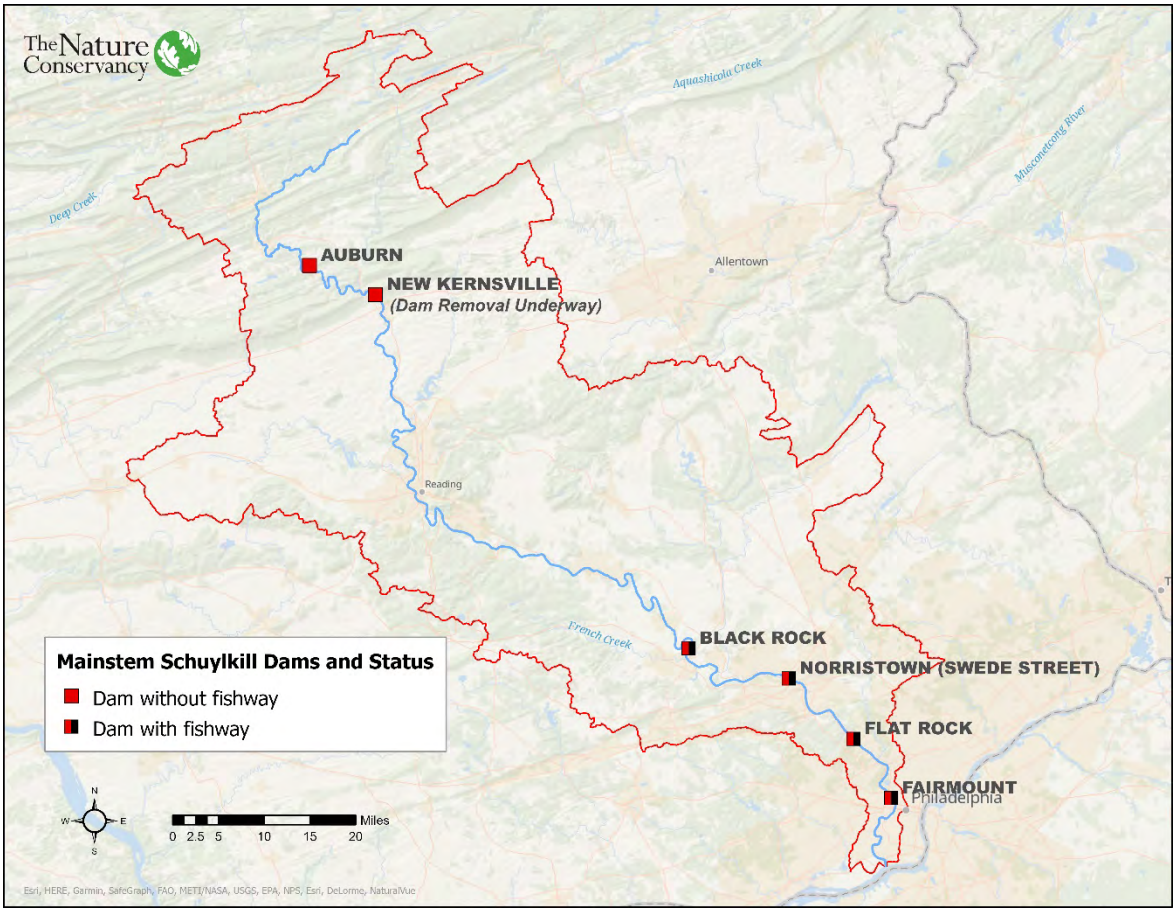

Figure 4: Schuylkill River Dams and Current Status. The map does not show several dams that are either breached or were removed in the last two decades.

Multiple partners are working to restore migratory fish passage within the Brandywine-Christina Basin. In 2014 the Byrnes Mill Dam, also known as White Clay Creek Dam No.1, was removed

and planning is underway for the removal of additional dams on White Clay Creek, including the Red Mill and Paper Mill Dams. An active partnership led by Brandywine Shad 2020 is looking to modify or remove each of the 10 remaining dams on the Brandywine that are located along a 5-mile stretch of river from Broom Street in the City of Wilmington to Brandywine State Park and the adjoining portion of New Castle County. In 2017, young-of-year (YOY) American shad were found downstream of the West Street Dam, when 386 YOY were sampled prior to the removal of the dam by the City of Wilmington in 2019. Sampling completed in the summer of 2020 confirmed that shad were spawning in the newly opened section of river upstream of the former West Street Dam and plans are underway for the modification of the next five dams.

Recent restoration efforts in non-tidal New Jersey tributaries have also expanded shad habitat within the Delaware River Basin. Between 2008 and 2016, the Musconetcong River Restoration Partnership removed five dams along the lower portion of the Musconetcong River (rkm 281). In 2017, American Shad were observed at the base of the Warren Mill Dam following the removal of the downstream Hughesville Dam in 2016. The Warren Mill Dam is a 37.5-foot High Hazard Class I Dam vulnerable to a “Sunny Day” breach and its removal will open up an additional three miles of habitat in addition to eliminating a hazard to downstream residents.

Along the Paulins Kill, The Nature Conservancy has been leading efforts to remove a series of dams and reconnect aquatic habitat. In 2018, the Columbia Lake Dam was removed near the mouth of the Paulins Kill and already American Shad have been found 17 kilometers upstream near the base of the Paulina Lake Dam, which is also slated for removal (NJDEP 2019). The Pequest River (rkm 318) is also known to have shad in its lower section and efforts are also underway to remove the two lowermost dams in Belvidere.

Conclusion

The American Shad Habitat Plan for the Delaware River Basin will continue to be updated in future years to reassess restoration efforts and key threats to restoring the shad population within the basin. According to the 2020 ASMFC Stock Assessment for American Shad, the adult mortality for the Delaware River population is currently unsustainable and habitat loss due to barriers is likely restricting positive responses in the coastwide metapopulation abundance (ASMFC 2020). With funding from National Fish and Wildlife Foundation (NFWF), The Nature Conservancy is currently developing a restoration roadmap for American Shad and River Herring in the Delaware River Basin that will lay out a basin-wide strategy for addressing key barriers to migration and improving access to historically significant spawning and rearing habitat. Several partners are already addressing some of these key barriers with recent dam removals or planned removals along major tributaries to the Delaware River, including the Schuylkill River, Brandywine and White Clay creeks, Paulins Kill, and Musconetcong River. Results from the restoration roadmap project will inform future updates to this Plan, with an anticipated final report in 2021.

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SOUTH CAROLINA HABITAT PLAN FOR AMERICAN SHAD

South Carolina Department of Natural Resources

April 2021

Introduction:

The purpose of this Habitat Plan is to briefly document existing conditions in rivers with American shad runs, identify potential threats, and propose action to mitigate such threats. American shad (*Alosa sapidissima*) are found in at least 19 rivers of South Carolina (Waccamaw, Great Pee Dee, Little Pee Dee, Lynches, Black, Sampit, Bull Creek, Santee, Cooper, Wateree, Congaree, Broad, Wando, Ashley, Ashepoo, Combahee, Edisto, Coosawhatchie, and Savannah Rivers). Many have historically supported a commercial fishery, a recreational fishery, or both. Currently, commercial fisheries exist in Winyah Bay, Waccamaw, Pee Dee, Black, Santee, Edisto, Combahee, and Savannah Rivers, while the Sampit, Ashepoo, Ashley, and Cooper rivers no longer support commercial fisheries. With the closure of the ocean-intercept fishery beginning in 2005, the Santee River and Winyah Bay complex comprise the largest commercial shad fisheries in South Carolina. Recreational fisheries still exist in the Cooper, Savannah, Edisto, and Combahee Rivers, as well as the Santee River Rediversion Canal. For the purposes of this plan, systems have been identified which, in some cases, include several rivers. Only river systems with active shad runs were included in this plan, these include the Pee Dee River run in the Winyah Bay System (primarily the Waccamaw and Great Pee Dee Rivers), the Santee-Cooper system (Santee and Cooper Rivers with the inclusion of Lakes Moultrie and Marion), and the ACE Basin (Edisto and Combahee Rivers) (Figure 1). A joint plan with Georgia was submitted and approved for the Savannah River.

Figure 1. Map of major South Carolina drainage basins and river systems with American shad (*Alosa sapidissima*) fisheries or historical American shad runs.

Pee Dee River System

Habitat Assessment

The Pee Dee River watershed encompasses parts of North Carolina and South Carolina. Beginning in North Carolina in the Appalachian Mountains, tributaries flow out across the piedmont and at the confluence of the Yadkin and Uwharrie Rivers the Great Pee Dee River begins. From there it flows 90 km in North Carolina, and 280 km in South Carolina before emptying into Winyah Bay. The Great Pee Dee River flows unimpeded for its entire length in South Carolina.

Historical Habitat

American shad inhabited all of the Great Pee Dee River (280 km) and had access to all main stem tributaries throughout the 22,258 km^2 watershed within South Carolina (SCDHEC), including Little Pee Dee River (187 km), Lynches River (225 km), Black River (243 km), and Waccamaw River (225 km) in both South Carolina and North Carolina. Stevenson (1899) reported American shad utilized the Pee Dee River throughout its entire length in South Carolina. He also reported American shad were taken 161 km up the Waccamaw River, 210 km up the Black River, and "considerable numbers" were taken 200 km up the Lynches River. Welch (2000), found contradicting reports on the historical presence of American shad in the Little Pee Dee River. A published letter to the U.S. Fish Commissioner from 1887 talked of shad in the Little Pee Dee River (Burns 1887); whereas Stevenson (1899) found no record of American shad caught in large numbers.

Current Useable Habitat

Spawning – American shad have access to all adequate habitats, there are no barriers to migration throughout the South Carolina portion of the watershed. Suitable freshwater riverine channel habitat for spawning occurs ~48 km inland and continues throughout the entire river portion of the Great Pee Dee River in South Carolina and all main stem tributaries.

Rearing - Suitable rearing habitats are similar to the listed waterways for suitable spawning habitat with the addition of 18,158 ha of estuary in the Pee Dee River basin (SCDHEC 2013).

Threats Assessment

a. Barriers to migration inventory and assessment

The Blewett Falls Dam is the furthest downstream dam on the Great Pee Dee River located at km 302. It is a North Carolina facility, however since it affects the spawning run of shad in the Pee Dee River System, it is mentioned briefly in this plan.

Action: Develop a plan for establishing fish passage at barriers in the Pee Dee River System.

Regulatory Agencies/Contacts: USFWS, NMFS, FERC, USACE, South Carolina Department of Natural Resources (SCDNR), North Carolina Wildlife Resources Commission (NCWRC), dam owners and operators, and federal and state legislators.

Goal/Target: Establish fish passage at dams in the Yadkin-Pee Dee River basin, where passage is determined to be feasible.

Progress: As part of the Federal Energy Regulation Commission (FERC) licensing process, hydroelectric facilities in the Yadkin-Pee Dee River Basin (in particular Blewett Falls Dam) are required to implement trap and truck operations by the forth spawning season following the issuance of the license. This phased approach also requires modification of the trap facility and installation of a fish exit flume, allowing direct passage of fish over Blewett Falls.

On April 1, 2015, the Federal Energy Regulatory Commission (FERC; Commission) issued Duke Energy Progress, LLC (Duke Energy) a New License for the Yadkin-Pee Dee Hydroelectric Project (Project, FERC Project No. 2206) Required fish passage and mandated flow requirements associated with the issuance of the license should greatly improve water quality in the system.

Cost: Unknown at this time.

Timeline: 2022-

b. The following is the list provided in 2013 of point source and nonpoint source activities that occur in the Savannah River. Since then, SCDHEC developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://gis.dhec.sc.gov/watersheds/

Active NPDES Facilities	*Facility Type*	*Permit Number*	*Section Number*	*Section Name*	*Receiving Stream*
INTERNATIONAL PAPER CO./GEORGETOWN	MAJOR INDUSTRIAL	SC0000868	03040207-01	(Sampit River)	SAMPIT RIVER
3V, INC.	MAJOR INDUSTRIAL	SC0036111	03040207-01	(Sampit River)	SAMPIT RIVER
CITY OF GEORGETOWN WWTP	MAJOR DOMESTIC	SC0040029	03040207-01	(Sampit River)	SAMPIT RIVER
CITY OF GEORGETOWN/WTP	MINOR INDUSTRIAL	SCG645013	03040207-01	(Sampit River)	SAMPIT RIVER
ISG GEORGETOWN INC.	MAJOR INDUSTRIAL	SC0001431	03040207-01	(Sampit River)	SAMPIT RIVER
SCPSA/WINYAH STEAM STATION	MAJOR INDUSTRIAL	SC0022471	03040207-01	(Sampit River)	TURKEY CREEK
INTERNATIONAL PAPER CO./SANTEE	MINOR DOMESTIC	SC0042960	03040207-01	(Sampit River)	TURKEY CREEK TRIBUTARY
CWS/WHITES CREEK-LINCOLNSHIRE SD	MINOR DOMESTIC	SC0030732	03040207-01	(Sampit River)	WHITES CREEK
GCSD/DEEP CREEK ELEM SCHOOL	MINOR DOMESTIC	SC0039195	03040207-02	(Great Pee Dee River/Winyah Bay)	BOSER SWAMP
GCSD/PLEASANT HILL ELEM SCHOOL	MINOR DOMESTIC	SC0039101	03040207-02	(Great Pee Dee River/Winyah Bay)	FLAT RUN SWAMP

CAROLINA SAND INC./BRITTONS NECK	MINOR INDUSTRIAL	SCG730043	03040207-02	(Great Pee Dee River/Winyah Bay)	MAPLE SWAMP
JAYCO/CANNONS LAKE MINE	MINOR INDUSTRIAL	SCG730538	03040207-02	(Great Pee Dee River/Winyah Bay)	MAPLE SWAMP
GCW&SD/PLANTERSVILLE EDR	MINOR DOMESTIC	SCG645051	03040207-02	(Great Pee Dee River/Winyah Bay)	CHAPEL CREEK TRIBUTARY
TOWN OF HEMINGWAY/WWTP	MINOR DOMESTIC	SC0039934	03040207-02	(Great Pee Dee River/Winyah Bay)	CLARK CREEK
DELTA MILLS INC./CYPRESS PLANT	MINOR INDUSTRIAL	SCG250151	03040201-12	(Great Pee Dee River)	GREAT PEE DEE RIVER
CAROLINA SAND/GRESHAM PIT	MINOR INDUSTRIAL	SCG730181	03040201-12	(Great Pee Dee River)	GREAT PEE DEE RIVER TRIBUTARY
DELTA MILLS INC./PAMPLICO PLANT	MINOR INDUSTRIAL	SCG250150	03040201-12	(Great Pee Dee River)	MILL BRANCH
TOWN OF PAMPLICO	MINOR DOMESTIC	SC0021351	03040201-12	(Great Pee Dee River)	GREAT PEE DEE RIVER
CITY OF MARION/S. MAIN ST. WWTP	MAJOR DOMESTIC	SC0046230	03040201-10	(Great Pee Dee River)	GREAT PEE DEE RIVER
DUPONT TEIJIN FILMS/FLORENCE PLANT	MAJOR INDUSTRIAL	SC0002917	03040201-10	(Great Pee Dee River)	GREAT PEE DEE RIVER
STONE CONTAINER CORP	MAJOR INDUSTRIAL	SC0000876	03040201-10	(Great Pee Dee River)	GREAT PEE DEE RIVER
MARION CERAMICS, INC./PEE DEE MINE	MINOR INDUSTRIAL	SCG730219	03040201-10	(Great Pee Dee River)	TOBYS CREEK
MOHAWK IND./OAK RIVER PLANT	MINOR INDUSTRIAL	SC0001996	03040201-08	(Great Pee Dee River)	GREAT PEE DEE RIVER
WALKER CONSTR./WALKER BORROW PIT	MINOR INDUSTRIAL	SCG730234	03040201-08	(Great Pee Dee River)	CARTERS BRANCH
DARLINGTON COUNTY/RUSSELL 2 MINE	MINOR INDUSTRIAL	SCG730515	03040201-08	(Great Pee Dee River)	BUCKHOLTZ CREEK TRIBUTARY
HANSON AGGREGATES SE/BROWNSVILLE	MINOR INDUSTRIAL	SCG730468	03040201-08	(Great Pee Dee River)	ROGERS CREEK TRIBUTARY
HANSON AGGREGATES SE/BLENHEIM	MINOR INDUSTRIAL	SCG730039	03040201-08	(Great Pee Dee River)	RIGGINS BRANCH
US CONSTRUCTORS/HANSON PIT	MINOR INDUSTRIAL	CG730435	03040201-08	(Great Pee Dee River)	GREAT PEE DEE RIVER TRIBUTARY
TOWN OF CLIO WWTF	MINOR DOMESTIC	SC0040606	03040201-08	(Great Pee Dee River)	HAGINS PRONG
TOWN OF CHERAW WWTP	MAJOR DOMESTIC	SC0020249	03040201-05	(Great Pee Dee River)	GREAT PEE DEE RIVER
DOMTAR PAPER CO.LLC/MARLBORO MILL	MAJOR INDUSTRIAL	SC0042188	03040201-05	(Great Pee Dee River)	GREAT PEE DEE RIVER
DELTA MILLS INC.	MAJOR INDUSTRIAL	SC0002151	03040201-05	(Great Pee Dee River)	GREAT PEE DEE RIVER
GALEY & LORD, INC./SOCIETY HILL	MAJOR INDUSTRIAL	SC0002704	03040201-05	(Great Pee Dee River)	GREAT PEE DEE RIVER
HANSON AGGREGATES SE/CASH MINE	MINOR INDUSTRIAL	SCG730467	03040201-05	(Great Pee Dee River)	PEE DEE RIVER TRIBUTARY
HANSON AGGREGATES SE/MARLBORO	MINOR INDUSTRIAL	SCG730359	03040201-05	(Great Pee Dee River)	CROOKED CREEK
CITY OF BENNETTSVILLE WWTP	MAJOR DOMESTIC	SC0025178	03040201-05	(Great Pee Dee River)	CROOKED CREEK
US CONSTRUCTION/BERMUDA PIT	MINOR INDUSTRIAL	SCG730472	03040201-05	(Great Pee Dee River)	CROOKED CREEK
MOREE FARMS/PARADISE PIT	MINOR INDUSTRIAL	SCG730558	03040201-05	(Great Pee Dee River)	SPOT MILL CREEK TRIBUTARY
SCHAEFFLER GROUP USA, INC	MINOR INDUSTRIAL	SCG250163	03040201-05	(Great Pee Dee River)	WILSON BRANCH TRIBUTARY
PALMETTO BRICK/IRBY MINE	MINOR INDUSTRIAL	SCG730240	03040201-05	(Great Pee Dee River)	PHILS CREEK
PALMETTO BRICK/ROBERTS MINE	MINOR INDUSTRIAL	SCG730573	03040201-05	(Great Pee Dee River)	PHILS CREEK TRIBUTARY
PALMETTO BRICK/WINBURN MINE	MINOR INDUSTRIAL	SCG730241	03040201-05	(Great Pee Dee River)	CEDAR CREEK
MARLBORO COUNTY/COUNTY PIT	MINOR INDUSTRIAL	SCG730158	03040201-05	(Great Pee Dee River)	BEVERLY CREEK
PALMETTO BRICK/CLINKSCALE MINE	MINOR INDUSTRIAL	SCG730443	03040201-05	(Great Pee Dee River)	BEAVERDAM CREEK TRIBUTARY
PALMETTO BRICK/PEFUES MINE	MINOR INDUSTRIAL	SCG730434	03040201-03	(Great Pee Dee River)	MARKS CREEK
OLD CASTLE STONE/ESKRIDGE MINE	MINOR INDUSTRIAL	SCG730475	03040201-03	(Great Pee Dee River)	GREAT PEE DEE RIVER TRIBUTARY
MARION CERAMICS/PAVER MINE	MINOR INDUSTRIAL	SCG730218	03040201-03	(Great Pee Dee River)	GREAT PEE DEE RIVER TRIBUTARY

Water Quantity					
Water User	***Regulated Cap. (MGD)***	***Pumping Cap. (MGD)***	***Section Number***	***Section Name***	***Stream***
CITY OF GEORGETOWN	5.2	10.5	03040207-02	(Great Pee Dee River/Winyah Bay)	GREAT PEE DEE RIVER
GSW&SA/BULL CREEK REGIONAL WTP	50.87	60.42	03040207-02	(Great Pee Dee River/Winyah Bay)	BULL CREEK
TOWN OF CHERAW	4.5	11.5	03040201-05	(Great Pee Dee River)	GREAT PEE DEE RIVER
CITY OF BENNETTSVILLE	4	6	03040201-05	(Great Pee Dee River)	LAKE WALLACE

All point source, nonpoint source, and water withdrawals that occur in the Pee Dee River System are closely monitored by the South Carolina Department of Health Environmental Control (DHEC). All discharges are held to water quality standards for the state. Therefore, it is highly unlikely these programs impact adult American shad migration and utilization of historic habitat. In addition, all programs are currently undergoing cooling water intake structures rules (40 CFR 122 and 125) analysis to assess the likelihood of impingement or entrainment in efforts to ensure compliance with the proposed EPA 316(b).

c. Toxic and thermal discharge inventory and assessment-none

d. Channelization and dredging

The following is a list of historic dredging programs that occurred in 2013 in the Pee Dee River System. Since then, USACE developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://permits.ops.usace.army.mil/orm-public

Start_Date	River	DA_Number	Action_Typ	Project_Na	County	Latitude	Longitude
8/20/1993	Pee Dee	SAC-1993-12414	NWP	WATERFORD PLANTATION CANAL	Georgetown	33.428610	-79.194440
7/13/1994	Pee Dee	SAC-1994-10314	LOP	CANAL MAINTENANCE EXCAVATION	Darlington	34.352990	-79.691980
8/9/1994	Pee Dee	SAC-1994-22612	NWP	DREDGING	Georgetown	33.305700	-79.292900
12/2/1994	Pee Dee	SAC-1994-15178	NWP	SAMPIT SHIPARD	Georgetown	33.353890	-79.306670
5/9/1995	Pee Dee	SAC-1995-10620	SP	STATE PIER #32 DREDGING	Georgetown	33.366570	-79.290710
7/17/1996	Pee Dee	SAC-1996-10887	SP	EMERGENCY CANAL DREDGE	Georgetown	33.701700	-79.258600
5/26/1998	Pee Dee	SAC-1998-11458	SP	SANDBAR REMOVAL	Chesterfield	34.707220	-79.876110
11/19/1999	Pee Dee	SAC-1999-11854	SP	GEORGETOWN LANDING MARINA US HWY 17	Georgetown	33.366600	-79.268360
1/3/2003	Pee Dee	SAC-2003-13032	SP	BELLE ISLE MARINA	Georgetown	33.306220	-79.292630
5/13/2008	Pee Dee	SAC-1985-08234-4NJ	NWP	SCWMRD	Horry	33.664130	-79.135730
12/7/2012	Pee Dee	SAC-2000-11969	SP	BELLE ISLE MARINA DREDGING	Georgetown	33.304400	-79.293100

In addition, the shipping channel near Georgetown, SC is 28.8 km long and authorized to 8.2 m. However, funding is rarely available to maintain it. Currently, it is significantly shallower than 8.2 m in some areas.

It is highly unlikely current or past dredging operations are having impacts on adult American shad migration and utilization of historic habitat.

e. The following is a list of land use and mining activities that occurred in 2013 in the Pee Dee River System. Since then, SCDHEC developed an interactive web-based database tool to better

assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://gis.dhec.sc.gov/watersheds/

Nonpoint Source Management Program				
Landfill Facilities	***Status***	***Permit #***	***Section Number***	***Section Name***
INTERNATIONAL PAPER, INC. LANDFILL	ACTIVE	222435-1601	03040207-01	(Sampit River)
INTERNATIONAL PAPER, INC. LANDFILL	ACTIVE	222654-8001	03040207-01	(Sampit River)
INTERNATIONAL PAPER, INC. LANDFILL	ACTIVE	222654-8002	03040207-01	(Sampit River)
FRASIER COMPOSTING SITE	ACTIVE	222679-3001	03040207-01	(Sampit River)
MCKENZIE WOOD CHIPPING	ACTIVE	222732-3001	03040207-01	(Sampit River)
MILLER WOOD PROCESSING FACILITY	ACTIVE	222763-3001	03040207-01	(Sampit River)
TOWN OF HEMMINWAY COMPOSTING SITE	ACTIVE	451003-3001	03040207-02	(Great Pee Dee River/Winyah Bay)
THOMPSONS LAND CLEARING	ACTIVE	222678-3001	03040207-02	(Great Pee Dee River/Winyah Bay)
SMURFIT STONE CONTAINER CORP.	ACTIVE	213310-1601	03040201-10	(Great Pee Dee River)
FLORENCE COUNTY C&D LANDFILL	ACTIVE	211001-1201	03040201-10	(Great Pee Dee River)
CITY OF BENNETTSVILLE TRANSFER STA.	ACTIVE	351002-6001	03040201-08	(Great Pee Dee River)
MARLBORO COUNTY COMPOSTING FACILITY	ACTIVE	351001-3001	03040201-08	(Great Pee Dee River)
PALMETTO BRICK CO.	ACTIVE	353324-1601	03040201-05	(Great Pee Dee River)
FURR FACILITY C&D LANDFILL	ACTIVE	132670-1201	03040201-05	(Great Pee Dee River)
MCDUFFIE & SON COMPOSTING	ACTIVE	352691-3001	03040201-05	(Great Pee Dee River)
WEYERHAEUSER COMPANY	ACTIVE	353301-1601	03040201-05	(Great Pee Dee River)
WEYERHAEUSER COMPANY	ACTIVE	353301-8001	03040201-05	(Great Pee Dee River)
CHESTERFIELD COUNTY LANDFILL	ACTIVE	131001-1601	03040201-05	(Great Pee Dee River)

Mining Activities	***Mineral***	***Permit #***	***Section Number***	***Section Name***
SAMPIT MINE	SAND	1639-43	03040207-01	(Sampit River)
HARMONY TOWNSHIP LAKES 1&2	SAND	1655-43	03040207-01	(Sampit River)
GRESHAM MINE NECK SAND MINE #2	SAND	0899-67	03040207-02	(Great Pee Dee River/Winyah Bay)
BACCHUS LAKE MINE	SAND	1682-67	03040207-02	(Great Pee Dee River/Winyah Bay)
CANNONS LAKE MINE	SAND	1552-67	03040207-02	(Great Pee Dee River/Winyah Bay)
WHITE HALL SAND MINE	SAND	1675-67	03040207-02	(Great Pee Dee River/Winyah Bay)
RICHARDSON MINE	SAND/GRAVEL	1765-67	03040207-02	(Great Pee Dee River/Winyah Bay)
JOHNSON ROAD MINE	SAND	1704-67	03040207-02	(Great Pee Dee River/Winyah Bay)
CHARLIE RICHARDSONS LAKE MINE	SAND	1776-67	03040207-02	(Great Pee Dee River/Winyah Bay)
PEE DEE CERAMICS MINE	CLAY	0050-67	03040201-10	(Great Pee Dee River)
BAKER BROTHERS OF GRESHAM INC	SAND; SAND/CLAY	0959-31	03040201-08	(Great Pee Dee River)
RUSSELL MINE #2	SAND/CLAY	0967-31	03040201-08	(Great Pee Dee River)
WALKER BORROW PIT	SAND	1195-69	03040201-08	(Great Pee Dee River)
BROWNSVILLE PLANT	SAND/GRAVEL	0090-69	03040201-08	(Great Pee Dee River)
CLINKSCALE	SAND	1528-69	03040201-05	(Great Pee Dee River)
MARLBORO PIT	CLAY	0171-69	03040201-05	(Great Pee Dee River)
ROBERTS MINE	SAND	1559-69	03040201-05	(Great Pee Dee River)

CASH PLANT	SAND/GRAVEL	0092-25	03040201-05	(Great Pee Dee River)
PEE DEE MINE	SAND/GRAVEL	0466-25	03040201-05	(Great Pee Dee River)
MARLBORO COUNTY PIT	SAND/CLAY	0280-69	03040201-05	(Great Pee Dee River)
BURNT FACTORY MINE	SAND/CLAY	1716-69	03040201-05	(Great Pee Dee River)
MARLBORO PLANT	SAND/GRAVEL	0095-69	03040201-05	(Great Pee Dee River)
MARLBORO FIELD PLANT	SAND/GRAVEL	0096-69	03040201-05	(Great Pee Dee River)
WINBURN	KAOLIN	0997-25	03040201-05	(Great Pee Dee River)
PEGUES MINE	SHALE	1485-69	03040201-03	(Great Pee Dee River)
MARLBORO COUNTY MINE	SAND	0726-69	03040201-03	(Great Pee Dee River)
MARION CERAMICS INC. - PAVER MINE	SHALE	0550-69	03040201-03	(Great Pee Dee River)

All land use and mining activities that occur in the Pee Dee River System are closely monitored by the South Carolina Department of Health Environmental Control (DHEC). Therefore, it is highly unlikely these programs impact adult American shad migration and utilization of historic habitat.

f. Atmospheric deposition

Atmospheric deposition is measured as a cooperative effort between many different groups, including federal, state, tribal and local governmental agencies, educational institutions, private companies, and non-governmental agencies as part of the National Atmospheric Deposition Program (NADP). This organization uses many networks (NTN, AIRMoN, MDN, AMNet, and AMNoN) to monitor methyl mercury, ammonia, etc. Detailed information concerning atmospheric deposition in SC can be found at the following website: http://nadp.sws.uiuc.edu/data/annualmaps.aspx

It does not appear that current levels of atmospheric deposition are impacting American shad migrations or utilization of historic habitat.

g. Climate change assessment

A changing climate will present water-related challenges for American shad in several areas including: water quality, water quantity and changes in sea level. Current climate models predict continued warming across the southeast, with the greatest temperature increases projected in summer. Average annual temperatures are projected to rise 4.5°F by the 2080s under a lower emissions scenario and 9°F under a higher emissions scenario with a 10.5°F increase in summer. The frequency, duration and intensity of droughts are likely to continue to increase with higher average temperatures and a higher rate of evapotranspiration. Drought conditions could potentially impact American shad recruitment and long duration drought could negatively impact multiple year classes. Sea level rise is of concern because of the expected change in location of the saltwater/freshwater interface. As sea level rises, saltwater will move further up the river systems of the state thus reducing the amount freshwater spawning habitat available. The amount and distribution of aquatic vegetation also will change in response to increases in

salinity, limiting cover and food sources for aquatic organisms. A changing climate will impact the water resources of South Carolina and will present challenges for American shad management.

Action: Develop a climate change plan.

Regulatory Agencies/Contacts: SC Department of Natural Resources (SCDNR)

Goal/Target: Establish recommendations to address climate change.

Progress: A "draft" plan has been developed and is still under review (Appendix 1)

Cost: Unknown at this time.

Timeline: Unknown

h. Competition and predation by invasive and managed species assessment

Aquatic invasive species occur throughout South Carolina's coastal rivers, and non-native ictalurids are some of the most ubiquitous invasive species. Flathead catfish (*Pylodictis olivaris*) and blue catfish (*Ictalurus furcatus*) were introduced into South Carolina in 1964 and are now found in all of South Carolina's coastal rivers. A significant portion of blue catfish and especially flathead catfish diet is comprised of fish, and due to their large adult size (>60 lbs) they have the potential to consume both adult and juvenile American shad. Ictalurid population information is currently unavailable for South Carolina's coastal rivers; however current studies are occurring in South Carolina and other neighboring states to assess the potential impacts of non-native catfish on American shad.

Action: Develop an invasive species plan.

Regulatory Agencies/Contacts: SC Department of Natural Resources (SCDNR)

Goal/Target: Establish recommendations to address invasive species.

Progress: SCDNR programs are currently monitoring catch rates of invasive catfish as part of non-targeting sampling and any flat head catfish captured during these activities are being removed from the system. In addition, current eradication programs, such as those on the Satilla River, GA, are being reviewed by SCDNR staff to determine if such programs are feasible for SC Rivers.

Cost: Unknown at this time.

Timeline: Unknown

Santee-Cooper System

Habitat Assessment

Watersheds in the Santee River basin begin in the foothills of the Blue Ridge Mountains, flow across the piedmont and coastal plain before emptying in the Atlantic Ocean. Santee River basin is the second largest watershed on the Atlantic coast of the United States, and through the works of man in the 1940's the Santee River was directly connected to the Cooper River. The connection was made by building Santee (Wilson) Dam on the Santee River at ~km 145 creating Lake Marion, then Lake Moultrie was constructed by diking and the two lakes were connected via a canal. Pinopolis Dam was constructed on Lake Moultrie and a ~7 km tailrace canal was dug to deliver the majority of the Santee River flow into Cooper River. Prior to the diversion of the Santee River, the Cooper River was a coastal plain, tidally influenced tributary to Charleston Harbor. In 1985, a 18.5 km rediversion canal and St. Stephens Dam were completed that rerouted a majority of the Santee River flow back to the historical Santee River channel at ~rkm 85.

Historical Habitat

Prior to dam construction, American shad inhabited many major rivers with suitable spawning and rearing habitat throughout a 27,454 km^2 watershed in South Carolina and a 13,726 km^2 watershed in North Carolina, these included the Santee River (230 km), and its major tributaries the Wateree River (120 km), Congaree River (76 km), Broad River (241 km), and the Catawba River (350 km) located in South Carolina and North Carolina. Although the complete distribution of American shad is unknown there were also historical records from smaller tributaries of the Broad River; such as Saluda River, Enoree River, Tyger River, and Pacolet River (Welch, 2000). The Cooper River also provided 67 km of suitable habitat.

Current Useable Habitat

Spawning – American shad begin spawning in tidal freshwater near rkm 48, and have about 105 km of suitable riverine channel habitat for spawning in the Santee River below the Santee-Cooper Dams and an additional 40km in the Cooper River (McCord 2003). Two of the three dams of the Santee-Cooper reservoir project provide American shad passage. A boat lock at Pinopolis Dam is operated for anadromous fish passage on the Cooper River, and a fish lift operates for anadromous fish passage at St. Stephens Dam on the rediversion canal. These passage facilities provide American shad access to areas of suitable spawning habitat such as Lake Marion (44,515 ha), Upper Santee River (above Lake Marion) (9.5 km), Wateree River to the base of Wateree Dam (121 km), Congaree River (76 km), and Broad River to the Columbia Diversion Dam (4 km). An additional fishway at Columbia Diversion Dam provides passage for American shad in the Broad River to the base of Parr Dam (39 km). Adult American shad are annually encountered in all currently available habitats.

Rearing-Suitable rearing habitats are similar to the listed waterways for suitable spawning habitat with the addition of Lake Moultrie (24,281 ha), and the estuaries of the Santee River basin (7,420 ha) and Charleston Harbor (18,518 ha) (SCDHEC 2013).

Threats Assessment

a. Barriers to migration inventory and assessment

The following are a list of dams on the Santee Cooper River System:

Name	Pupose	Owner	Height (ft.)	Width (ft.)	Length (ft.)	Impoundment size (ha)	Water storage capacity (acre/ ft.)	Location	River Kilometer	Fish Passage	Method
Jefferies Dam	Hydro	Santee-Cooper	~85	~60	11,500	38,400	1,129,480	33°14'40.78"N/79°59'28.95"W	77	Yes	Lock
Santee Dam	Hydro	Santee-Cooper	48	~30	40,940	24,000	1,180,800	33°27'13.59"N/ 80° 9'50.30"W	140	No	
St. Stephen Dam	Hydro	Santee-Cooper	128	~156	965	38,400	1,129,480	33°25'36.19"N/79°55'51.57"W	84	Yes	Fish Lock

Action: Develop a plan for establishing fish passage at barriers in the Santee Cooper River System.

Regulatory Agencies/Contacts: USFWS, NMFS, FERC, USACE, South Carolina Department of Natural Resources (SCDNR), dam owners and operators, and federal and state legislators.

Goal/Target: Establish fish passage at dams in the Santee Cooper River River basin, where passage is determined to be feasible.

Progress: As part of the Federal Energy Regulation Commission (FERC) licensing process, hydroelectric facilities in the Santee Cooper River Basin (in particular Santee Dam) are required provide upstream and downstream passage for anadromous fishes following the issuance of the license. This will require construction of a fishway at the Santee Dam and modifications at the Jefferies Dam (Pinopolis Lock). In addition, mandated flow requirements associated with the issuance of the license should greatly improve water quality in the system.

A Biological Opinion for Atlantic and shortnose sturgeon from NMFS was issued 01/22/2020. However, to date, FERC has yet to issue a license for the Santee Cooper Project (Project, FERC Project No. 199).

Cost: Unknown at this time.

Timeline: unknown

b. The following is a list of point source and nonpoint sources that occurred in 2013 in the Santee River. Since then, SCDHEC developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://gis.dhec.sc.gov/watersheds/

Active NPDES Facilities	*Facility Type*	*Permit Number*	*Section Number*	*Section Name*	*Receiving Stream*
GCW&SD NORTH SANTEE WWTP	MINOR DOMESTIC	SC0042439	03050112-060	(North Santee River/South Santee River)	NORTH SANTEE RIVER
SCPSA/WINYAH STEAM	MAJOR INDUSTRIAL	SC0022471	03050112-060	(North Santee River/South Santee River)	NORTH SANTEE RIVER
TOWN OF ST STEPHEN	MINOR DOMESTIC	SC0025259	03050112-030	(Santee River)	SANTEE RIVER
CHARGEURS WOOL (USA), INC.	MAJOR INDUSTRIAL	SC0000990	03050112-030	(Santee River)	SANTEE RIVER
MARTIN MARIETTA/GEORGETOWN II (SOUTHERN AGGR.)	MINOR INDUSTRIAL	SCG730059	03050112-030	(Santee River)	DUTART CREEK
US ARMY/ST. STEPHEN POWER PLANT	MINOR INDUSTRIAL	SC0047937	03050112-020	(Rediversion Canal)	REDIVERSION CANAL
GA PACIFIC RESINS/RUSSELVILLE/CHEM	MINOR INDUSTRIAL	SCG250181	03050112-020	(Rediversion Canal)	REDIVERSION CANAL
GA PACIFIC CORP./RUSSELVILLE/PARTICLE	MINOR INDUSTRIAL	SCG250179	03050112-020	(Rediversion Canal)	REDIVERSION CANAL
ALBANY INTNL/PRESS FABRIC	MINOR INDUSTRIAL	SC0002569	03050112-020	(Rediversion Canal)	CURRIBOO BRANCH
WILLIAMSBURG CO. W&SA/SANTEE RIVER WWTP	MINOR DOMESTIC	SC0048097	03050112-010	(Santee River)	SANTEE RIVER
PINEWOOD SITE-HILLS/LABRUCE MINE	MINOR INDUSTRIAL	SCG730026	03050111-010	(Santee River)	LAKE MARION
PINEWOOD CUSTODIAL TRUST	MINOR INDUSTRIAL	SC0042170	03050111-010	(Santee River)	LAKE MARION
MARTIN MARIETTA/BERKELEY QUARRY	MINOR INDUSTRIAL	SCG730058	03050111-010	(Santee River)	LAKE MARION TRIBUTARY
TOWN OF PINEWOOD WWTP	MINOR DOMESTIC	SC0046868	03050111-010	(Santee River)	BALLARD CREEK

Nonpoint Source Management Program				
Landfill Facilities	*Status*	*Permit #*	*Section Number*	*Section Name*
GA PACIFIC CORP. CHEM.	ACTIVE	083304-1601 (IWP-078, CWP-026)	03050112-020	(Rediversion Canal)
DUKE POWER CO.	ACTIVE	463303-1601 (IWP-192, IWP-128)	03050111-010	(Santee River)
JF CLECKLEY & CO./PLT #4		IWP-025, IWP-023	03050111-010	(Santee River)
JF CLECKLEY & CO./PLT #6		IWP-060	03050111-010	(Santee River)
LAIDLAW ENVIR. SERVICES	ACTIVE	IWP-145	03050111-010	(Santee River)

The following is a list of point source and nonpoint sources that occurred in 2013 in the Cooper River. Since then, SCDHEC developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://gis.dhec.sc.gov/watersheds/

Active NPDES Facilities	*Facility Type*	*Permit Number*	*Section Number*	*Section Name*	*Receiving Stream*
MEAD WESTVACO SC	MAJOR INDUSTRIAL	SC0001759	03050201-050	(Cooper River)	COOPER RIVER
AMERADA HESS/VIRGINIA AVE. N.	MINOR INDUSTRIAL	SC0002852	03050201-050	(Cooper River)	COOPER RIVER
AMERADA HESS/VIRGINIA AVE. S.	MINOR INDUSTRIAL	SC0002861	03050201-050	(Cooper River)	COOPER RIVER
ALLIED TERMINALS/CHARLESTON	MINOR INDUSTRIAL	SC0001350	03050201-050	(Cooper River)	COOPER RIVER
SOPUS PRODUCTS/CHAS	MINOR INDUSTRIAL	SC0003026	03050201-050	(Cooper River)	COOPER RIVER
SUN CHEMICAL CORP.	MAJOR DOMESTIC	SC0003441	03050201-050	(Cooper River)	COOPER RIVER
US NAVY/WEAPONS STATION	MINOR INDUSTRIAL	SC0043206	03050201-050	(Cooper River)	COOPER RIVER
NCSD/FELIX DAVIS WWTP	MAJOR DOMESTIC	SC0024783	03050201-050	(Cooper River)	COOPER RIVER
OAK AMERICAS LLC/COOPER RIVER PLT.	MAJOR INDUSTRIAL	SC0026506	03050201-050	(Cooper River)	COOPER RIVER
BP AMOCO CHEMICALS/COOPER RIVER	MAJOR INDUSTRIAL	SC0028584	03050201-050	(Cooper River)	COOPER RIVER
BCW&SA/LOWER BERKELEY WWTP	MAJOR DOMESTIC	SC0046060	03050201-050	(Cooper River)	COOPER RIVER
NUCOR STEEL/BERKELEY PLT	MAJOR INDUSTRIAL	SC0047392	03050201-050	(Cooper River)	COOPER RIVER

MT PLEASANT WATER PLANT #2	MINOR DOMESTIC	SC0043273	03050201-050	(Cooper River)	COOPER RIVER
EVENING POST PUBLISHING CO.	MINOR INDUSTRIAL	SCG250040	03050201-050	(Cooper River)	COOPER RIVER TRIBUTARY
CHARLESTON CPW/DANIEL ISLAND	MINOR DOMESTIC	SC0047074	03050201-050	(Cooper River)	TIDAL CREEK TO COOPER RIVER
SCE&G/WILLIAMS STATION	MAJOR INDUSTRIAL	SC0003883	03050201-050	(Cooper River)	TIDAL CREEK TO COOPER RIVER
DEFENSE FUEL SUPPORT PT/CHAS	MINOR INDUSTRIAL	SCG340022	03050201-050	(Cooper River)	FILBIN CREEK
MEAD WESTVACO CORP/CHAS	MAJOR INDUSTRIAL	SC0001759	03050201-050	(Cooper River)	FILBIN CREEK
KINDER MORGAN BULK TERM./N. CHAS	MINOR INDUSTRIAL	SCG340015	03050201-050	(Cooper River)	FILBIN CREEK
KINDER MORGAN BULK TERM./SHIPYARD RIV. TERM	MINOR INDUSTRIAL	SC0048046	03050201-050	(Cooper River)	SHIPYARD CREEK
MONTENAY CHARLESTON/RESOURCE RECOVERY	MINOR INDUSTRIAL	SC0041173	03050201-050	(Cooper River)	SHIPYARD CREEK
TOWN OF MONCKS CORNER WWTP	MAJOR DOMESTIC	SC0021598	03050201-030	(West Branch Cooper River)	WEST BRANCH COOPER RIVER
BCW&SA/CENTRAL BERKELEY WWTP	MINOR DOMESTIC	SC0039764	03050201-030	(West Branch Cooper River)	WEST BRANCH COOPER RIVER
SCE&G/WILLIAMS ASH DISP	MINOR INDUSTRIAL	SC0046175	03050201-030	(West Branch Cooper River)	WAPPOOLA SWAMP
SCE&G/WILLIAMS LANDFILL	MINOR INDUSTRIAL	SC0039535	03050201-030	(West Branch Cooper River)	MOLLY BRANCH
OAKLEY MAINTENANCE FACILITY MINOR DOMESTIC	MINOR DOMESTIC	SC0026867	03050201-030	(West Branch Cooper River)	MOLLY BRANCH TRIBUTARY
D&A PARTNERSHIP/DANGERFIELD MINE	MINOR INDUSTRIAL	SCG730125	03050201-030	(West Branch Cooper River)	MOLLY BRANCH
SCPSA/CROSS GENERATING STATION	MAJOR INDUSTRIAL	SC0037401	03050201-010	(Lake Moultrie)	DIVERSION CANAL
US NAVY/SHORT STAY REC. FAC.	MINOR INDUSTRIAL	SC0024708	03050201-010	(Lake Moultrie)	LAKE MOULTRIE
BERKELEY COUNTY/CROSS HIGH SCHOOL	MINOR DOMESTIC	SC0027103	03050201-010	(Lake Moultrie)	LAKE MOULTRIE
SCPSA/JEFFERIES GENERATING STATION	MAJOR INDUSTRIAL	SC0001091	03050201-010	(Lake Moultrie)	TAIL RACE CANAL
C.R. BARD, INC.	MAJOR INDUSTRIAL	SC0035190	03050201-010	(Lake Moultrie)	TAIL RACE CANAL
SCPSA/MONCKS CORNER WTP	MINOR DOMESTIC	SCG641011	03050201-010	(Lake Moultrie)	TAIL RACE CANAL
BERKELEY COUNTY/CROSS ELEM SCHOOL	MINOR DOMESTIC	SC0034479	03050201-010	(Lake Moultrie)	DUCK POND CREEK

Nonpoint Source Management Program				
Landfill Facilities	***Status***	***Permit #***	***Section Number***	***Section Name***
WESTVACO LANDFILL	ACTIVE	IWP-177, IWP-090, IWP-150	03050201-050	(Cooper River)
SCE&G/WILLIAMS STATION	ACTIVE	083320-1601 (IWP-191)	03050201-030	(West Branch Cooper River)
SCE&G/GENCO/WILLIAMS STATION	ACTIVE	083309-1601	03050201-030	(West Branch Cooper River)
BERKELEY COUNTY LANDFILL	ACTIVE	081001-1101	03050201-030	(West Branch Cooper River)
SCPSA/CROSS GENERATING STATION	ACTIVE	085801-1601	03050201-010	(Lake Moultrie)
C&D LANDFILL	--------	083322-1201	03050201-010	(Lake Moultrie)

All point source and nonpoint sources that occur in the Santee Cooper River System are closely monitored by the South Carolina Department of Health Environmental Control (DHEC). All discharges are held to water quality standards for the state. Therefore, it is highly unlikely these programs impact adult American shad migration and utilization of historic habitat. In addition, all programs are currently undergoing Cooling Water Intake Structures Rules (40 CFR 122 and 125) analysis to assess the likelihood of impingement or entrainment in efforts to ensure compliance with the proposed EPA 316(b).

c. Toxic and thermal discharge inventory and assessment-none

d. Channelization and dredging

The following is a list of historic dredging programs that occurred in the Cooper River System. Since then, USACE developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://permits.ops.usace.army.mil/orm-public

Start_Date	River	DA_Number	Action_Typ	Project_Na	County	Latitude	Longitude
9/9/1993	Cooper	SAC-1993-10092	SP	MAINTENANCE EXCAVATION	Berkeley	33.210830	-79.976110
9/2/1994	Cooper	SAC-1994-10386	SP	TAIL RACE CANAL DUCT SYSTEM	Berkeley	33.212300	-79.974540
4/10/1995	Cooper	SAC-1995-10597	SP	MARITIME CENTER	Charleston	32.787740	-79.926830
7/20/1995	Cooper	SAC-1995-10659	SP	MAINTENANCE DREDGING	Charleston	32.882200	-79.964600
11/24/1995	Cooper	SAC-1995-10730	SP	REISSUE 854D324 DREDGING	Charleston	32.883330	-79.966670
8/29/1995	Cooper	SAC-1995-12639	NWP	YACHT BASIN DREDGING	Charleston	32.772790	-79.926430
2/8/1996	Cooper	SAC-1996-10773	SP	MAINTENANCE DREDGING NAVY BASE	Charleston	32.883330	-79.966670
8/20/1996	Cooper	SAC-1996-10943	SP	DREDGING AT PIER P	Charleston	32.851390	-79.945830
9/22/1997	Cooper	SAC-1997-11257	SP	PIERS TANGO & SIERRA	Charleston	32.849720	-79.938330
8/7/1997	Cooper	SAC-1997-13631	NWP	METAL TRADES INC PIER H	Charleston	32.859530	-79.959140
6/23/1997	Cooper	SAC-1997-22569	NWP	SILTING NAVIGATION PROBLEMS	Berkeley	33.181100	-79.976900
6/18/1997	Cooper	SAC-1997-22633	NWP	DREDGE CANAL	Berkeley	33.180500	-79.975000
3/19/1998	Cooper	SAC-1998-11402	SP	BETWEEN PIER TANGO AND PIER SIERRA	Charleston	32.849720	-79.938330
1/29/1999	Cooper	SAC-1999-11623	SP	STATE PIER 8 MAINTENANCE DREDGING	Charleston	32.798620	-79.930090
4/30/1999	Cooper	SAC-1999-11708	SP	ATF MAINTENANCE DREDGING	Charleston	32.829440	-79.937780
8/6/1999	Cooper	SAC-1999-11777	SP	MAINTENANCE DREDGING LOP	Charleston	32.829440	-79.937780
7/5/2000	Cooper	SAC-2000-11971	SP	MAINTENANCE DREDGING STATE PIER 15	Charleston	32.902700	-79.959400
7/5/2000	Cooper	SAC-2000-11972	SP	UNION PIER TERMINAL STATE PIER 2	Charleston	32.781390	-79.923610
4/11/2001	Cooper	SAC-2001-12267	SP	CHARLESTON NAVAL COMPLEX DREDGING	Charleston	32.863700	-79.963200
4/11/2001	Cooper	SAC-2001-12268	SP	MAINTENANCE DREDGING PIERS Z M & N	Charleston	32.852200	-79.947400
4/11/2001	Cooper	SAC-2001-12269	SP	MAINTENANCE DREDING PIER P	Charleston	32.883330	-79.966670
10/2/2001	Cooper	SAC-2001-12429	SP	BERTH MAINTENANCE DREDGING	Charleston	32.883010	-79.967970
7/8/2002	Cooper	SAC-2002-12823	SP	COOPER RIVER MARINA EXPANSION	Charleston	32.831750	-79.935020
1/2/2003	Cooper	SAC-2003-13026	SP	UNION PIER TERMINAL STATE PIER 2	Charleston	32.783900	-79.924400
3/12/2003	Cooper	SAC-2003-13099	SP	COLUMBUS STREET TERMINAL	Charleston	32.793790	-79.926260
4/22/2005	Cooper	SAC-2005-15947	NWP	BIGGINS LANDING - MINOR DREDGING	Berkeley	33.212190	-79.973770
11/16/2006	Cooper	SAC-2006-03557	SP	BERTH MAINTENANCE DREDGING	Charleston	32.881390	-79.967500
12/14/2006	Cooper	SAC-2006-03772	SP	BIGGINS LANDING DREDGING (SANTEE COOPER)	Berkeley	33.212950	-79.973900

The following is a list of historic dredging programs that occurred in the Santee Cooper Lakes System. Since then, USACE developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://permits.ops.usace.army.mil/orm-public

Start_Date	River	DA_Number	Action_Typ	Project_Na	County	Latitude	Longitude
4/19/1993	Santee Cooper Lakes	SAC-1993-17035	NWP	SANTEE LAKES	Calhoun	33.541020	-80.509260
11/5/1993	Santee Cooper Lakes	SAC-1993-18242	NWP	MAINTENANCE DREDGING CROSS S/D	Berkeley	33.328000	-80.146000
11/1/1993	Santee Cooper Lakes	SAC-1993-18243	NWP	MAINTENANCE EXCAVATION	Orangeburg	33.500000	-80.452780
1/11/1994	Santee Cooper Lakes	SAC-1994-10173	SP	BOAT SLIP EXCAVATION	Clarendon	33.481940	-80.374440
4/21/1994	Santee Cooper Lakes	SAC-1994-12510	NWP	STUMP HOLE LANDIANG DREDGE	Clarendon	33.570000	-80.503330
11/15/1994	Santee Cooper Lakes	SAC-1994-18248	NWP	MAINTENANCE DREDGING	Berkeley	33.230870	-80.018930
7/31/1996	Santee Cooper Lakes	SAC-1996-10902	SP	LAND O PINES S/D CANAL DREDGE	Berkeley	33.219200	-80.047100
8/5/1996	Santee Cooper Lakes	SAC-1996-10917	SP	FRANCIS MARION S/D DREDGING	Clarendon	33.481900	-80.380600
1/9/1997	Santee Cooper Lakes	SAC-1997-11060	SP	POLLYS LANDING MARINA	Clarendon	33.509700	-80.423600

11/7/1997	Santee Cooper Lakes	SAC-1997-12902	NWP	JACK'S HOLE CANAL MAINTENANCE	Berkeley	33.333500	-79.994640
8/30/1999	Santee Cooper Lakes	SAC-1999-11801	SP	COVE 1 MAINTENANCE EXCAVATION	Clarendon	33.496180	-80.412270
3/10/1999	Santee Cooper Lakes	SAC-1999-15973	NWP	EXCAVATION	Clarendon	33.482450	-80.386920
2/17/1999	Santee Cooper Lakes	SAC-1999-22910	NWP	EXCAVATION NEAR SPIERS LANDING	Berkeley	33.384900	-80.181700
1/10/2000	Santee Cooper Lakes	SAC-2000-11876	SP	CANAL EXCAVATION JACKS HOLE	Berkeley	33.333540	-79.994640
10/19/2000	Santee Cooper Lakes	SAC-2000-15941	NWP	MAINTENACE EXCAVATION	Berkeley	33.341700	-80.123000
10/1/2001	Santee Cooper Lakes	SAC-2001-11358	NWP	127 Waterfront Drive CHANNEL EXCAVATION	Orangeburg	33.416230	-80.323940
4/17/2001	Santee Cooper Lakes	SAC-2001-12271	SP	DIVERSION CANAL S/D MAINTENANCE EXCAVAT	Berkeley	33.387070	-80.144170
6/6/2002	Santee Cooper Lakes	SAC-2002-15847	NWP	DREDGING FILL	Berkeley	33.315700	-79.999000
11/3/2003	Santee Cooper Lakes	SAC-2003-14167	NWP	CANAL UPGRADE	Berkeley	33.384300	-80.139200
1/10/2007	Santee Cooper Lakes	SAC-2007-00073	SP	JACK'S HOLE DREDGING (SANTEE COOPER)	Berkeley	33.366800	-79.996760
11/26/2007	Santee Cooper Lakes	SAC-2007-02647	SP	MAINTENANCE SAND REMOVAL AT COVE ENTRANCE	Orangeburg	33.487700	-80.447900
1/2/2008	Santee Cooper Lakes	SAC-2008-00088	SP	DIVERSION CANAL DREDGING	Berkeley	33.347520	-80.100190

In addition, the shipping channel near Charleston, SC is currently authorized to a depth of 45 feet (47-foot deep entrance channel) plus 2 feet of advanced maintenance and 2 feet of allowable overdepth for a total potential dredging depth of 49 feet.

It is highly unlikely current dredging operations are having impacts on adult American shad migration and utilization of historic habitat.

e. The following is a list of land use and mining activities that occurred in 2013 in the Santee River System. Since then, SCDHEC developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://gis.dhec.sc.gov/watersheds/

Land Application Sites	*Type*	*ND #*	*Section Number*	*Section Name*
TOWN OF ELLOREE	DOMESTIC	ND0067628	03050111-010	(Santee River)
LAKE MARION RESORT & MARINA	DOMESTIC	ND0067610	03050111-010	(Santee River)
SANTEE PSD	DOMESTIC	ND0065676	03050111-010	(Santee River)
SANTEE RESORT HOTEL WWTP	DOMESTIC	ND0067652	03050111-010	(Santee River)
SANTEE LAKES CAMPGROUND	DOMESTIC	ND0067326	03050111-010	(Santee River)
CYPRESS POINT CONDO	DOMESTIC	ND0062227	03050111-010	(Santee River)
SCDPRT/SANTEE STATE PARK	DOMESTIC	ND0067920	03050111-010	(Santee River)

Mining Activities	*Mineral*	*Permit #*	*Section Number*	*Section Name*
MCKENZIE MINE	SAND	1240-19	03050112-060	(North Santee River/South Santee River)
CHARLES CLARK MINE	SAND	1531-19	03050112-060	(North Santee River/South Santee River)
TAYLOR POND MINE	SAND	1544-43	03050112-060	(North Santee River/South Santee River)
GEORGETOWN II QUARRY	LIMESTONE	0885-15	03050112-030	(Santee River)
OLD FIELD MINE	SAND/CLAY	0929-15	03050112-020	(Rediversion Canal)
MINGO MINE #4	CLAY	0712-27	03050111-010	(Santee River)
HILLS-LABRUCE	CLAY	1014-27	03050111-010	(Santee River)
MCCURRY PIT	CLAY	1069-17	03050111-010	(Santee River)

The following is a list of land use and mining activities that occurred in 2013 in the Cooper River System. Since then, SCDHEC developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://gis.dhec.sc.gov/watersheds/

Mining Activities	*Mineral*	*Permit #*	*Section Number*	*Section Name*
PRIMUS TRACT	SAND/CLAY	0962-15	03050201-050	(Cooper River)
WILLIAMS ASH DISPOSAL	SAND	0964-15	03050201-030	(West Branch Cooper River)
JOHN R. CUMBIE MINE	SAND	0747-15	03050201-010	(Lake Moultrie)
WEEKS MINE	SAND	1488-15	03050201-010	(Lake Moultrie)

Water Quantity				
Water User	*Regulated Cap. (MGD)*	*Pumping Cap. (MGD)*	*Section Number*	*Section Name*
SANTEE COOPER REG. WTR. AUTH.	36	38	03050201-010	(Lake Moultrie)

All land use, mining activities, and water withdrawals that occur in the Santee Cooper River System are closely monitored by the South Carolina Department of Health Environmental Control (DHEC). Therefore, it is highly unlikely these programs impact adult American shad migration and utilization of historic habitat.

f. Atmospheric deposition assessment

Atmospheric deposition is measured as a cooperative effort between many different groups, including federal, state, tribal and local governmental agencies, educational institutions, private companies, and non-governmental agencies as part of the National Atmospheric Deposition Program (NADP). This organization uses many networks (NTN, AIRMoN, MDN, AMNet, and AMNoN) to monitor methyl mercury, ammonia, etc. Detailed information concerning atmospheric deposition in SC can be found at the following website: http://nadp.sws.uiuc.edu/data/annualmaps.aspx

It does not appear that current levels of atmospheric deposition are impacting American shad migrations or utilization of historic habitat.

g. Climate change assessment

A changing climate will present water-related challenges for American shad in several areas including: water quality, water quantity and changes in sea level. Current climate models predict continued warming across the southeast, with the greatest temperature increases projected in summer. Average annual temperatures are projected to rise 4.5°F by the 2080s under a lower emissions scenario and 9°F under a higher emissions scenario with a 10.5°F increase in summer. The frequency, duration and intensity of droughts are likely to continue to increase with higher average temperatures and a higher rate of evapotranspiration. Drought conditions could potentially impact American shad recruitment and long duration drought could negatively impact multiple year classes. Sea level rise is of concern because of the expected change in location of

the saltwater/freshwater interface. As sea level rises, saltwater will move further up the river systems of the state thus reducing the amount freshwater spawning habitat available. The amount and distribution of aquatic vegetation also will change in response to increases in salinity, limiting cover and food sources for aquatic organisms. A changing climate will impact the water resources of South Carolina and will present challenges for American shad management.

Action: Develop a climate change plan.

Regulatory Agencies/Contacts: South Carolina Department of Natural Resources (SCDNR)

Goal/Target: Establish recommendations to address climate change.

Progress: A "draft" plan has been developed and is still under review (Appendix 1)

Cost: Unknown at this time.

Timeline: Unknown

h. Competition and predation by invasive and managed species assessment

Aquatic invasive species occur throughout South Carolina's coastal rivers, and non-native ictalurids are some of the most ubiquitous invasive species. Flathead catfish and blue catfish were introduced into South Carolina in 1964 and are now found in all of South Carolina's coastal rivers. A significant portion of blue catfish and especially flathead catfish diet is comprised of fish, and due to their large adult size (>60 lbs) they have the potential to consume both adult and juvenile American shad. Ictalurid population information is currently unavailable for South Carolina's coastal rivers; however current studies are occurring in South Carolina and other neighboring states to assess the potential impacts of non-native catfish on American shad.

Action: Develop an invasive species plan.

Regulatory Agencies/Contacts: South Carolina Department of Natural Resources (SCDNR)

Goal/Target: Establish recommendations to address invasive species.

Progress: SCDNR programs are currently monitoring catch rates of invasive catfish as part of non-targeting sampling and any flat head catfish captured during these activities are being removed from the system. In addition, current eradication programs, such as those on the Satilla River, GA, are being reviewed by SCDNR staff to determine if such programs are feasible for SC Rivers.

Cost: Unknown at this time.

Timeline: Unknown

Edisto River

Habitat Assessment

Two main tributaries of the Edisto River, the North Fork and South Fork begin just south of the piedmont fall line. The main stem river and its two major tributaries amble for 400 km through the Atlantic coastal plain as the longest free flowing black river in South Carolina. During excessive rainy seasons the river inundates lowlands and swamps and the flow basin increases to a mile wide or more.

Historic Habitat

American shad inhabited all of the Edisto River and its major tributaries throughout the 8,161 km^2 watershed (SCDHEC 2013). According to Stevenson (1899), American shad utilized the entire length of both the North and South Fork of the Edisto River, with the reported inland limit to be "sources 300 miles from the coast".

Current Useable Habitat

Spawning - American shad have access to all adequate habitats in the watershed as there are no barriers to migration. Suitable freshwater riverine channel habitat for spawning in the Edisto River begins approximately at rkm 48 and continues for 143 km to the confluence of the North Fork and South Fork Edisto Rivers. Additionally, McCord (2003) stated that American shad are found for 16 km in the North Fork Edisto River and 48 km of South Fork Edisto River.

Rearing - Suitable rearing habitats are similar to the listed waterways for suitable spawning habitat with the addition of 8,432 ha of estuary in the Edisto River basin (SCDHEC 2013).

Threats Assessment

a. Barriers to migration inventory and assessment

There are no dams on the Edisto River.

b. The following is a list of point source, nonpoint source, mining activities, and water withdrawals that occurred in the Edisto River in 2013. Since then, SCDHEC developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://gis.dhec.sc.gov/watersheds/

Active NPDES Facilities	*Facility Type*	*Permit Number*	*Section Number*	*Section Name*	*Receiving Stream*
TOWN OF BRANCHVILLE	MINOR DOMESTIC	SC0047333	03050206-01	(Edisto River - Headwaters)	EDISTO RIVER
R. WHALEY DURR/HARTZOG PIT	MINOR INDUSTRIAL	SCG730091	03050206-01	(Edisto River - Headwaters)	CATTLE CREEK
SCE&G/CANADYS STATION	MAJOR INDUSTRIAL	SC0002020	03050206-01	(Edisto River - Headwaters)	EDISTO RIVER
NORTH AMERICAN CONTAINER CORP.	MINOR INDUSTRIAL	SCG250191	03050206-01	(Edisto River - Headwaters)	BETTY BRANCH TRIBUTARY
PETER R. STOKES IV MINE	MINOR INDUSTRIAL	SCG731112	03050206-01	(Edisto River - Headwaters)	EDISTO RIVER
JAY & J CONSTRUCTION INC./BRANCHVILLE PIT MINE	MINOR INDUSTRIAL	SCG731107	03050206-01	(Edisto River - Headwaters)	EDISTO RIVER
REA CONTRACTING LLC/CARROLL PIT #9	MINOR INDUSTRIAL	SCG730656	03050206-01	(Edisto River - Headwaters)	EDISTO RIVER TRIBUTARY
CIRCLE C TRUCK STOP	MINOR INDUSTRIAL	SCG730003	03050206-01	(Edisto River - Headwaters)	EDISTO RIVER
SCDOT/GROVER PIT	MINOR INDUSTRIAL	SCG730517	03050206-01	(Edisto River - Headwaters)	EDISTO RIVER TRIBUTARY
ARGOS CEMENT LLC/HARLEYVILLE CEMENT PLT	MINOR INDUSTRIAL	SC0022586	03050206-02	(Indian Field Swamp)	TOM AND KATE BRANCH
TOWN OF HARLEYVILLE	MINOR DOMESTIC	SC0038504	03050206-02	(Indian Field Swamp)	TOM AND KATE BRANCH
DORCHESTER CO./UPPER DORCHESTER CO. WWTP	MINOR DOMESTIC	SC0025844	03050206-02	(Indian Field Swamp)	POLK SWAMP
SC MINERALS/SANDY RUN MINE	MINOR INDUSTRIAL	SCG730261	03050206-03	(Edisto River/South Edisto River)	SANDY RUN TRIBUTARY
MEM LLC/MIXSON MINE	MINOR INDUSTRIAL	SCG730385	03050206-03	(Edisto River/South Edisto River)	POORLY BRANCH
MURRAY MINES INC./PRINCIP MINE	MINOR INDUSTRIAL	SCG730773	03050206-03	(Edisto River/South Edisto River)	EDISTO RIVER TRIBUTARY
GLOVER REAL ESTATE LLC/COTTAGEVILLE MINE	MINOR INDUSTRIAL	SCG731055	03050206-03	(Edisto River/South Edisto River)	BOSTON BRANCH
SEAFREE EDISTO INC./GOOD HOPE MINE	MINOR INDUSTRIAL	SCG731086	03050206-03	(Edisto River/South Edisto River)	SANDY RUN
DANNY LEE CONSTRUCTION/PIT SAND HILL MINE	MINOR INDUSTRIAL	SCG730976	03050206-03	(Edisto River/South Edisto River)	EDISTO RIVER TRIBUTARY
PALMETTO SAND CO. INC./BINLAW HWY 17A	MINOR INDUSTRIAL	SCG730408	03050206-03	(Edisto River/South Edisto River)	SPOOLER SWAMP
ROGERS & SONS CONSTR. INC./SULLIVANS LANDING	MINOR INDUSTRIAL	SCG730643	03050206-03	(Edisto River/South Edisto River)	SPOOLER SWAMP
JOE WEEKS/DEEP SOUTH MINE	MINOR INDUSTRIAL	SCG731049	03050206-03	(Edisto River/South Edisto River)	ADAMS RUN TRIBUTARY
WEST BANK CONSTR. CO., INC./RED HOUSE POND	MINOR INDUSTRIAL	SCG730657	03050206-03	(Edisto River/South Edisto River)	SANDY RUN
MALPHRUS CONSTR.CO./CRYSTAL LAKES MINE	MINOR INDUSTRIAL	SCG730990	03050206-03	(Edisto River/South Edisto River)	EDISTO RIVER TRIBUTARY
CHARLES HILLS/NICHOLS POND MINE	MINOR INDUSTRIAL	SCG731064	03050206-04	(North Edisto River)	BOHICKET CREEK TRIBUTARY
BEARS BLUFF NATIONAL FISH HATCHERY	MINOR INDUSTRIAL	SC0047848	03050206-04	(North Edisto River)	WEE CREEK
LCP MINING CO. LLC/LEGARE CREEK PLANTATION MINE	MINOR INDUSTRIAL	SC0048488	03050206-04	(North Edisto River)	NORTH EDISTO RIVER
ISLAND CONSTR. CO./TREMONT MINE	MINOR INDUSTRIAL	SCG730128	03050206-04	(North Edisto River)	CHURCH CREEK TRIBUTARY
DIRT SUPPLY LLC/BLUEMEL MINE	MINOR INDUSTRIAL	SCG731001	03050206-04	(North Edisto River)	CHURCH CREEK TRIBUTARY
L. DEAN WEAVER/VANNESS MINE	MINOR INDUSTRIAL	SCG730436	03050206-04	(North Edisto River)	LOWER TOOGOODOO CREEK
RENTZ LANDCLEARING/RENTZ MINE	MINOR INDUSTRIAL	SCG730114	03050206-04	(North Edisto River)	LOWER TOOGOODOO CREEK TRIBUTARY

Nonpoint Source Management Program				
Landfill Facilities	*Status*	*Permit #*	*Section Number*	*Section Name*
HARTZOG PIT	SAND; SAND/CLAY	0412-35	03050206-01	(Edisto River - Headwaters)
P&M MINE	SAND	0950-35	03050206-02	(Indian Field Swamp)
HARLEYVILLE QUARRY	LIME	0110-35	03050206-02	(Indian Field Swamp)
CAW CAW BURROW	SAND	1447-19	03050206-03	(Edisto River/South Edisto River)
RED HOUSE POND	SAND	1568-19	03050206-03	(Edisto River/South Edisto River)
EDINGSVILLE ONE	SAND/CLAY	1090-19	03050206-03	(Edisto River/South Edisto River)

MAD DOG #3 MINE	SAND	1105-35	03050206-03	(Edisto River/South Edisto River)
EDISTO #1	SAND; TOPSOIL	1615-35	03050206-03	(Edisto River/South Edisto River)
DURANT SHELL HOUSE ROAD MINE	SAND; TOPSOIL	1705-19	03050206-03	(Edisto River/South Edisto River)
ADAMS RUN #1 MINE	SAND; TOPSOIL	1770-19	03050206-03	(Edisto River/South Edisto River)
MIXSON MINE	SAND/CLAY	1398-35	03050206-03	(Edisto River/South Edisto River)
HPT BINLAW MINE	SAND; S/CLAY; TOPSOIL	1492-35	03050206-03	(Edisto River/South Edisto River)
PETER J KUHNS		1539-29	03050206-03	(Edisto River/South Edisto River)
SULLIVANS LANDING MINE #2	SAND; SAND/CLAY	1556-35	03050206-03	(Edisto River/South Edisto River)
PRINCIP MINE	SAND; SAND/CLAY	1620-29	03050206-03	(Edisto River/South Edisto River)
PINE BLUFF MINE	SAND/CLAY	1654-35	03050206-03	(Edisto River/South Edisto River)
JOHNS ISLAND #1 MINE	SAND	0122-19	03050206-04	(North Edisto River)
RENTZ MINE	SAND; SAND/CLAY	0994-19	03050206-04	(North Edisto River)
JAMISON MINE	CLAY	0206-19	03050206-04	(North Edisto River)
CEDAR HILL MINE	SAND/TOP SOIL	1694-19	03050206-04	(North Edisto River)
BED ROCK II MINE	SAND/CLAY	1644-19	03050206-04	(North Edisto River)
SHEPPARD C&D LANDFILL	C&D	------	03050206-03	(Edisto River/South Edisto River)

All point source and nonpoint sources that occur in the Edisto River System are closely monitored by the South Carolina Department of Health Environmental Control (DHEC). All discharges are held to water quality standards for the state. Therefore, it is highly unlikely these programs impact adult American shad migration and utilization of historic habitat. In addition, all programs are currently undergoing cooling water intake structures rules (40 CFR 122 and 125) analysis to assess the likelihood of impingement or entrainment in efforts to ensure compliance with the proposed EPA 316(b).

c. Toxic and thermal discharge inventory and assessment-none

d. Channelization and dredging inventory and assessment

The following is a list of historic dredging programs that occurred in the Edisto River System. Since then, USACE developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://permits.ops.usace.army.mil/orm-public

Start_Date	River	DA_Number	Action_Typ	Project_Na	County	Latitude	Longitude
4/1/1994	Edisto	SAC-1994-10226	SP	EXCAVATION IN OXBOW LAKE	Bamberg	33.230560	-80.849170
5/26/1998	Edisto	SAC-1998-11456	SP	BASIN DREDGING EDISTO ISLAND	Colleton	32.493390	-80.342420
11/16/1999	Edisto	SAC-1999-11853	SP	DREDGING A CANAL	Colleton	32.754500	-80.450700
10/16/2000	Edisto	SAC-2000-13153	NWP	INTAKE DREDGING CANADYS STATION	Colleton	33.065980	-80.623240

It is highly unlikely past dredging operations are causing detrimental impacts on adult American shad migration and utilization of historic habitat.

e. The following is a list of land use and water withdrawal activities that occurred in the Edisto River in 2013. Since then, SCDHEC developed an interactive web-based database tool to better

assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://gis.dhec.sc.gov/watersheds/

Land Application Sites	*Type*	*ND #*	*Section Number*	*Section Name*
TOWN OF EDISTO BEACH/FAIRFIELD GOLF COURSE	DOMESTIC	ND0063789	03050206-03	(Edisto River/South Edisto River)
JEREMY CAY	DOMESTIC	ND0071510	03050206-03	(Edisto River/South Edisto River)
TOWN OF SEABROOK ISLAND	DOMESTIC	ND0063347	03050206-04	(North Edisto River)
BP FARMS LLC	INDUSTRIAL	ND0087807	03050206-04	(North Edisto River)
BRABHAM DIRT PIT/HOLLYWOOD	INDUSTRIAL	ND0087131	03050206-04	(North Edisto River)

Water Quantity	*REG. CAPACITY (MGD)*	*PUMP. CAPACITY (MGD)*	*Section Number*	*Section Name*
CITY OF CHARLESTON	150	100	03050206-03	(Edisto River/South Edisto River)

All land use and water withdrawals that occur in the Edisto River are closely monitored by the South Carolina Department of Health Environmental Control (DHEC). Therefore, it is highly unlikely these programs impact adult American shad migration and utilization of historic habitat.

f. Atmospheric deposition assessment

Atmospheric deposition is measured as a cooperative effort between many different groups, including federal, state, tribal and local governmental agencies, educational institutions, private companies, and non-governmental agencies as part of the National Atmospheric Deposition Program (NADP). This organization uses many networks (NTN, AIRMoN, MDN, AMNet, and AMNoN) to monitor methyl mercury, ammonia, etc. Detailed information concerning atmospheric deposition in SC can be found at the following website: http://nadp.sws.uiuc.edu/data/annualmaps.aspx

It does not appear that current levels of atmospheric deposition are impacting adult American shad migrations or utilization of historic habitat.

g. Climate change assessment

A changing climate will present water-related challenges for American shad in several areas including: water quality, water quantity and changes in sea level. Current climate models predict continued warming across the southeast, with the greatest temperature increases projected in summer. Average annual temperatures are projected to rise 4.5°F by the 2080s under a lower emissions scenario and 9°F under a higher emissions scenario with a 10.5°F increase in summer. The frequency, duration and intensity of droughts are likely to continue to increase with higher average temperatures and a higher rate of evapotranspiration. Drought conditions could potentially impact American shad recruitment and long duration drought could negatively impact multiple year classes. Sea level rise is of concern because of the expected change in location of the saltwater/freshwater interface. As sea level rises, saltwater will move further up the river systems of the state thus reducing the amount freshwater spawning habitat available. The

amount and distribution of aquatic vegetation also will change in response to increases in salinity, limiting cover and food sources for aquatic organisms. A changing climate will impact the water resources of South Carolina and will present challenges for American shad management.

Action: Develop a climate change plan.

Regulatory Agencies/Contacts: South Carolina Department of Natural Resources (SCDNR)

Goal/Target: Establish recommendations to address climate change.

Progress: A "draft" plan has been developed and is still under review (Appendix 1)

Cost: Unknown at this time.

Timeline: Unknown

h. Competition and predation by invasive and managed species assessment

Aquatic invasive species occur throughout South Carolina's coastal rivers, and non-native ictalurids are some of the most ubiquitous invasive species. Flathead catfish and blue catfish were introduced into South Carolina in 1964 and are now found in all of South Carolina's coastal rivers. A significant portion of blue catfish and especially flathead catfish diet is comprised of fish, and due to their large adult size (>60 lbs) they have the potential to consume both adult and juvenile American shad. Ictalurid population information is currently unavailable for South Carolina's coastal rivers; however current studies are occurring in South Carolina and other neighboring states to assess the potential impacts of non-native catfish on American shad.

Action: Develop a invasive species plan.

Regulatory Agencies/Contacts: South Carolina Department of Natural Resources (SCDNR)

Goal/Target: Establish recommendations to address invasive species.

Progress: SCDNR programs are currently monitoring catch rates of invasive catfish as part of non-targeting sampling and any flat head catfish captured during these activities are being removed from the system. In addition, current eradication programs, such as those on the Satilla River, GA, are being reviewed by SCDNR staff to determine if such programs are feasible for SC Rivers.

Cost: Unknown at this time.

Timeline: Unknown

Combahee River

Habitat Assessment

Combahee River is formed at the confluence of Salkehatchie and Little Salkehatchie Rivers and flows 64 km to Saint Helena Sound. Combahee River and its tributaries begin south of the piedmont fall line and flow unimpeded throughout their length (193 km) (McCord 2003). Similar to the Edisto River, Combahee River is characterized by clear tannic acid-stained water flowing across flat, low elevation land.

Historic Habitat

American shad had access to all of the Combahee River and its major tributaries throughout the 3,325 km^2 watershed (SCDHEC 2013). The inland limit of American Shad in the Salkehatchie and Combahee Rivers are not clear, but migrating fish were present near the "source" of the river (Welch 2000). Stevenson (1899) did not distinguish between the two rivers in his report, but did state that "shad ascend a distance of 85 miles" and that the difficulty of ascending the stream prevented him from assessing small fisheries upstream.

Current Useable Habitat

Spawning - American shad have access to all suitable habitats in the watershed as there are no barriers to migration. In the Combahee River, 20 km of suitable freshwater riverine channel spawning habitat is available. In addition, American shad are found for 73 km in the Salkehatchie River (McCord 2003).

Rearing - Suitable rearing habitats are similar to the listed waterways for suitable spawning habitat with the addition of 15,584 ha of estuary in the Combahee River basin (SCDHEC 2013).

Threats Assessment

a. Barriers to migration inventory and assessment

There are no dams on the Combahee River.

b. The following is a list of point source facilities that occurred in the Combahee River in 2013. Since then, SCDHEC developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://gis.dhec.sc.gov/watersheds/

Active NPDES Facilities	*Facility Type*	*Permit Number*	*Section Number*	*Section Name*	*Receiving Stream*
TOWN OF YEMASSEE	COMBAHEE RIVER	SC0025950	DOMESTIC	03050207-07	(Combahee River)

All point source and nonpoint sources that occur in the Combahee River System are closely monitored by the South Carolina Department of Health Environmental Control (DHEC). All discharges are held to water quality standards for the state. Therefore, it is highly unlikely these programs impact adult American shad migration and utilization of historic habitat. In addition, all programs are currently undergoing cooling water intake structures rules (40 CFR 122 and 125) analysis to assess the likelihood of impingement or entrainment in efforts to ensure compliance with the proposed EPA 316(b).

c. Toxic and thermal discharge inventory and assessment-none

d. Channelization and dredging inventory and assessment

The following is a list of historic dredging programs that occurred in the Combahee River System. Since then, USACE developed an interactive web-based database tool to better assess proposed, ongoing, and/or completed projects. It can be accessed at the following website: https://permits.ops.usace.army.mil/orm-public

Start_Date	River	DA_Number	Action_Typ	Project_Na	County	Latitude	Longitude
4/26/1994	Combahee	SAC-1994-10243	SP	MILL POND MAINTENANCE	Colleton	32.677780	-80.686110
7/14/1999	Combahee	SAC-1999-15974	NWP	COMBAHEE LANDING SILT REMOVAL	Hampton	32.706230	-80.827530

It is highly unlikely past dredging operations are causing detrimental impacts on adult American shad migration and utilization of historic habitat.

e. Land use inventory and assessment-none

f. Atmospheric deposition assessment

Atmospheric deposition is measured as a cooperative effort between many different groups, including federal, state, tribal and local governmental agencies, educational institutions, private companies, and non-governmental agencies as part of the National Atmospheric Deposition Program (NADP). This organization uses many networks (NTN, AIRMoN, MDN, AMNet, and AMNoN) to monitor methyl mercury, ammonia, etc. Detailed information concerning atmospheric deposition in SC can be found at the following website: http://nadp.sws.uiuc.edu/data/annualmaps.aspx

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continued warming across the southeast, with the greatest temperature increases projected in summer. Average annual temperatures are projected to rise 4.5°F by the 2080s under a lower emissions scenario and 9°F under a higher emissions scenario with a 10.5°F increase in summer. The frequency, duration and intensity of droughts are likely to continue to increase with higher average temperatures and a higher rate of evapotranspiration. Drought conditions could potentially impact American shad recruitment and long duration drought could negatively impact multiple year classes. Sea level rise is of concern because of the expected change in location of the saltwater/freshwater interface. As sea level rises, saltwater will move further up the river systems of the state thus reducing the amount freshwater spawning habitat available. The amount and distribution of aquatic vegetation also will change in response to increases in salinity, limiting cover and food sources for aquatic organisms. A changing climate will impact the water resources of South Carolina and will present challenges for American shad management.

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Cost: Unknown at this time.

Timeline: Unknown

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Cost: Unknown at this time.

Timeline: Unknown

Fish Passage Considerations

The 2020 Atlantic States Marine Fisheries Commission's American Shad Stock Assessment and Peer Review Report provides an extensive review of available literature and discussion on the topic of fish passage (ASMFC 2020). Specifically, it highlights the issues with lack of evaluation and performance from decades-old approaches, facilities designs/operations that are not effective, and therefore cannot reasonably be expected to achieve management and restoration goals without significant changes. The Assessment Report also provides an important quantitative modeling approach examining shad habitat and passage barriers, and the need to address status quo fish passage performance. The impacts of these barriers and status quo passage are described and also modeled as effects on spawner population size under three scenarios, 1) no barriers, 2) first barrier with no passage, and 3) realistic fish passage performance measures applied to barriers (e.g., upstream passage efficiency of 50%).

The Assessment Report used standardized data and modelling approaches that quantified the impacts of barriers and fish passage as significant in all three management areas examined based on shad life history and habitat (New England, Mid-Atlantic, and South Atlantic). The assessment determined that overall, dams completely or partly block nearly 40% of the total habitat once used by American Shad. The model results of the "no barriers" scenario yielded an estimated spawner production potential 1.7 times greater than that yielded by the scenario assuming no passage at the first barrier: 72.8 million versus 42.8 million fish. The results of the third model scenario, which applies "realistic" (i.e., current) fish passage efficiencies, resulted in a gain of less than 3 million fish. Conclusions include "losses in (spawner production) potential are significant in each state and region." The Assessment Report provides a strong justification for the need and benefits of requiring improved fish passage performance measures. Additionally, meeting such improved passage performance standards is now an achievable goal given the current state of knowledge on fish behavior, swimming performance, and fish passage engineering expertise.

References

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Welch, S. M. 2000. A Report on the Historical Inland Migrations of Several Diadromous Fishes in South Carolina Rivers. Clemson University, Department of Aquaculture, Fisheries and Wildlife. 19 pp.

Appendix 1. SCDNR Climate Change document

DNR

CLIMATE CHANGE IMPACTS TO NATURAL RESOURCES IN SOUTH CAROLINA

This document is available on the Department of Natural Resources web site at http:www.dnr.sc.gov/

FOREWORD

In recent years state natural resource agencies including the South Carolina Department of Natural Resources (DNR) have been engaged in discussions about climate change. Staff at DNR, and many of our counterpart state agencies, are routinely asked some of the following questions:

1. What might happen to our fish, wildlife and marine resources if climate change should have an effect on them?
2. Are invasive and noxious species likely to be able to exploit subtle changes in air or water temperature or water quality or quantity?
3. What impact might climate change have on water resources and its continued availability for both humans and fish and wildlife?
4. What are some of the common-sense things we can do to adapt to climate change if it begins to occur?
5. How might recreational boating be affected if our lakes and reservoirs are impacted by climate change?
6. What monitoring programs are in place that will enable us to be able to predict impacts to natural resources or recreational use before they occur?
7. What technologies are necessary to enable science-based natural resource monitoring programs?

These are just a few of the questions we must consider given our mandate to be the stewards of natural resources in South Carolina. In reality, there are many more questions and none of them have easy answers. Facing complex issues and preparing for an uncertain future are nothing new to the DNR. We utilize a sound, science-based approach and have been doing this for many decades. DNR does not have experts in the field of climate change or personnel involved in pure climate change research. However, scientists, biologists, and other personnel from DNR have reviewed the available scientific literature on climate change and the possible impacts on the state's natural resources and drafted a guidance document to help us navigate the path forward.

Over the past few decades scientists have documented melting glaciers, diminishing polar sea ice, shifting of growing seasons, changes in migratory patterns of birds and fish, rising sea levels and many other climate-related phenomena. These changes and countless more like them may have substantial consequences for both the environment and the economy. Nationally, hunting, fishing and wildlife-related recreation alone add $122 billion to the economy each year. In South Carolina, natural resources are essential for economic development and contribute nearly $30 billion and 230,000 jobs to the state's economy. Access to abundant recreational opportunities and natural assets play an important role in economic growth and quality of life at the local, regional and state levels, so protection and enhancement of our natural resources can and should be part of our overall economic development strategy.

Any changes to our coastal environment could cause substantial economic consequences. Shoreline changes affect property uses, land values, tourism, and

natural resources management as well as traditional uses such as hunting and fishing, timber management and agriculture.

Some have argued that natural variability and chance have the major influences over climate change, that this is a natural process, and that climate scientists have been overreacting. At DNR, we do not profess to know why all of these changes seem to be occurring, but we do understand that we have a responsibility to stay abreast of the latest science as we strive to make the best decisions possible in the management of the state's natural resources.

All of these potential impacts require a science-based approach to decision making. Moving forward, we should develop an efficient strategy incorporating baseline measurements, monitoring, and data analyses to provide decision makers accurate assessments and predictions of future environmental changes. We know that we must be prepared for change should it occur.

This report is a first step in the process of identifying and gathering published information on how climate change may affect wildlife, fisheries, water supply and other natural resources in South Carolina. We have identified some key adaptive steps necessary to respond to potential climate change in our state. This report is being released for public review, and we invite our citizens and leaders to participate by providing their comments. Public comments may be submitted electronically to climatechange@dnr.sc.gov or by mail to Climate Change, PO Box 167, Columbia, SC 29202. We will appreciate receiving your comments by May 24, 2013.

Signature:

Alvin A. Taylor
Director

ACKNOWLEDGEMENTS

This report is the product of the direct efforts of a number of dedicated South Carolina Department of Natural Resources staff from various internal divisions who both participated in the construction of and advocated for this document. Department of Natural Resources participating staff represented their respective divisions with the clear understanding that such an effort is vital in order to protect and conserve natural resources during a period of potentially rapid climate change. Many other agency employees provided input, and, most importantly, encouraged the preparers toward the goal of producing a draft and ultimately a final report. Staff contributors from their respective divisions included:

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DEFINITIONS

Sources:

1. Glossary of Terms used in the IPCC Fourth Assessment Report.[1]
2. American Geological Institute, Glossary of Geology.[2]
3. NOAA.[3]
4. Climate Literacy.[4]

Adaptation – Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, moderating harm or exploiting beneficial opportunities.

Albedo – The fraction of solar radiation reflected by a surface or object, often expressed as a percentage. Snow-covered surfaces have a high albedo; the albedo of soils ranges from high to low; vegetation-covered surfaces and oceans have a low albedo. The Earth's albedo varies mainly through varying cloudiness, snow, ice, leaf area and land cover changes.

Anadromous – Migration of aquatic organisms from the sea to freshwater to spawn.

Anthropogenic – Effects, processes or materials that are derived from human activities, as opposed to those occurring in biophysical environments without human influence. Resulting from or produced by human beings.

Assemblage – The smallest functional community of plants or animals.

Atmosphere – The mixture of gases surrounding the Earth, retained by gravity. It protects life by absorbing ultraviolet solar radiation, warms the surface through heat retention (the greenhouse effect), and reduces temperature extremes between day and night.

Benthic – Relating to the bottom of a sea or lake or to the organisms that live there.

Catadromous – Migration of aquatic organisms from freshwater to the sea to spawn.

Climate – The characteristic weather of a region, particularly as regards temperature and precipitation, averaged over some significant interval of time. Climate in a narrow sense is usually defined as the average weather, or more rigorously, as a statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the *climate system*. In various parts of this report different averaging periods, such as a period of 20 years, also are used.

Climate change – Climate change refers to a change in the state of the climate that can be identified, for instance by using statistical tests, by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal

[1] http://www.ipcc.ch/publications_and_data/publications_and_data_glossary.htm. Last accessed Jan 2011.
[2] http://www.agiweb.org/pubs/glossary/. Last accessed May 2011.
[3] http://www.weather.gov/glossary/. Last accessed Mar 2011.
[4] https://gcce.larc.nasa.gov/index.php?q=resources/climate-literacy&page=7. Last accessed Apr 2011.

processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

Climatology – The study of climate, the long-term average of conditions in the atmosphere, ocean, and ice sheets and sea ice described by statistics, such as means and extremes.

Demersal – Refers to species living near the benthic, or bottom, zone of the sea.

Diadromous – Migration of aquatic organisms between fresh and salt waters; includes both anadromous and catadromous.

Ecological services – Humankind benefits from a multitude of resources and processes supplied by natural ecosystems including products such as clean drinking water and processes such as decomposition and assimilation of wastes.

Endangered species – A species of flora or fauna whose numbers are so small that the species is at risk of extinction.

Evapotranspiration – The sum of water vapor evaporated from the Earth's surface and transpired from vegetation to the atmosphere from sources such as the soil, forest canopy interception and surface waters.

Feedback mechanism - A loop system in which the system responds to a change either in the same direction (positive feeback) or in the opposite direction (negative feedback).

Fossil fuel – A general term for any hydrocarbon that may be used for fuel, chiefly coal, petroleum and natural gas formed by decomposition and compression of buried dead organisms.

Glacial maximum – The time or position of the greatest advance of a glacier, or of glaciers.

Greenhouse effect – The natural effect produced as greenhouse gases allow incoming solar radiation to pass through the Earth's atmosphere, but prevent most of the outgoing infrared radiation from the surface and lower atmosphere from escaping into space. Life on Earth could not be sustained without the natural greenhouse effect. However, if the atmospheric concentrations of these greenhouse gases rise, the average temperature of the lower atmosphere will gradually increase.

Greenhouse gas (GHG) – The gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. Water vapor (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and ozone (O_3) are the primary greenhouse gases in the Earth's atmosphere. There are a number of entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine and bromine containing substances.

Habitat – An ecological, environmental or physical area inhabited by a particular species of animal, plant or other organism.

Insolation – A measure of the amount or rate of solar radiation (Sun) energy received on a given surface area in a given time. **IN**cident **SOL**ar radi**ATION**

Last glacial maximum (LGM) – The time of maximum extent of the ice sheets during the last glacial period, 18,000 years ago. For the central and eastern United States this is referred to as the Wisconsin glaciations. The most recent glacial period lasted from 110,000-11,700 years ago, during the Pleistocene. The

Holocene begins at the end of the Pleistocene, and is considered an interstadial in Quaternary/Pleistocene glaciations.

Little Ice Age – An interval of time between approximately AD 1400-1900 when temperatures in the Northern Hemisphere generally were colder than today, especially in Europe. Originally employed for a mid-Holocene event in the Yosemite area, California, about 3,000 years BC.

Medieval Warm Period (MWP) – An interval of time between AD 1000-1300 in which some Northern Hemisphere regions were warmer than during the Little Ice Age that followed.

Milankovitch theory – An astronomical theory of glaciation, formulated by Milutin Milankovitch, Yugoslav mathematician, in which climatic changes result from fluctuations in the seasonal and geographic distribution of insolation, determined by variations of the Earth's orbital elements, namely eccentricity, tilt of rotational axis and precession. It is supported by recent radiometrically dated reconstructions of ocean temperature and glacial sequences.

Mitigation – An anthropogenic intervention to reduce the anthropogenic forcing of the climate system including strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks.

Outgassing –The release of trapped or embedded gases

Paleoclimate Proxies – A proxy climate indicator is a local record that is interpreted, using physical and biophysical principles, to represent some combination of climate-related variations back in time. Climate-related data derived in this way are referred to as proxy data. Examples of proxies include pollen analysis, tree ring records, characteristics of corals and various data derived from ice cores.

Paleoclimatology – The study of climate during periods prior to the development of measuring instruments, including historic and geologic time, for which only proxy climate records are available.

Paleotempestology – The study of past tropical cyclone activity (hurricanes) by means of geological proxies and historical records.

Pleistocene – The earlier of 2 Quaternary epochs, extending from the end of the Pliocene, about 1.8 million years ago, until the beginning of the Holocene, about 11,600 years ago.

Sea-level rise – The contextual relationship between land and the sea when the surface of the sea is increased in height relative to land due to increased water volume of the ocean and/or sinking of the land.

Sequestration – The removal and storage of carbon from the atmosphere in carbon sinks (such as oceans, forests or soils) through physical or biological processes, such as photosynthesis.

Stadial – A short period of colder temperatures during an interglacial (warm period) separating the glacial periods of an ice age. It can be marked by a glacial readvance. The Little Ice Age is a stadial event. This is opposite of an interstadial, which is a short, warm period occurring within a longer glacial period and is marked by a temporary glacial retreat.

Teleconnections – Refers to a recurring and persistent large-scale pattern of pressure and circulation anomalies spanning vast geographical areas. Teleconnection patterns also are referred to as preferred modes of low-frequency (or long time

scale) variability. Although these patterns typically last for several weeks to several months, they sometimes can be prominent for several consecutive years, thus reflecting an important part of both the interannual and interdecadal variability of the atmospheric circulation. Many of the teleconnection patterns also are planetary-scale in nature, and span entire ocean basins and continents. For example, some patterns span the entire North Pacific basin, while others extend from eastern North America to central Europe. Still others cover nearly all of Eurasia. They are climate anomalies that are related to each other but occur at large distances from each other perhaps scanning thousands of miles.

Threatened species – A species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Troposphere – The lowest portion of Earth's atmosphere, from the surface to about 10 km in altitude at mid-latitudes (ranging from 9 km at high latitudes to 16 km in the tropics on average), where clouds and weather phenomena occur. In the troposphere, temperatures generally decrease with height. It contains approximately 75% of the atmosphere's mass and 99% of its water vapor and aerosols**.**

Vostok Ice Core – In January 1998, this ice-drilling project, a collaborative between Russia, the United States and France at the Russian Vostok station in East Antarctica yielded the deepest ice core ever recovered, reaching a depth of 3,623 m. Preliminary data indicate the Vostok ice-core record extends through four climate cycles, with ice slightly older than 400,000 years ago.

Water supply – The total amount of water within a defined area that is available for human and other uses.

Wisconsin Glaciation or Wisconsin Stage – the classical fourth glacial stage (and last) of the Pleistocene Epoch in North America. It followed the Sangamon Interglacial Stage and preceded the current Holocene Epoch.

Younger Dryas – A period 12,900-11,600 years ago, during the deglaciation, characterized by a temporary return to colder conditions in many locations, especially around the North Atlantic.

ACRONYMS AND ABBREVIATIONS

ACE Basin – Ashepoo, Combahee and Edisto rivers basin
ASMFC – Atlantic States Marine Fisheries Commission
AMO – Atlantic Multi-Decadal Oscillation
BMRI – Baruch Marine Research Institute, of the University of South Carolina
CO_2 – Carbon dioxide
COR – Coastal Reserves and Outreach of the MRD
CWCS – Comprehensive Wildlife Conservation Strategy
DHEC – South Carolina Department of Health and Environmental Control
DNR – South Carolina Department of Natural Resources
ENSO – El Niño-Southern Oscillation
FAA – Federal Aviation Administration
GIS – Geographic Information Systems
GHG – Greenhouse gas
GSP – Greenville-Spartanburg Airport National Weather Service Station
HAB – Harmful Algal Bloom
LED – Law Enforcement Division of DNR
LGM – Last Glacial Maximum
LWC – Land, Water and Conservation Division of DNR
MARMAP – Marine Resources Monitoring, Assessment and Prediction Program
MJO – Madden-Julian Oscillation
MRD – Marine Resources Division of DNR
MRRI – Marine Resources Research Institute, of MRD
NGO – Non-governmental organization
NOAA – National Oceanic and Atmospheric Administration
NWS – National Weather Service
OFM – Office of Fisheries Management of MRD
QBO – Quasi-Biennial Oscillation
SAB – South Atlantic Bight
SAMFC – South Atlantic Marine Fisheries Council
SEAMAP – Southeast Area Monitoring and Assessment Program
SENRLG – Southeast Natural Resource Leadership Group
SERTC – Southeastern Regional Taxonomic Center
USC – University of South Carolina, National Weather Service Station
USGS – United States Geological Survey
USHCN – United States Historical Climatology Network
WFF – Wildlife and Freshwater Fisheries Division of DNR

CONTENTS

EXECUTIVE SUMMARY

Global warming and cooling have occurred naturally throughout history, but changes in the past were usually much slower than the rate of warming that has occurred in the last few decades. Both land and ocean temperature measurements independently indicate a warming trend since around 1880, but since 1979, land temperatures have increased approximately twice as fast as ocean temperatures (0.25 °C per decade versus 0.13 °C per decade). Since the mid 1970s, the average surface temperature has increased by about 1°F (0.56 °C). If this trend continues, by the end of this century, average global temperature is projected to rise between 2-11.5ºF (1.1-6.4°C). Observed climate-related changes are expected to continue, and are likely to result in new natural resource impacts and changes that potentially disrupt or damage ecological services, water supplies, agriculture and forestry, fish and wildlife species and their habitats, endangered species and commercial and recreational fishing and hunting.

The South Carolina Department of Natural Resources (DNR) is charged by law with the management, protection and enhancement of natural resources in South Carolina and thus is the steward of the state's natural resources for their use and enjoyment by the public. In South Carolina, natural resources are essential for economic development and contribute nearly $30 billion and 230,000 jobs to the state's economy. The DNR recognizes the need to address potential climate change as a threat-multiplier that could create new natural resource concerns, while exacerbating existing tensions already occurring as a result of population growth, habitat loss, environmental alterations and overuse. Thoughtful and careful planning regarding climate change is needed in order to protect the valuable natural resources of the Palmetto State. In response to these challenges, DNR has identified potential impacts of climate change on the natural resources of South Carolina, and developed an adaptive response strategy to offset, minimize or delay the effects of a changing climate on natural resources. The agency will:

1. Gather factual, accurate information and data on how climate change may affect wildlife, fisheries, water supply and other natural resources within the state,
2. Identify monitoring and data needs required to assess impacts of climate change in the state,
3. Use factual information, data, research and modeling to determine what actions need to be taken to address climate change,
4. Ensure data quality; provide original research that addresses information needs; and validate modeling results with collected data,
5. Identify opportunities to partner with other state agencies and academic institutions where needed to accomplish this mission,
6. Identify ways for state officials, local government and citizens to assist in mitigation of or adaptation to natural resource impacts related to climate change, and
7. Locate and obtain available funding to assist in meeting agency mission and goals related to climate change.

Climatology is the study and analysis of weather records over an extended period of time. The study of climate prior to the use of instrumental records is known as paleoclimatology. Results from paleoclimate studies indicate that climate variation is a natural phenomenon; Earth's climate has changed many times throughout history. Currently, we are in an interglacial, or warm, period, which began at the end of the last glacial maximum 13,500 years ago. Other results from paleoclimate studies show that climate has changed episodically on a variety of timescales, and some of these changes have occurred quite abruptly. Climate has varied through time under the influence of its own internal dynamics involving changes such as volcanic eruptions and solar variations. Now, human-caused changes in atmospheric composition appear to be influencing climate change.

To date, no systematic study of South Carolina's paleoclimate has been completed. Some studies have addressed climatic conditions at a specific time or at a specific site, but no studies document the state's climate before instrumental records became available. The state's paleoclimate record should be studied at several time scales to establish a baseline for current climatic conditions and future trends. South Carolina climatological trend data, 1895-2010, has been analyzed and shows a warming trend that started during the 1970s continuing to the present. A warming trend was also observed in winter coastal water temperatures during a study performed from 1950-2010. Severe weather is a persistent feature of South Carolina's climatology. No discernible relation is seen between the number of tornadoes or coastal hurricanes land falls and the aforementioned warming trends.

Current climate models predict continued warming across the southeast, with the greatest temperature increases projected in summer. Average annual temperatures are projected to rise 4.5°F by the 2080s under a lower emissions scenario and 9°F under a higher emissions scenario with a 10.5°F increase in summer. The frequency, duration and intensity of droughts are likely to continue to increase with higher average temperatures and a higher rate of evapotranspiration.

Sea level rise is a serious concern in South Carolina due to our extensive coastline. Sea level rise will affect coastal habitats such as estuaries, creeks, marshes, managed wetlands, hammocks, sand dunes and beaches by modifying patterns of sea water encroachment, flooding, erosion and deposition. It will also affect fish and wildlife species that depend on these habitats, as well as any related activities such as fishing, hunting and tourism. Some habitats may adapt by depositional growth or inland migration, but coastal development could impede the latter in many areas. Potential management responses include inland retreat, coastal reinforcement and beach nourishment, but each option has ecological and economic costs.

A changing climate will present water-related challenges in several areas to include water quality, water quantity and changes in sea level. Rainfall and streamflow are tied directly to seasonal climatic conditions. Although DNR has no direct responsibility in regulating water quality, issues of water quality and quantity are difficult to separate when availability is in question. By statute DNR is responsible for water planning in

South Carolina. A comprehensive statewide water policy is needed to maintain and preserve surface- and ground-water supplies. Basic information needed for this work is lacking or threatened due to limited funding. Necessary steps are required to maintain and expand the availability of reliable information needed for a water assessment. Sea-level rise, drought and flooding are occurring, and sea-level rise already is creating shoreline change. Several drought periods in recent years have adversely affected agricultural interests, forestry and water supply. Planning and monitoring is needed prior to and during drought events. A predicted result of climate change is the increase in intense storm events causing greater water inputs in shorter periods of time, affecting flood frequency and duration.

Temperature rise is expected to affect a number of natural resource issues in South Carolina. Habitats and life histories of species within the state may be shifted both in terms of time and space. This could result in changes to feeding and nesting areas as well as reproductive cycles. Additionally, ecosystem-wide regime shifts may result in major changes in species diversity and interactions at all trophic levels. Temperature has a direct effect on the physiology and survival of aquatic species. Commercial and recreational landings of aquatic species may be affected when life histories shift. Ranges for species may shift so they no longer occur in South Carolina, while other more temperature tolerant species may thrive where they had not done so previously. Harmful algal blooms caused by certain species of microscopic, photosynthetic algae can cause a wide range of detrimental effects that are species-specific. These effects may include shading and destruction of estuarine grass habitat, shellfish poisoning and toxin production that can bioaccumulate in the food chain potentially inducing sickness and death in wildlife and humans. Increasing temperatures can reduce oxygen levels in coastal waters through a variety of mechanisms such as a decrease in the solubility of oxygen, an increase in productivity and stratification of the water column. These factors can result in dead zones in coastal and estuarine waters. Increasing ocean acidification is related to increasing carbon dioxide levels in the Earth's atmosphere. Ocean acidification (decreasing Ph) raises concerns about the future of coral reefs and other species that incorporate calcium carbonate into their skeletons including mollusks, crustaceans and some plankton.

Habitat decline, a shifting climate regime, increasing development, particularly in coastal areas, and rising sea level represent constraints and barriers to dispersal and migration of fish, wildlife and plant species. Maintenance of migratory corridors is essential for the ability of wildlife and fish to find suitable habitat and for population maintenance. Temperature changes likely will change the vegetative structure of wildlife habitats throughout the state. Habitat loss not only affects the area in which the species can live, it also affects food availability and availability of suitable nesting and breeding areas. Impacts associated with temperature changes most likely will be greater in the higher elevations of the state. Precipitation changes will affect both surface and groundwater levels and will result in impacts to both terrestrial and aquatic systems. As the nation strives to locate and develop alternative, cleaner and more carbon-neutral sources of energy, it is important to understand that such energy sources may result in additional impacts to wildlife, fish and their habitats.

Species of greatest conservation need are identified in the *South Carolina Comprehensive Wildlife Conservation Strategy*; these include endangered and threatened species and species of concern. Although DNR has collected some short- and long-term information relative to some of these species and their habitats, the collective database is insufficient to understand the role of climate change in the population trends of these species. It also is difficult to identify conservation actions needed to offset or mitigate the effects of climate change. DNR should strengthen and standardize the inventory and monitoring of greatest conservation need species and their habitats.

Increased temperatures, changes in rainfall and other environmental factors affected by climate shifts can create ideal conditions for proliferation of invasive plant and animal species, including parasites and pathogens. Regardless of the manner in which they have become established, these species already are affecting native animals and their habitats. As climate changes, we likely will see an increase of exotic species migrating to South Carolina. Habitats can be destroyed as resources are over-utilized. Invasive and non-indigenous species have the potential to outcompete native species for food and other resources. Species currently located in Florida and southern Georgia that come from more temperate parts of the world have been historically limited to ranges south of South Carolina by cold winters. They are now of major concern. Significant climate change could allow range expansion in these exotic species that would be detrimental to native species.

Climate warming has been linked with a general increase in pathogens of marine, aquatic and terrestrial organisms. This may negatively impact the populations of certain species, including some of economic importance.

Wildlife and fish populations likely will be altered as climate change occurs. While such changes may lead to a reduction of commercial and recreational hunting and fishing opportunities of some species, other opportunities may increase for those species which could benefit from an altered climate. Regardless of whether climate change produces commercial and recreational winners or losers, it will be important for DNR to implement long-term monitoring of harvested species in order to detect temporal and spatial changes in numbers and prevent unsustainable population declines. Further, it will be important for DNR to keep the public and policy makers informed, through outreach and education efforts, of changes as they occur in order to reduce the potential for conflict between human and natural resource needs.

A critical element of the agency's response to climate change is to increase public awareness of the potentially adverse and positive effects resulting from these changes. Agency efforts at outreach and education are first, to strengthen and increase partnerships with other agencies and organizations involved in climate change research and policy and planning; second, to assist local communities in planning for change, such as providing coastal resiliency to reduce overall vulnerability of economic and ecological systems to climate variations; and, third, to communicate information on

climate change to citizens of South Carolina using the World Wide Web and public forums. Additionally, scientific research results will be published in peer-reviewed journals.

In order to meet the agency's long-term ability to respond to climate change impacts in South Carolina, numerous additional strategies and technologies will be required. First, DNR should implement a resource inventory and monitoring program to track trends in resource abundance and distributions at the species and landscape level. Second, the agency must expand its technology infrastructure to support the climate change studies including implementing various direct and remotely-sensed measurement platforms to provide *in situ* documentation of critical climate change parameters and the integration of these data into a comprehensive database. Third, DNR must develop appropriate data access, scientific analysis and resource management decision-support tools to assess climate change impacts and to develop appropriate resource management strategies. Fourth, DNR must develop the expertise required to meet the challenges of understanding and addressing the vast array of environmental impacts and natural resource management issues associated with climate change. Staff training in various analytical, modeling and geographic information systems software, and associated technologies is essential.

This report identifies the overriding natural resource issues and provides recommended actions to keep South Carolina at the forefront of conserving natural resources during an era of changing climate. These overarching issues include the potential for:

1. Detrimental change in habitat,
2. Detrimental change in abundance and distribution of species,
3. Detrimental change in biodiversity and ecosystem services,
4. Detrimental change to the traditional uses of natural resources,
5. Detrimental change in the abundance and quality of water, and
6. Detrimental change in sea level.

Specific tasks identified by DNR in order to move forward in an era of climate change while protecting natural resources include:

1. Spatial mapping,
2. Monitoring and establishing living and non-living resources and climate trends,
3. Habitat acquisition,
4. Adaptation strategies on DNR-titled properties,
5. Integration and analysis of data,
6. Outreach and education,
7. Developing additional partnerships and collaborating with others, and
8. DNR leading by example.

DNR is making climate change an integral part of the agency's ongoing mission by integrating climate change into the DNR organizational culture, its structure and all aspects of its work. These key steps include:

1. Develop an approach that will incorporate climate change into DNR strategic and operational plans and existing structure to be used as a vehicle for internal and external communication,
2. Ensure that all levels of agency staff are aware of and engaged in climate-change initiatives,
3. Update and align DNR actions with regional and national climate change initiatives as appropriate,
4. Work with stakeholders and partners on fish, wildlife and habitat adaptation and mitigation,
5. Prepare an internal and external outreach strategy to communicate climate change issues, and
6. Develop clear and measurable indicators to track the results of DNR climate change efforts.

To accomplish its mission, DNR recommends the following core climate change efforts:

1. Policies and Opportunities – focus on grants, legislation, partnerships and strategic planning,
2. Research and Monitoring – focus on standardized monitoring protocols and state-specific data (including gaps) and predictive modeling,
3. Communication and Outreach – focus on the DNR messages and a climate change communication plan,
4. Adaptation – focus on the activities related to unavoidable climate change impacts on natural resources
5. Operations – focus on positioning DNR as a leader by reducing the agency's carbon footprint, improving its energy efficiency and decreasing operational costs.
    a. Achieve increased fuel economy through various methodologies.
    b. Achieve increased energy efficiency through energy audits and adoption of practicable energy audit recommendations.
    c. Implement practicable water efficiency measures for agency buildings.
    d. Implement paperless internal communications and document management.

DNR is taking a lead role among South Carolina state agencies to advance the scientific understanding of the vulnerability of South Carolina's vital natural resources during an era of changing climate. This will enable the agency, its partners, constituents and all Palmetto State citizens to avoid or minimize the anticipated impacts while protecting South Carolina's natural resources.

TABLES

FIGURES

1.0 INTRODUCTION

1.1 Climate Change

Climate change, such as global warming and cooling, has occurred naturally throughout history over timescales that vary from decades to hundreds of thousands of years. However, changes in the past were usually much slower than the rate of warming that has been measured in the last few decades. Figure 1.1 provides the annual global temperature anomalies for the past 130 years, including both land and ocean temperature trends. Land temperatures increase faster than ocean temperatures due to the greater heat capacity of the ocean and its ability to transfer more heat to the atmosphere in the form of evaporative cooling.[5] Both land and ocean temperature measurements independently indicate a warming trend since around 1880, but since 1979, land temperatures have increased approximately twice as fast as ocean temperatures (0.25 °C per decade versus 0.13 °C per decade)[6]. Although temperature changes vary over the globe, since the mid 1970s, the average surface temperature has increased by about 1°F (0.56 °C) [7]. If this trend continues, by the end of this century, average global temperature is projected to rise between 2-11.5ºF (1.1-6.4°C)[8].

While some of this warming has a natural cause, there is evidence that human activity is disproportionally contributing to the measured warming. The concern over human activities arises primarily from fossil fuel combustion, which releases carbon dioxide and other greenhouse gases, and changes in land use. The introduction of external greenhouse gases into the atmosphere alters the radiative balance of the earth by changing its atmospheric composition, which enhances the natural greenhouse effect. There are complex interactions between many of these processes.

The increase in global temperatures is just one consequence of a changing climate. The various components of the climate and earth system are linked through complex feedback mechanisms, so that a change in one component, such as temperature, can induce changes and adjustments in other components. Changes already observed, or projected to occur, include sea level rise; changes in rainfall patterns; increases in

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[5] Rowan T. Sutton, Buwen Dong, Jonathan M. Gregory (2007). "Land/sea warming ratio in response to climate change: IPCC AR4 model results and comparison with observations". *Geophysical Research Letters* **34** (2).

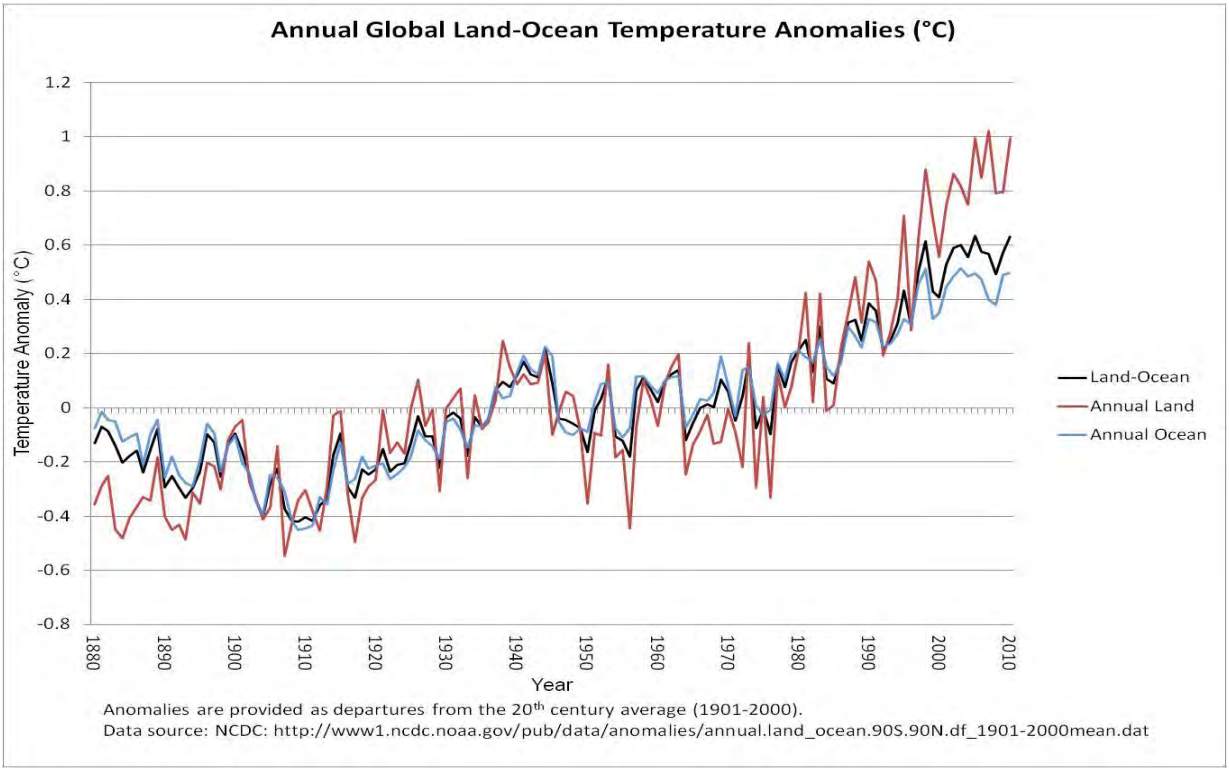
[6] Chapter 3, p. 237, in IPCC AR4 WG1 (2007). Solomon, S.; Qin, D.; Manning, M.; Chen, Z.; Marquis, M.; Averyt, K.B.; Tignor, M.; and Miller, H.L.. ed. *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press

[7] (NOAA)2008 State of the Climate Report

[8] IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working*
Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning,Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

frequency of extreme weather events; decreases in ice mass of glaciers, ice sheets and sea ice; ocean warming and acidification[9]; and alterations in ocean circulation patterns.

Figure 1.1 Annual land, annual ocean, and combined annual land-ocean global temperature anomalies for the past 130 years indicating a significant rise over the last 30 years. Land surface temperatures are generated from the Global Historical Climate Network-Monthly **(GHCN-M)**. Sea surface temperatures are determined using the Extended Reconstructed Sea Surface Temperature **(ERSST)** analysis[10].



The South Carolina Department of Natural Resources recognizes the need to address potential climate change as a threat-multiplier that could create new natural resource concerns, while exacerbating existing tensions already occurring as a result of population growth, habitat loss, environmental alterations and overuse. Climate-related changes may adversely affect the environment in many ways, potentially disrupting or damaging ecological services, water supply, agriculture and forestry, fish and wildlife species and their habitats, endangered species and commercial and recreational fishing. One particular impact is sea-level rise and its effects on coastal areas. Rising sea level may amplify problems of coastal flooding, coastal erosion, and general disruptions to sensitive coastal and estuarine ecosystems. Thoughtful and careful

[9] Effects of Climate Change and Ocean Acidification on Living Marine Resources, Written testimony presented to the U.S. Senate Committee on Commerce, Science and Transportation's Subcommittee on Oceans, Atmosphere, Fisheries, and Coast Guard, May 10, 2007

[10] http://www.ncdc.noaa.gov/cmb-faq/anomalies.php. Last accessed October, 2011

planning regarding climate change is needed in order to protect the valuable natural resources of the Palmetto State. In response to these challenges, DNR has prepared this report to address potential impacts of climate change on the natural resources of South Carolina and guide the agency's adaptive response strategy to offset, minimize, or delay these effects.

1.2 Background

South Carolina's natural resources contribute nearly $30 billion and 230,000 jobs to the state's economy. These economic benefits include forestry, mining, recreational fishing, hunting and wildlife viewing, a large part of the tourism market, and the recreational industry. South Carolina's beaches alone generate about $3.5 billion annually and support 81,000 jobs. Fishing, hunting and wildlife viewing contribute almost $2.2 billion annually to South Carolina's economy and support nearly 59,000 jobs, while the state's forestry industry exports more than $1 billion in forest products, supporting more than 83,000 jobs[11].

DNR is charged by law (Titles 48 and 50, South Carolina Code of Laws (1976), as amended) with the management, protection and enhancement of natural resources in South Carolina[12]. Additionally, DNR is charged with regulating watercraft operation and associated recreation, including establishing boating safety standards. Title 49, South Carolina Code of Laws, authorizes DNR as the state agency responsible for considering water supply (domestic, municipal, agricultural and industrial) issues, water quality facilities and controls, navigation facilities, hydroelectric power generation, outdoor recreation, fish and wildlife opportunities, and other water and land resource interests. This title also charges DNR with aquatic plant management, comprehensive drought planning, management and coordination of State Scenic Rivers and the conservation, protection, and use of floodplain lands.

DNR is the steward of the State's natural resources and is responsible for the protection and management of these resources for the use and enjoyment of the public. Natural resources within DNR's purview include land, water, mineral and biological resources. In carrying out its responsibilities, DNR must balance its objectives and actions holistically in order to most appropriately protect and sustain the natural resources of South Carolina.

DNR is a multifaceted agency consisting of the fish and wildlife sciences and the offices of the State Climatologist, State Geologist and State Hydrologist. Scientists in all divisions of the DNR are concerned over the potential impacts of climate change on natural resources. In fact, natural resource agencies across the nation, both state and federal, are examining climate change and the specific issues affecting their area of responsibility and core mission. DNR recognizes climate change as a real phenomenon, grounded in numerous scientific studies, and DNR recognizes that

[11] Underappreciated Assets: The Economic Impact of South Carolina's Natural Resources, University of South Carolina Moore School of Business, 2009, http://www.dnr.sc.gov/green/greenreport.pdf
[12] http://www.scstatehouse.gov/code/statmast.htm. Last accessed October 2011.

thoughtful and careful planning is needed in order to protect the natural resources of the Palmetto State to benefit its citizens in the future.

South Carolina state government has been involved in the climate change discussion primarily through the Climate, Energy and Commerce Advisory Committee called to action by former Governor Mark Sanford in 2007. The committee consisted of elected officials and leaders from government agencies, utilities, non-government organizations, businesses, and industry. The final committee report examined present and projected state contributions to GHG, and recommended ways to reduce GHG output over the next planning horizon, which was defined as by 2020 and beyond. Of particular note, the report recommended a comprehensive set of 51 specific policies to reduce GHG emissions and address climate-, energy-, and commerce-related issues in South Carolina[13]. The State has taken positive steps toward developing policies that will decrease the contribution of GHG emitted from Palmetto State sources, and the State has joined with states across the nation in an effort to mitigate the potential impacts of climate change by reducing the greenhouse effect [14].

1.3 Greenhouse Effect

The greenhouse effect is a natural phenomenon that keeps the Earth insulated from the cold temperatures in space. Solar radiation enters the atmosphere and is absorbed and reemitted back from the Earth's surface as infrared energy. The greenhouse gases (GHGs) in the atmosphere prevent some of this heat energy from escaping back into space and reflect it back down to the surface. Since the industrial revolution, however, emissions of these gases have increased and accumulated. These larger volumes of atmospheric GHG are trapping more and more heat resulting in an enhanced greenhouse effect. The greenhouse effect is depicted in Figure 1.2.

There are ten primary GHGs, of which water vapor (H_2O) is the only GHG that is solely naturally occurring. Carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) are naturally occurring and also are created from anthropogenic sources[15]. After water vapor, carbon dioxide is the second most abundant greenhouse gas. It occurs naturally as part of the carbon cycle, which includes inputs from animal and plant respiration, ocean-atmosphere exchanges of gases, as well as outgassing from volcanic eruptions. It is also estimated to be responsible for 9–26 percent of the greenhouse effect[16]. Since the mid 18th century, anthropogenic activity has increased the concentration of carbon dioxide and other greenhouse gases (Figure 1.3). This has resulted in atmospheric concentrations of carbon dioxide being 100 ppm higher than pre-industrial levels[17].

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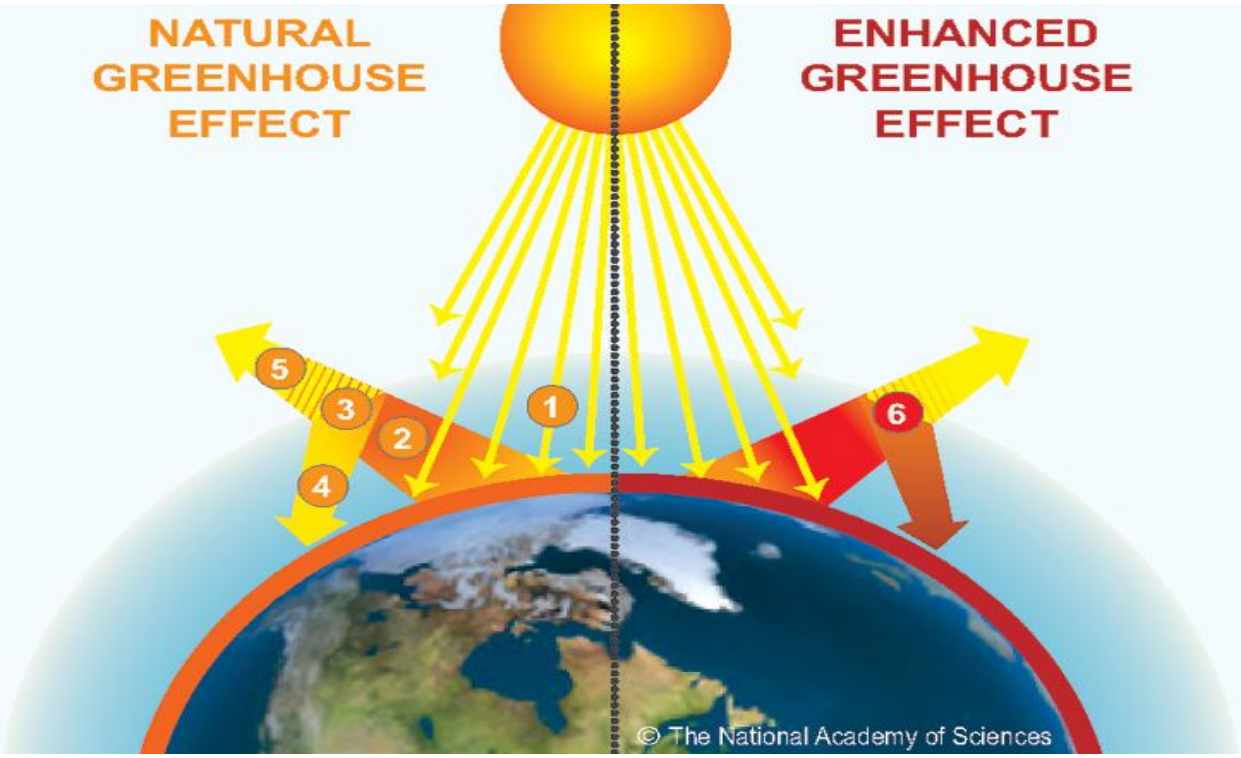
[13]South Carolina Climate, Energy and Commerce Advisory Committee. 2008. Final Committee report. 653 pp. Hereinafter CECAC 2008. http://www.scclimatechange.us/index.cfm Last accessed October 2011.
[14]http://www.scclimatechange.us/ Last accessed Jan 2011.
[15]Center for Sustainable Systems, University of Michigan. 2010. "*U.S. Greenhouse Gases Factsheet.*" Pub. No. CSS05-21. http://css.snre.umich.edu/css_doc/CSS05-21.pdf. Last accessed October 2011.
[16] [4]Kiehl, J.T.; Trenberth, K.E. (1997). "Earth's Annual Global Mean Energy Budget" (PDF). *Bulletin of the American Meteorological Society* **78** (2): 197–208
[17] Climate Change 2001: Working Group I: The Scientific Basis: figure 6-6.

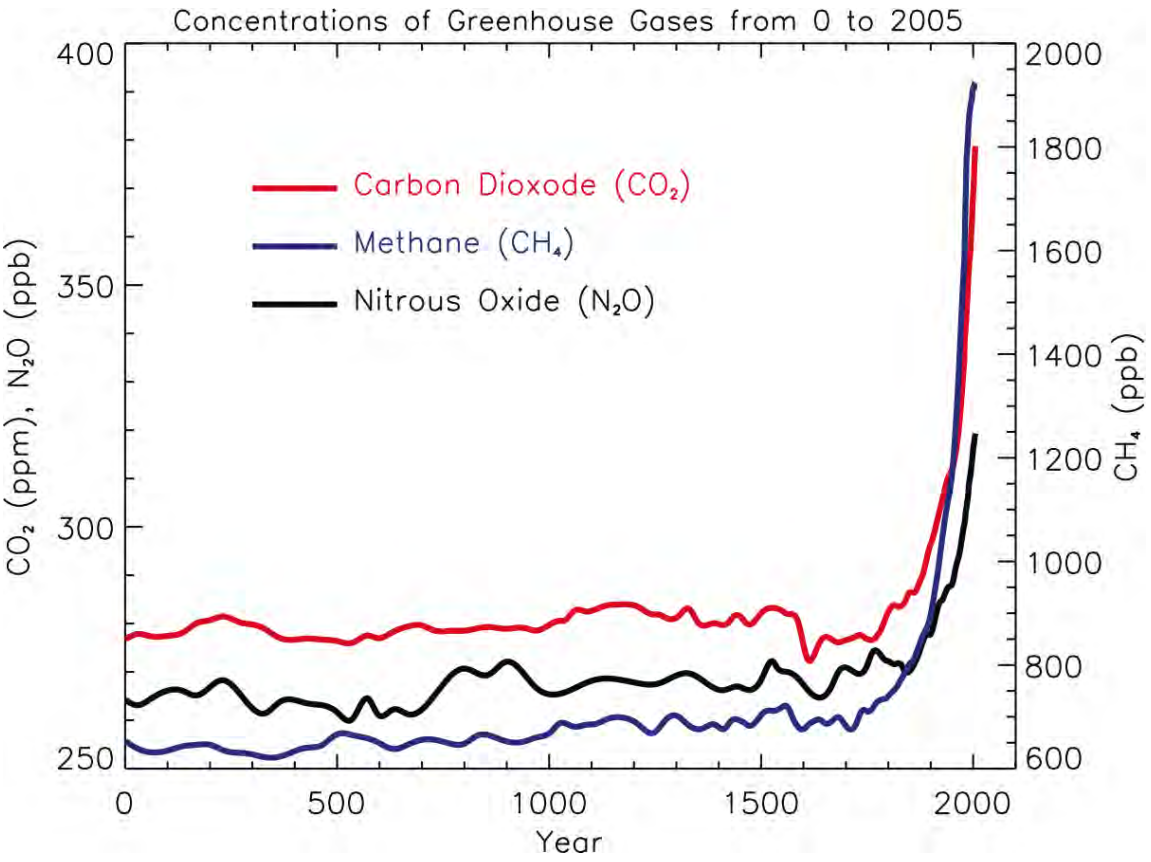
Figure 1.2 The greenhouse effect illustrated: visible sunlight passes through the atmosphere without being absorbed. Some of the sunlight striking the earth is (1) absorbed and converted to infrared radiation (heat), which warms the surface. The surface (2) emits infrared radiation to the atmosphere, where some of it (3) is absorbed by greenhouse gases and (4) re-emitted toward the surface; some of the infrared radiation is not trapped by greenhouse gases and (5) escapes into space. Human activities that emit additional greenhouse gases to the atmosphere (6) increase the amount of infrared radiation that gets absorbed before escaping to space, thus enhancing the greenhouse effect and amplifying the warming of the Earth[18].



Methane (CH_4) is the third most abundant greenhouse gas, and remains in the atmosphere for approximately 9-15 years. It is over 20 times more effective in trapping heat than carbon dioxide (CO_2) over a 100-year period[19]. It is formed from a variety of natural and anthropogenic processes. Methane occurs naturally when organic material decomposes. The main natural sources of methane are wetlands, termites, bodies of water, and gas hydrates. The major anthropogenic sources are landfills, natural gas and petroleum systems, agriculture, and coal mining.

[18] Reprinted by permission of the Marian Koshland Science Museum of the National Academy of Sciences, http://www.koshland-science-museum.org.
[19] http://www.epa.gov/methane/. Last accessed October 2011

Figure 1.3 This figure shows the concentrations of carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) in the atmosphere from year 0 to 2005.



Source: National Center for Atmospheric Research (NCAR), WMO:Concentrations of greenhouse gases from 0 to 2005, http://gcmd.nasa.gov/records/GCMD_WMO_Concentrations_greenhouse_gases0-2005.html

Nitrous oxide (N_2O) is the fourth most abundant greenhouse gas. Despite its lower concentration, it is 310 times more powerful at trapping atmospheric heat than carbon dioxide, and remains in the atmosphere for 120 years[20]. It is naturally emitted from oceans and soils, but anthropogenic sources include agricultural (mostly nitrogen fertilization) and industrial activities, fossil fuel combustion, and nitric acid production.

Between 10,000 and 150 years ago, atmospheric concentrations of CO_2, CH_4, and N_2O were relatively stable. In the last 150 years, concentrations of CH_4 and N_2O increased 148% and 18%, respectively[21]. Table 1.1 compares the preindustrial and current levels of the primary anthropogenically-produced GHG and their radiative forcing. Radiative forcing is a measure of the influence an external factor has on the balance of incoming and outgoing energy and is an index of the importance of the factor as a potential

[20] http://www.epa.gov/nitrousoxide/. Last accessed October 2011
[21] IPCC (2007) *Climate Change 2007: The Physical Science Basis*. Intergovernmental Panel on Climate Change; Ed. S. Solomon et al.; Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

climate change mechanism. Radiative forcing values are for changes relative to preindustrial conditions in 1750 and are typically expressed in watts per square meter (W/m^2).

Table 1.1 Preindustrial and current levels of the primary anthropogenically-produced GHG and their radiative forcing.

Gas	Preindustrial level	Current level	Increase since 1750	Radiative forcing (W/m^2)
Carbon dioxide	280 ppm	388 ppm	108 ppm	1.46
Methane	700 ppb	1745 ppb	1045 ppb	0.48
Nitrous oxide	270 ppb	314 ppb	44 ppb	0.15

Source: http://en.wikipedia.org/wiki/Greenhouse_gas, Last Accessed

1.4 Climate

Climate is defined as the complex, interactive system consisting of the atmosphere, land surface, snow and ice, oceans and other bodies of water, flora and fauna. Climate can be described in terms of the average temperature, humidity, atmospheric pressure, precipitation, wind and other parameters over a period of time, ranging from months to millions of years. Modern climate studies tend to use intervals of 30 years to define climate norms. The climate of a location is affected by its latitude, terrain and altitude, as well as nearby water bodies and their currents[22]. The generalized worldwide climate classifications are depicted in Figure 1.4.

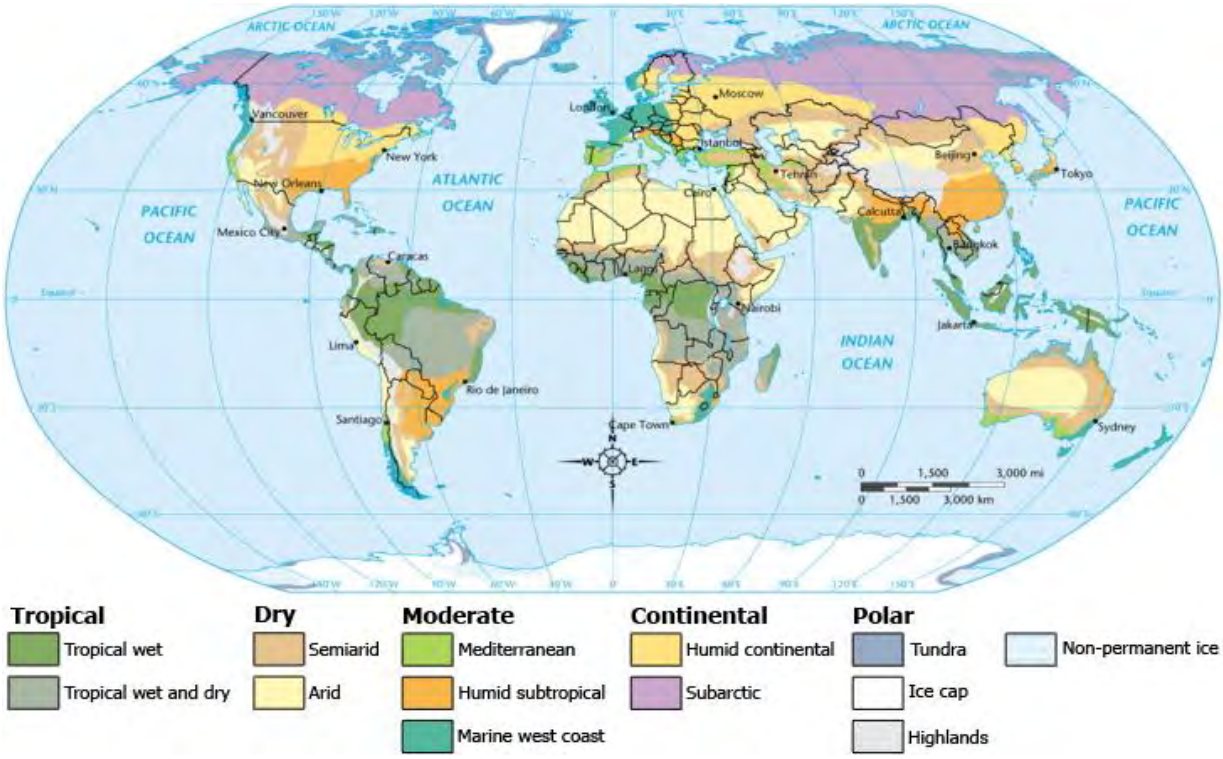
Climate has varied through time under the influence of its own internal dynamics involving changes such as volcanic eruptions and solar variations. Now, human-caused changes in atmospheric composition appear to be influencing climate change. Ultimately, the energy of the Sun drives the Earth's climate. Climate changes may occur in a limited number of ways including: (1) changes in incoming solar radiation resulting from changes in Earth's orbit or in the Sun itself, (2) changes in the fraction of solar radiation that is reflected back into space, otherwise known as albedo, and (3) changes in the amount of infrared radiation reflected back to to Earth by GHG concentrations. Although climate responds directly to these, it also can respond indirectly, through a variety of feedback mechanisms[23]. The climate system is

[22] Thornthwaite, C. W. 1931. The Climates of North America: According to a New Classification, Geo. Rev. 21(4):633-655.

[23] Le Treut, H., R. Somerville, U. Cubasch, Y. Ding, C. Mauritzen, A. Mokssit, T. Peterson and M. Prather, 2007: Historical overview of climate change. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller, *eds*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

characterized by positive and negative feedback effects between processes that affect the state of the atmosphere, oceans and land. An example of a climate feedback mechanism is the ice-albedo positive feedback loop. Melting snow exposes more dark ground, with lower albedo, which in-turn absorbs heat that would have been reflected back into space by snow or ice[24].

Figure 1.4 Generalized worldwide climate classifications noting the southeastern United States to be part of the humid subtropics.



1.5 Weather

Weather occurs in the troposphere, or the lowest portion of the atmosphere. It is the current, localized condition of atmospheric elements.[25] Common weather factors that affect daily life include wind, clouds, rain, sleet, snow and fog. Less common weather events that occur in South Carolina and the southeastern United States are tornadoes and hurricanes. These natural disasters cause economic distress as well as loss of property and life.

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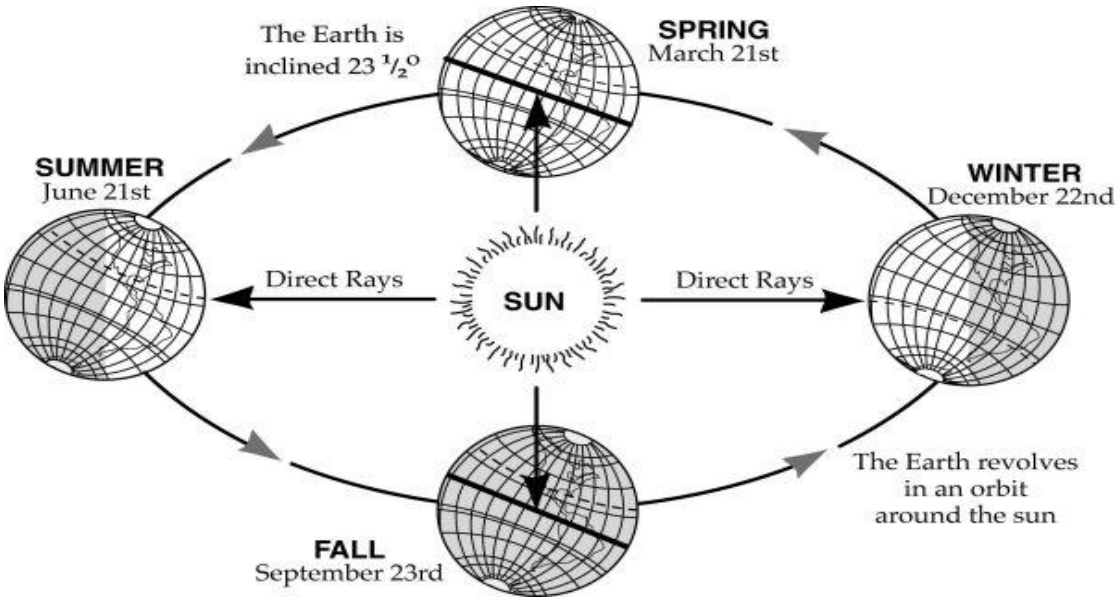
[24] Heimann, M. and M. Reischstein. 2008. Terrestrial ecosystem carbon dynamics and climate feedbacks. Nature. 451(289-292).

[25] Karl, T. R., J. M. Melillo and T. C. Peterson, eds. 2009. Global Climate Change Impacts in the United States. Cambridge University Press.

The Earth rotates daily on its axis, and its axis precesses, or wobbles, over the course of a year (Fig 1.5). Thus, the incident angle of solar insolation on a seasonal basis. Weather results from many factors, but the primary cause is differential heating of the Earth rotating on a variable axis and orbiting around the sun. This differential heating varies by time and location and is complicated by topography and bathymetry resulting in variability in temperature, moisture distribution and atmospheric dynamics. Figure 1.5 depicts the Earth's orbit around the Sun and the relative inclination of the Earth to the Sun.

Figure 1.5 The Earth orbits around the Sun. As the Earth moves around the Sun it is tilted 23.5° from the perpendicular. The Earth's revolution and inclination cause the changing seasons. The arrows extending from the Sun to the Earth represent where the direct rays of the Sun strike the Earth on the first day of each season.[26]



1.6 Methodology

Although temperature at the surface of the Earth is typically used as a primary indicator of climate change, there are other key measures that should be considered. Some of the other key measures and datasets include air temperature observed above both the land and sea, water temperature at the sea-surface extending hundreds of meters below the surface, changes in humidity, changes in sea level, and changes in sea-ice, glaciers and snow cover[27].

[26] © Herff Jones, Inc. Used by permission. All rights reserved.
[27] Evidence: The state of the climate, Met Office, UK, 2010 http://www.metoffice.gov.uk/media/pdf/m/6/evidence.pdf Last accessed Oct. 2011

1.6.1 Satellite versus Surface Observations

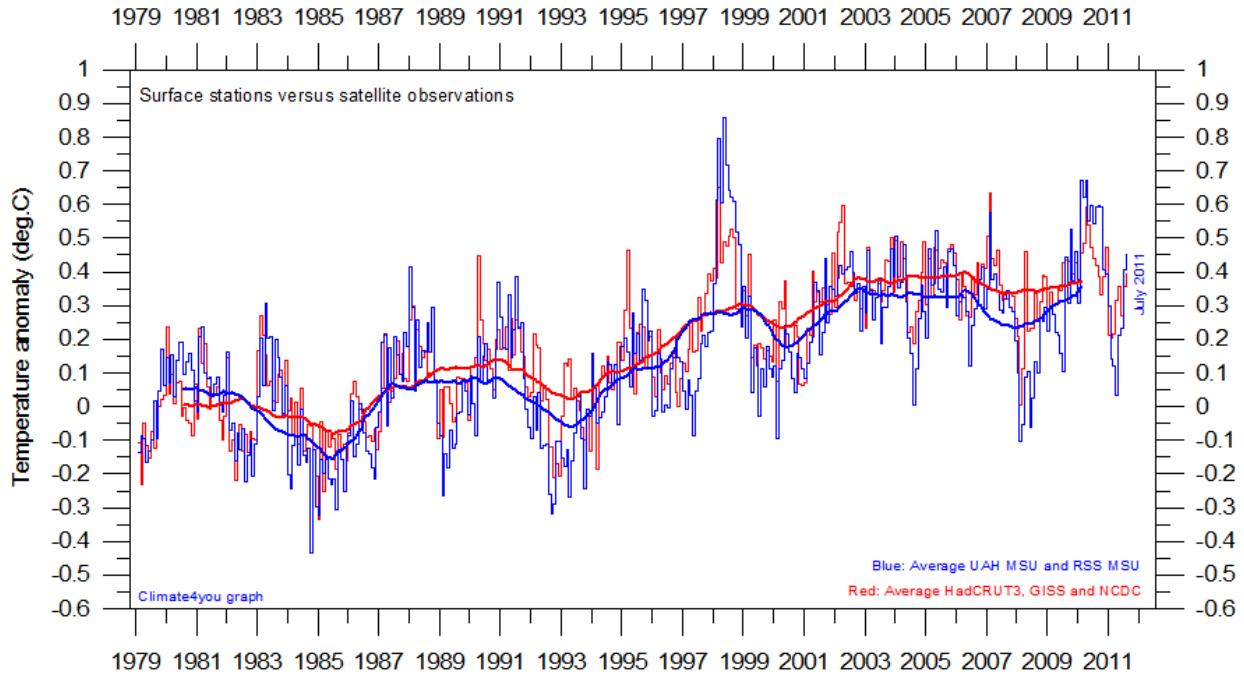
Deriving reliable global temperature from instrument data is a difficult task because the instruments are not evenly distributed across the planet, the hardware and locations have changed over time, and there has been extensive land use change around some of the sites. There are three main datasets showing analyses of surface global temperatures; the joint Hadley Centre/University of East Anglia Climatic Research Unit temperature analysis (HadCRUT), Goddard Institute for Space Studies (GISS), and the National Climatic Data Center (NCDC). These datasets are updated on a monthly basis and are generally in close agreement.

Since the satellite era took off in the late 1970s, both atmospheric and surface temperatures were able to be determined using satellite measurements. Satellites do not measure temperature directly, but instead measure how much light is emitted or reflected in different wavelength bands. Using mathematical calculations, temperature time series are indirectly inferred and reconstructed. This is advantageous over other methods because it provides global coverage. Because of slight differences in methodology, satellite-derived temperature datasets often differ. Thus it is imperative to make routine corrections due to orbital drift or decay, and sensor deterioration.

Two satellite datasets, the Remote Sensing Systems (RSS) dataset and the one prepared by the University of Alabama in Huntsville (UAH), utilize Microwave Sounding Units (MSU) of orbiting satellites to estimate lower tropospheric temperature. This is done by measuring microwave emissions of oxygen molecules, which increase proportionally to temperature. Lower tropospheric temperatures are expected to be slightly higher than surface temperatures, so the surface temperature record produced using these measurements is adjusted accordingly. Temperature measurements based on MSU also provide sparse coverage of Arctic and Antarctic regions. Figure 1.6 indicates that the average surface-based temperatures are slightly different to those obtained by satellites. Although the general agreement is good, satellites seem to record a larger temperature variability than surface observations. Additionally, over the entire time period shown in this plot, the average of the surface-based estimates suggests a less than 0.1^{o}C larger global temperature increase, compared to the average of satellite-based observations. The surface temperature record has increased at approximately 0.17 °C/decade since 1979. Comparing these values to satellite temperature estimates through January 2011, RSS shows an increase of 0.148 °C/decade while UAH finds an increase of 0.140°C/decade.[28]

[28] Remote Sensing Systems". http://www.ssmi.com/msu/msu_data_description.html. Retrieved 2009-01-13. "UAH". http://vortex.nsstc.uah.edu/data/msu/t2lt/tltglhmam_5.4. Retrieved 2011-01-14.

Figure 1.6 Average monthly global surface air temperature estimates (HadCRUT3, GISS and NCDC) and satellite-based temperature estimates (RSS MSU and UAH MSU). The thin lines indicate the monthly value and the thick lines represent the simple running 37 month average, nearly corresponding to a running 3 year average.



1.6.2. Climate Models and Projections

Climate models are based on computer programs that contain various mathematical equations. These equations quantitatively describe how atmospheric variables such as temperature, air pressure, wind, greenhouse gases and precipitation respond to incoming and outgoing solar radiation. Climate models are used for a variety of purposes from the study of climate system dynamics to future climate predictions. Predicting temperature changes caused by increases in atmospheric concentrations of greenhouse gases is one of the better known applications of climate modeling.

The Intergovernmental Panel on Climate Change (IPCC) is currently the leading international organization for the assessment of climate change. It was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO). The IPCC is a scientific body that reviews the most recent scientific, technical, and socio-economic information produced worldwide. Although the IPCC does not conduct any original research or monitor climate data, its membership consists of the leading researchers and scientists in climate studies.

The IPCC delivered assessment reports in 1990, 1995, 2001, and 2007. Within these reports are model-derived estimates of future climate (i.e. projections). Some of these climate projections are based on scenarios that assume different levels of future CO_2 emissions. Each scenario has a range of possible outcomes associated with it. The most optimistic outcome assumes an aggressive campaign to reduce CO_2 emissions; the most pessimistic is a "business as usual" scenario, while other scenarios fall in between. In the Fourth Assessment Report published in 2007, some of the projections state that global temperatures could rise between 1.1 and 6.4 °C (2.0 and 11.5 °F) during this century and that sea levels could rise by 18 to 59 centimeters (7.1–23 in).

1.7 Climate Change Adaptation and Mitigation

The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as:

> *The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.*[29]

Adaptation may be more simply defined as *coping*. Climate scientists agree that climate change will occur in the future, even if the rates of GHG emissions decline. Adapting to climate change will therefore become necessary in certain regions in order to protect or sustain certain environmental systems, species and habitats. The need for adaptation may be increased by growing populations in areas vulnerable to extreme events. However, according to the IPCC:

> *Adaptation alone is not expected to cope with all the projected effects of climate change, and especially not over the long term as most impacts increase in magnitude*.[30]

Mitigation for climate change will involve changes in environmental and industrial behavior and practices such as reducing the rates of GHG emissions and increasing the rates of GHG sequestration. Decreasing consumption of fossil fuels is the best way to reduce GHG emissions, although these may be reduced by other ways such as conservation and recycling practices and utilizing alternative forms of energy. One of the best ways to sequester CO_2 is to protect acreage and growing timber – this is a natural fit for DNR's overall mission and is in keeping with DNR objectives to make land available to the using public.

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[29] Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (eds) Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[30] Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate ChangeCore Writing Team, Pachauri, R.K. and Reisinger, A. (Eds.) IPCC, Geneva, Switzerland. pp 104

1.8 DNR Climate Change Mission Statement

DNR's mission in response to the potential challenges of climate change to South Carolina is two-fold:

1. Identify issues and assess potential impacts of climate change on the natural resources of South Carolina, and
2. Develop an adaptive response strategy in order to offset, minimize, or delay the effects of climate change on natural resources.

The potential issues and impacts of climate change on people, landscapes, ecosystems, and other features will vary. Understanding these potential impacts and issues will play a significant role in adaptation planning by the agency, and it will provide a foundation for leaders to make informed and effective decisions. At a time when funding for climate change adaptation is scarce, understanding the potential consequences associated with climate change is vital. Table 1.2 provides a generalized summary of potential climate change phenomena.

Table 1.2 Generalized summary of potential climate change impacts and consequences.[31] While some impacts and consequences may not directly affect South Carolina, all are expected to create indirect effects.

Climate Change Phenomena	Potential Impacts	Potential Consequences
• Increasing land, surface water, sea surface and atmospheric temperatures • Rising sea level	• More frost-free days/year • More heat waves • Changes in precipitation cycles • More frequent and prolonged droughts • Increased evapotranspiration • Increased frequency of wildfire • More severe flood events • More problems with invasive species • Spatial changes in species' ranges • Changes in timing of ecological events such as animal migration • Intra- and inter-specific competition for available resources as food chains are altered • Loss of sea ice, glacial coverage and polar snowpack • Increased coastal flooding • Increased coastal erosion • Rising water tables • Saltwater intrusion • Increased nonpoint source pollution • Increases in toxic substances flowing from upstream to coastal areas • Increases in numbers of threatened and endangered species • Decline in forest growth	• Widespread human health impacts • Changes in ecosystem services such as the ability of streams and wetlands to naturally filter, assimilate and degrade pollution • Decline in water quality and quantity • Surface and sea-water pH changes • Decline in productivity and availability of fish and other aquatic species although some species could benefit • Economic losses directed toward business associated with natural resource management in both inland as well as coastal zones • Loss of beaches • Increased storm surge flooding • Impacts to coastal infrastructure • Salt marsh conversion to open water • Freshwater marsh conversion to salt marsh • Loss of important recreational and commercial fishing and shell fishing habitats • Loss of coastal forest habitats • Loss of cultural resources • Extinction of threatened and endangered species

[31] National Oceanic and Atmospheric Administration NOAA. 2010. Adapting to Climate Change: A Planning Guide for State Coastal Managers. NOAA Office of Ocean and Coastal Resource Management. Hereinafter NOAA 2010. http://coastalmanagement.noaa.gov/climate/adaptation.html. Last accessed Sept 2010

1.9 Agency Goals to Address a Changing Climate

In response to the DNR Climate Change Mission Statement the agency will have the following goals:

1. Gather factual, accurate information and data on how climate change may affect wildlife, fisheries, water supply and other natural resources within South Carolina,
2. Identify monitoring and data needs required to assess impacts of climate change in the state,
3. Use factual information, data, research and modeling to determine what actions need to be taken to address climate change,
4. Ensure data quality, provide original research that addresses information needs and validate modeling results with collected data,
5. Identify opportunities to partner with other state agencies, academic institutions and non-profit organizations where needed to accomplish the mission,
6. Identify ways for state officials, local government and citizens to assist in mitigation of or adaptation to natural resource impacts related to climate change, and
7. Locate and obtain available funding to assist in meeting agency mission and goals related to climate change.

1.10 DNR Resource Divisions, Organization and Responsibility

1.10.1 Land, Water and Conservation Division

The DNR Land, Water and Conservation Division (LWC) develops and implements programs that study, manage and conserve land and water resources. This is accomplished by providing guidance in resource development and management through planning, research, technical assistance, public education and development of a comprehensive natural resources database. The scope of the division is broad and incorporates expertise in climatology, flood-plain mapping, geology, hydrology, land use, rivers and water conservation.

1.10.2 Marine Resources Division

The Marine Resources Division (MRD) is responsible for the management and conservation of the state's marine and estuarine resources. It also works with regional authorities such as the Atlantic States Marine Fisheries Commission (ASMFC) and the South Atlantic Fishery Management Council (SAFMC) to ensure that marine resources are sustainably managed throughout their range. MRD has 3 main sections with the following responsibilities:

1. The Office of Fisheries Management (OFM) reviews coastal development activities, recommends marine fishing seasons and fish size/creel limits,

issues permits and conditions for the harvest of marine species (e.g. fish, shrimp, crabs and oysters) and tracks trends in the harvest of marine species.

2. The Marine Resources Research Institute (MRRI) conducts research and long-term surveys of inshore and offshore resources (e.g., finfish, shellfish and marine habitats), assesses the effects of human activities on coastal resources, and operates marine stocking research programs (e.g., red drum and striped bass).
3. Coastal Reserves & Outreach (CRO) is responsible for MRD functions relating to coastal land management, education and outreach, and all programs in the ACE Basin National Estuarine Research Reserve[32] (1 of 28 reserves in the National Estuarine Research Reserves System).[33]

Data from numerous MRD programs indicate that the physical and biological systems of the coastal zone have already been impacted by increasing population density and development. Additional pressure on these systems from climate change is likely to exacerbate system degradation, although the extent of future degradation related to climate change is uncertain.[34] Ecological, social, educational and technological issues associated with climate change impacts in the marine environment are reviewed in this report.

1.10.3 Wildlife and Freshwater Fisheries Division

The Wildlife and Freshwater Fisheries (WFF) Division of DNR develops and implements programs that manage and conserve the wildlife and freshwater fishery resources of the state. The Wildlife Section protects, manages and enhances the state's habitats and associated wildlife for the public benefit of present and future generations. The Wildlife Section also is responsible for the state's Endangered Species Program which protects and enhances a variety of declining species and diminishing habitats. The Freshwater Fisheries Section provides protection, enhancement, and conservation of South Carolina inland aquatic resources. It also provides recreational fishing opportunities for the state's citizens through its operation of hatcheries, regional fisheries management, state public fishing lakes, research and diadromous fisheries coordination.

Pressures from increasing development, habitat loss and increasing numbers of invasive species have changed the landscape of South Carolina, negatively affecting wildlife and fish resources.[35] Climate change will exacerbate the effects of these pressures. Given the potential for severe impacts to our natural resources, it is critical

[32] http://www.nerrs.noaa.gov/Doc/SiteProfile/ACEBasin/html/resource/protland/lunerr.htm. Last accessed Dec 2010.
[33] http://www.chbr.noaa.gov/ecosystems/nerrs.aspx. Last accessed Oct 2011.
[34] NOAA. 2000. The potential consequences of climate variability and change on coastal areas and marine resources: Report of the Coastal Areas and Marine Resources Sector Team U.S. National Assessment of the Potential Consequences of Climate Variability and Change U.S. Global Change Research Program. D. F. Boesch, J.C. Field and D. Scavia, *eds*. NOAA Coastal Analysis Prog. Decision Analysis Series No. 21. 181 pp. http://www.cop.noaa.gov/pubs/das/das21.pdf. Last accessed Dec 2010.
[35] Environmental Law Institute. 2002. Mitigation of impact to fish and wildlife habitat: Estimating costs and identifying opportunities. http://www.elistore.org/Data/products/d17_16.pdf. Last accessed Oct 2011.

to plan ahead to address the effects of climate change on our native wildlife and fish species and essential habitats.

2.0 THE CLIMATE OF SOUTH CAROLINA – PAST AND PRESENT

2.1 Paleoclimatology: Recent Studies and Contributions to Climate Modeling

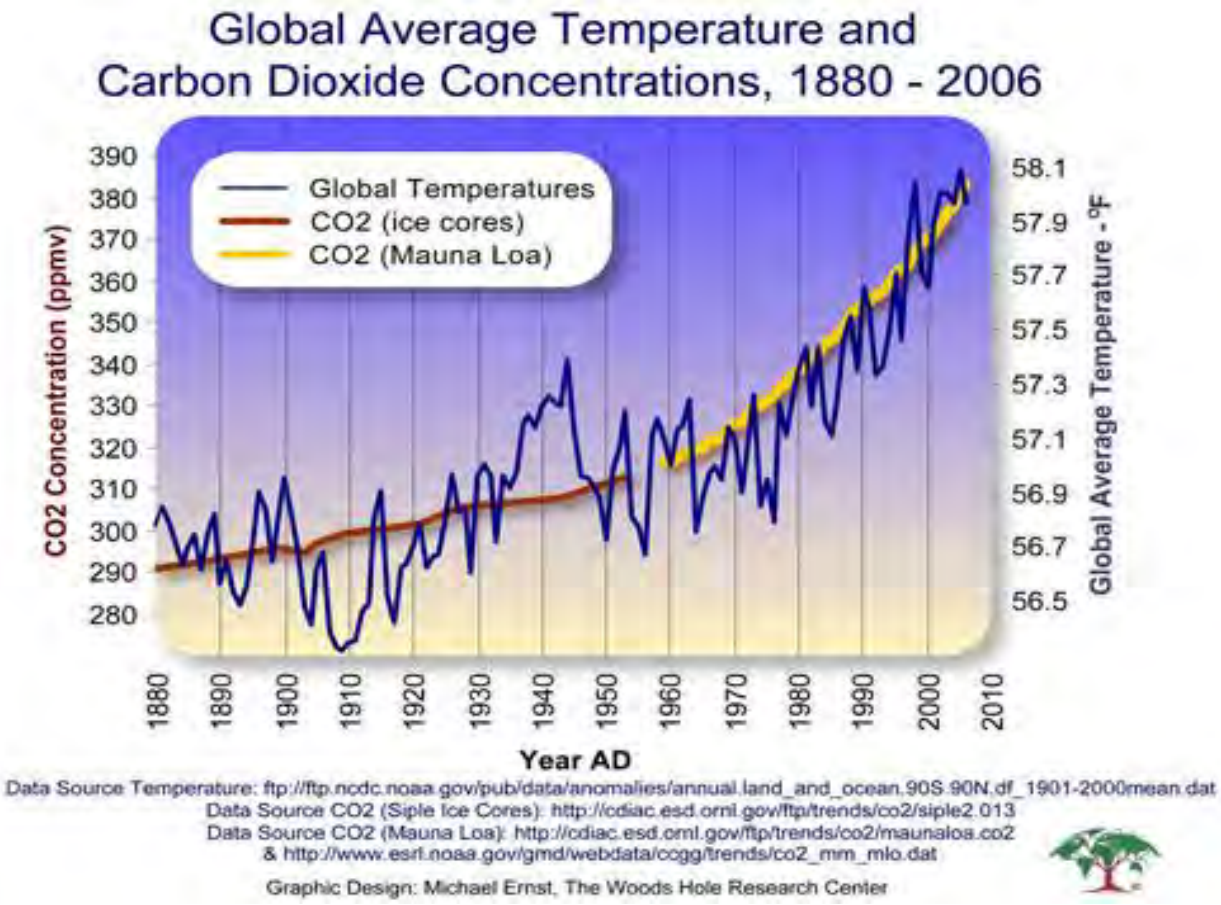
Climatology is the study and analysis of weather records over an extended period of time. Instruments such as thermometers and rain gauges have evolved since the 1700s and are now routinely used to record weather conditions. To reconstruct climate from an earlier time, it is necessary to use natural climate recorders, such as ice cores, tree rings, ocean and lake sediments, and corals. Measurements collected from these natural climate archives are called proxies because they do not provide a direct measurement of climate, as an instrument does. Rather, scientists deduce past climatic conditions from the physical and biological parameters contained in the proxy. The study of climate prior to the use of instrumental records is known as paleoclimatology.

Climatic conditions preserved in various proxies provide a way of understanding past changes in the environment where the proxy grew or existed. The ring width of a tree is an example of a proxy for temperature, or in some cases rainfall, because the thickness of the annual ring is sensitive to the temperature and rainfall of that year. The greatest understanding of paleoclimate comes when there are multiple data sets, providing a robust view of conditions. Figure 2.1 illustrates a reconstruction of global average temperature and CO_2 concentrations using both proxy measures of CO_2 from the Vostok ice core and instrumental CO_2 records from Mauna Loa Observatory in Hawaii.

Paleoclimate studies indicate that the earth's climate has changed many times throughout its history, and cycles of climate change have been recognized on a variety of time scales. Results from paleoclimate studies include the identification of regular episodic changes and the concept of abrupt climate change. The first is the result of a robust and expanding paleoclimate database. The second result owes, in part, to the greater precision of the datasets that have revealed dramatic climate shifts occurring in very short time spans.[36]

[36] NANRC 2001.

Figure 2.1 Global Temperature and CO_2 Concentration Since 1880. Data from NOAA's National Climate Data Center (NCDC) & Oak Ridge National Laboratory.[37]



2.2 Results of Studies

Paleoclimatic records are more precise and accurate in the last million years, and the last 650,000 years have been extensively studied because of well-preserved glacial and geological records. Currently, we are in an interglacial, or warm, period, which began at the end of the last glacial maximum (LGM) 13,500 years ago. The identification of episodic climates shows that glacial-interglacial, or cooling-warming, cycles can be recognized in the last million years, and that recurring intervals can be recognized. A well-supported theory suggests that these intervals correspond to Earth's orbital deviations. The relationship between orbital variations and glacial periods is referred to as a Milankovitch cycle. Although the Milankovitch Theory accounts for many glacial periods, some periods still defy a solely celestial cause.

[37] Data from NOAA's National Climate Data Center (NCDC) and Oak Ridge National Laboratory. http://www.whrc.org/resources/primer_fundamentals.html last accessed July 2010.

Much research has focused on the last 13,500 years, since the end of the last glacial period, and particularly on the last 2,000 years. The last 2,000 years are of interest because interglacial conditions were relatively stable, and thus provide a baseline to study modern climate variations. Three significant periods of climate variation, however, have occurred since the end of the LGM. In the upper latitudes of the Northern Hemisphere 12,800-11,500 years ago, oxygen-isotope-derived temperatures from an ice core in Greenland indicate conditions approximately 45-59°F (7-15°C) colder than present-day Greenland. This late Pleistocene glacial stadial event, or cooler period, is referred to as the Younger Dryas. The end of the Younger Dryas was marked by rapid transition from stadial to interglacial conditions and occurred in a time span of 20 years, possibly even less. The Medieval Warm Period occurred between 800-1300 AD and is primarily documented in Europe. It is recognized as an interglacial period bracketed by older and younger stadial events, so the description of warm is relative. Another stadial event in more recent times is also of interest. The Little Ice Age occurred from the 16th until the mid-19th centuries and affected the Northern Hemisphere, although in lesser magnitude than the Younger Dryas. There are numerous historical records documenting the shifts which occurred during the Little Ice Age.[38]

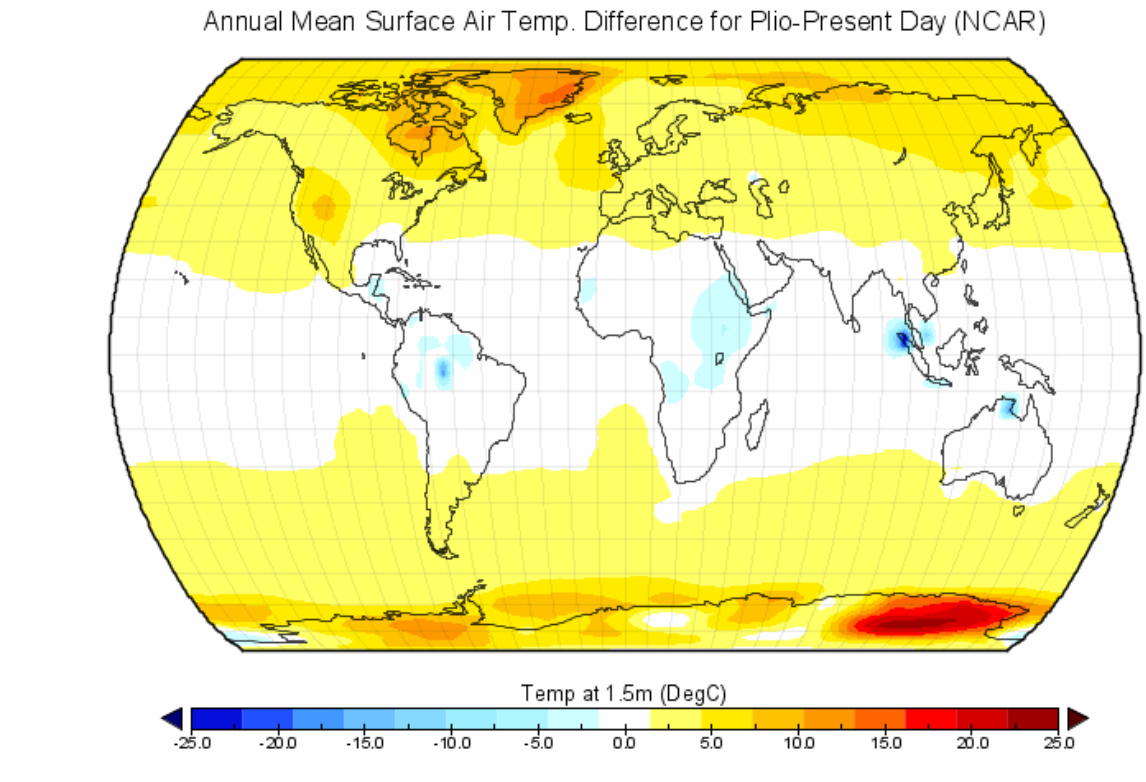
The recognition of a mid-Pliocene warm period (Fig 2.2), approximately 3.3 to 3.0 million years ago, may provide insight into what could happen during the present period of climate change. The mid-Pliocene change happened recently enough that the configuration of continents and oceans has not changed significantly, and air and ocean currents probably were similar to those of today. Mean-global temperatures during the mid-Pliocene warm period were 2-3°C above pre-industrial-age temperatures. CO_2 levels were in the range of 360-400 ppm, and the extent of ice sheets was reduced compared to today. These conditions resulted in sea level being 15-20 meters above present-day levels, and there was lower continental aridity.

The second major result of paleoclimate studies is the recognition of abrupt shifts in climatic conditions. Some of these shifts involved extreme changes in conditions, such as large magnitude warming events with increases of up to 61°F (16°C). The time scale of some shifts is as little as 10 years. The causes of rapid climate shifts are not fully understood, but it is thought they result from a combination of several natural processes.[39] The question now is whether human inputs of GHGs, along with trends in natural processes, trigger an abrupt climate change. If an abrupt shift in climate is possible, prudent planning necessitates efforts to predict both the magnitude and duration of the change.

[38] Jansen, E., J. Overpeck, K.R. Briffa, J.-C. Duplessy, F. Joos, V. Masson-Delmotte, D. Olago, B. Otto-Bliesner, W.R. Peltier, S. Rahmstorf, R. Ramesh, D. Raynaud, D. Rind, O. Solomina, R. Villalba and D. Zhang, 2007: Palaeoclimate. *in* Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller, *eds.* Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 66 pp.

[39] NANRC 2001.

Figure 2.2 Annual Mean Surface Air Temperature Difference between Pliocene and Present Day. Global temperatures, particularly at high latitudes, are believed to have been significantly warmer than today.[40]



2.3 Paleoclimate Summary and Recommendations for the Future

Paleoclimate studies indicate that climate variation is a natural phenomenon. The focus of paleoclimate studies is shifting now toward identifying the processes and causes of climate change. To date, no systematic study of South Carolina's paleoclimate has been done. Some studies have addressed climatic conditions at a specific time or at a specific site, but no studies have been done to document the state's climate over an extended period of time. The state's paleoclimate record should be studied at several time scales. First, the climate since European settlement should be reconstructed by examining local and state records, which would provide a detailed account of climate over the last 400 years. Instrument records can be integrated into this history. In addition to shorter term studies, studies extending back several thousand to several hundred thousand years could be useful.

[40] http://geology.er.usgs.gov/eespteam/prism/products/agu3.pdf

2.4 South Carolina Climate in the Early 21st Century[41]

South Carolina's location provides a mild climate and, in normal years, generous rainfall. Several factors responsible for this include our relatively low latitudinal location and a strong moderating influence from Atlantic Ocean warm water. Also of importance are the Blue Ridge Mountains to the north and west, which help block or delay movement of cold air masses from the northwest.

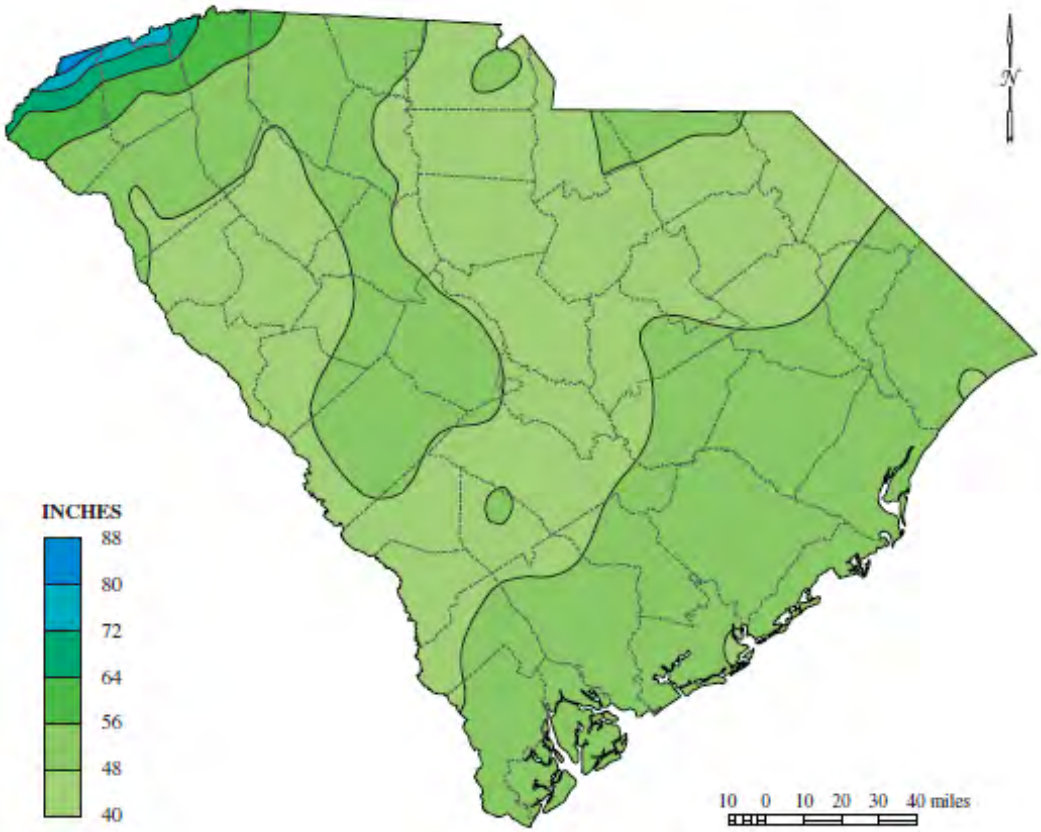
2.4.1 Precipitation

Precipitation in South Carolina is ample and distributed with two maxima and two minima throughout the year. The maxima occur during March and July; the minima occur during May and November. There is no wet or dry season; only relatively heavy precipitation periods or light precipitation periods. No month of the year averages less than 2 inches (5 cm) of precipitation anywhere in South Carolina. In the northwestern corner of the state, winter precipitation is greater than in summer and the reverse is true for the remainder.

The South Carolina average annual precipitation is slightly more than 48 inches (122 cm). Average annual precipitation is heaviest in the northwestern counties because moist air is forced up the mountains to higher and cooler elevations, where condensation and precipitation are initiated. In the Blue Ridge Mountains, 70-80 inches (179-203 cm) of rainfall occur on average at the highest elevations (Fig. 2.3), with the highest annual average of 79.29 inches (201.40 cm) occurring at Caesars Head. Across the foothills, average annual precipitation ranges from 60 inches (152 cm) to more than 70 inches (179 cm). In the eastern and southern portions of the Piedmont, the average annual rainfall ranges from 45-50 inches (114-127 cm). Areas in the northern Midlands report the lowest rainfall on average, between 42-47 inches (107-119 cm). Precipitation amounts are a little higher across the Coastal Plain. A secondary statewide maximum occurs parallel to the coast 10-20 miles (16-32 km) inland. This maximum, 50-52 inches (127-132 cm) is a result of the diurnal sea-breeze front thunderstorms prevalent during summer.

[41] http://www.dnr.sc.gov/climate/sco/ClimateData/cli_sc_climate.php. Last accessed May 2011.

Figure 2.3 South Carolina average annual precipitation, 1971-2000.



There is little difference in monthly rainfall distribution for the months of December-March, with the exception that the monthly total for March is somewhat higher than for any of the previous three months. During March, rainfall along the coast begins to increase, and by May the normal for the southern coast exceeds 5 inches (13 cm). At the same time, the central part of South Carolina receives only about 3 inches (8 cm) of rain and the mountains more than 5 inches (13 cm). During the summer, our weather is dominated by a maritime tropical air mass known as the Bermuda high, which forces warm, moist air inland from the ocean. As the air comes inland, it rises and forms localized thunderstorms, resulting in a precipitation maximum. Summer rainfall (June – August) is heaviest in the mountains, with 4-7 inches (10-18 cm) monthly, and along the coast with 6-8 inches (15-20 cm) monthly. During September, the greatest rainfall on average occurs along the coast. This is due to the passage of tropical storms and hurricanes that may influence coastal weather at this time of year. During October-November precipitation on average is at a minimum throughout the state. Any heavy precipitation during this period is likely to be the result of a hurricane or early winter storm. The greatest documented 24-hour rainfall was 14.80 inches (35.56 cm) observed at Myrtle Beach on September 16, 1999. The greatest total annual

precipitation occurred in 1979 at Hogback Mountain in Greenville County, where more than 120 inches (305 cm) was recorded.

Wintry precipitation, such as snow, sleet and freezing rain, also affect South Carolina. Snow and sleet may occur separately, together, or mixed with rain during the winter months from November-March, although snow has occurred as late as May in the mountains. Measurable snowfall may occur from 1-3 times in a winter in all areas except the Lowcountry, where snowfall occurs on average once every 3 years. Accumulations seldom remain very long on the ground except in the mountains.

Typically, snowfall occurs when a mid-latitude cyclone moves northeastward along or just off the coast. The greatest snowfall in a 24-hour period was 24 inches (61 cm) at Rimini in February 1973. During December 1989, Charleston experienced its first white Christmas on record, and other coastal locations had more than 6 inches (15 cm) of snow on the ground for several days following. Episodes of sleet and freezing rain are observed statewide, although less frequently in the Lowcountry. One of the most severe cases of ice accumulation from freezing rain took place in February 1969 in several Piedmont and Midlands counties with significant timber losses and power disruptions.

Abnormal weather patterns can alter or restrict precipitation, resulting in prolonged dry spells. Periods of dry weather have occurred in each decade since 1818 (National Water Summary 1988-1989 Hydrologic Events and Floods and Droughts, 1991). The earliest records of drought indicate that some streams in South Carolina went dry in 1818, and fish in smaller streams died from lack of water in 1848. The most damaging droughts in recent history occurred in 1954[42], 1986[44], 1998-2002[43], and 2007-2008.[44] Severe droughts occur about once every 15 years, with less severe widespread droughts about once every 7 years. In 1954, the beginning of one of South Carolina's record droughts, only 20.73 inches (52.65 cm) of precipitation fell at Rimini, in Clarendon County, to set the record annual low precipitation value for the State.

2.4.2 Temperature

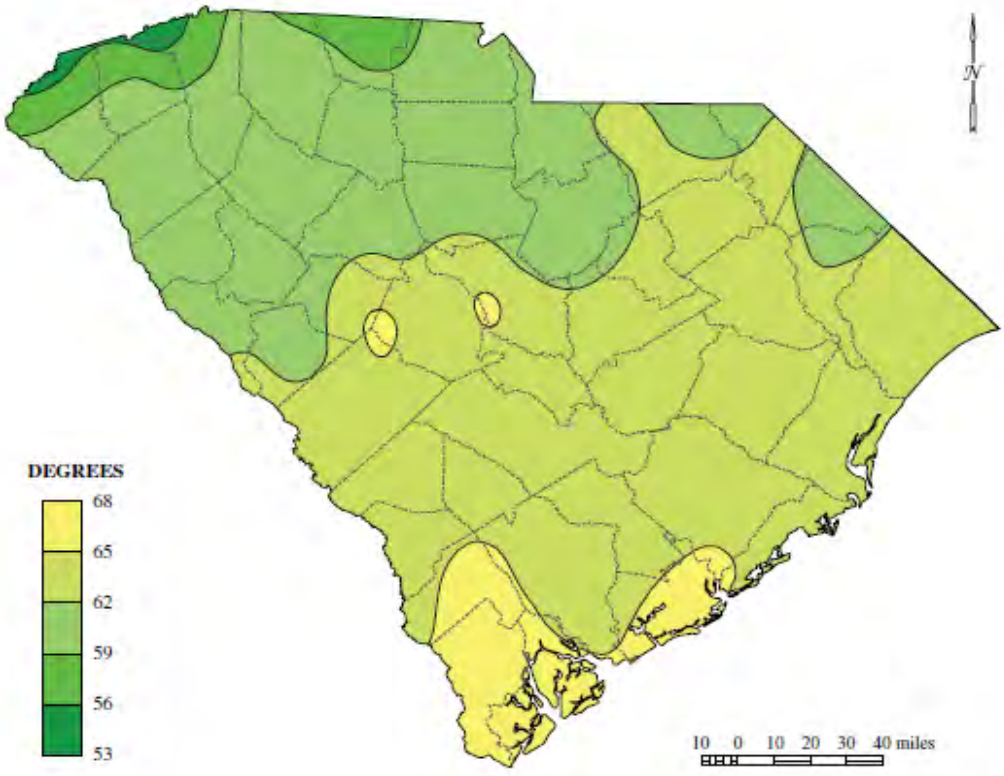
The state's annual average temperature is about 61°F (16°C). Local averages range from 55°F (12°C) at Caesars Head in the mountains to 66°F (19°C) along the southern coast at Beaufort (Fig 2.3). Elevation, latitude and distance from the coast are the main influences on temperature. The state's record low of -19°F (-28°C) was recorded at Caesars Head on January 21, 1985. Along the coast, ocean water temperatures vary a very small amount daily and annually when compared with adjacent land areas. The air

[42] National Water Summary 1988-1989 - Hydrologic Events and Floods and Droughts (1991), 2375, United States Geological Survey, United States Government Printing Office, Denver, Colorado.
[43] Gellici, J.A., M. Kiuchi, S.L. Harwell, and A.W. Badr (2004), Hydrologic Effects of the June 1998-August 2002 Drought in South Carolina, South Carolina Department of Natural Resources Open File Report, Columbia, S.C.
[44] South Carolina Department of Natural Resources On-line Archived Drought Status, http://www.dnr.sc.gov/climate/sco/Drought/drought_press_release.php, 2008.

over coastal water is cooler than the air over land in summer and warmer than the air over land in winter, thus providing a moderating influence on temperatures at locations near the coast. Records show maximum temperatures along the coast to average 4-5°F (2°C) lower than maximum temperatures in the central part of the State. The record high temperature, 111°F (44°C), has occurred in central South Carolina 3 times: at Calhoun Falls on September 8, 1925; at Blackville on September 4, 1925; and at Camden on June 28, 1954. January is the coldest month, with monthly normal temperatures ranging from 39°F (4°C) at Caesars Head to 51°F (11°C) at Beaufort. July is the hottest month, with monthly average temperatures ranging from 72°F (22°C) at Caesars Head to 82°F (28°C) at Charleston.

The growing season for most crops is limited by fall and spring freezes and ranges from 200 days in the coldest areas to about 280 days along the south coast. In areas where most of the major crops are grown, the growing season ranges from 210-235 days. The average date of the last freezing temperature in spring ranges from March 10 in the south to April 1 in the north. Fall frost dates range from late October in the north to November 20 in the south. Minimum temperatures of less than 32°F (0°C) occur on about 70 days in the upper portion of the state and on 10 days near the coast. The central part of South Carolina has maximum temperatures of 90°F (32°C) or more on about 80 summer days. There are 30 such days along the coast and 10-20 in the mountains.

Figure 2.4 South Carolina average annual temperature, 1971-2000.



2.4.3 Severe Weather

Severe weather in the form of violent thunderstorms, hurricanes and tornadoes occurs occasionally. Thunderstorms are common in the summer months, but violent storms usually accompany squall lines and cold fronts in the spring. These storms are characterized by lightning, hail, high winds and they sometimes spawn tornadoes. Most tornadoes occur from March-June, with April being the peak month. In the 61-year period 1950-2010, South Carolina averaged 15 tornadoes per year. The majority of these tornadoes (81%) were short-lived EF-0 and EF-1 tornadoes on the Enhanced Fujita scale.[45] Stronger, more destructive tornadoes are rare, but do occur with a consistent annual frequency of 2-4 per year. Since 1950 eleven destructive EF-4 tornadoes have touched down in South Carolina with wind speeds of 166-200 miles per hour.

Tropical cyclones affect the South Carolina coast on an infrequent basis, but do provide significant influence annually through enhanced rainfall during the summer and fall months. Depending on storm intensity and proximity to the coast, tropical systems can be disastrous. Historically, hurricanes are more frequent in late summer and early fall; however, tropical cyclones have affected South Carolina as early as May and as late as November. From the late 1800s-2010, 171 tropical cyclones have affected the state. South Carolina has experienced 3 major hurricanes since the 1950s: Category 4 Hazel on October 15, 1954; Category 3 Gracie on September 29, 1959; and Category 4 Hugo on September 21, 1989.

2.4.4 El Niño-Southern Oscillation Influence on South Carolina's Climate

The Palmetto State's climate is complicated by a number of oscillations in the global atmosphere and ocean that can shift and alter distant weather patterns. There are many of these oscillations, some better known and studied than others: Quasi-Biennial Oscillation (QBO), Madden-Julian Oscillation (MJO), El Niño-Southern Oscillation (ENSO) and Atlantic Multi-Decadal Oscillation (AMO). Each oscillation can interact with others to provide a complex forcing for downstream sensible weather. Thus, changes in these oscillations and their interactions produce changes in regional climate.

The ENSO with embedded Kelvin waves is the best understood oscillation. ENSO is a coupled atmosphere-ocean circulation pattern that induces teleconnections in the Northern Hemisphere atmosphere, complicating South Carolina weather and climate by shifting the position of the jet stream. The ENSO has 3 phases: warm, neutral and cold. El Niño is the warm phase of the ENSO and is characterized by abnormally warm ocean water occurring along the coast of Peru and eastern equatorial Pacific Ocean. The ENSO cold phase, La Niña, is characterized by a deep pool of abnormally cold water across the eastern equatorial Pacific affecting upper atmospheric circulation patterns. During the El Niño portion of ENSO, increased precipitation falls along the Gulf Coast and Southeast due to a stronger than normal, and more southerly, polar jet

[45] http://www.spc.noaa.gov/efscale/. Last accessed May 2011.

stream.[46] During La Niña events, the storm track is shifted northward. Analysis of past La Niña winter events indicates that South Carolina weather was warmer and drier than the weather observed during neutral or El Niño events. Periods of severe to extreme drought experienced in South Carolina during 1954, 1988, 1998-2002 and 2007-08 are correlated with La Niña events in the Eastern Pacific Ocean. There is no clear periodicity of these drought-producing events. Conversely, El Niño winters in South Carolina on average tend to be wetter and cooler than the weather during neutral or La Niña events.

2.5 Analyzing South Carolina Climate Trends

A major hurdle for any climate study is locating a long-term continuous record of observational data. The National Oceanic and Atmospheric Administration United States Historical Climate Network (USHCN) is a well-documented, accurate source of daily and monthly state climate data for the period 1895-to the present. These data consist of minimum, mean and maximum temperatures and precipitation totals measured at 28 stations located across the state and provide the longest record of weather conditions in South Carolina.

To evaluate climate variability in South Carolina, a first-order analysis of the annual mean monthly USHCN temperature data was performed. Temperature data recorded at the Greenville-Spartanburg (GSP) Airport in Greer, University of South Carolina (USC) in Columbia, Beaufort and Georgetown were used to investigate trends in temperature variability. These stations were selected to represent the three major geographic divisions of South Carolina: mountains-piedmont, midlands-sandhills, and coastal plain. The data from these 4 climate observing stations revealed similar temperature trends that are presented in Figures 2.5-2.8.

After a pronounced cool period occurring from 1895-1904, a net average warming period occurred at USC, Beaufort and Georgetown (Fig. 2.5-2.8). During the 1905-1938 warming trend, mean temperatures at GSP rose rapidly in the first 8 years, remaining neutral until 1958 (Fig. 2.5); the GSP data demonstrated the cooling trend lagged approximately 10 years behind the other stations studied. Another pronounced cooling period is observed in the coastal station data from the period 1948-1968. This cooling period also is noted in the data collected at USC.

Of particular importance in the discussion over climate change is the good agreement of a warming trend beginning in 1970 to the present for all 4 stations. This warming trend is most pronounced in the GSP and Beaufort data sets.

[46] Climate Prediction Center, El Nino and La Nina-related Winter Features over North America, http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensocycle/nawinter.shtm. Last accessed Dec 2010.

Figure 2.5 Annual mean temperatures at Greenville-Spartanburg Airport (GSP), South Carolina, 1895-2010.[47]

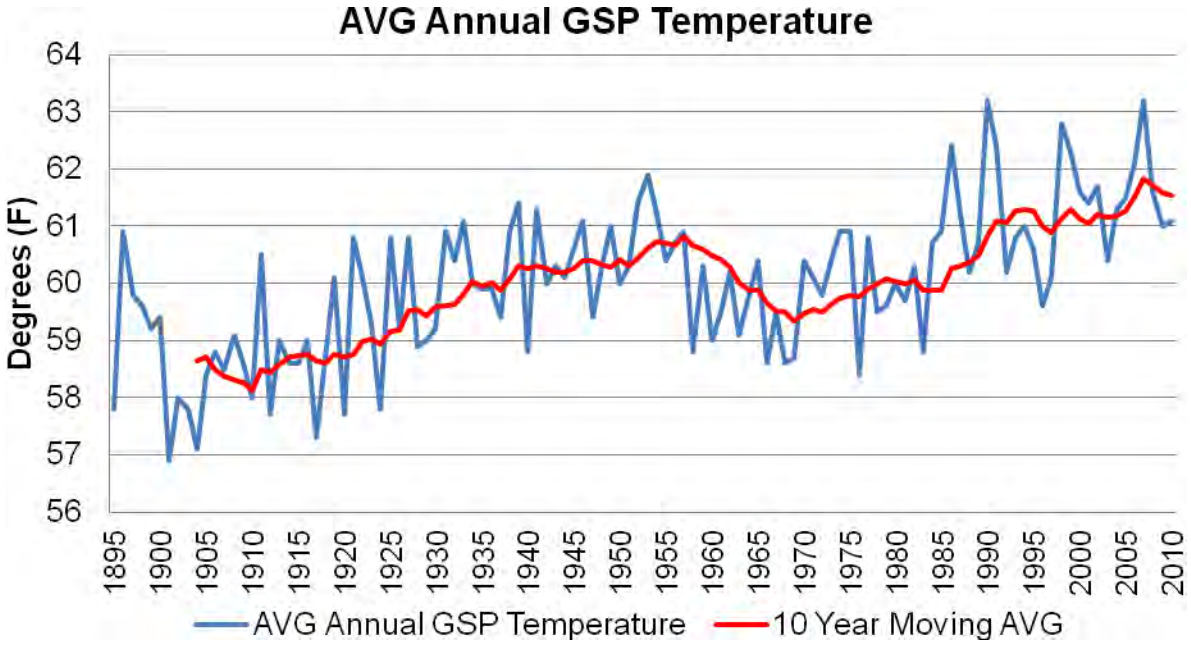
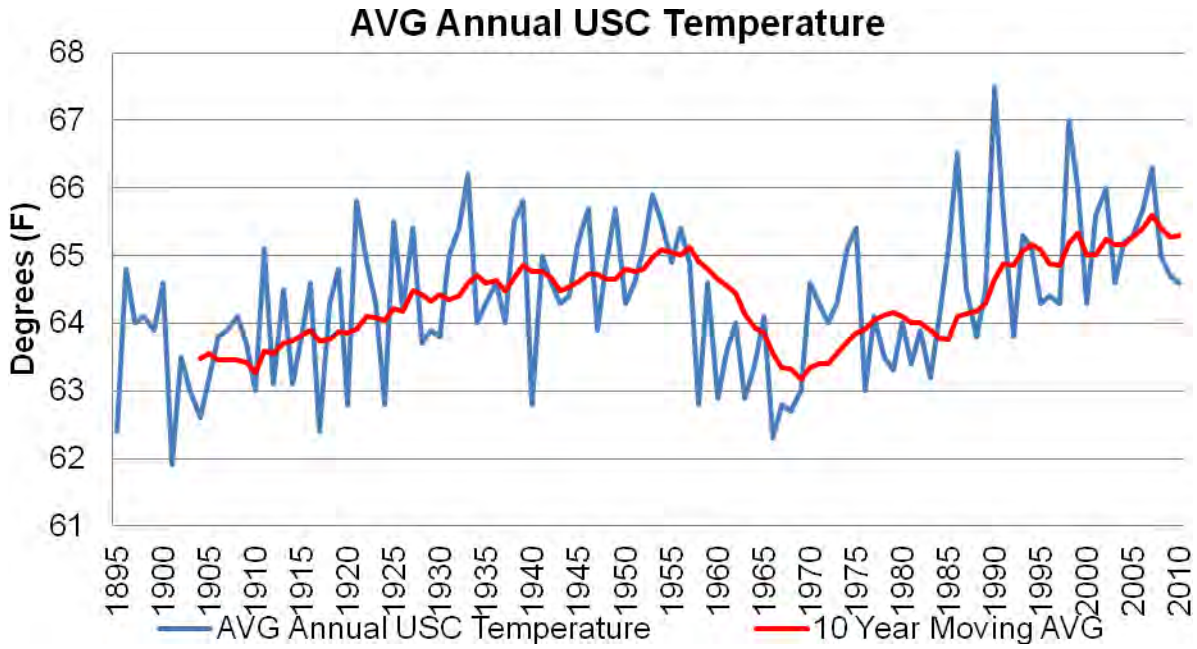


Figure 2.6 Annual mean temperatures at University of South Carolina (USC), Columbia, South Carolina, 1895-2010.[48]



[47] National Oceanic and Atmospheric Administration Climate Research Data. The Daily Historical Climatology Network

http://www.ncdc.noaa.gov/oa/climate/research/ushcn/ushcn.html . Last accessed July 2010. Hereinafter NOAA/USHCN.

[48] NOAA/USHCN.

Figure 2.7 Annual mean temperatures at Beaufort, South Carolina, 1895-2010.[49]

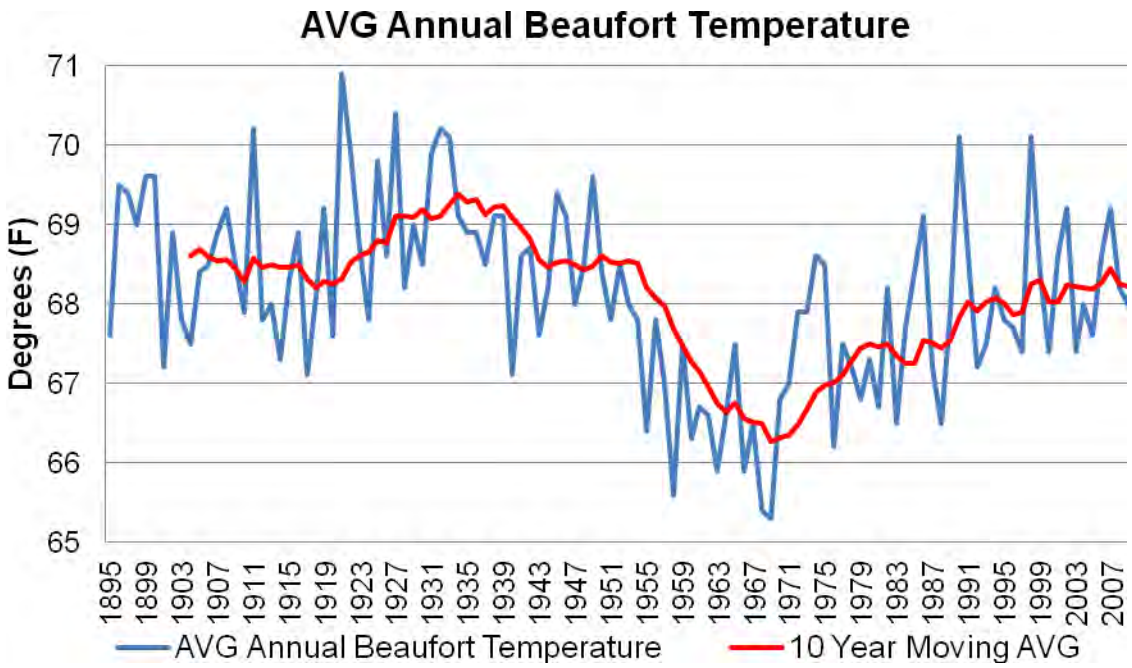
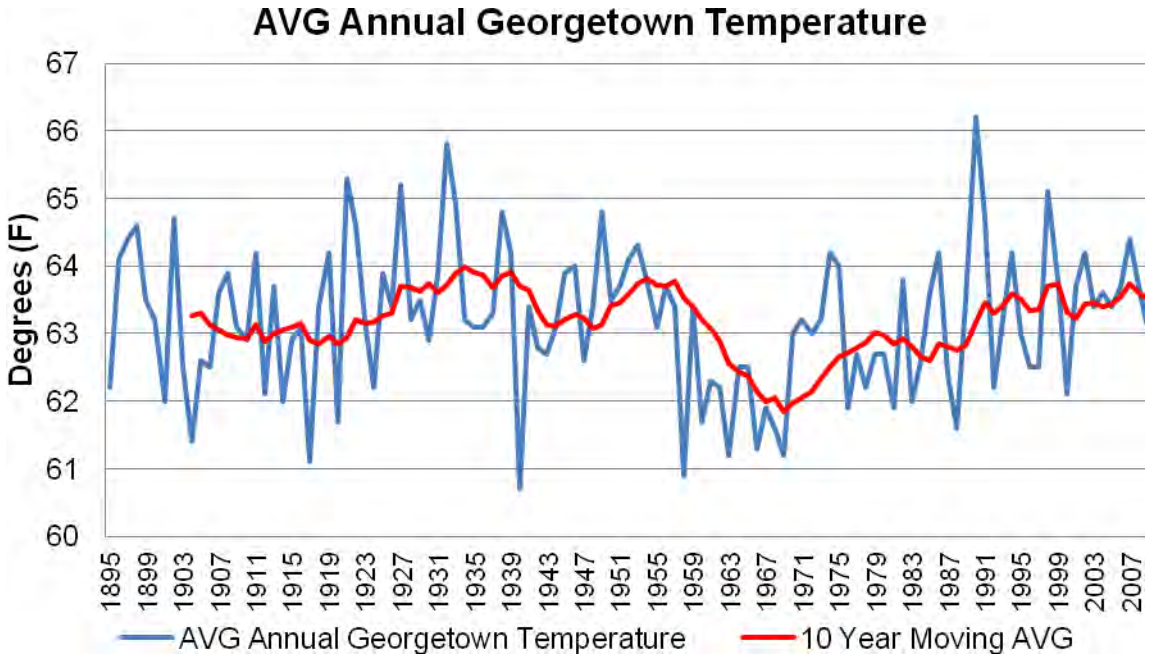


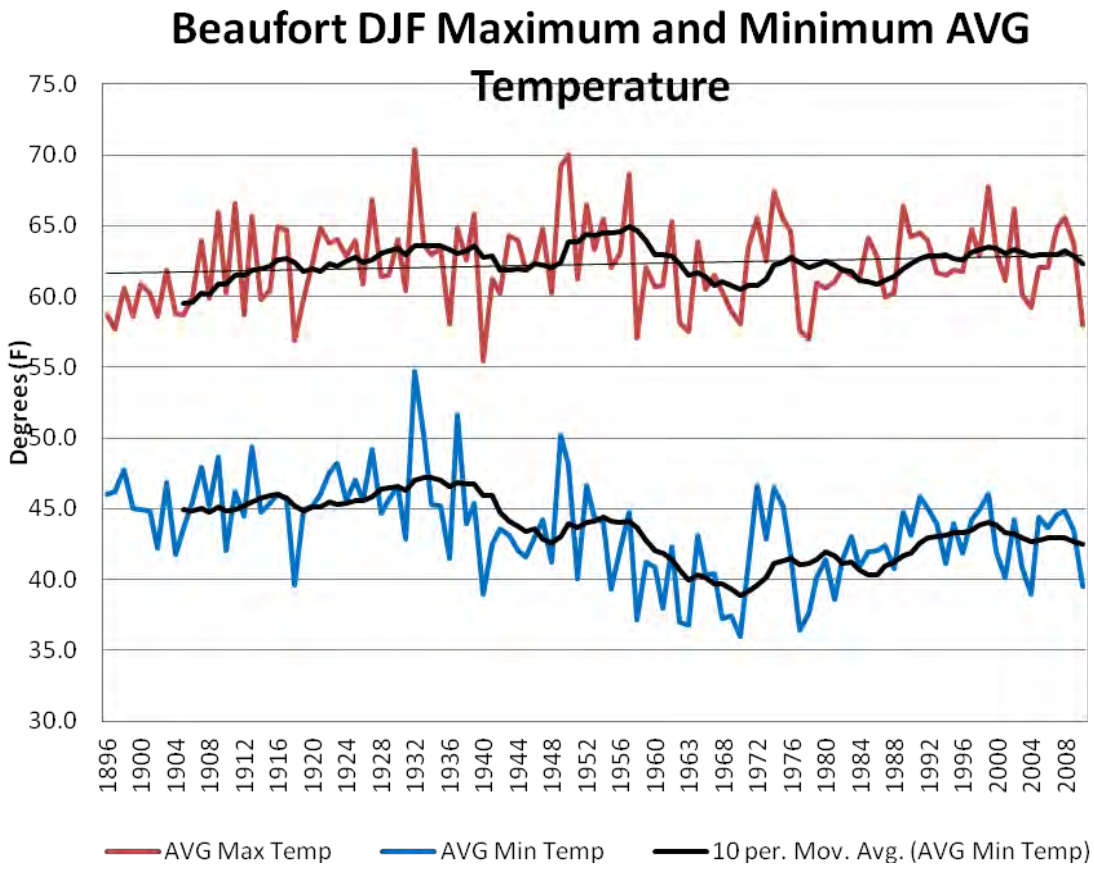
Figure 2.8 Annual mean temperatures at Georgetown, South Carolina, 1895-2010.[50]



[49] NOAA/USHCN.
[50] NOAA/USHCN.

USHCN data for Beaufort were investigated further to explore winter temperature trends. The December-January-February (DJF) monthly mean temperature data were plotted for the period of record 1896-2010 (Fig 2.9). Winter maximum temperatures demonstrated a slight warming trend for the period and conversely, minimum winter temperatures showed a very slight cooling trend. The long-term winter temperature trend was similar to the cool-warm-cool-warm trend seen in Beaufort's annual mean temperature data presented in Figure 2.7.

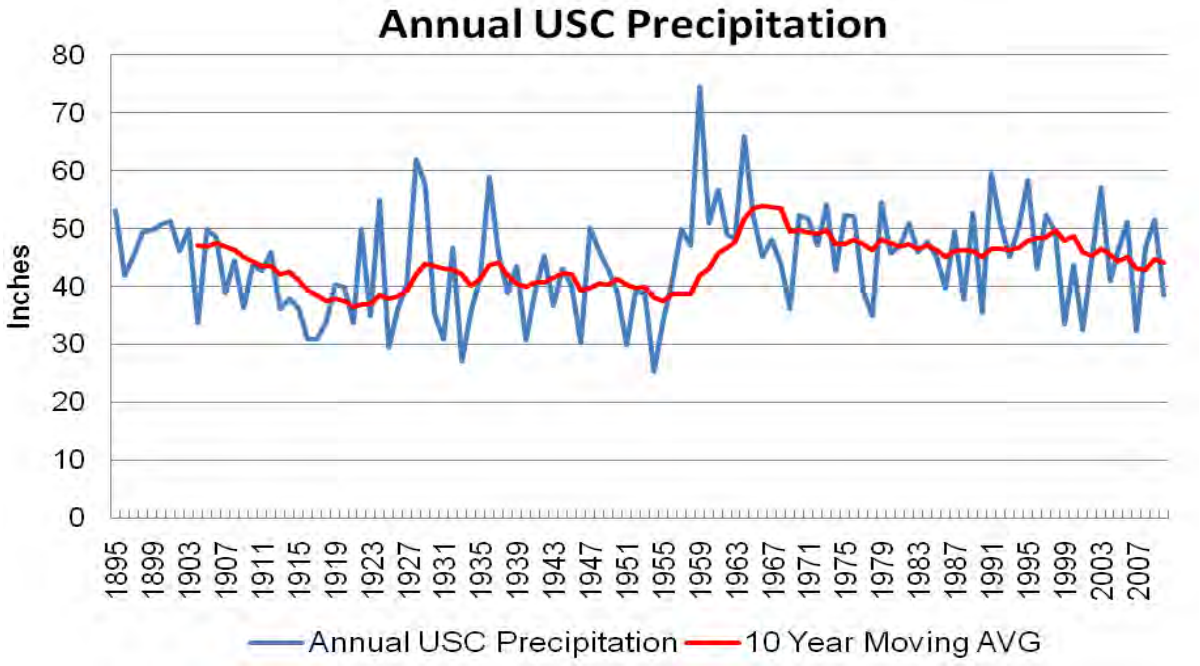
Figure 2.9 December, January, February average and median air temperatures recorded in Beaufort, South Carolina, 1895-2010.[51]



Examination of the USHCN annual rainfall data for the 5 stations showed no discernible trends, as shown, for example, in Figure 2.10. Lengthy periods of drought were evident in the data record as well as years with precipitation maxima. Some of the wetter years coincided with tropical cyclone activity, which can deliver a quarter to a third of the total annual rainfall amount in a single tropical storm event. There was poor correlation of the precipitation data and the annual temperature data (Fig 2.6, 2.10).

[51] NOAA/USHCN.

Figure 2.10 Cumulative annual precipitation, USC, Columbia, South Carolina, 1895-2010.[52]

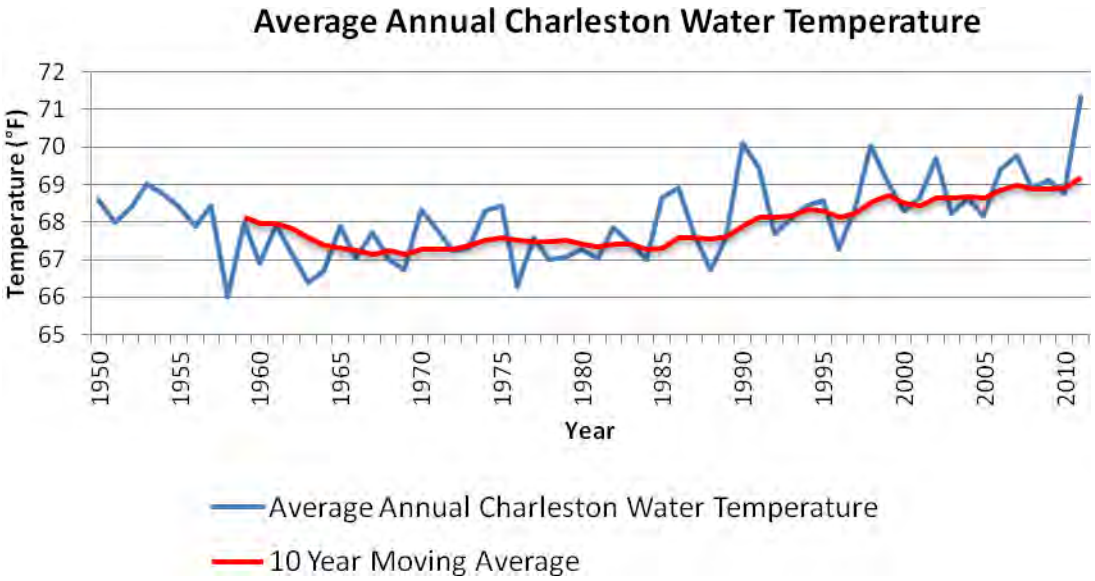


In addition to the temperature and precipitation study, a trend analysis of annual sea-water temperature data was completed using annual water temperature samples collected from the Charleston Harbor (Figure 2.11). The 10-year moving average of annual Charleston water temperature (Figure 2.11) shows relatively constant water temperatures from 1970 through 1985 before a steady warming trend began in 1985.

Data on severe storms were examined to discern any trends in severe storms. These data proved to be problematic due to the subjective nature of calculating the number of storm reports. Tornadoes and coastal hurricane landfalls provide a more objective measure to evaluate trends and variability; however, each has some inherent limitations. Tornado data from the period 1950-2010 (Fig. 2.12) demonstrate an increasing trend in these severe storms. This increasing trend is believed to be due to improved communications and detection capability, rather than climate change, and is attributable to increased population levels and the advent of Doppler radar technology in the early 1990s.

[52] NOAA/USHCN.

Figure 2.11 Average annual water temperature for Charleston, South Carolina, 1950-2010[53]



A tally of tropical cyclones making landfall along the South Carolina coast from 1878-2010 was plotted with a 10-year moving average calculation in order to note any trends (Fig. 2.13). Despite improvements in satellite technology, which can identify tropical cyclones, and indications that coastal water temperatures may be increasing, there is no evidence that tropical cyclone activity has increased along the South Carolina coast over the last 122 years .

[53] South Carolina Department of Natural Resources, Marine Resources Division

Figure 2.12 Annual observed South Carolina tornadoes, 1950-2010, demonstrating a Linear trend. [54]

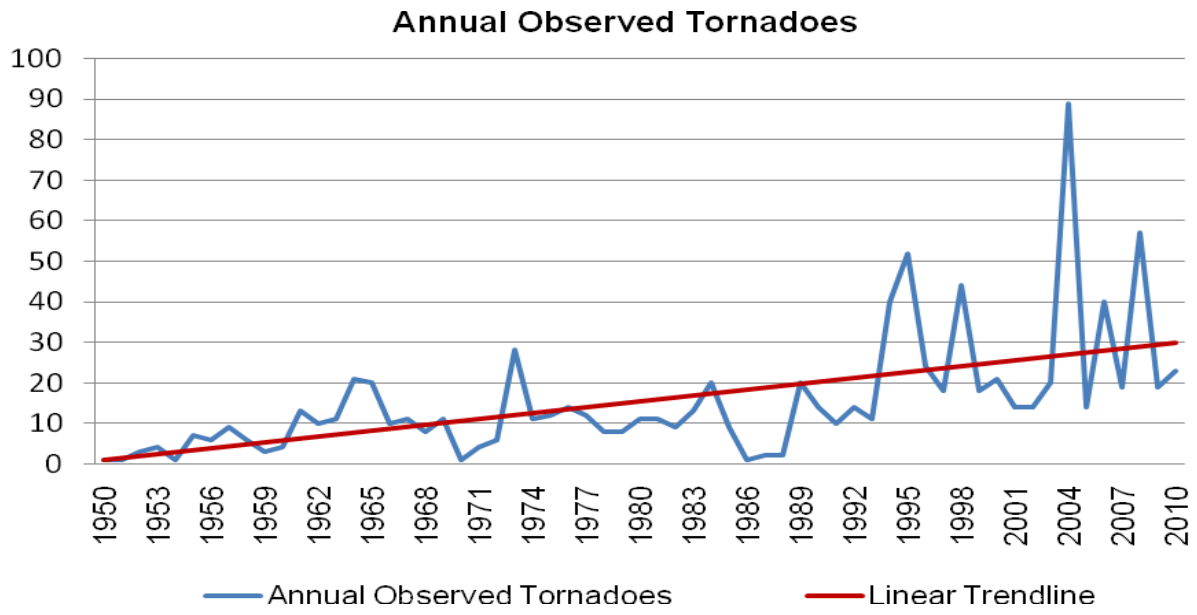
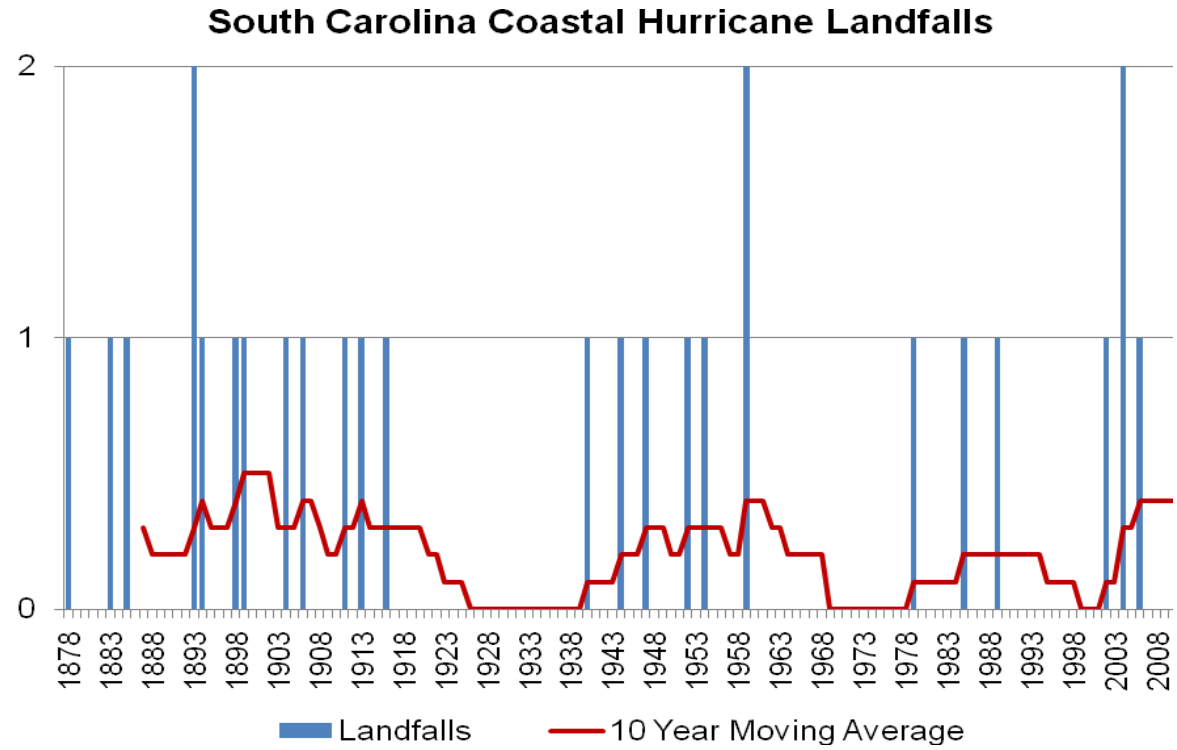


Figure 2.13 South Carolina coastal hurricane landfalls with a 10-year moving average applied.[54]



[54] http://www.nhc.noaa.gov/pastall.shtml. Last accessed Sept 2010.

2.6 Conclusions Based on South Carolina Data Examination

Temperature and precipitation data provide a record of variations in South Carolina climate extending back into the late 1800s. Air-temperature data from 1970 to the present show a steady increase in mean annual temperatures. Coastal water temperatures also support the recent warming phase, but the water temperature data record is not as extensive and continuous as the air temperature data. At this time, there is no definitive signal that tornadoes and hurricanes making landfall are increasing in the state. It must be noted that there is uncertainty in drawing broad conclusions on the recent and future climate of South Carolina based on examination of these kinds of localized data sets. In order to reduce uncertainty, more comprehensive data sets collected over a longer period of time and covering a larger geographic area must be examined.

2.7 Examination of Regional Climate Data and Predictive Models

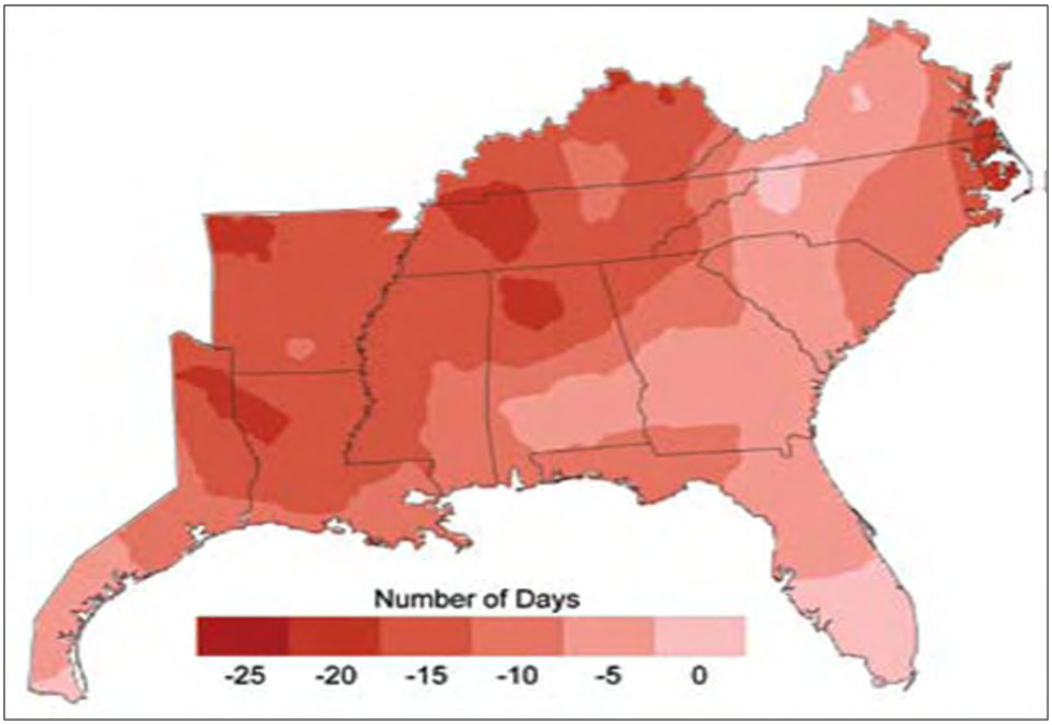
The southeastern United States may be particularly vulnerable to climate change because of the risks associated with its low-lying coastline, periodically occurring winter storms and tropical systems.[55] The rich biodiversity of the Southeast could be exposed to more risks related to drought, plant and animal pathogens and invasive species. The Southeast is home to more than 400,000 farms on almost 80 million acres (32 million ha),[56] over 127 million acres (51 million ha) of timberland[57] and 33% of estuaries[58] and almost 30% of all wetlands in the conterminous United States.[59]

Since it is harder to examine climatic trends at the state level variations over the past in order to make climatic predictions, it is important to examine regional climate trends and models. Compared to the continental United States, the climate of the Southeast is uniquely warm and wet, with mild winters and high humidity. Southeastern average annual temperature has exhibited natural variation for most of the past century; however during the past 40 years annual average temperature has increased about 2°F (1°C).[60] The greatest seasonal change has occurred during winter with freezing days declining 4-7 days per year over the period (Fig. 2.14). Changes in precipitation have been occurring over the past 3 decades with increases in heavy downpours in many parts of the Southeast, even though much of the region has experienced moderate to severe droughts during the same period.[61] While there is uncertainty in projecting trends in

[55] Karl, T.R., J.M. Melillo, and T.C. Peterson (eds.). 2009. Global Climate Change Impacts in the United States. Cambridge University Press, New York.
[56] USDA. 2008. Data Sets: Regional Agricultural Profile System. USDA Economic Research Service. Presentation tool for the 2002 Census of Agriculture. http://www.ers.usda.gov/data/RegionMapper/index.htm. Last accessed July 2010.
[57] USFS. 2010. Stream Temperature Modeling. US.Forest Service. http://www.fs.fed.us/rm/boise/AWAE/projects/stream_temperature.shtml. Last accessed June 2010.
[58] NOAA. 1990. Estuaries of the United States: Vital Statistics of a National Resource Base. Monograph. NOAA National Ocean Service, Strategic Assessment Branch, Rockville, MD.
[59] Dahl, T.E. 1990. Wetland Losses in the United States 1780s to 1980s. US Department of the Interior, Fish and Wildl. Serv, Washington, DC. 167 pp.
[60] Regional Climate Impacts: Southeast. USGCCRP 2009. http://www.globalchange.gov/images/cir/pdf/southeast.pdf. Last accessed Aug 2010. Hereafter USGCCRP 2009.
[61] USGCCRP. 2009.

tropical activity, it is important to address that changes in tropical intensity and frequency has the potential for major implications.

Figure 2.14 Change in freezing days per year from1976 to 2007 in the southeastern United States demonstrating that since the mid-1970s the number of days per year during which the temperature falls below freezing has declined by 4-7 days over much of the Southeast but over 15 days for much of Arkansas, Louisiana, Mississippi and Tennessee.[62]



Current climate models predict continued warming across the Southeast with the rate of warming more than twice the current rate. The greatest temperature increases are projected to occur in the summer months. The number of very hot days of ≥ 100°F (38°C) is projected to rise at a greater rate than the average temperature. Under the lower GHG emissions scenario average temperatures in the Southeast are projected to rise by about 4.5°F (2.5°C) over the next 70 years, while a higher GHG emissions scenario is predicted to yield about 9°F (5°C) of average warming. Summers by the 2080s are projected to be about 11°F (6°C) hotter with a much higher heat index. The frequency, duration and intensity of droughts are likely to continue to increase with higher average temperatures and a higher rate of evapotranspiration.[63]

Interest in the effects of climate change in the Southeast is increasing, but there are any number of impediments to understanding and predicting climate change, including public apathy and a lack of awareness, lack of outreach on adaptation options, lack of

[62] USGCCRP. 2009.
[63]USGCCRP. 2009.

uniform access to information on current climate change risks and a lack of guidance on what information and tools are available. Climate change documentation and development of adaptation strategies also are limited primarily by a lack of funding, a lack of political will and lack of government leadership. Leadership issues may be a result of division of authority across topics as well as geographic and political boundaries across federal, state and municipal governments. All of these factors impede development of effective climate change adaptation policies across the Southeast.[64]

2.8 Climate and Weather Assessment

How will climate change affect day-to-day weather conditions, and how will these weather changes impact South Carolina natural resources and their public use and enjoyment? Can we monitor climate change at useful scales? The recognition and description of climate change and weather patterns are vital to the management of natural resources.

Detailed information about temperature, soil moisture, precipitation and humidity, when combined with long-term weather models and historical climate data, provide valuable information, such as duration of droughts and shifts in the duration of seasons. In turn, this information is used to help citizens in many ways. An important application of accurate climate data is monitoring the shift in frost-free days. An accurate, statewide monitoring system should be integrated with a warning system to alert local officials and citizens when temperatures or weather conditions become hazardous.

Extreme weather events are also of concern. For example, it has been proposed that climate change can influence the intensity and number of storm events.[65] Although supporting data are not entirely conclusive, the physics behind models are well understood. Warmer ocean temperatures potentially can provide more energy to hurricanes, leading to more intense storms. Increased precipitation patterns could have an adverse affect on flooding issues. High intensity rainfalls could lead to greater flooding hazards and mud- or landslides.

Enhanced support is needed for weather-station systems to forecast short-term events and monitor longer term trends. Weather stations that have reliable, long-term homogeneous data provide data needed for the detection and attribution of present and future climate change. Costs and maintenance associated with these systems require partnerships between federal, state and local governments and non-governmental organizations (NGOs). There needs to be a stable, long-term commitment to these weather station systems and to the monitoring and management of the data.

Our understanding of climate change also can benefit from paleoclimate studies. Past climates can indicate the potential range of physical and biological conditions we might

[64]USEPA. 2010. Report on the USEPA Southeast Climate Change Adaptation Planning Workshop. http://epa.gov/region4/clean_energy/Task.5.Report.05.10.2010.pdf. Last accessed Sept 2010.
[65]H. Tompkins. 2002. Climate change and extreme weather events: Is there a connection? Cicerone 3:1-5.

expect. Paleoclimate studies also can provide insight into rates of climate change, conditions prior to major changes and the overall effect to the landscape resulting from climate change. Several lines of research could provide detailed information about past climates. For example, the stratigraphic record in the coastal plain can provide information about sea-level positions, minimums, maximums and rates of change. Carolina bays are known to have detailed fossil assemblages that can help interpret climatic conditions. Coastal lagoons may contain evidence of ancient hurricanes, providing information about the number, age and intensity of storms in the past. The study of ancient hurricanes (paleotempestology) could provide useful information about the frequency and intensity of hurricanes affecting South Carolina during the past. This information could be related to climatic conditions anticipated over the next several decades.

Climate change has the potential to increase flooding events requiring up-to-date flood mapping. The potential for increased flooding events or increased magnitude of flooding events or both could diminish the accuracy of current flood-plain maps. A strong flood-mapping program is needed. Through climate and stream monitoring, DNR may be able to better understand increased hazards, translate the results into a new generation of flood maps and design better emergency response programs.

3.0 CLIMATE CHANGE IMPACTS TO NATURAL RESOURCES IN SOUTH CAROLINA

3.1 Potential Physical Effects Resulting from a Changing Climate

3.1.1 Potential Effects Related to Change in Sea Level

3.1.1.1 Sea-level Rise

Sea level is rising,[66] and whatever the cause, it is a serious concern.[67] The evidence for the rise is visible to anyone who visits the beach. Communities have seen their shoreline retreat, requiring an increased need for beach nourishment. Along some beaches, downed trees and drowned tree stumps are an obvious sign of shoreline retreat. One of the most pronounced effects of sea-level rise will be the effects on shoreline and estuarine habitats and the species that depend on them. Sea-level rise and land subsidence also will affect coastal zone development. Shoreline change takes several forms: erosion, deposition and migration. Monitoring changes in magnitude, direction and rates of these parameters will provide important information to policy and decision makers. Beaches are among the most economically valuable natural resources in South Carolina, and the frequency of beach nourishment projects has accelerated over the past several decades. Impacts to beaches could be exacerbated by increasing intensity and frequency of damaging tropical storms, as predicted under some climate

[66] IPCC. 2007.
[67] EPA, 1989: The Potential Effects of Global Climate Change on the United States. Report to Congress. US Environmental Protection Agency. EPA 230-05-89-052. 401 pp. http://www.epa.gov/climatechange/effects/downloads/potential_effects.pdf. Last accessed Aug 2010.

change scenarios. While the magnitude of sea-level rise expected over the next century is not known with certainty, most models project approximately a 2.0 feet (0.6 m) rise. Estimates of sea-level rise have used multiplier factors ranging from 20-100 to estimate landward intrusion, indicating a potential intrusion boundary of 39-197 feet (12-60 m)[68] – clearly placing much of current beach development in South Carolina in jeopardy. In addition, outflow of coastal rivers, which act as a sand replenishment source, has been altered through more than a century of dam and hydroelectric reservoir development, the Santee and Pee Dee rivers being good examples. Not only are the physical threats of shoreline loss important, but the natural beauty of coastal beaches and the wildlife they sustain are extremely important to the state's economy and cultural heritage, and their sustainment is in doubt.

3.1.1.2 DNR Response and Recommendations

A comprehensive shoreline change strategy is needed to define the rate and magnitude of relative sea-level rise, as well as associated effects including shifting shoreline position, erosion rates and shifting salinity. Consideration of vegetation and aquatic organisms also is important to assess ecosystem change. Tracking sea-level rise and concomitant coastal change is a substantial task, but it is most effective when performed in cooperation with other state, federal and local efforts. Partnerships will be needed to acquire and protect habitat, as well as to collect, host and share regional, specific coast-wide data.

3.1.1.3 Coastal Habitats Affected by Sea-level Rise

The coastal zone is home to a number of unique habitats that are critical to support important wildlife and marine species. These include hammocks, salt and brackish emergent wetlands, that accommodate nesting, resting, and feeding areas for birds and beach dune systems where sea turtles (superfamily *Chelonioidea*) nest. These species and their habitats are especially vulnerable to the treat of sea-level rise.[69] [70]

South Carolina has several thousand small, unique coastal islands associated with larger barrier islands. The hammocks provide valuable resting and feeding stations for migratory shore birds as well as natural refuges for coastal mammals including deer, otter, mink and others. These small islands, ranging in size from less than an acre to several hundred acres, are most numerous between the Santee and Savannah rivers. Termed marsh hammocks or back barrier islands, they typically are located behind the oceanfront barrier islands and adjacent to the larger barrier islands. Other hammocks are located along the Atlantic Intracoastal Waterway or adjacent to coastal rivers and

[68] IPCC. 2007.

[69] Daniels R. C., T. W. White and K. K. Chapman. 1993. Sea-level rise: destruction of threatened and endangered species habitat in South Carolina. Environ. Manage. 17: 373-385.

[70] Cheung, W., W. Vicky, J. Lam, K. Sarmiento, R. Kearney, R. Watson and D. Pauly. 2009. Projecting global marine biodiversity impacts under climate change scenarios. Fish and Fisheries. 10(3):235-251.

estuaries. Almost all are surrounded by expanses of salt marsh, occasionally being bordered by tidal creeks or rivers.[71]

Sea-level rise poses the following risks to hammocks:

1. Low elevation (< 0.3 meters in some cases) increases susceptibility to even modest sea-level rise,
2. They provide preferred habitat for biota requiring freshwater ponds or wetlands for reproduction and are sensitive to sea-water intrusion, and
3. Increased demand for marsh front or water front property has made these formerly unattractive and inaccessible areas economically attractive for development.

Sand dunes and beach habitat on the South Carolina coastline are vital for nesting of sea turtles, including the loggerhead sea turtle (*Caretta caretta*) and for feeding of sea birds. It is widely accepted that most female sea turtles return to their natal region every 2–3 years to nest.[72] Because of this vital link in their natural history, loss of front beach nesting habitat to beach erosion is a serious problem for this threatened species. Furthermore, since beach erosion is typically exacerbated by sea-level rise, rising water levels clearly pose a long-term threat to sea turtle populations. If beach erosion occurs on undeveloped islands, impacts to sea turtles may be minimal as the island simply retreats. However, aerial observations suggest that undeveloped islands in South Carolina are not retreating in a manner that would sustain turtle nesting because erosion is occurring at such a rapid pace.[73] *Bone yards or* dead tree trunks and limbs in the surf zone, exposed peat from geologically older marshes and a general loss of sand, due to dams on major rivers and nourishment projects, all appear to be diminishing the nesting quality of these beaches.[74] Although nourishment on developed beaches can restore some beach function as a nesting area, steep scarps sometimes develop just above the surf zone preventing female sea turtles from nesting or limiting them to lower sites where nests are vulnerable to tidal inundation and wave action.[75] Additionally, research indicates the nourishment process creates significant disruption to the physical and biological compositions of offshore sites where sand is mined and not replenished naturally.[76]

Estuarine flats, salt marshes and creeks form essential habitat to the juvenile stages of many marine species that support important inshore fisheries such as shrimp (*Litopenaeus* and *Farfantepenaeus*), blue crab (*Callinectes sapidus*), spot (*Leiostomus*

[71] Whitaker, J. D., J. W. McCord, P. P. Maier, A. L. Segars, M. L. Rekow, N. Shea, J. Ayers and R. Browder. 2004. An ecological characterization of coastal hammock islands in South Carolina. Final report to Ocean and Coastal Resources Management, SC Dept. of Health and Environmental Control. SC Dept. Nat. Resour. Rept. 115 pp.

[72] Bjorndal, K. A., A. B. Meylan and B. J. Turner. 1983. Sea turtle nesting at Melbourne Beach, Florida, I. Size, growth and reproductive biology. Biological Cons. 26: 65-77.

[73] Dubose Griffin, DNR, personal communication.

[74] Dubose Griffin, DNR, personal communication.

[75] M. Steinitz, M. Salmon, and J. Wyneken. 1998. Beach renourishment and loggerhead turtle reproduction: A seven year study at Jupiter Island, Florida . J. Coast. Resour. 14(3):1000-1013.

[76] Posey M. and T. Alphin. 2002. Resilience and stability in an offshore benthic community: Responses to sediment borrow activities and hurricane disturbance. J. Coast. Resour. 18(4):685-697.

xanthurus), flounder (*Paralichthys spp.*), red drum (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus*) and gag grouper (*Mycteroperca microlepis*). These flats also sustain high densities of other small species, such as fiddler crabs (*Uca* spp.), snails and killifish (*Fundulus,* spp.), which are important prey for larger fish, crabs and birds. Rising sea levels could contribute to a reduction in the area of intertidal marsh available, especially if coastal development impedes their inland expansion in response to inundation. Reduced salt marsh area would be expected to have a negative impact on the populations of species that rely on salt marsh habitat.

3.1.1.4 DNR Response and Recommendations

The effects of rising sea level and its biological ramifications are at best uncertain and potentially devastating to the coastal zone ecosystem. Substantial resources need to be dedicated to reducing these uncertainties. Support should be given to spatial mapping projects that can model the effects of sea-level rise and assist in identifying methods of reducing its impacts.

Migratory routes and utilization of hammock islands by birds should be quantitatively compared to the mainland and the larger barrier islands. In order to determine relative abundance of birds and mammals, utilization of truly isolated hammocks should be compared to the more accessible hammocks. Other research interests include the importance of woodland edges for birds, the influence of the physical shape on bird utilization (complex shorelines vs. a circular-shaped island), predator-prey interactions and the interrelationships between plants and animals should be studied. Efforts should be made to ensure that land is set aside to serve as isolated hammocks as salt marshes migrate inland as a result of rising sea level.

Cooperative studies and management efforts with beachfront communities should continue to ensure the protection and enhancement of sea turtle nesting beaches. The rate of sea-level rise should be monitored, and resultant information should be used to determine appropriate management options as conditions change. Long-term management plans for beach nourishment should be developed through collaboration among beach communities, researchers and state/federal agencies. These plans should included examination and identification of likely renewable sand resources, beach nourishment funding sources and beach nourishment impacts upon other natural resources.

3.1.1.5 Sea-level Rise Effect on Marine and Coastal Resources

Implications of sea-level rise will require societal considerations that will have both direct and indirect effects on marine and coastal resources. Regarding the gradual inundation of beaches, river banks, and marsh edges, only three basic options are available: retreat inland, armor with sea walls or revetments or, in the case of beaches, nourishment by physically moving sand, usually from offshore. Each of these options has high economic costs as well as potential biological costs.

Sea-level rise could have profound effects on coastal salt marshes, inland brackish marshes and further inland freshwater marshes. Some believe that marshes, with time, can migrate inland and maintain their viability;[77] however if development and armored shorelines prevent potential inland retreat, marsh area will be reduced along with associated living marine resource productivity. Even without the opportunity for marshes to migrate landward, studies in South Carolina have shown that some salt marsh habitats may be resilient to sea-level rise due to sufficient sedimentation that allows the marshes to rise with sea level, while other marsh habitats will not be able to do so, resulting in drowning of those marshes. Similar problems could occur in the state's valuable shellfish beds if the beds cannot migrate landward, or changes in existing habitat conditions destabilize the beds.

If populations that are targeted by recreational and commercial fishing are negatively impacted by climate change, particularly loss of estuarine nursery habitat, mitigation in the form of aquaculture replenishment stocking or for pond grow out of seafood may be in greater demand.

3.1.1.6 DNR Response and Recommendations

Efforts should be undertaken to proactively address marsh migration through the use of migration models that identify likely areas where marshes could migrate. On the basis of these models, strategies should be cooperatively developed to protect these areas from further and future development. Research and development of mariculture techniques for important fishery species should continue or be initiated.

3.1.1.7 Sea-level Effects on the Fresh and Saltwater Interface

Changes in the location of the saltwater/freshwater interface will affect many freshwater and diadromous fish species. As sea level rises, saltwater will move further up the river systems of the state. Species with low salt tolerances and diadromous fish will be limited in their ability to move upstream into better quality habitat due to dams and hydroelectric reservoirs constructed on most South Carolina riverine systems. The amount and distribution of aquatic vegetation also will change in response to increases in salinity, limiting cover and food sources for aquatic organisms. Additionally, the potential exists for increased demand for water releases from reservoirs to fight the salt wedge that will be moving inland.

3.1.1.8 DNR Response and Recommendations

For shifting salinity profiles, a contemporary, comprehensive hydrological survey of the coastal rivers is needed to determine existing and normal salinity patterns. Predictive models to analyze potential for salinity change by river mile should be developed throughout the coastal zone. Information obtained from sound scientific research could

[77] Feagin, R. A., M. Luisa Martinez, G. Mendoza-Gonzalez and R. Costanza. 2010. Salt marsh zonal migration and ecosystem service change in response to global sea level rise: a case study from an urban region. Ecology and Society. 15(4):14. [online] URL: http://www.ecologyandsociety.org/vol15/iss4/art14/. Last accessed June 2011.

be used to support development of adaptive management strategies to cope with shifting salinity in coastal rivers.

3.1.1.9 Sea-level Rise Effects on Coastal Managed Wetlands

The coastal landscape of South Carolina has both beauty and ecological significance. Managed tidal wetlands, also known as *rice fields, diked marshes* and *coastal impoundments* are a unique category of tidal coastal wetlands that exist in substantial acreage in and primarily only in South Carolina, largely as relics of a long-past agricultural era. Predominantly occurring in the traditional freshwater tidal zone, the infrastructure of most of the original acreage of managed tidal wetlands has been abandoned for a variety of reasons. However, a portion of the original acreage of these historically, culturally and economically important habitats in the coastal landscape is maintained intact for utilization by migratory birds and for recreational hunting. Conservation of rice plantations and associated managed wetlands in South Carolina is unique and is the predominant basis for habitat protection initiatives enabling modern preservation of tens of thousands of acres of ecologically important wetlands and upland buffer.

Waterfowl migrate during autumn from northern production areas to southern wintering areas, then in spring return northward to nesting areas.[78] Southern wintering allows dispersal over a broad area resulting in diverse foraging opportunities and maintenance of body condition.[79] Optimum wintering waterfowl habitat such as that located within South Carolina managed tidal wetlands is critical to the maintenance of this national trust resource.

Rudimentary wetland habitat management strategies were improved during the period between 1945 and 1985 until they became highly refined and specific.[80] [81] [82] Numerous papers have described prescriptive water quality parameters and water level manipulations designed to produce standing crops of preferred naturally occurring emergent and submerged wetland plants in fresh, intermediate, brackish, saline and hypersaline marshes.[83] [84] [85] [86] [87] [88]

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[78] Welty, J. C. 1975. The life of Birds, 2nd edition. W. B. Saunders Co. Philadelphia, PA. 662 pp.

[79] Baldassarre, G. A. and E. G. Bolen. 1994. Waterfowl ecology and management. John Wiley & Sons, New York, NY. 609 pp.

[80] Gordon, D. H., B. T. Gray, R. D. Perry, M. P. Prevost, T. H. Strange and R. K. Williams. 1989. South Atlantic coastal wetlands. Pages 57-92 *in:* Habitat Management for Migrating and Wintering Waterfowl in North America, L. M. Smith, R. L. Pedersen and R. M. Kaminski, eds. Texas Tech University Press, Lubbock, TX. 574 pp. Hereinafter: Gordon et. al. 1989.

[81] Conrad, W. Brock. Conrad. 1966. A food habits study of ducks wintering on the lower Pee Dee and Waccamaw rivers, Georgetown, South Carolina. Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm, 19:93-99.

[82] W. P. Baldwin. 1950. Recent Advances in Managing Coastal Plain Impoundments for Waterfowl, An. Conf. SE Assoc. Game and Fish Comm. 11 pp.

[83] Williams, R. K., R. D. Perry, M. B. Prevost and S. E. Adair. 1998. Management of South Atlantic coastal wetlands for waterfowl and other wildlife. Ducks Unlimited, Inc., Memphis, TN. 26 pp.

[84] Morgan, P. M., A. S. Johnson, W. P. Baldwin and J. L. Landers. 1975. Characteristics and management of tidal impoundments for wildlife in a South Carolina estuary. Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm. 29:526-539.

[85] Landers, J. L., A. S. Johnson, P. H. Morgan and W. P. Baldwin. 1976. Duck foods in managed tidal impoundments in South Carolina. Journal Wildl. Manage. 40:721-728.

Coastal wetland managers have made significant strides in habitat management employing diverse, holistic habitat management plans that incorporate a wide variety of strategies to maximize production of favored plant material, seeds, and tubers and associated invertebrates while allowing for estuarine connectivity.[89] As a result of these successes some coastal landowners in the tidal regime constructed dikes in brackish and saline wetlands not previously included in rice culture.[90] By the mid-1970s over 70,000 acres (112,630 ha) of South Carolina coastal wetlands were in some form of wetland management primarily directed toward attracting waterfowl for recreational hunting and enjoyment.[91] Waterfowl since have flourished in managed tidal wetlands along with other wetland dependent wildlife, most notably shore and wading birds, the bald eagle (*Haliaeetus leucocephalus*) and the American alligator (*Alligator mississippiensis*).[92] DNR manages a total of 32,940 acres (13,331 ha) of managed wetlands at 6 locations that occur in the intertidal zone. The Yawkey Wildlife Center and Santee Coastal Reserve are located in Charleston and Georgetown counties and have dikes and wetlands that front directly on the ocean. These properties have 26.4 miles (42.5 km) and 15.8 miles (25.4 km) of perimeter dikes with 32 and 25 water control structures in these dikes, respectively. These 2 properties are under direct threat from sea-level rise. Existing dikes are minimally adequate in height and any rise will threaten the management of these wetlands. Bear Island WMA in Colleton County and Santee Delta WMA in Georgetown County are located more inland but will be affected by sea-level rise. They have 15.0 miles (24.1 km) and 5.8 miles (9.3 km) of perimeter dikes with 35 and 10 water control structures in these dikes, respectively. Samworth WMA located in Georgetown County and Donnelley WMA located in Colleton County are even further inland but still depend upon the tide to provide water for flooding of the wetlands. These 2 properties have 14.2 miles (22.8 km) and 0.7 miles (1.1 km) of perimeter dikes with 22 and 5 water control structures located in these dikes, respectively.

An embankment of sufficient composition and height is mandatory to seasonally restrict tide water from a managed tidal wetland; water control structures installed in embankments are necessary to adjust, raise or lower water levels in accordance with regularly occurring tides and a desired wetland management strategy.[93] Because the

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[86] Prevost, M. B., A. S. Johnson and J. L. Landers. 1978. Production and utilization of waterfowl foods in brackish impoundments in South Carolina. Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm. 32:60-70.

[87] Perry, R. D. 1987. Methods to enhance target species production in freshwater impoundments. Pages 33-43 *in*: M. R. DeVoe and D. S. Baumann, eds. SC Coastal Wetland Impoundments: Management Implications, Workshop Proc. SC Sea Grant Consortium. Tech. Rep. No. SC-SG-TR-87-1.

[88] Perry, R. D. 1995. Management of tidal freshwater wetlands for waterfowl. Pages D124-D134 *in*: W. R. Whitman, et al. eds. Waterfowl habitat restoration, enhancement and management in the Atlantic Flyway. Third ed. Environmental Manage. Co., Atlantic Flyway Coun. Tech. Sect. and Delaware Div. Fish and Wildl., Dover, DE.

[89] Gordon et. al. 1989.

[90] Miglarese, J. V. and P. A. Sandifer, eds. 1982. An ecological characterization of South Carolina wetland impoundments. SC Mar. Resour. Cent. Tech. Rep. 51. SC Wildl. & Mar. Resour. Dept. Columbia, SC. 132 pp.

[91] Tiner, R. W., Jr. 1977. An inventory of South Carolina's coastal marshes. SC Mar. Resour. Cent. Tech. Rep. 23. SC Wildl. & Mar. Resour. Dept. Columbia, SC. 33 pp.

[92] Gordon et. al. 1989.

[93] Williams, R. K. 1987. Construction, maintenance and water control structures of tidal impoundments in South Carolina. Pages 139-166 *in*: W. R. Whitman and W. H. Meredith. eds. Waterfowl and Wetlands Symposium: Proc .

elevation of managed tidal wetland embankments typically is only slightly higher than the flooded water level of the interior managed wetlands, rising sea level poses a significant threat to their existence, and therefore the sustainability of these habitats for the benefit of migratory waterfowl and other managed tidal wetland species.

Equally important to the management of these wetlands is the salinity of the water used to facilitate water manipulations. At Samworth and Donnelley, freshwater has been the norm and the vegetation communities within the wetlands do not tolerate significant salinity. Even at Yawkey and Santee Coastal Reserve where embankments front on the ocean, relatively low-salinity riverine water has been available for water management purposes. Wetland management scenarios for these wetlands target a range of moderate salinities. As sea level rises and saltwater travels farther inland, fresh water near or at the coast will not occur. Saltwater management strategies will shift to hyper saline; brackish water management strategies will shift to saline; and freshwater management strategies will shift to brackish. These shifting salinity profiles will require DNR to adapt in order to effectively manage wetlands located directly on the coast.

3.1.1.10 DNR Response and Recommendations

Care must be given to ensure current regulatory mechanisms continue to protect this special kind of wetland as well as all other wetlands. Equally important is the need to be certain that the wetland protection regulations embrace an adaptive approach, when necessary, to benefit society and continue to protect all natural resource wetland attributes.

DNR should routinely monitor and maintain dikes, monitor water levels and salinities within and outside the wetlands. Embankments should be raised as needed and water control structures should be maintained and replaced as required. Adaptive relocation of water control structures may be necessary in order to adjust to changing riverine salinity profiles. Adaptive management of these wetlands, based upon water levels and salinities, is critical. Inland expansion or replacement of managed wetlands, by retreat, should be considered as properties become available.

3.1.2 Potential Effects Related to Changes in Water

3.1.2.1 Water Quantity

Water-supply issues are becoming increasingly critical.[94] With more demands on all water resources, it is essential to develop a comprehensive statewide conservation policy that balances human and natural resource needs. Without detailed information about capacity, long-term trends and their relation to the climate and the water budget,

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Symp. On Waterfowl and Wetland Manage. In the Coastal Zone of the Atlantic Flyway. Delaware Dept. of Natural Resour. and Environ. Control. Dover, DE. 522 pp.

[94] Bates, B. C., Z. W. Kundzewicz, S. Wu and J. P. Palutikof, *eds.* 2008: Climate change and water. Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva, 210 pp. http://www.ipcc.ch/pdf/technical-papers/climate-change-water-en.pdf. Last accessed July 2010.

an efficient and effective water plan will be difficult to implement. Water issues involve both surface and ground waters and include a myriad of factors that must be considered including availability, quality, recharge areas, source-area protection and storage. The primary interest is in fresh water, but at times salt water is an issue, in particular salt-water intrusion into coastal drinking-water wells as well as salt water moving up stream systems from estuaries.[95]

Surface water is monitored primarily by the United States Geological Survey (USGS), but additional information in critical areas would be helpful. Stream gauges provide water quantity information and also are used to monitor flood conditions and issue flood alerts by other agencies. At present, the ground-water monitoring system does not sufficiently cover the state, and a detailed, county-based ground-water monitoring program is needed to determine the availability and sustainability of ground water.

3.1.2.2 DNR Response and Recommendations

An effective policy for water management begins with a fundamental understanding of the behavior and processes that govern water movement and storage. Therefore, the most significant step to improve the understanding of South Carolina water supply is to increase monitoring capability of both surface- and ground-water sources, establish baseline measures of in-stream flow, better understand recharge and define recharge areas, develop databases to compile accumulated results and provide reliable information to assist in management decisions. Accurate assessment of ground-water availability can come only from long-term monitoring and a thorough understanding of the geologic architecture of the aquifers and their confining layers. This type of detailed work includes stratigraphic, subsurface geologic mapping and hydrogeologic studies. Results of these studies and others would reside in an integrated geologic, geophysical and hydrologic database that would benefit not only DNR, but all groups interested in surface- and ground-water issues.

Comprehensive basin-wide water planning should be done for each of the sub-basins in the state. These plans should include a detailed assessment of our ground- and surface-water resources, an assessment of ground- and surface-water use by water-use category, a water-demand analysis for each of the water-use categories, and a comprehensive water plan incorporating water-supply and water-demand management strategies to meet future demands and sustain the resource.

River-basin hydrologic models are needed for each of the sub-basins in South Carolina to predict where and when water shortages will occur and to evaluate the effects that changes in temperature and precipitation will have on surface-water supply. Ground-water flow models are needed in the coastal plain to predict the effects that withdrawals will have on aquifers. These models can be used to evaluate the effects that changes in precipitation and ground-water recharge rates have on our water supply.

[95] Ranjan, S.P., Kazama, S. and Sawamoto, M. 2006. Effects of climate and land use changes on groundwater resources in coastal aquifers, J. Environ. Manage. 80(1):25-35.

A monitoring network is needed to study interactions between shallow ground water and surface water. The network could also be used to assess antecedent drought and flood conditions, and could be used as a barometer of drought conditions. This network could assist in understanding the relationships between base flow, ground-water levels and changes in precipitation.

3.1.2.3 Water Quality

In addition to affecting water quantity, climate change also will affect water quality.[96] Although DNR does not regulate water quality, the nature of how contaminants enter the water system is a direct function of the physical condition of the environment, including subsurface geology and land-use practices. The LWC can provide important technological and educational assistance in these areas.

3.1.2.4 DNR Response and Recommendations

Support is needed to adequately investigate of the state's subsurface geology. Prior knowledge of subsurface geology is important when planning for industry and development. The impact of accidental spills and remediation of hazardous-waste contamination can be reduced with proper planning. The availability of water, or lack thereof, is highly influenced in parts of the state by subsurface geology. The potential for geologic hazards, fault zones, also needs to be clearly defined. A comprehensive drilling program will help to establish the subsurface framework that influences ground water flow as well as earthquakes.

An expanded surface-water monitoring system also is needed. Monitoring should include water quality parameters such as water temperature, dissolved oxygen, pH, salinity and fecal coliforms. When combined with stream-flow data, this information can yield important information relative to how drought and flooding events impact water quality. These data could be used to augment the South Carolina Department of Health and Environmental Control (DHEC) monitoring system and to provide technical assistance to local governments and other stakeholders involved in land use planning.

A ground-water monitoring network along the coast should be established to measure salt-water intrusion. Strategically located wells in each aquifer should be continuously monitored for water level, temperature and specific conductance.

3.1.2.5 Potential Effects of Changes in Rainfall and Riverine Flow

Estuarine systems are among the most productive ecosystems on Earth and may be among the most sensitive to impacts of climate change as a result of changes in sea level and variation in rainfall that may shift salinity profiles and changes in biotic

[96] IPCC. 2007.

composition.[97] Shifts in salinity profiles in the estuarine system will depend entirely upon freshwater input and rainfall.[98] The projections for rainfall in South Carolina under a warming climate are unknown and require DNR to plan for a range of contingencies. The past decade has been dominated by drought conditions with accompanying shifts in the distribution of species within estuaries. Changes in biotic composition and the prevalence and seasonal distribution of diseased organisms must be expected, but little data exist to predict possible ramifications.

Salinity profiles in estuaries are expected to change as a result of both sea-level rise and changes in precipitation patterns. The former will shift the salinity regimes up estuaries; however the impact of the latter is unknown, as current models do not provide a clear direction to anticipated rainfall in South Carolina over the next few decades.[99] While estuarine species are renowned for their ability to tolerate salinity shifts over a tidal cycle, many have optimal ranges and move in the system according to prevailing conditions.

The worst scenario for sea-level rise could result in a landward shift in salinity resulting from sea-level rise accompanied by drought. This scenario would compress the available habitat, due in part to coastal development, likely resulting in reduced salt-marsh habitat in the optimal salinity ranges. Reduction of the spatial area covered by the salt marsh would reduce abundance and reproduction of estuarine species, as well as affect the entire ecosystem.

Another apparent consequence of extended droughts is drying out and dieback of saltwater marshes. The severe drought in 1999-2002 is thought primarily to have been responsible for salt marsh diebacks along the East Coast and Gulf of Mexico.[100] Studies in the Gulf of Mexico suggest that the drought caused low pH levels which resulted in greater bioavailability of metals which may have been responsible for *Spartina* mortality. On the South Carolina coast, both marsh meadows and marsh fringing tidal creek channels died in 2002.[101] It also is possible that low ground water levels resulting from drought may be related to salt marsh die offs. Salt marsh dieback has obvious implications including a reduction in primary productivity and increased vulnerability to predators of juvenile fishes and invertebrates.[102]

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[97] Michener, W., E. Blood, K. Bildstein, M. Brinson, and L. Gardner. 1997. Climate change, hurricanes and tropical storms and rising sea level in coastal wetlands. Ecological Applications. 7(3):770-801.

[98] Meynecke J., S. Lee, N. Duke andJ. Warnken. 2006. Effect of rainfall as a component of climate change on estuarine fish production in Queensland, Australia. Estuarine, Coastal and Shelf Sci. 69:491-504

[99] IPCC. 2007.

[100] Alber, M., E. Swenson, S. Adamowicz and I. Mendelssohn. 2008. Salt Marsh Dieback: An overview of recent events in the US. Estuarine, Coastal and Shelf Science. 80:201-211.

[101] D. Whitaker, personal observation. Dec 2002.

[102] Minelo, T. and R. Zimmerman. 1985. Differential selection for vegetative structure between juvenile brown shrimp (*Penaeus aztecus*) and white shrimp (*Peneus setiferus*), and implications for predator–prey relationships. Estuarine Coastal Shelf Sci. 20:707–716.

3.1.2.6 DNR Response and Recommendations

Field studies are needed to clearly document the effect and consequences that drought has on the salt marsh and its sensitive ecosystems. These studies would focus on determining the causes of salt marsh dieback and its impacts on primary and secondary productivity.

Accompanying hydrological studies are needed to determine the ambient conditions of coastal ground water and how ground-water levels and water chemistry are influenced by tidal fluctuations, sea-level change and drought. Field-based studies also are needed on the potential ecological and physiological impacts on mollusks, crustaceans and fish resulting from shifting salinity profiles and ocean acidification. Other studies of the migration and dispersal of estuarine species, especially those near the southern limits of their range, are needed.

Support is needed to develop predictive models that project expected sea-level rise, accompanied by a broad range of rainfall and hydrological scenarios. GIS mapping and mathematical modeling of estuarine water salinities as related to changes in river flow and local drought also are needed. This information would define affected marine species that will be forced farther inland than present or whose populations could be negatively impacted by reduced optimal nursery habitat. Mitigation plans could be established and implemented once information is available.

3.1.3 Potential Effects of Temperature Rise

3.1.3.1 Temporal and Spatial Shifts in Habitat and Life Histories

Shifting climate can cause changes in the spatial distribution of habitat and/or temporal aspects of life history. Shifts in habitat can occur in patches across the landscape, or the geographic range of species can shift. Temporal shifts in life history of species also are likely to occur in response to warmer or cooler temperatures, changes in precipitation, changes in vegetation or shifting seasons. For example, species' reproductive cycles can occur earlier or later in the year (budding has been observed to be occurring earlier for some plant species), become shorter or longer in duration, or occur earlier or later in age. Species at the edges of their range or in marginal habitats need to be able to migrate or disperse to adjust to changing habitat conditions.

Striped bass (*Morone saxatilis*) occurring in lakes that thermally stratify, such as lakes Murray and Thurmond, may experience increased incidence of mortality due to the vertical compression of oxygenated habitat. This could lead to population shifts away from striped bass toward species more tolerant of habitat compression such as hybrid striped bass (*Morone saxatilis* x *Morone chrysops*).[103]

[103] Brandt, S. B.; Gerken, M.; Hartman, K. J.; Demers, E. 2009. Effects of hypoxia on food consumption and growth of juvenile striped bass (*Morone saxatilis*). J. Exp. Marine Biol. Ecol. 381: S143-S149 .

3.1.3.2 DNR Response and Recommendations

A comprehensive strategy and long-term monitoring program is needed to assess spatial and temporal impacts to organisms, particularly for sensitive, rare or vulnerable species. Knowledge of life history and range for species is needed to develop effective management strategies to protect wildlife and freshwater and marine fishes and their habitat.

3.1.3.3 Population and Ecosystem Effects

Changes in climatic conditions have been linked with ecosystem-wide regime shifts resulting in major changes in species diversity and interactions at all trophic levels.[104] Climate change also has been associated with a northward shift in the distribution of many marine fish species across the Northern Atlantic, the Northwest Pacific and the Bering Sea.[105] [106] The evidence supporting climate-related shifts in distribution and abundance in the southeastern United States is limited since the issue has not been explicitly examined. The potential effects are profound, especially if economically important species are impacted, or if unexpected shifts occur that affect the biodiversity, stability or resilience of ecosystems.

Temperature has a direct effect on the physiology and survival of aquatic species. For example, temperature directly affects their physical growth and maturity, since the majority of aquatic species is poikilotherms, or cold blooded, and has metabolic rates that fluctuate with environmental temperature. Such changes can affect the rate of energy transfer between trophic levels, influence productivity and the function of the marine ecosystem as a whole. Survival can be directly affected by a species' upper and lower temperature tolerances. Overwinter mortality caused by freezes can have major impacts on the abundance of some species, such as spotted seatrout.[107] Conversely, other species utilizing habitats near their thermal maximum, for instance striped bass (*Morone saxatilis*) utilizing coastal waters, may be negatively impacted by high temperatures in the summer.

The abundance and annual commercial landings of brown shrimp (*Farfantepenaeus aztecus)* appear to have declined steadily in South Carolina over the last 2 decades concurrent with increasingly warm winters. Although no cause and effect has been definitively identified, it is hypothesized that the species' recruitment mechanism requires relatively cold winters. On the other hand, the white shrimp (*Litopenaeus*

[104] Beaugrand G. 2009. Decadal changes in climate and ecosystems in the North Atlantic Ocean and adjacent seas. Deep Sea Research Part II: Topical Studies in Oceanography. 56:656-673.
[105] Grebmeier, J., J. Overland, S. Moore, E. Farley, E. Carmack, L. Cooper, K. Frey, J. Helle, F. McLaughlin and S. McNutt. 2006: A major ecosystem shift in the northern Bering Sea. Science, 311(5766):1461-1464.
[106] ter Hofstede, R., J. Hiddink, and A. Rijnsdorp. 2010. Regional warming changes fish species richness in the eastern North Atlantic Ocean. Mar. Ecol. Prog. Serv. 414:1-9.
[107] South Carolina Department of Natural Resources. 2007. State of South Carolina's coastal resources: Spotted seatrout. http://www.dnr.sc.gov/marine/mrri/pubs/yr2007/seatrout07.pdf. Last accessed Dec 2010.

setiferus), is a subtropical species that may benefit from warmer winters and may expand its range farther north.[108]

Shifting water temperatures in the nearshore and shelf-break can lead to a shift in the distribution of both larval and adult fish. Increasing water temperatures could lead to shifts in areas of maximal abundance and overall species range for species such as red snapper (*Lutjanus campechanus*), red grouper (*Epinephelus morio*), gag (*Mycteroperca microlepis*) and scamp (*Mycteroperca phenax*). Anecdotal evidence suggests that shifts in some species' ranges may have occurred already off South Carolina.[109]

Strong year classes of Atlantic croaker (*Micropogonias undulatus*) populations along the mid-Atlantic coast have been positively related to warmer-than-normal winters.[110] Presumably, a higher frequency of warmer winters could modify the relative abundance for other important species and could result in significant shifting of ecological relationships including trophic structure, food webs and others. A long-term study in Narragansett Bay has documented a progressive shift in the marine community from vertebrates to invertebrates and, especially since 1980, from benthic to pelagic species.[111] Populations of small, short-lived forage species of fish, in particular, can change rapidly in response to climate variation, which can affect the growth and survival of other fish, mammals[112] and birds[113] that consume them.

Some diadromous species are near the southern end of their ranges in South Carolina. Many of these species already are stressed by summer conditions including high temperatures and, in some cases, low dissolved oxygen and anthropogenic impacts.[114] Finfish examples include the shortnose sturgeon (*Acipenser brevirostrum*), federally listed as endangered, and the Atlantic sturgeon (*Acipenser oxyrinchus*), a species of concern that was recently petitioned for listing as endangered. Both of these fish previously were of great economic, nutritional and cultural value to the state.[115] Climate change could exacerbate management problems for these and other species including shad species and river herring (*Alosa spp.*), or even in some cases, limit or eliminate their occurrence in South Carolina. Recruitment failure may occur in severe drought conditions as a consequence of dewatering of gravel bars and absence of the

[108] D. Whitaker, personal observation.
[109] J. Ballenger, MRRI, DNR. Personal communication
[110] J. Hare and K. Able. 2007. Mechanistic links between climate and fisheries along the east coast of the United States: explaining population outbursts of Atlantic croaker (Micropogonias undulatus) Fish. Oceanogr. 16(1):31–45,
[111] Collie, J., A. Wood, and P. Jeffries. 2008 Long-term shifts in the species composition of a coastal fish community Can. J. Fish. Aquat. Sci. 65:1352–1365.
[112] McLeod, et al. 2007. Linking sand eel consumption and the likelihood of starvation in harbour porpoises in the Scottish North Sea: could climate change mean more starving porpoises? Biol. Lett. 3:185-188.
[113] Frederiksen, et al. 2004. Scale-dependent climate signals drive breeding phenology of three seabird species. Global Change Biol, 10:1214-1221.
[114] Jenkins, W.E., T.I.J. Smith, L.D. Heyward and D. M. Knott. 1995. Tolerance of shortnose sturgeon, *Acipenser brevirostrum*, juveniles to different salinity and dissolved oxygen concentrations. Proc. Southeast. Assoc. Fish and Wildl. Agencies. 47:476-484.
[115] Leland, J. 1968. A survey of the sturgeon fishery of South Carolina. Contribution from Bears Bluff Laboratories. No. 41. 27 pp.

seasonally elevated flows which serve as a cue for spawning migration. Results of preliminary modeling investigations suggest that local extinction can occur rapidly.[116]

Freshwater fish species also are likely to be affected by changes in temperature regimes. Eastern brook trout (*Salvelinus fontinalis*) are the most sensitive to temperature of the 3 trout species that occur in South Carolina. They require colder water than rainbow (*Oncorhynchus mykiss*) and brown (*Salmo trutta*) trout. DNR has monitored temperatures in brook trout streams on the Sumter National Forest and Jocassee Gorges streams. Currently, maximum summer temperatures in South Carolina brook trout streams routinely reach 68-70°F (20-21°C) during the hottest summer periods. Brook trout typically do not occur in streams where maximum temperatures exceed 70°F (21°C). Any increase in stream temperature as a result of climate change likely would result in the loss of the species in South Carolina.

Smallmouth bass (*Micropterus dolomieu*) are a popular temperature-dependant coolwater sport fish that are managed in a number of South Carolina waters. For example, if waters were to warm in the Broad River, this recreationally valuable fishery could become jeopardized.

No studies of the response of nongame fishes to projected climate change in South Carolina or the southeastern United States have been published, but research elsewhere has predicted decline in distribution of cool and cold-water fishes.[117] In South Carolina, likelihood of extirpation from the state is high for the suite of fishes that are endemic to the southern Appalachian highlands, as these populations which are restricted to the upper reaches of the Savannah and Saluda drainages are relics from historic stream capture from the Tennessee River system. It also is possible that other upland-endemic species noted in the CWCS as sensitive to environmental change could decline in abundance and distribution with climate change.

Even if the overall distribution of fish species or their center of abundances is unchanged due to warming water temperatures, climatic changes could affect fish populations in other ways. Blue catfish (*Ictalurus furcatus*) are a nongame species that was introduced to the state's waters decades ago. No adverse effects to other aquatic species have been documented as a result of this introduction, and a popular fishery has developed for blue catfish. However, increased average water temperatures could result in increased competition between blue catfish and other species for spawning resources. Blue catfish spawn in temperatures ranging from 70-84°F (21-29°C). A typical spawning could shift from May to April could occur if temperatures rise. Native catfish, which usually do not compete for resources with blue catfish, may compete for spawning sites. This competition could be more pronounced if climate change altered seasonal durations, creating a shorter spring and a more prolonged summer.

[116] J. Hightower, USGS, Raleigh, NC. Personal communication.
[117] Lyons, J, J.S. Stewart and M. Mitro. 2010. Predicted effects of climate warming on the distribution of 50 stream fishes in Wisconsin, U.S.A. Journal of Fish Biology 77: 1867-1898.

Additionally, climatic changes could alter the timing of the spring phytoplankton blooms – affecting zooplankton populations that many larval and juvenile fish species depend on as prey during this critical period of development. Conversely, climatic changes could directly affect the maturation of fishes, causing a shift in the spawning season. In any case, this could lead to a mismatch in the temporal period for which prey are available to larval and juvenile fish species in any given year, leading to more sporadic recruitment events and a higher probability of recruitment failure in any given year. This effect is often referred to as the Cushing match-mismatch hypothesis.[118]

Evidence is emerging that variations in annual oceanographic events affect the phytoplankton distribution of productivity.[119] For example, studies in other areas indicate that the intensity and timing of seasonal upwelling events have shifted compared to previous decades. This can have major effects on coastal ecosystems and may change the species composition of phytoplankton.[120] For example, the relative proportion of dinoflagellates, which tend to prefer warmer and more stratified water columns, may increase with respect to diatoms.[121]

It is unknown if a longer growing season would affect South Carolina oysters (*Crassostrea virginica*), but it might be due to effects on species composition and abundance of phytoplankton.

Seasonal inshore-offshore and latitudinal distributions, timing of migration and duration of nesting season of loggerhead sea turtles appear to be greatly influenced by water temperature.[122] Satellite-tagged juvenile loggerhead sea turtles have been shown to demonstrate inshore-offshore movement coincidental with water temperatures of 17°C.[123] It also has been demonstrated that warmer sea-surface temperatures in at least some locations lead to earlier onset and longer duration of nesting seasons.[124] It is not known to what degree extended warm weather seasons may alter these life history dynamics, and what the consequences of these environmental changes could have on the recovery of this threatened species. Additionally, sea turtle sex ratios are known to be determined by incubation temperatures in the nest, with warmer

[118] Cushing, D.H. 1990. Plankton production and year-class strength in fish-populations – an update of the match mismatch hypothesis. Advances in Marine Biology 26:249-293.

[119] Hays, G., A. Richardson and C. Robinson. 2005. Climate change and marine plankton. Trends in Ecology and Evolution. 20(6):337-344.

[120] Barth, J. B. Menge, J. Lubchenco, F. Chan, J. Bane, A. Kirincich, M. McManus, K. Nielsen, S. Pierce and L. Washburn. 2007. Delayed upwelling alters nearshore coastal ocean ecosystems in the northern California current. Proc. of the Nat. Acad. of Sci. 104(10):3719-3724.

[121] Monterey Bay Aquarium Research Institute. 2006. Seeing the Future in the Stratified Sea. 2006 Annual Rept. http://www.mbari.org/news/publications/ar/chapters/06_timeseries.pdf. Last accessed Dec 2010.

[122] Bjorndal, K.A., A.B. Meylan and B.J. Turner. 1983. Sea turtle nesting at Melbourne Beach, Florida, I. Size, growth and reproductive biology. Biological Conservation, 26:65-77.

[123] Arendt, M., J. Byrd, A. Segars, P. Maier, J. Schwenter, D. Burgess, J. Boynton, D. Whitaker, L. Liguori, L. Parker, D. Owens and G. Blanvillain. 2009. Examination of local movement and migratory behavior of sea turtles during spring and summer along the Atlantic coast off the southeastern United States. SC DNR, Univ. GA and College of Charleston, Final Report to NOAA Fisheries, Contract Number NA03NMF4720281, 177 pp.

[124] Hawkes, L.A., A.C. Broderick, M.H. Godfrey and B.J. Godley. 2007. Investigating the potential impacts of climate change on a marine turtle population. Global Change Biology, 13(5): 923-932.

temperatures resulting in sex ratios skewed to females.[125] It is conceivable that climate change could cause additional bias in sea turtle sex ratios, and males might become the limiting resource. In a worst-case scenario, a warming local climate could lead to the elimination of male offspring production altogether.[126]

3.1.3.4 DNR Response and Recommendations

Continuation of long-term surveys and archiving, integrating and analyzing the data they produce are essential to understanding climate-related impacts on the state's wildlife and freshwater and marine fisheries resources.

Abundant data exist to explore climate-related issues in databases compiled by MRD, other DNR sections and other organizations including NOAA and the University of South Carolina Baruch Marine Research Institute (BMRI) but funds for analyses are lacking. The MRD databases archive information from numerous ongoing, long-term (10-30 year) biological surveys that cover a variety of key habitats, ranging from small estuarine creeks to offshore deep waters. Examples include an electrofishing survey of upper estuarine habitats, a trammel net survey of lower estuarine marshfront, an estuarine crustacean trawl survey, a coastal trawl survey, a coastal shark and adult red drum longline survey and an offshore live bottom survey. These surveys often complement one another because many species spend different parts of their life cycle in different habitats. Two of the surveys, which are federal programs administered and conducted by MRD staff, cover the entire South Atlantic Bight (SAB) from North Carolina to Florida. They include the Southeast Area Monitoring and Assessment Program (SEAMAP), which began a shallow water trawl survey of the near-coastal SAB in 1986, and the Marine Resources Monitoring, Assessment and Prediction (MARMAP) program, which began research further offshore in 1973 and primarily covers live bottom habitat.

In addition to the various fishery-independent surveys mentioned above, the OFM compiles fishery-dependent databases that record harvest rates of recreationally and commercially important species such as shrimps, crabs, oysters and fish.

Continued support of these long-term surveys is critical for understanding climate-related changes in the marine system, and for predicting potential future scenarios for South Carolina's marine resources. The value of the surveys derives from the time periods covered and the use of standardized collection methodology enabling meaningful, comparable data across years. Support for the collection of additional important biotic and abiotic data, such as fish and crustacean community structure and densities, life history information, temperature and salinity is essential. Existing programs currently provide data for regional stock assessments, but lack resources for critical analyses and modeling of existing data to support climate change studies.

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[125] Mrosovsky, N, and C.L. Yntema. 1980. Temperature dependence of sexual differentiation in sea turtles: implications for conservation practices. Biological Conservation 18:271-28

[126] Blanvillain, G., L. Wood, A. Meylan. and P. Meylan. 2008. Sex ratio prediction of juvenile hawksbill sea turtles from South Florida, USA. Herpetological Conservation and Biology 3(1):21-27.

In order to assess the impacts of climate change on freshwater fisheries, a model simulation is needed for various scenarios of climate change using stream assessment data recently collected across the state to provide an objective evaluation of risk to native upland fish species.

Monitoring of penaeid shrimp, crab, fish and oyster populations should continue with fishery-dependent and fishery-independent methods. Efforts should be made to determine relationships between climate change and population dynamics of important species, for instance the impact of warmer winters on brown shrimp recruitment.

Data from other sources are also available, such as the long-term monitoring projects conducted by the BMRI. The integration of data across surveys, across DNR sections and across other research institutes would be a powerful method of detecting long-term biological trends associated with climate change. To facilitate this, it would be useful to compile an easily accessible list of all data sources within the DNR as a whole to integrate marine, freshwater and climate data sources, as well as other organizations within the state that collect long-term data. Comparison of these data with information available from other regions along the Atlantic and Gulf coasts would be useful in order to detect regional patterns.

There is a need to compile and analyze water temperature records from multiple locations to determine if temperatures have increased significantly in the last decade along the Gulf of Mexico and South Atlantic Coast as related to nearshore loggerhead sea turtle foraging grounds. Also needed is repeated examination of the sex ratios in loggerhead sea turtle nests with respect to spatial and temporal variability. At-sea monitoring of sea turtles with trawls should be continued to document overall population trends of juveniles and adults.

Agencies and local communities should continue education and eradication campaigns to eliminate beach vitex, an invasive plant that restricts nest building by sea turtles.

Populations of diadromous species should be evaluated in all major coastal rivers to estimate populations and monitor trends.

3.1.3.5 Harmful algal blooms (HABs)

HABs are caused by certain species of microscopic photosynthetic algae (phytoplankton). They cause a wide range of detrimental effects that are species-specific. Examples include shading and destruction of estuarine grass habitat, shellfish poisoning and toxin production that can bioaccumulate up the food chain and induce sickness and death in wildlife and humans. There has been an increase in reported HAB events over recent decades,[127] partly because of improved monitoring, but also

[127] Anderson, D.M. 2004. The growing problem of harmful algae: Tiny plants pose potent threat to those who live in and eat from the sea. Woods Hole Oceanographic Institution. http://www.whoi.edu/page.do?pid=11913&tid=282&cid=2483. Last accessed Jan 2011.

because of increased aquatic nutrient loading from run-off, alteration in land use patterns and the introduction of exotic HAB species. Climate change may further affect the timing and intensity of HAB events, but the overall relationships among climate change and other factors affecting the HAB prevalence remain unclear. For example, blooms of toxic cyanobacteria and raphidophytes are common in South Carolina. These blooms can cause mass fish kills and often are associated with increased levels of certain nutrients, particularly nitrogen;[128] [129] however, the timing and duration of blooms may be augmented by climate change.

3.1.3.6 DNR Response and Recommendations

The South Carolina Algal Ecology Laboratory has been jointly operated by USC and DNR over the last decade. Additional collaborations exist with the National Ocean Services, Charleston Laboratory. The monitoring and research performed by these collaborative efforts should be encouraged. Examples of relevant questions concerning HABs and climate change include:

1. Does climate change lead to longer summer growing seasons, and if so, then how would HAB taxa that tend to be more responsive to warmer temperatures respond? How might these co-vary with land use patterns?
2. Would harmful blooms simply persist for longer timeframes under predicted climate change scenarios?
3. Or, would phytoplankton blooms eventually exhaust their supply of nutrients, die off, and subsequent microbial respirations adversely affect water oxygen levels, thus inducing hypoxia?

3.1.3.7 Hypoxia and Dead Zones

Increasing temperatures can reduce oxygen levels in coastal waters through a variety of mechanisms such as a decrease in the solubility of oxygen, an increase in productivity and stratification of the water column. Hypoxia-related events have been well-documented in other coastal regions after, for example, extended phytoplankton blooms including in the Gulf of Mexico and Long Island Sound in New York.[130] Hypoxia often is related to increased nutrient run-off coupled with a stratified water column. These combined processes often promote proliferation of phytoplankton biomass, including that of HAB species. Cessation of blooms is typically coupled with increased oxygen consumption by bacteria, and in extreme cases, this oxygen consumption causes hypoxic conditions or dead zones, where oxygen concentrations fall below levels supporting life. These hypoxic regions impact benthic or demersal species and can result in considerable losses to fisheries. The incidences of dead zones are increasing worldwide and are believed to be, in part, a result of increasing global temperatures

[128] Chorus I, Bartram J (1999) Toxic cyanobacteria in water. World Health Organization, London.
[129] Downing TG, Meyer C, Gehringer MM, Venter M (2005) Microcystin content of *Microcystis aeruginosa* is modulated by nitrogen uptake rate relative to specific growth rate or carbon fixation rate. Environ Toxicol 20:257-262
[130] Diaz, R.J. and R. Rosenberg. 2008. Marine ecosystems spreading dead zones and consequences for marine ecosystems. Science. 321:926-929.

promoting greater water stratification.[131] The phenomenon can be exacerbated by nutrient-laden freshwater runoff related to increasing impervious surfaces from coastal development and changes in rainfall patterns. Numerous dead zone events have occurred in South Carolina during the last 2 decades, but most have been confined to small estuarine creeks and were of short duration. In 2004 and in 2009, relatively large events occurred in coastal waters just off Horry County in Long Bay.[132] Preliminary studies indicate these events were caused by persistent southwest winds resulting in upwelling near the coast, thence causing the unusual effect of trapping nutrient-laden water near the beaches, leading to hypoxia. Climate-related changes in ocean and wind circulation patterns could result in a greater frequency of coastal hypoxia. [133]

3.1.3.8 DNR Response and Recommendations

The relationship between climate change, land use and phytoplankton bloom timing and intensity is virtually unstudied for coastal South Carolina, but should be an important focus of future research. Agencies and universities should continue to form partnerships to monitor coastal hypoxia. Permanent nearshore monitoring stations strategically located along the coast should be maintained to monitor physical and chemical aspects of coastal waters. Efforts should be made to develop mathematical models that can explain hypoxia events, including the oceanographic conditions that give rise to them. Anthropogenic causes of hypoxia should be addressed and corrected where possible.

3.1.3.9 Potential Effects of Ocean Acidification

Increasing ocean acidification apparently related to increasing CO_2 levels in the Earth's atmosphere raises concerns about the future of reef-building corals and other species that incorporate calcium carbonate into their skeletons including mollusks, crustaceans and some plankton.[134] While South Carolina does not have shallow-water coral reefs, the impact of ocean acidification on oysters and other species is of concern. It is expected that ocean pH will fall to about 7.8 over the next 300 years and this is within the range known to impact oyster growth. However, pH in estuaries typically ranges between 7.0-7.9, with the lower values known to impact a variety of physiological and

[131] Kelling, R, and H. Garcia. 2002. The change in oceanic O2 inventory associated with recent global warming. Proc. Nat. Acad. Sci. 99(12):7848-7853.

[132] Sanger, D. , D. Hernandez, S. Libes, G. Voulgaris, B. Davis, E. Smith, R. Shuford, D. Porter, E. Koepfler and J.H. Bennett. 2010. A case history of the science and management collaboration in understanding hypoxia events in Long Bay, South Carolina, USA. J. Environmental Manage. 46:340-350.

[133] Gregg, R.M. L.J. Hansen, K.M. Feifel, J.L. Hitt, J. M. Kershner, A.Score, and J. R. Hoffman The State of Marine and Coastal Adaptation in North America: A Synthesis of Emerging Ideas. Eco. Adapt. Bainbridge Island, WA. http://www.cakex.org/sites/default/files/EcoAdapt%20Synthesis%20Report%20January%202011.pdf. Last accessed May 2011.

[134] Orr, J.,, V. Fabry, O. Aumont, L. Bopp, S. Doney, R. Feely, A. Gnanadesikan, N. Gruber, A. Ishida, F. Joos, R. Key, K. Lindsay, E. Maier-Reimer, R. Matear, P. Monfray, A. Mouchet, R. Najjar, G. Plattner, K. Rodgers, C. Sabine, J. Sarmiento, R. Schlitzer, R. D. Slater, I. Totterdell, M. Weirig, Y. Yamanaka and A. Yool. 2005. Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms. Nature. 437:681-686.

immune functions in oysters.[135] Further deceases in pH could result from increasing ocean acidification, acid rain and increasing development in the coast zone. The effects of low pH are amplified at higher temperatures. Whether the expected increases in ocean acidity, atmospheric CO_2 and temperature pose serious threats to oysters and other estuarine species is difficult to assess as the issue has not been well studied. Similar concerns exist for many crustaceans, as the molting process involves calcium demineralization and re-mineralization of the exoskeleton and this is influenced by both internal pH as well as external pH. Increased acidification also could impact phytoplankton bloom dynamics and regional primary productivity.

3.1.3.10 DNR Response and Recommendations

Agency and university researchers should cooperatively monitor pH in coastal waters. Support is needed for research on the potential ecological and physiological impacts of shifting salinity profiles and ocean acidification on mollusks, crustaceans and fishes.

3.1.4 Potential Effects Related to Changes in Terrestrial and Aquatic Habitats

3.1.4.1 Habitat Fragmentation

Habitat decline, shifting climate regime, increasing development, particularly in coastal areas, and rising sea level represent constraints and barriers to dispersal and migration of fish, wildlife and plant species.[136] Maintaining migratory corridors is essential for the ability of wildlife and fishes to find suitable habitat and for population maintenance. Over the past several decades, habitats within South Carolina have become increasingly fragmented. Natural areas have been developed and roads have been created or widened throughout much of the state. This development has disrupted traditional corridors and resulted in pockets of wildlife habitat that are isolated from one another. Dams and other barriers have fragmented entire river systems and impede migration of diadromous and freshwater fish as well as many invertebrate species. As climate changes, further habitat fragmentation will restrict movement of animals, limiting or preventing the critical ability to migrate to more favorable habitats.

3.1.4.2 DNR Response and Recommendations

The South Carolina Heritage Trust Program was created in 1976 to help stem the tide of habitat loss by protecting critical endangered species sites through acquisition and other means. Enabling legislation directed DNR, in concert with other state agencies, to set aside a portion of the state's rich natural and cultural heritage in a system of heritage preserves to be protected for the benefit of present and future generations (Sec. 51-17-20, 1976 *S.C. Code of Laws*).[137] Support for the Heritage Trust and other habitat

[135] Gazeau, F., C. Quiblier, J. Jansen, J.P. Gattuso, J. Middelburg and C Heip. 2007. Impact of elevated CO2 on shellfish calcification. Geophysical Research Lett. 34 :L07603, doi:10.1029/2006GL028554.
[136] P. Opdam and D. Wascher. 2003. Climate change meets habitat fragmentation: linking landscape and biogeographical scale levels in research and conservation. Biological Conservation 117:285–297. http://research.eeescience.utoledo.edu/lees/Teaching/EEES4760_07/Opdam.PDF Last accessed Sept 2010.
[137] http://www.scstatehouse.gov/code/statmast.htm. Last accessed Sept 2010.

protection programs is needed to identify, create and preserve important conservation corridors to allow migration and movement of affected species. In addition, the agency will need to investigate ways to partner with other agencies and non-governmental organizations to develop and maintain adequate migration corridors.

3.1.4.3 Loss and Alteration of Habitats

Temperature changes likely are to result in changes in vegetative structure of wildlife habitats throughout the state. In the event local temperatures warm, higher elevation habitats could suffer; cooling temperatures could affect lowcountry habitats. More rapid and extreme temperature fluctuations could stress populations and restrict thermal refugia. These changes could result in habitat loss and a change in both vegetative and animal community structure. Two examples of important freshwater fisheries at increased risk are trout (subfamily *Salmoninae*) and striped bass. Habitat loss not only affects the area in which the species can live, it also affects food availability and availability of suitable nesting/breeding areas. Impacts associated with temperature changes most likely will be greater in the higher elevations of the state.

Precipitation changes will affect both surface and groundwater levels and will result in impacts to both terrestrial and aquatic systems.[138] Wildlife depends on a variety of water sources within the state. All animals require water within their habitats, some more than others. Changes in wetland systems will affect many species of birds (particularly waterfowl), reptiles and amphibians that depend on these areas for foraging and breeding habitats. Isolated freshwater wetlands, small streams and seepage wetlands are critical to the survival of many of these species. Small wetlands and the species associated with them may be excellent indicators for the effects of climate change on larger systems.

Freshwater aquatic systems are susceptible to changes in precipitation. Streams, rivers, lakes and ponds are dependent upon both precipitation and groundwater recharge to maintain flow and water levels. Changes in surface and groundwater levels can affect the species assemblages and migration in freshwaters throughout the state.

3.1.4.4 DNR Response and Recommendations

There is the need to gather plant and animal baseline data for terrestrial and aquatic habitats and monitor the rate of change in both vegetative and animal community structures. The agency should use the information collected to determine appropriate management options in response to climate change and adapt management activities as climate changes occur in response to the changing habitat needs of wildlife and fish species. DNR should use these data to develop predictive models of the effects of temperature changes.

Monitoring the rate of water level and flow change in all surface waters and groundwater systems is vital to terrestrial as well as aquatic habitats. DNR should use the

[138] IPCC. 2007.

information collected to determine appropriate management options in response to climate change and adapt its management activities as climate changes occur in response to the evolving habitat needs of wildlife and fish species. The agency should use data collected to develop models that can assist in predicting water level and flow change and work with other entities to ensure adequate water levels and flow rates for wildlife and fish.

3.1.4.5 Habitat Impacts Related to New and Alternative Energy

As the nation strives to locate and utilize alternative, cleaner and more carbon-neutral sources of energy, it is important to understand that such sources may result in additional impacts to wildlife, fish and their habitats. Increased demand for biofuels can result in decreased wildlife habitat as forests and conservation areas are converted to production areas. Wind power, both on- and off-shore, can result in increased mortality to birds and bats. Hydropower can result in reduced flow in rivers and restrict movements of freshwater and diadromous fish as well as cause direct impacts through turbine impingement. Impacts to natural resources may be mitigated during planning, permitting and licensing for alternative energy projects.

3.1.4.6 DNR Response and Recommendations

The agency should work with all stakeholders including utilities, other agencies, NGOs, legislators, government planners and other experts as alternative energy sources are developed, licensed and brought on line to ensure natural resource needs are addressed during planning.

3.2 Potential Biological Effects Resulting from a Changing Climate

3.2.1 Species and Habitat Data

3.2.1.1 Insufficient Data for Species and Habitat

Although very detailed distribution and life history data exist for some harvestable species within the state and for a limited number of special status species (threatened and endangered species), these types of data are lacking for the majority of wildlife and freshwater fish. Without information about the distribution and abundance of species and their habitat requirements, reproductive abilities and longevity, it will be very difficult to understand and respond to impacts associated with climate change.

DNR has developed a plan to identify species of greatest conservation need in the state through its *South Carolina Comprehensive Wildlife Conservation Strategy* (CWCS) which includes recommendations to address threats to these species and their habitats.[139] A total of 1,240 species is identified in the CWCS, including marine species. Because these species currently are considered at risk, any additional impacts

[139] Kohlsaat, T., L. Quattro and J. Rinehart. 2005. South Carolina Comprehensive Wildlife Conservation Strategy. SC Dept. Nat. Resour. http://www.dnr.sc.gov/cwcs/index.html. Last accessed Sept 2010.

associated with climate change will exacerbate current threats; data needs identified for those species in the CWCS should be addressed as we manage for climate change.

In addition to those species identified in the CWCS, other wildlife and fish species are likely to experience impacts related to climate change. Habitat for local, migrating and wintering waterfowl, neotropical migrant birds, reptiles and amphibians as well as a number of freshwater fish species is particularly vulnerable to climate change impacts.

3.2.1.2 DNR Response and Recommendations

The agency should continue to collect baseline data for wildlife and fishes in South Carolina. Data collection projects should include abundance, distribution and life history studies. Data should be utilized to determine appropriate management options in response to climate change. Habitat management activities must be adaptive as climate changes occur in response to the changing needs of wildlife and fish species. DNR should use data collected to develop models that can assist in predicting species response to climate change.

3.2.1.3 Habitat Data and Characterization

As with information about wildlife and fish species in South Carolina, there is a lack of data concerning the historic and current condition of habitats. Without current or past baseline data, it will be very difficult to assess the vulnerability of habitats and to determine the rate of habitat loss. In addition to the need for baseline data, it will be critical to identify the climate change effects on wildlife and fish habitat.

3.2.1.4 DNR Response and Recommendations

DNR should collect baseline data on the condition of wildlife and fish habitat in South Carolina. This information should be used to determine appropriate management options in response to climate change. The agency should adjust management activities as climate changes occur in response to the changing habitat needs of wildlife and fish species. Data collected can be utilized to develop models that can assist in predicting habitat response to climate change.

3.2.2 Endangered, Threatened or Species of Concern

3.2.2.1 Declining Habitat for Endangered, Threatened or Species of Concern

Habitat loss is the most important factor contributing to species decline. Climate change may exacerbate habitat decline, particularly for rare or sensitive species such as amphibians. Nuisance and exotic species invasions, changes in plant and animal community structure and changes in abiotic factors such as hydrology, soil moisture and climate are areas of great concern relative to rare or sensitive species conservation.

3.2.2.2 DNR Response and Recommendations

DNR maintains and manages the South Carolina Rare, Threatened and Endangered Species Inventory. Much of the data in the Inventory is submitted to DNR by citizens and academic institutions, so data acquisition is driven by individual submissions rather than a comprehensive plan or strategy. Additional support for comprehensive and long-term monitoring of rare and sensitive plant and animal species is needed. This should involve development of a more modern inventory system with significant IT support. The current database should be screened and standardized with other systems in the region.

An improved monitoring strategy can provide vital data to guide conservation and habitat management activities. Again, there is opportunity to partner under the umbrella of existing and future conservation efforts. Potential conservation activities include translocation of species where appropriate, rare plant species propagation and identification and protection of important habitat. The management of natural resources will become increasingly difficult and complicated as climate change advances. The Conservation Section within the LWC can provide needed leadership and technical expertise to local, regional and statewide conservation and planning efforts.

3.2.3 Invasive Species

3.2.3.1 Potential for Introduction of Invasive Species

Increased temperatures, changes in rainfall and other environmental factors affected by climate shifts or change can create ideal conditions for proliferation of invasive plant and animal species, including parasites and pathogens. An increase in the number and diversity of native and non-indigenous invasive plant and animal species has been documented in South Carolina terrestrial, freshwater and marine habitats. Some of these species may have been released accidently or by well-meaning citizens, but others are likely migrating northward from more tropical climates as a result of warming temperatures. Regardless of the manner in which they have become established, these species already are impacting native animals and their habitats. As climate changes, an increasing number of exotic species likely will migrate to South Carolina. Habitats can be destroyed as resources are over-utilized. Invasive and non-indigenous species have the potential to outcompete native species for food and other resources.

Impacts of invasive species are second only to habitat loss for the significant decline and extirpation of both endangered and common species. The current environmental, economic and health costs of invasive species could exceed $138 billion per year in the United States, more than all other natural disasters combined. In 2006 alone, the United States spent $1.2 billion combating invasive species. That total does not even consider the numerous hours and dollars spent at regional, state and private levels to combat invasive species.[140]

[140] Pimental, D., L. Lach, R. Zuniga, and D. Morrison. 2000. Environmental and economic costs associated with non-indigenous species in the United States. Biosci. 50(1):53-65.

Invasive species can completely overtake unique, sensitive and important habitats, such as those protected on lands dedicated as DNR Heritage Preserves, and out compete other established natives, forcing them into endangered, threatened or species of concern status. Stressed vegetation is vulnerable to attack by non-indigenous parasites and pathogens. The identification and acquisition of land for preserves often is based on the presence of unique native floral or faunal populations; however, if climate change alters local conditions in ways that allow invasive species to proliferate, the value of conservation lands as habitat for native species can become compromised.

Tilapia is a warmwater non-indigenous group of fish that extensively are stocked under permit in the state to control algae in private ponds. With few notable thermal refuges excluded, tilapia will die from cold stress in a typical South Carolina winter when water temperatures drop below 50°F (10°C). Historically, south coastal South Carolina water temperatures routinely drop to 45-50°F (7-10°C) during the winter. In the event that waters were to warm in the state, the potential for tilapia to overwinter is possible. Tilapia currently overwinters in Florida and has become an invasive species and a major management problem. If tilapia were to routinely overwinter in South Carolina it would result in direct competition with native and existing species for space, food, habitat and spawning areas, which could drastically alter natural fish communities.

The destruction that non-indigenous peacock bass (*Cichla* spp.) can cause to native fish communities is well documented.[141] In Florida, these fish currently are widespread, but, fortunately, these fish are very temperature dependant and do not typically survive in waters cooler than 60°F (16°C). Given current South Carolina winter low temperatures, tilapia is much more of an eminent threat than peacock bass. However, if winter temperatures increase, peacock bass could become a threat in South Carolina. Other invasive fish that are common in Florida and, like peacock bass, could become established in South Carolina, include various cichlids, pleco (*Hypostomus plecostomus*), Asian swamp eel (*Monopterus albus)*, walking catfish (*Clarias batrachus*), various piranha and oscar (*Astronotus ocellatus*). All of these fish could, like tilapia, compete with native species for habitat, food and spawning resources.

Despite the increased frequency of occurrence, and in some cases the establishment in South Carolina, of subtropical and tropical flora and fauna, including invertebrate fauna, with historic ranges once restricted to latitudes south of Cape Canaveral, little has been done to determine the impact of these species on the natural ecosystems of our state, or to assess whether or not their arrival and dispersal has been enhanced or accelerated by climate changes. Recently it has been demonstrated that changes in seasonal maxima and minima of water temperature may be more important than changes in means.[142] Examples of marine invertebrates that have extended their ranges northward include two millennia Andrew C. Kemp, Benjamin P. Hortona,,

[141]Pelicice, F.M. and A.A. Agostinho. 2009. Fish fauna destruction after the introduction of a non-native predator (*Cichla kelberi*) in a neotropical reservoir. Biol Invasions. 10.1007/s10530-008-9358-3.

[142] Stachowicz, J, J Terwin, R Whitlatc, and R. Osman. 2002. Linking climate change and biological invasions: Ocean warming facilitates nonindigenous species invasions. Proc. Natl. Acad. Sci. 99(24):15497-15500.

Jeffrey P. Donnellyc, Michael E. Mannd,species of callinectid crabs similar to native blue crabs (*Callinectes bocourti* and *C. exasperatus*); the spiny hands crab (*Charybdis hellerii*); the blue land crab (*Cardisoma guanhumi*); the green porcelain crab (*Petrolisthes armatus*); two pulmonate snails (*Creedonia succinea* and *Microtralia ovula*); an intertidal littorinid snail (*Echinolittorina placida*); the Asian green mussel and the charrua mussel (*Perna viridis* and *Mytella charruana*); the Asian tiger shrimp (*Penaeus monodon*); two acorn barnacles (*Megabalanus coccopoma* and *M. tintinnabulum*); and a caprellid amphipod (*Caprella scaura*).[143] In addition, lionfish (*Pterois volitans*) have colonized the southeastern United States from Florida to North Carolina over the past decade.[144] These represent some of the most recently discovered arrivals, although others are certain to arrive in the future. Invasive species can be extremely problematic because they may competitively displace existing species or cause radical habitat changes that affect entire populations or ecosystems. For example, beach vitex (*Vitex rotundifolia),* an introduced exotic plant from Hawaii, recently has taken over sand dune areas on some beachfronts in northern Georgetown and Horry counties. Its aggressive growth and impenetrable roots quickly cover dunes, making them unsuitable for loggerhead sea turtle nesting.[145] Species such as *Phragmites australis*, *Hydrilla verticillata* and *Eichhornia crassipes* are aquatic plants with similar impacts to brackish and freshwater areas in the United States where they create monocultures outcompeting native species and drastically altering the ecology of entire ecosystems. Another example is the nematode *Anguillicoloides crassus*, a parasitic worm originally located only in Asian eels (*Anquilla japonica*). The first record of *A. crassus* in wild-caught American eels (*Anguilla rostrata*) was from Winyah Bay in 1996,[146] having been introduced by the transport of live Asian eels. The parasite is much more detrimental to the health of American eels than its natural host, and it may exacerbate problems in this already declining species by interacting with other sources of stress, such as climate change. (Martin Vermeere, and Stefan Rahmstorff www.pnas.org/cgi/doi/10.1073/pnas.1015619108)

The recent range expansions of native North American mammals, specifically coyotes (*Canis latrans*), into South Carolina raise questions about the role climate change has played or may play in this phenomenon. Obviously, ranges have expanded and contracted over time but, more recently, it has become clear that transport and release by humans have placed animals and plants in new areas, and these species have occupied available habitats. In many cases they then compete directly with native species, to their detriment. The principal of natural range expansion is difficult to detect and describe and naturalization is difficult to determine.

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[143] South Carolina aquatic invasive species management plan. Prepared in coordination with the South Carolina Aquatic Invasive Species Task Force by the South Carolina Department of Natural Resources. September 2008. 94 pp.

[144] Albins, M. and M. Hixon. 2008. Invasive Indo-Pacific lionfish *Pterois volitans* reduce recruitment of Atlantic coral-reef fishes. Mar Ecol. Prog. Ser. 367:233–238.

[145] Murphy, S. and D. Griffin. 2005. Loggerhead turtle - *Caretta caretta.* 2006. http://www.dnr.sc.gov/cwcs/pdf/Loggerheadturtle.pdf. Last accessed Dec 2010.

[146] Fries, L.T., D.J. Williams and S.K. Johnson. 1996. Occurrence of *Anguillicola crassus*, an exotic parasitic swim bladder nematode of eels, in the SE United States. Trans. Am Fish. Soc. 125:794-797.

Recently, the armadillo (*Dasypus novemcinctus*) expanded its range into South Carolina from points south and west, and the federally endangered wood stork (*Mycteria americana*), that historically nested in Florida, now nests in significant numbers in this state. The available literature does not describe climate change as a factor in this expansion. Habitat loss and alteration for nesting and foraging are most often described as the major factors for range expansion of the wood stork.

Of greater threat are species currently located in Florida and South Georgia that come from more temperate parts of the world but have been historically limited to ranges south of South Carolina by cold winters. Significant climate change could allow northward and eastward range expansion in these species that would be detrimental to native species. Plants, birds, reptiles (especially large constrictors), amphibians and a few mammals are now reproducing in areas south of South Carolina. Inventory and monitoring is essential to determine and describe any changes in range of these exotic species.

3.2.3.2 DNR Response and Recommendations

DNR should continue monitoring wildlife and fish populations and their habitats for evidence of new invasive and non-indigenous species. Through existing programs within DNR, South Carolina needs to consistently fund and expand control activities to eliminate or reduce concentrations of those species where possible. DNR and others should seek to strengthen State laws regulating importation and transportation of non-native species and to implement the action items delineated under the goals and objectives of the South Carolina Aquatic Invasive Species Management Plan.

DNR is a partner in the South Carolina Aquatic Invasive Species Task Force and, through the Aquatic Nuisance Species Program, collaborates with the South Carolina Aquatic Plant Management Council to annually develop a South Carolina Aquatic Plant Management Plan. DNR also is active on regional levels with the Gulf States and South Atlantic Panel and on state levels with the South Carolina Exotic Plant Pest Council. Similar strategies to address nuisance and exotic species, particularly on conservation lands should be expanded within the state. Support is needed to develop and implement a comprehensive, prioritized monitoring strategy for the early detection of non-indigenous species. DNR also should seek to partner and collaborate with others working in this area.

Support of taxonomic expertise is an important component of any successful invasive species monitoring program. The Southeastern Regional Taxonomic Center (SERTC), located in the MRRI, has developed a curated collection of marine and estuarine animals from the SAB and maintains a searchable library of regionally relevant peer-reviewed taxonomic literature. Through collaborations with other labs and museums, SERTC has collected and preserved representative specimens from numerous habitats throughout the southeastern United States, documenting northern range extensions along the Atlantic Coast. Continued funding for this program needs to be secured. The

Center played an important role in developing the management plan for South Carolina aquatic invasive species.[147]

Prevention may be the best adaptive strategy to minimize the impact of invasive species. Enforcement of existing statutes related to intentional importation of non-indigenous species, such as apple snails (family *Ampullariidae*), is essential. Enforcement mechanisms should be strengthened; however, a review of all statutes and regulations regarding importation of non-indigenous organisms is recommended, with the legislative goal of a consolidated, comprehensive state law to minimize intentional and accidental introduction. A rapid response plan to eradicate, contain or control invasive species also is an essential tool to curtail the spread of invasive species.

3.2.4 Potential for Increased Incidence of Pathogens

3.2.4.1 Increased Incidence of Pathogens

Climate warming has been linked with a general increase in pathogens, which may have negative effects on host populations.[148]

The oyster disease Dermo (*Perkinsus marinus*) has been determined to be ubiquitous in South Carolina oysters although infection intensities are relatively low.[149] Infection intensities have consistently been relatively low, perhaps because Palmetto State oysters are almost exclusively intertidal and exposed to high summer temperatures that may inhibit the disease.[150] Another oyster disease, MSX (*Haplosporidium nelson*) has been infrequently detected in South Carolina and it is not known how climate change may affect the prevalence of this pathogen.

An apparent outbreak of disease caused by the hemolymph-infecting dinoflagellate *Hematodinium* in the late 1990s in Georgia reportedly led to substantial mortalities in blue crabs and other crustaceans. It is believed that the outbreak was initiated by a prolonged drought that resulted in higher salinities in estuaries, thus favoring the growth of *Hematodinium*.[151] In many South Carolina estuaries, blue crabs can escape to lower salinity refuges, but in the northern part of the state these refuges may not be available. Knowledge of the dynamics of hosts and pathogens in the marine environment is limited, but where disease outbreaks occur, they often are associated with unusual

[147] South Carolina Department of Natural Resources. 2008. South Carolina aquatic invasive species management plan. http://www.dnr.sc.gov/invasiveweeds/aisfiles/SCAISplan.pdf. Last accessed Dec 2010.
[148] Harvell et al. 2002. Climate warming and disease risks in terrestrial and marine biota. Science 296: 2158-2162. Hereafter Harvell et al. 2002.
[149] Bobo, Y., D. Richardson, L. Coen and V. Burrell. 1997. A report on the protozoan pathogens *Perkinsus marinus* (Dermo) and *Haplosporidium nelson* (MSX) in South Carolina shellfish populations. SC DNR Mar. Res. Div. Tech. Rept. No. 86. 50 pp.
[150] Bushek, D. 1997. Chlorine tolerance of the eastern oyster pathogen, *Perkinsus marinus*: Standards for sterilization and quarantine. Grant # P/M-2A, SC Sea Grant Consortium Final Rept.
[151] *Hematodinium* Continues - No Let-Up in Sight. 2002. The Georgia Blue Crab Journal. http://crd.dnr.state.ga.us/assets/documents/BlueCrabNewsletterapr02.pdf. Last accessed Dec 2010.

climatic events.[152] The potential for outbreaks of new pathogens is high because of the expectation of greater variation in climate over the next few decades and invasion of species carrying non-native pathogens.

Large-scale disease mortality in wild penaeid shrimp has not been observed in South Carolina; however, disease and mortality in nonnative shrimps in aquaculture farms within the state has been documented. Cultured shrimp are vulnerable to a number of viruses with susceptibility varying among species, but thus far, no known mortality has occurred in the wild populations of South Carolina. Because pathogenic viruses are known to exist and shrimp are more vulnerable when exposed to multiple stresses, including high temperature and salinity, additional stresses caused by climate change may have a negative effect on wild populations.[153] [154] A pathogen that is known to affect wild shrimp is the black gill (brown gill) syndrome. This condition is caused by an apostome (protozoan) that attaches to shrimp gills and causes melanization, or a darkening of the chitinized exoskeleton. This disease typically is most common when coastal waters are warmest in August and September.[155] Although no directly related mortality has been documented, it is clear that shrimp stamina, ability to escape predators and probably resistance to disease are compromised by the condition. The lowest incidence of the disease since 1999 occurred in 2001 following a relatively cold winter. These apparent relationships to water temperature may suggest that warmer winters and summers associated with climate change may amplify the disease.

Changes in temperature regimes may result in an increase in wildlife and fish diseases that are adapted to warmer conditions. Warmer temperatures can increase the potential for invasion by new pathogens, or increase risk of more serious invasions by existing pathogens. Not only could such pathogens affect wildlife and fish, effects to native vegetation could alter habitats and make them unsuitable for native species. Sudden oak death and the hemlock wooly adelgid infestations are already changing the landscape of some of South Carolina forests, making them potentially more vulnerable to invasion.

3.2.4.2 DNR Response and Recommendations

A proactive program monitoring the health of aquatic animals is not feasible. The potential pathogen pool is large and resources and tools are limited. The most adaptive approach is vigilance for potential pathogens and collaboration with the Clemson Veterinary Diagnostic Center. Advances in molecular technologies have developed a broad range of diagnostic tools that allow scientists to assess thousands of known pathogens in a single assay. It is not known if similar tools for other species are available. Efforts to monitor interstate movement of potentially infected animals should

[152] Harvell et al. 2002.
[153] Zein-Eldin, Z. and M. Renaud. 1986. Inshore environmental effects on brown shrimp, *Penaeus aztecus,* and white Shrimp, *P. setiferus,* populations in Coastal waters, particularly of Texas. Mar. Fish. Rev. 48(3):9-19.
[154] Zhan, W., Y. Wang, J. Fryer, K. Yu, H. Fukuda and Q. Meng. 1998. White spot syndrome virus infection of cultured shrimp in China, J. of Aquatic Animal Health 10:405-410.
[155] Whitaker, D., J. Powers, B. Gooch, N. West and A. Von Harten. 2009. Cooperative research in South Carolina – SC DNR Final Report to National Marine Fisheries Service NOAA, Grant Number NA04NMF4720306. p 45-49.

be continued and enhanced. Research should continue for the development of diagnostics, particularly field tests that can be used to identify pathogens.

Continued support is needed to monitor wildlife and fish populations and their habitats for evidence of new disease and parasite infestations. DNR should maintain and strengthen regional and national contacts and interactions related to disease and parasite challenges, including participation in the Southeastern Cooperative Wildlife Disease Study.

3.3 Impacts to Commercial and Recreational Fishing and Hunting and Other Public Uses of Natural Resources Resulting from a Changing Climate

3.3.1 Potential for Changes in Recreational and Commercial Opportunity

Wildlife and fish populations likely are to be altered as climate change occurs. Such changes may result in reduced commercial and recreational hunting and fishing opportunities of some species, although opportunities may increase with others. As populations are monitored, it may become necessary to alter seasons or bag limits on some species. It will be important to keep the public notified of changes as they occur in order to reduce the potential for conflict between human and natural resource needs and values.

3.3.2 DNR Response and Recommendations

Long-term monitoring of harvested species should be conducted in order to detect temporal and spatial changes in numbers and prevent unsustainable population declines. Research is needed to model and understand the relationship between climate change and population dynamics of important species. Outreach and education are required so that South Carolina residents, city and county officials and legislators understand changes in natural resources resulting from climate change. Strategies and policies are needed to establish compromises that balance needs of the resource with human needs and uses.

3.4 Natural Resources Education and Outreach Needed as a Result of a Changing Climate

3.4.1 Needs for Climate Change Impacts Education and Outreach

Climate change potentially will cause significant alterations to the nature and structure of habitats and species distributions in the southeastern United States including South Carolina. Coastal communities, in particular, will become increasingly vulnerable to a wide range of hazards including hurricanes, shoreline erosion, flooding and storm surge. The impact of these hazards is compounded by coastal development as coastal population increases and coastal ecosystems are degraded. A resilient community understands the potential impacts of these hazards and prepares itself to respond with

timely and holistic management strategies. This gives communities the ability to recover after hazard events and adapt to future conditions.

3.4.2 DNR Response and Recommendations

A critical element of the DNR response to climate change is to increase public awareness of the potential adverse, and positive, effects resulting from these changes. Agency efforts at outreach and education are threefold:

1. DNR should strengthen and increase partnerships with other agencies and organizations involved in climate change research and policy and planning. For example, the Southeast Natural Resource Leadership Group (SENRL), an interagency collaboration established to improve communication on natural resource issues, has recognized the need for natural resource agencies to proactively guide policy, management and socioeconomic decision making regarding climate change.[156] The DNR should seek opportunities to participate in national and local networks such as the SENRL and the recently established Southeastern Climate Science Center. National and local networks are a rich source of information, ideas, research and funding opportunities. Participation in such efforts can greatly increase the efficiency and effectiveness of a state climate change response plan.
2. DNR must assist local communities in planning for change and providing coastal resiliency to reduce overall vulnerability of economic and ecological systems to climate variations. The agency's education programs can help inform decision making in the state regarding climate change by strengthening regional and local partnerships for improved community response. Communities will need assistance planning for their response to potential hazards by considering institutional capacity, land development patterns and natural resource conservation. DNR alone cannot respond to the needs of these communities; however, DNR regularly works with partners that can provide access to information and tools designed to help communities identify critical linkages and understand how decisions impact their community and the environment. By strengthening regional and local partnerships, DNR can help respond to the needs of communities by linking them with the information they require.
3. DNR will play an important role in communicating information on climate change to citizens of South Carolina. Through partnerships with educators and policy makers, DNR research and management staff can work with these groups to translate scientific information into action. The agency will use the World Wide Web to publish reports, news articles and other information involving climate change as well as to provide a mechanism for public comment and input into the process. By involving the public in the research process, DNR will build buy-in from the community and capacity at the local level to respond adaptively to future conditions. The importance of resilient communities will increase as the impacts of climate change are felt. In addition, substantial

[156] Southeast Natural Resource Leadership Group. 2008. Meeting notes. 14 pp.

efforts should be made by agency staff to publish their research data and analysis in peer-reviewed scientific journals.

Climate change is a global concern with potentially significant impacts to South Carolina. To understand and assess the impacts to the human and natural resource populations of this state will involve the cooperative efforts of many agencies, scientists and planners as well as the local community. Education of the state's citizens on the negative and positive impacts of climate change is an essential component of this process. Each of these outreach initiatives is critical to improving the state's capabilities to respond and adapt to climate change. Through regional, state and national partnerships, DNR can help communities protect themselves and the important natural resources surrounding them.

3.5 Technologies Needed to Mitigate and Protect Natural Resources as a Result of a Changing Climate

3.5.1 Technologies Needed to Monitor Physical and Biological Change

Understanding and monitoring climate change impacts on the state's natural resources will require the enhancement of the agency's technology infrastructure, database and analysis and modeling capabilities. Various DNR programs have collected natural resource data for the state, and these historic and recent data are maintained in disparate database systems. For example, the South Carolina Climate Office records hourly and daily temperature, precipitation, storm event and other meteorological data from numerous weather stations throughout the state. These data are stored in Oracle and are used by staff in regional drought analysis and monitoring studies. Similarly, the South Carolina Geological Survey and the USGS established cooperative programs to record surface and ground water and lithologic data from various river/stream gauges and well monitoring stations. These data primarily are maintained in Oracle with some tables residing in Microsoft Access. WFFD maintains numerous fisheries, wildlife, botanical and other habitat-related databases in a variety of mainframe, server and PC-based database management systems.

MRD has a variety of long-term data sets containing both physical and biological data. For example, MRRI maintains several long-term fishery and water-quality databases that are relevant to evaluating the effects of climate change on those resources. These include: the MARMAP fishery independent monitoring program of offshore (deepwater) reef fish that extends back 20+ years and the SEAMAP fishery independent monitoring program of nearshore non-reef finfish and crustacean species that also extends back 20+ years. Both of these programs collect data from Cape Hatteras to Cape Canaveral that includes basic water quality measures and both use standardized sampling programs that facilitate long-term trends analysis. MRRI also maintains a 10-year database of juvenile loggerhead sea turtle distribution and density that extends from about Winyah Bay south to and including the northern portion of Florida.

To facilitate inshore monitoring, the MRRI conducted a standardized trammel netting program to assess the composition and abundance of the state's recreational finfish species for 20+ years, and another standardized sampling program to assess the relative abundance and distribution of shrimp and blue crabs that is also 20+ years in duration. The MRRI also participates in several programs to determine and assess environmental measures affecting coastal resources. In cooperation with DHEC, the MRRI has conducted an annual statewide assessment of water quality, sediment quality and biological resources for bottom invertebrate fauna, fish and crustaceans since 1999. The ACE Basin NERR program also has nearly continuous water quality and weather data extending back to 1995 and this program is expected to continue to be maintained in the future.

Mining these various data sets for long-term trends is a critical need, but the data are stored in a variety of formats and in many cases are not in advanced information management systems. Therefore, it is strategically important to develop a comprehensive spatial and tabular database of existing natural resources data and integrate various analytical, statistical and modeling tools to forecast trends and project changes in the distribution of these resources in response to climate change.

DNR also has extensive natural resources spatial data in the agency's geographic information system. These data include statewide soils, wetlands and land use, hydrography, known threatened and endangered species locations, road centerlines, administrative boundaries, contours, digital elevation models, agency owned and/or managed lands and boat ramps, surface and subsurface geology, multi-temporal digital orthophoto quarter quadrangles and Landsat Thematic Mapper satellite imagery. Statewide land cover data was classified from Landsat TM data for the 1985/86, 1992/93, 1997/98, 2002/03 and 2008/09 time periods. These data can be used to provide baseline trends in habitat change and to project potential future impacts from climate change and sea-level rise. Similarly, MRD has developed new oyster maps that provide detailed base imagery and shape files of intertidal shellfish resources. These imagery products also could be used to evaluate changes in wetland vegetation extent and distribution over time which has tremendous potential value in evaluating loss of wetlands and shellfish due to sea-level rise. More recently, the agency initiated a statewide program to develop high resolution elevation data using Light Detection and Ranging (LiDAR) technologies. These data provide digital elevation models with a vertical accuracy of 15.0 to 18.5 cm in open terrain which is essential for sea-level rise and wetland change modeling.

3.5.2.1 DNR Response and Recommendations

In order to meet the agency's long-term needs for responding to climate change impacts in South Carolina, numerous additional strategies and technologies will be required to include:

1. DNR needs to implement a resource inventory and monitoring program to track trends in resource abundance and distributions at the species and landscape

levels as determined to be viable and appropriate to the agency mission. This inventory will require input from all sections and groups, and should expand upon existing data collection and monitoring programs as discussed in Section 3.5.1. Further, it should include the use of various satellite image processing data and tools to systematically assess changes to the vegetative structure and man-made landscape features of the state. Access to accurate, long-term monitoring databases is critical for developing strategies to respond to climate change impacts; therefore, implementation of these comprehensive monitoring programs should be considered a priority.

2. The agency must expand its existing technology infrastructure to support the climate change studies. This includes the implementation of various direct and remotely-sensed measurement platforms to provide *in situ* documentation of sea-level rise, temperature and precipitation, stream flow and other critical data and the integration of all data collected through agency resource inventories in a comprehensive Oracle database. Coupled with various data mining and warehousing technologies, this would enable examination of data for trends and patterns useful for understanding climate change impacts. Further, as these long-term data and information are recorded and analyzed, additional network bandwidth, data storage and computational processing capabilities will be required to support the volume and complexity of scientific, graphic, GIS, imagery and video applications. Additionally, partnerships should be established with other southeastern states and academic institutions to develop a standardized data schema and information delivery platform that will facilitate sharing/exchange of regional data, analysis results and reports.
3. DNR also must develop appropriate data access, scientific analysis (statistical, biometric, image processing, spatial modeling and forecasting, etc.) and resource management decision-support tools to assess the impacts of climate change and develop appropriate management strategies. These tools must include business intelligence and data mining technologies to discover patterns inherent in the data and extensive use of the World Wide Web to disseminate relevant information to the public regarding climate change and its impacts to the state's natural resources. Where available, the agency should implement commercial-off-the-shelf (COTS) solutions that can be augmented with software and applications developed by agency programming staff that address issues specific to natural resources management in South Carolina. For example, the Sea Level Affecting Marshes Model (SLAMM) developed by the United States Fish and Wildlife Service can be adapted from its general visualization modeling application to incorporate high resolution LiDAR elevation and soils data to model potential impacts of sea-level rise on salt and brackish marshes along the coast. Other software tools appropriate to the needs of the DNR are available from various federal and state governments including numerous sea-level rise and biodiversity impact assessment technologies developed by the NOAA Coastal Services Center. These assessment tools should be evaluated for application to the needs of the DNR for determining climate change impacts in the state.

4. Finally, DNR must develop the expertise required to meet the challenges of understanding and addressing the vast array of environmental impacts and natural resource management issues associated with climate change. Staff training in various analytical, modeling and geographic information systems software and associated technologies is essential. Similarly, sponsorship and participation in various regional programmatic workshops and technical committees are critical for developing and maintaining strategic climate change response initiatives.

The creation of long-term monitoring programs, implementation of new technologies and establishment of regional partnerships are essential components of the DNR's response to climate change in South Carolina. The efforts required to accomplish these key objectives may be facilitated by outside funding sources, as many grant opportunities now support or require the development of digital data and implementation of innovative technologies. Additionally, cooperative partnerships facilitate information sharing, which increases the efficiency and effectiveness of programs and opens opportunities for additional funding sources.

4.0 NATURAL RESOURCES LAW ENFORCEMENT DURING AN ERA OF CLIMATE CHANGE

The Law Enforcement Division (LED) is responsible for enforcement of state and federal laws governing hunting, recreational and commercial fishing, recreational boating and other natural resources conservation concerns; promoting safety and developing public support through education and outreach. Additionally, the LED is tasked with assisting other state and federal agencies with varying security missions dealing with non-natural resource issues and events.

Climate change can no longer be considered solely an environmental issue. The physical effects of climate change will have both natural resources impacts as well as socio-economic impacts including the loss of infrastructure, resource scarcity and displacement of life and property. In turn, these impacts could produce security consequences to include civil unrest and instability, presenting new challenges to law enforcement agencies and governments attempting to maintain order and rule of law.[157]

[157] Abbot, C. 2008. An uncertain future: Law enforcement, national security and climate change. Oxford Research Group. http://www.bvsde.paho.org/bvsacd/cd68/uncertain.pdf. Last accessed May 2010.

Table 4.1 Anticipated public safety effects related to climate change in South Carolina.[158]

Weather Event	Public Safety Issue	Population Affected	Public Safety Burden
Heat waves	Heat stress	Elderly, socially isolated, poor, those already health impacted	Low to moderate
Increase in mean temperature	Heat stress, increased disease	Outdoor workers, elderly, poor, outdoor recreationalists	Low to moderate
Extreme weather events	Injuries, drowning	Coastal and Lowcountry dwellers, the poor, outdoor recreationalists	Moderate
Severe winter weather	Injuries, hypothermia, drowning,	Elderly, poor, outdoor recreationalists	Moderate
Sea-level rise	Injuries, drowning, water and soil salinization, ecosystem and economic disruption	Coastal and Lowcountry dwellers, outdoor recreationalists	Moderate
Drought, ecosystem migration	Water shortage, low rivers and lakes, boating accidents, food shortage	Elderly, children, poor, outdoor recreationalists, multiple populations	Moderate to high
Floods	Excess water, dam failures, crop losses, livestock loses, loss of pollution containment, loss of human life	Multiple populations	Moderate to high
Severe climate change	Heat stress, drowning, water shortage, limited food availability, human conflict	Multiple populations	High

4.1 Marine Law Enforcement

4.1.1 Marine Law Enforcement Issues

Marine law enforcement primarily is responsible for enforcing recreational and commercial fishing laws, promoting boating safety and investigating boating incidents in the marine environment. DNR officers regularly conduct search and rescue missions in outlying areas and assist other law enforcement agencies in investigations. The LED has officers trained in underwater diving to assist in law enforcement, search and rescue and evidence recovery missions. The Division also utilizes aircraft for law enforcement patrol, search and rescue and other department missions. The LED is called upon to provide homeland security missions related to waterborne activities including, but not limited to, commercial ship escorts and port security.

[158] Balbus, J.M. and M. L. Wilson. 2000. Human health and global climate change: A review of potential impacts in the United States. Washington, DC: Pew Center on Global Climate Change. http://www.pewclimate.org/docUploads/human_health.pdforg/global-warming-in-depth/all_reports/human_health. Last accessed Oct 2010.

As certain species adapt to climate change some will shift ranges creating additional opportunity for commercial and recreational fishing in the marine environment. These shifts in range and availability will be magnified by human population growth and additional resource pressure. Sensitive habitats may be threatened, requiring additional monitoring and patrols to stem illegal activities and overharvests. The need for conservation enforcement will become apparent as this process unfolds. In view of the possible decline of food resources there will be ever increasing pressure to push the boundaries of conservation to meet economic and food supply needs. In the case of a catastrophic event these issues will manifest themselves at the most basic level, where everyday citizens stressed by poor economic and environmental conditions will begin subsistence fishing by harvesting whatever is available to meet daily needs. Law enforcement will be the only line of defense between these individuals and overharvesting of species. Additionally, alternative energy development will usher in a new set of law enforcement issues in order to monitor and protect marine energy development infrastructure.

In addition to resource protection, the LED may be faced with an increasing recreational boating population along our coastline as a result of higher temperatures and possible longer boating seasons. As a result, enforcement of recreational boating may not be readily available if the current trend of reducing officer positions continues.

4.1.2 DNR Response and Recommendations

Funding for an adequate, if not expanding, natural resource law enforcement presence in the marine environment will be necessary. Partnerships with federal and other state and local law enforcement agencies will be required.

4.2 Inland Law Enforcement

4.2.1 Inland Law Enforcement Issues

As in the marine environment, the LED is responsible for enforcing recreational and commercial fishing laws, promoting boating safety and conducting boating incident investigations on inland surface water bodies. DNR officers regularly conduct search and rescue missions in the air and on or under the surface of rivers, lakes and ponds assisting other law enforcement agencies in investigations. The LED performs homeland security missions related to waterborne activities near hydroelectric dams, nuclear facilities and other energy production facilities. Additionally, the LED is tasked with protecting land-based game and non-game species as well as investigation of hunting related incidents.

Climate change may shift ranges of popular species pursued through recreational hunting and fishing, bringing pressures on sensitive species and habitats; such as the threat that warming and drought imposes on aquatic species, for example, trout and anadromous fish. These threats will be magnified by human population growth and

additional resource pressures. Sensitive habitats may be threatened, requiring additional monitoring and patrols to stem illegal activities and over harvests.

As within the marine environment, the need for conservation enforcement will be apparent as this process unfolds. With ever increasing pressure to push the boundaries of conservation to meet economic and food supply needs, every day citizens stressed by poor economic and environmental conditions will begin subsistence fishing and hunting by harvesting whatever is available to meet daily needs. Law enforcement will be the only line of defense between these individuals and the overharvesting of species.

Additionally, as higher temperatures and longer seasons become stabilized, the LED will be faced with an ever increasing recreational boating population. As a result, enforcement of recreational boating activity may not be readily available if the current trend of reducing officer positions continues.

4.2.2 DNR Response and Recommendations

Funding for an adequate, if not expanding, natural resource law enforcement presence in inland areas will be necessary. Partnerships with federal and other state and local law enforcement agencies will be required.

4.3 Public Safety

4.3.1 Public Safety Issues

The potential public safety effects of climate change have been extensively reviewed.[159] Many are health and safety related. Principal public safety concerns include those related to severe weather events and heat waves. Indirect concerns, for which data to support projections are less available and uncertainties are greater, include human competition for available resources, population dislocation and civil conflict/unrest. In addition, changes in the patterns of pests, parasites, and pathogens may affect wildlife, agriculture, forests and coastal habitats and can alter ecosystem composition and functions. Climate change may disrupt these life-support systems and carry implications for public safety.

Very few public safety laws and regulations currently have a direct bearing on climate change. However, public safety officials can provide science-based input regarding laws and regulations affecting the environment, natural resources and alternative energy arenas. As policies are codified, there may be roles for state and local public health agencies in enforcing such policies including water quantity and quality regulations as an example.

[159] Frumkin, H., J. Hess, G. Luber, J.Malilay and M. McGeehin. 2008. Climate Change: The Public Health Response. Am. J. Public Health. 98:435-445. http://www.bvsde.paho.org/bvsacd/cd68/HFrumkin2.pdf. Last accessed Sept 2010.

4.3.2 DNR Response and Recommendations

There is widespread scientific consensus that climate is changing and it also is being reported in the public safety arena.[160] Mounting evidence suggests there will be future impacts on public safety, including illnesses and injuries associated with heat stress and exposure. Other future impacts will include incidents related to drought caused by shallow surface waters, severe weather events and floods. Finally there are likely to be public safety impacts to surface- and ground-water supplies. Indirect effects may include the consequences of mass migration and human conflicts over available resources. Addressing these occurrences to public safety will be a pressing challenge for natural resource and other law enforcement agencies. Although the scope and complexity of the challenges may be unprecedented, the conceptual framework for responding will draw on long-standing public safety policy. An effective public safety response to climate change is essential to preventing injuries and illnesses, enhancing preparedness, and reducing risk. Science-based decision-making will help manage uncertainty and optimize environmental outcomes.[161]

As climate change evolves, the role of natural resources law enforcement will be required to adapt. There will be a need for additional emphasis on protecting dwindling resources requiring the need for enhanced conservation enforcement. Also, public ambivalence to natural resources will become apparent as the need for gathering food becomes a priority at an unknown cost to all fish and wildlife resources. In either case, the role of the LED will evolve with a greater focus on resource enforcement or a greater focus on more traditional roles of law enforcement where public safety is the priority. In either instance, the LED, in the face of an ever-changing world, will continue to play an increasing role in traditional public safety.

[160] IPCC. 2007.
[161] IPCC. 2007.

5.0 SUMMARY AND PRIORITY LIST OF CLIMATE CHANGE ISSUES

5.1 Overarching Issues and DNR Recommendations

This first report from DNR sets the foundation for actions needed to address climate change impacts to natural resources in South Carolina. The report identifies the overriding natural resource issues and provides recommended actions to keep South Carolina at the forefront of conserving natural resources during an era of changing climate. These overarching issues include the potential for:

1. Detrimental change in habitat,
2. Detrimental change in abundance and distribution of species,
3. Detrimental change to biodiversity and ecosystem services,
4. Detrimental change on the traditional uses of natural resources including hunting, fishing, other compatible public uses, forestry and agriculture,
5. Detrimental change in the abundance and quality of water, and
6. Detrimental change in sea level.

Specific tasks identified by DNR in order to move forward in an era of climate change while protecting natural resources include:

1. Spatial mapping,
2. Monitoring and establishing baselines on
    a. Living resources,
    b. Non-living resources, and
    c. Climate trends.
3. Habitat acquisition,
4. Adaptation strategies on DNR-titled properties,
5. Integration and analysis of data,
6. Outreach and education,
7. Developing additional partnerships and collaborating with others, and
8. DNR leading by example.

5.2 DNR Leading by Example

DNR is making climate change an integral part of the agency's ongoing mission. A Climate Change Impacts Technical Working Group (CCI-TWG) was formed with representatives from each division. The CCI-TWG reports directly to the Executive Office and was charged with the completion of this comprehensive report addressing the potential impacts of a changing climate to natural resources in South Carolina. The CCI-TWG developed recommendations that will lead to integrating climate change into the DNR organizational culture, its structure and all aspects of its work. These key steps include:

1. Develop an approach that will incorporate climate change into DNR strategic and operational plans and existing structure that can be used as a vehicle for internal and external communication,
2. Ensure that all levels of agency staff are aware of, and appropriate staff engaged in, climate-change initiatives,
3. Update and align DNR actions with regional and national climate-change initiatives as appropriate,
4. Work with stakeholders and partners on fish and wildlife adaptation and mitigation,
5. Prepare an internal and external outreach strategy to communicate climate change issues, and
6. Develop clear and measurable indicators to track the results of DNR climate change efforts.

To accomplish its mission, DNR recommends the following core climate change foci of effort:

1. Policies and Opportunities – focus on grants, legislation, partnerships and strategic planning,
2. Research and Monitoring – focus on standardized monitoring protocols and state-specific data (including gaps) and predictive modeling,
3. Communication and Outreach – focus on the DNR messages and a climate change communication plan,
4. Adaptation – focus on the activities related to unavoidable climate-change impacts on fish and wildlife, and
5. Operations – focus on positioning DNR as a leader by reducing the agency's carbon footprint, improving its energy efficiency and decreasing operational costs by accomplishing the following:
    a. Achieve increased fuel economy through fleet reduction, use of more efficient vehicles as well as implementing efficient wildlife and fisheries management and law enforcement where combustion engines are required,
    b. Achieve increased energy efficiency through obtaining energy audits for agency buildings and adoption of practicable energy audit recommendations,
    c. Implement practicable water efficiency measures for agency buildings, and
    d. Implement paperless internal communications and document management.

DNR is taking a lead role among South Carolina state agencies to advance the scientific understanding of the vulnerability of South Carolina's vital natural resources during an era of changing climate. These actions and advocacy for sound planning should enable the agency, its partners, constituents and all Palmetto State citizens to avoid or minimize the anticipated impacts. The agency will strive to lead by example, work to

create ecosystem resiliency and partner with others to preserve and protect South Carolina's natural resources.

American Shad Habitat Plan Update

State of Florida

Florida Fish and Wildlife Conservation Commission
Fish and Wildlife Research Institute
Division of Marine Fisheries Management

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Introduction

Amendment 3 to the Interstate Management Plan for Shad and River Herring cites habitat loss and degradation as major factors in the decline of and continued depression of populations of American Shad along the Atlantic coast and requires member states to develop habitat plans for American Shad in their jurisdiction. This plan is submitted to serve as the required habitat plan for the State of Florida. It outlines historic and current habitats available to American Shad in Florida and identifies known threats to those habitats as well as efforts to mitigate those threats.

The primary spawning run of American shad in Florida historically was and currently is in the St. Johns River. The only other river lying within Florida in which spawning has been documented historically (Williams and Bruger 1972) and recently (Holder et al. 2011, Dutterer et al. 2011) is the Econlockhatchee River which is a tributary to the St. Johns River. The St. Marys River is along the eastern border between Georgia and Florida historically supported a population of American Shad. This plan includes these three systems.

The Ocklawaha River is the largest tributary of the St. Johns River and is the largest Atlantic drainage river in Florida obstructed by a dam in its lower reaches. There is no record of a spawning run of American Shad in the Ocklawaha River pre-dating construction of the dam in 1968. However, the Ocklawaha River is discussed briefly at the end of this plan because advocates for removal of the dam often cite American Shad as among migratory species that would benefit from dam removal.

St. Johns River

1) Habitat Assessment

   General: The St. Johns River emerges from the headwater marsh in Indian River and Brevard Counties and flows approximately 450 km north to the mouth in Jacksonville. Several broad shallow lakes lie within the run of the river. Stream gradient is small with the river bottom dropping 4 m between rkm 450 and rkm 314. The river bottom is at or below mean sea level downstream of rkm 314. American Shad spawn in the St. Johns River from January through April which corresponds to the declining flows of Florida's dry season (Kelly and Gore 2008).

   a. Spawning Habitat
      i. Historic spawning grounds were documented from rkm 230 to rkm 433 near the headwaters (Williams and Bruger 1972). Of that distance 160 km can be classified as river and 43 km as lake. Primary spawning

grounds were in river habitats between rkm 275 and rkm 360 (Williams and Bruger 1972).

ii. A weir built at the outlet of Lake Washington (rkm 415) in 1976 blocks access to approximately 14 km of potential spawning habitat in the uppermost river. Current spawning habitat identified by egg collection (Miller et al. 2012b) and telemetry (Dutterer et al. 2011) is between rkm 230 and the weir at rkm 415. Primary spawning areas are still between rkm 275 and 360. Approximately 146 kilometers of potential habitat remains available for spawning depending on water level.

b. Rearing Habitat

i. Historical in-river and estuarine rearing habitat included 95 km of river between Lake George and Lake Harney, 260 km^2 of lakes within the run of the river, and 105 km of tidal freshwater estuary between Black Creek and Lake George.

ii. All historical rearing habitats are still available.

2) Threats

a. Barriers

i. Low head dam at rkm 415. Crest height of 3.8m NAVD 1988 is 1 m above the river surface at low stage.

1. Action: None. Dam obstructs access to less than 10% of historical spawning habitat. Preferred habitat is between rkm 275 and rkm 360.
2. Regulatory Contact: St. Johns River Water Management Disctrict (SJRWMD).

b. Water Withdrawals Inventory and Assessment

i. Consumptive use permits are coordinated through the SJRWMD. There is a proposal to allow withdrawal of up to a total of 262 million gallons per day (mgd) of surface water from the basin with a total of 155 mdg from several sites along the middle and upper St. Johns River. The District completed the St. Johns River Water Supply Impact Study (WSIS) in 2012 (Lowe et al. 2012). The intent of the WSIS "was to provide a comprehensive and scientifically rigorous analysis of the potential environmental effects to the St. Johns River associated with annual average surface water withdrawals as high as 262 mgd" (155 mgd from the St. Johns River and 107mgd from a tributary). Chapter 12 focused on fishery impacts of the proposed withdrawals with special consideration given to anadromous herrings in appendix 12-C (Miller et al. 2012a and 2012b). Key findings are as follows.

1. WSIS found that impingement/entrainment of anadromous herring eggs and larvae could occur at all proposed intake sites and could be potentially significant at two locations under consideration. The WSIS recommended reducing the impingement/entrainment risk to alosines by considering: intake designs that are safer for ichthyoplankton, alternative intake locations to avoid core spawning locations of American Shad, and curtailing withdrawals on the spawning grounds during the spawning season at sites with high egg/larval abundance.
2. WSIS found that optimal spawning habitat for American Shad as delineated by depth and velocity shrinks under low flow conditions. WSIS finds that access to spawning grounds and acreage of spawning grounds will not be adversely affected by withdrawals due to offsetting effects of base flow augmentation by the Upper Basin Restoration Project. The frequency and duration of low flow events are expected to decline only slightly under modeled expected scenarios.

FWC should coordinate closely with SJRWMD after consumptive use requests for surface water withdrawals have been submitted by an applicant, to ensure the requested withdrawals will not negatively impact American Shad. In particular, withdrawals should not interfere with the ability of American Shad to reach their spawning grounds, nor should potential egg/larval entrainment be excessive. Coordination should include review of potential hydrologic impacts of the proposed withdrawals, assistance with selection of preferred withdrawal sites and assistance with intake design.

The City of Deltona secured a permit from the US Army Corp of Engineers in 2020 to construct a raw water intake on the north shore of Lake Monroe. The project consists of a 0.92 acre intake basin in the littoral zone adjected to the Enterprise Boat Ramp (Latitude 28.862681° Longitude -81.252439°). The basin will feed a 30-inch raw-water main that will deliver water to the Alexander Avenue Water Resources Facility and Rapid Infiltration Basin. The intake is far from the run of the river and not expected to pose a risk to egg, larval, or juvenile shads. The ACOE finding was of no substantial adverse impact to EFH or federally managed fisheries. The project is intended to offset over-pumping of

ground water that adversely affects base flow from Blue Spring which discharges to the St. Johns River at river kilometer 248.

c. Water Quality
    i. Nutrient loads are high in the St. Johns River Basin which results in cyanobacteria dominated algae blooms and occasional hypoxia both in freshwater reaches and in the brackish estuary near the river mouth (Hendrickson et al. 2003). Algae blooms may occur in the lower river from summer through early fall which can negatively alter zooplankton communities (Paerl et al. 2002). Reduction in DO may impact larval and juvenile American Shad nursery habitat and/or juvenile emigration corridors. Florida Department of Environmental Protection (FDEP) has established Total Maximum Daily Loads (TMDL) for nitrogen, phosphorus, and/or DO in the upper, middle, and lower St. Johns River (Gao 2006, 2009, Magley and Joyner 2008). TMDLs for nutrients and DO were created for Crescent Lake and Haw Creek (FDEP 2017 and Rhew 2020). TMDL implementation is carried out through two primary routes.
        1. Nutrient reductions are being carried out following guidelines outlined in Basin Management Action Plans (BMAPs) for the lower and middle SJR as well as Lake Jesup (FDEP 2008, 2012, 2010, 2019). BMAPs were developed by committees representing state agencies as well as public and private entities. BMAPs address both point and non-point sources of nutrient loads to the St. Johns River Basin. Subsequent BMAPs have been established for three first magnitude springs in the middle SJR basin: Volusia Blue Spring, Deleon Springs, and Gemini Springs (FDEP 2018). Specific BMAP action items include tasks such as upgrades to wastewater treatment plants, wastewater reclamation, stormwater retrofits, urban structural BMPs, urban nonstructural BMPs, agricultural BMPs, environmental education, and water quality credit trading. Watershed response to BMAPs is tracked through water quality monitoring carried out by FDEP and SJRWMD. BMAP progress is subject to annual review by the TMDL Executive Committee or Basin Working Group overseeing the water body/basin of concern.
        2. Florida Water Management Districts are instructed by the Surface Water Improvement and Management (SWIM) Act

to develop plans to improve the quality and management of surface water. Plans are cooperative with relevant state agencies and affected local governments participating in plan development. Plans have been developed for the upper, middle, and lower St. Johns River (SJRWMD 2002, 2007, 2008).

FWC should monitor the progress of implementation plans to ensure that water quality goals protect American Shad and communicate additional research findings as needed. Nutrient, chlorophyll, and dissolved oxygen trends have been stable to slightly improving in the main stem of the river although cyanobacteria blooms are still common in the Lower St. Johns River. (Pinto et al. 2020)

d. Channelization and Dredging
    i. Historic alterations in the non-tidal river: Navigational improvements occurred in the non-tidal portion of the river between 1884 and 1945.To enhance navigation numerous bends were cut off by excavating new channels in the river between Lake George's southern inlet (rkm 199) and Lake Monroe's outlet (rkm 265).This excavation straightened the main river channel and created numerous new oxbows. Sandbars were removed to establish a minimum depth of four meters between Palatka and Sanford. Further alteration of the non-tidal portion of the river is not planned.
    ii. Jacksonville is an active harbor for cargo. Deepening of the lower 32 km of the river from the mouth to Jacksonville Harbor is likely. US Army Corps of Engineers has prepared a project assessment including environmental impact assessment (USACE 2014). No immediate threat to shad migration or rearing is apparent from this project. Some loss of lower nursery zone could occur due to salt water intrusion. FWC Fish and Wildlife Research Institute (FWRI) Freshwater Fisheries Research section has added parts of the lower St. Johns River estuary to its list of water bodies for long term fishery montoring. FWRI Fishery Independent Monitoring conducts monthly sampling in the lower St. Johns River from the river mouth to rkm 134.
e. Land Use
    i. The marshes of the upper basin were drained for agriculture and livestock grazing from 1900 through 1970. As much as 62 percent of the floodplain upstream of Lake Harney was drained and much water was diverted out of the basin. Following passage of the National

Environmental Policy Act focus of management of the upper basin turned towards flood control, marsh restoration and enhancement, and improved water quality. The 166,500 acre Upper St. Johns River Basin Flood Control Project consists of four water management areas, four marsh conservation areas and two marsh restoration areas managed by the St. Johns River Water Management District and the USACE (SJRWMD 2007).

ii. Other land use impacts result primarily from urbanization and associated stormwater management challenges. These impacts and their mitigation are quantified in previously mentioned SWIM and BMAP plans as well as in flow modeling in the WSIS.

f. Climate Change

i. The St. Johns River, Florida hosts the southernmost spawning run of American Shad on the U.S. Atlantic Coast. Predicted global warming could shorten the spawning season by advancing the date at which temperature exceeds that suitable for spawning. The river bottom of spawning grounds between rkm 230 and 314 is below sea level. Current mean water surface height of the St. Johns River is above sea level down to rkm 230. Predicted sea level rise could impact these lower spawning reaches. Altered dry season rainfall patterns could change the quantity and quality of water available for spawning and rearing.

ii. Florida FWC has formed a Climate Change Team that includes a Steering Committee and four employee workgroups on adaptation, research and monitoring, communication and outreach, policy and opportunity.

Econlockhatchee River

1) Habitat Assessment

General: The Econlockhatchee River is the second largest tributary to the St. Johns River encompassing a watershed area of 700 km^2 with a stream length of 57 km. It discharges into the St. Johns River at rkm 317. American Shad spawning has been documented in the lower Econlockhatchee River (Williams and Bruger 1972, USACE 1973). It is not known if the Econlockhatchee River supports its own run of American Shad or if it attracts strays from the adjacent St. Johns River spawning grounds. Monitoring by FWC has found that the relative abundance of spawning American Shad can be high in the Econlockhatchee River compared to the adjacent St. Johns when flows are high in the Econ compared to the St. Johns (Hyle et al., 2019)

a. Spawning Habitat: There are no barriers. Historical extent of spawning in the Econlockhatchee River is not confirmed but surveys in March 1969 found adult American Shad as far upstream as the confluence with the Little Econlockhatchee River. Recent electrofishing and telemetry surveys have located adult shad from rkm 4 to rkm 14 during the spawning season (Holder et al. 2012, SJRWMD 2011).
b. Rearing Habitat: Econlockhatchee River shares rearing habitat with the St. Johns River.

2) Threats
   a. Water Quality: Stormwater Management. Portions of the Econlockhatchee River watershed are densely developed which affects stormwater flow patterns and pollution. Management of associated run off is covered by the Middle St. Johns River Basin SWIM plan (SJRWMD 2002). Land use changes and flow augmentation by treated wastewater enhanced Econlockhatchee River base flows starting in the mid-1980s (German and Adamski 2013). Stormwater diversion and reclamation could reduce pollutant loads to the Econlockhatchee River but could also reduce base flow during the winter dry season in which American Shad spawn.

St. Marys River

The St. Marys River originates in the Okeefenokee swamp and flows 203 km to the Atlantic Ocean along the eastern border between Georgia and Florida. Head of the tide extends to rkm 88 and salt water extends to rkm 30-35. The St. Marys River is managed by the Georgia Department of Natural Resources (GaDNR) and the St. Johns River Water Management District (SJRWMD) in cooperation with St. Marys River Management Committee (SMRMC). The St. Marys River Management Committee (SMRMC) is a quasi-governmental advisory panel established by Interlocal Agreement between Baker and Nassau counties in Florida and Camden and Charlton counties in Georgia. The SMRMC has five voting representatives from each county: one county commissioner and four appointed members (two riverfront landowners or representatives of corporations with riverfront property and two at-large members). One representative from the St. Johns River Water Management District (SJRWMD) and one representative from the Georgia Department of Natural Resources (GDNR) serve as non-voting members.

1) Habitat Assessment

   All historic spawning and rearing habitat is still available. Neither has been quantified.

2) Threats
   a. GDNR Environmental Protection Division has identified a stretch of the lower St. Marys River with hypoxic summer conditions.
      i. GDNR has developed a TMDL for dissolved oxygen and is working with local governments and conservation organization to implement measures to reduce organic loads and improve dissolved oxygen conditions in the affected river reach.
   b. Florida Department of Environmental Protection has developed a water quality assessment as a road map for developing plans to improve water quality in the basin (FDEP 2007).

Ocklawaha River

The Ocklawaha River is the largest tributary of the St. Johns River but it does not have a documented historical spawning run of American Shad. It flows 119 kilometers from Lake Griffin to the St. Johns River and there is a dam located at rkm 19 that was constructed in 1968 (Senator George Kirkpatrick Dam). The Ocklawaha River is mentioned in this plan because some advocates for dam removal cite American Shad among the species of migratory fish that would benefit from removal of the dam.

Habitat above and below the dam appears suitable for American Shad to spawn. However, records of a spawning run of or fishery for American Shad from the Ocklawaha River have not been found. One specimen was noted in a dissertation entitled “Fishes of the St. Johns River System” (McLane 1955). There are anecdotes from veteran commercial fishermen of American Shad present in the Ocklawaha River prior to dam construction (Jordan 1994) but no confirmation. There are modern anecdotes of shad present below the dam but recent efforts to locate spawning American Shad in the Ocklawaha River below the dam have yielded none (Holder et al. 2012). The absence of a documented historical or current run of American Shad in the Ocklawaha River precludes a need for a restoration plan. However, the prospect of dam removal may warrant further investigation into whether shad historically used or could use in the future the Ocklawaha River.

The St. Johns River Water Management District produced an updated review (to update the 1994 review) of downstream water quality/nutrient loading in 2016 (Hendrickson 2016). The preliminary finding is that additional nutrient loading from a free-flowing Ocklawaha River is not likely a disqualifying factor for dam removal when balanced against other nutrient mitigation strategies ongoing in the watershed.

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Atlantic States Marine Fisheries Commission

Atlantic Striped Bass Management Board

May 5, 2021
1:00 – 4:30 p.m.
Webinar

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 (*D. Borden*) 1:00 p.m.

2. Board Consent 1:00 p.m.
   - Approval of Agenda
   - Approval of Proceedings from February 2021

3. Public Comment 1:05 p.m.

4. Consider the 2020 Albemarle Sound-Roanoke River Striped Bass Stock Assessment 1:15 p.m.
   Action
   - Presentation of Stock Assessment and Peer Review Panel Report (*L. Lee, C. Godwin*)
   - Presentation of Technical Committee Report *(K. Sullivan)*
   - Consider Acceptance of Benchmark Stock Assessment and Peer Review Report for Management Use

5. Public Comment Summary to Draft Amendment 7 Public Information Document 1:40 p.m.
   - Public Comment Summary *(E. Franke)*
   - Advisory Panel Report *(E. Franke)*

6. Draft Amendment 7 *(D. Borden)* **Action** 2:10 p.m.
   - Provide Guidance to the Plan Development Team for Draft Amendment 7

7. Review and Populate Advisory Panel Membership *(T. Berger)* **Action** 4:25 p.m.

8. Other Business/Adjourn 4:30 p.m.

MEETING OVERVIEW

Atlantic Striped Bass Management Board
Wednesday, May 5, 2021
1:00 p.m. – 4:30 p.m.
Webinar

Chair: David Borden (RI) Assumed Chairmanship: 02/20	Technical Committee Chair: Kevin Sullivan (NH)	Law Enforcement Committee Rep: Kurt Blanchard (RI)
Vice Chair: Martin Gary (PRFC)	Advisory Panel Chair: Louis Bassano (NJ)	Previous Board Meeting: October 21, 2020
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 February 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 the 2020 Albemarle Sound-Roanoke River Striped Bass Stock Assessment (1:15 – 1:40 p.m.) Action

Background

- North Carolina Division of Marine Fisheries (NCDMF) completed a benchmark stock assessment of the Albemarle Sound-Roanoke River (A-R) stock in 2020 **(Briefing Materials).**
- Based on the assessment results, measures were put in place to reduce the striped bass total allowable landings in the A-R management area (2020 Revision to Amendment 1 to the North Carolina Estuarine Striped Bass FMP).
- Under Addendum IV of the Atlantic Striped Bass Fishery Management Plan, the A-R stock is managed by the State of North Carolina using reference points from the latest A-R stock assessment reviewed by the TC and approved for management use by the Board.
- The TC met on March 9, 2021 to review the 2020 A-R striped bass stock assessment **(Briefing Materials).**

Presentations

- Assessment overview, peer review summary, and NC management update by NCDMF staff L. Lee and C. Godwin
- TC report by K. Sullivan

Board Actions for Consideration

- Accept the NC Albemarle Sound-Roanoke River Stock Assessment Report and Peer Review Report for management use.

5. Public Comment Summary to Draft Amendment 7 Public Information Document (1:40 – 2:10 p.m.)

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 that have been facing striped bass management for a long time.
- At their February 2021 meeting, the Board approved for public comment the Draft Amendment 7 Public Information Document (PID) which is a broad scoping document intended to focus public input and inform development of the draft amendment.
- Eleven public hearings on the PID were conducted in March **(Briefing Materials)** and written comments were accepted through April 9 **(Supplemental Materials).**
- The Advisory Panel reviewed the PID on April 13, 2021 **(Briefing Materials).**

Presentations

- Public Comment Summary by E. Franke
- AP Report by E. Franke

6. Draft Amendment 7 (2:10 – 4:25 p.m.) Action

Background

- The Draft Amendment 7 Public Information Document (PID) is a broad scoping document intended to focus public input and inform development of the draft amendment.
- The PID includes nine issues as well as a category of "Other Issues" for possible inclusion in Draft Amendment 7.

Board Actions for Consideration

- Provide Guidance to the Plan Development Team on which issues to include in Draft Amendment 7.

7. Review and Populate Advisory Panel Membership (4:25 – 4:30 p.m.) Action

Background

- There is one new nomination to the Atlantic Striped Bass Advisory Panel – Jon Worthington, a recreational fisherman in North Carolina **(Briefing Materials)**.

Presentations

- Nominations by T. Berger

Board Actions for Consideration

- Approve Jon Worthington to the Atlantic Striped Bass Advisory Panel.

8. Other Business/Adjourn (4:30 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 – various tasks in response to the 2018 benchmark assessment and relating to development of Draft Amendment 7
- TC – June 15th: Annual compliance reports due

TC Members: Kevin Sullivan (NH, chair), Jason Boucher (DE, vice chair), Nicole Lengyel Costa (RI), Olivia Phillips (VA), Alexei Sharov (MD), Carol Hoffman (NY), Charlton Godwin (NC), Ellen Cosby (PRFC), Gail Wippelhauser (ME), Gary Nelson (MA), Brendan Harrison (NJ), Jeremy McCargo (NC), Kurt Gottschall (CT), Luke Lyon (DC), Bryan Chikotas (PA), Peter Schuhmann (UNCW), Gary Shepherd (NMFS), Steve Minkkinen (USFWS), John Ellis (USFWS), Katie Drew (ASMFC), Emilie Franke (ASMFC)

SAS Members: Gary Nelson (MA), Alexei Sharov (MD), Hank Liao (ODU), Justin Davis (CT), Michael Celestino (NJ, Chair), John Sweka (USFWS), Gary Shepherd (NMFS), Katie Drew (ASMFC), Emilie Franke (ASMFC)

PDT Members: Nichola Meserve (MA), Nicole Lengyel Costa (RI), Brendan Harrison (NJ), Olivia Phillips (VA), Simon Brown (MD), Jason Boucher (DE), Derek Orner (NMFS), Greg Wojcik (CT), Emilie Franke (ASMFC)

Tagging Subcommittee (TSC) Members: Stuart Welsh (WVU, Chair), Heather Corbett (NJ, Vice Chair), Angela Giuliano (MD), Beth Versak (MD), Chris Bonzak (VIMS), Gary Nelson (MA), Ian Park (DE), Jessica Best (NY), Carol Hoffman (NY), Gary Shepherd (NMFS), Josh Newhard (USFWS), Wilson Laney (USFWS), Katie Drew (ASMFC), Emilie Franke (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ATLANTIC STRIPED BASS MANAGEMENT BOARD

Webinar
February 3, 2021

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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INDEX OF MOTIONS

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)
Mike Armstrong, MA, proxy for Dan McKiernan (AA)
Raymond Kane, MA (GA)
Rep. Sarah Peake, MA (LA)
Jason McNamee (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Rep. Sosnowski (LA)
Justin Davis, CT (AA)
Bill Hyatt, CT (GA)
Jim Gilmore, NY (AA)
Emerson Hasbrouck, NY (GA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Joe Cimino, NJ (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)
Mike Luisi, MD, proxy for B. Anderson (AA)
Russell Dize, MD (GA)
David Sikorski, MD, proxy for Del. Stein (LA)
Pat Geer, VA, proxy for S. Bowman (AA)
Bryan Plumlee, VA (GA)
Shanna Madsen, VA, proxy for Sen. Mason (LA)
Chris Batsavage, NC, proxy for J. Batherson (AA)
Jerry Mannen, NC (GA)
Bill Gorham, NC proxy for Rep. Steinberg (LA)
Marty Gary, PRFC
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
Kristen Anstead
Pat Campfield
Maya Drzewicki
Emilie Franke
Chris Jacobs
Jeff Kipp
Dustin Colson Leaning
Laura Leach
Savannah Lewis
Kirby Rootes-Murdy
Sarah Murray
Joe Myers
Julie Simpson
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Fred Akers, Newtonville, NJ
John Almeida, NOAA
Mike Armstrong, MA DMF
Alex Asquino
Gerald Audet, VT
Pat Augustine, Coram, NY
Matt Ayer, MA DMF
Duncan Barnes
Mike Bednarski, VMRC
David Behringer, NC DENR
Rick Bellavance, N. Kingston, RI
John Bello, CCA VA
Jessica Best, NYS DEC
Peter Benoit, Ofc. Sen. King
Alan Bianchi, NC DENR
Kevin Blinkoff
Ellen Bolen, VMRC
Jason Boucher, DE DFW
Dick Brame, CCA
Simon Brown, MD DNR
Delayne Brown, NH F&G
Jeff Brust, NJ DEP
George Bucci
Jack Buchanan, VIMS
Andrew Carr-Harris, NOAA
Patrick Cassidy
Vincent Catalano
Joe Cavaluzzi
Mike Celestino, NJ DEP
Benson Chiles, Chiles Consulting
Van Christie
Matt Cieri, ME DMR
Germaine Cloutier

Guests (continued)

Allison Colden, CBF
Ryan Conceicao
Heather Corbett, NJ DEP
Nicole Lengyel Costa, RI DEM
Caitlin Craig, NYS DEC
Jack Creighton
Greg Cudnik
Jessica Daher, NJ DEP
John Dameron
Andrew Dangelo
Bob Danielson
Lorena De la Garza, NC DENR
Rachel Dean
Randy Dean
Melissa Dearborn
Jeff Deem, Lorton, VA
Monty Deihl, Ocean Fleet Svcs.
Vinny DelGozzo
Patrick Denno
John DePersenaire, RFA
Greg DiDomenico, Cape May NJ
David Dietz, NC DENR
Renee DiPippo
Michael Doebley
Chris Dollar, CBF
Frazer Dougherty
Russell Dunn, NOAA
Mark Eustis
Julie Evans
Peter Fallon
Michael Faulkingham, Portland, ME
Lynn Fegley, MD DNR
James Fletcher, Wanchese Fish Co
Julian Frank
Toby Frey
Tony Friedrich, SGA
Thomas Fuda
Jerry Gaff
Alexa Galvan, VMRC
John Gans, TRCP
Roger Gendron
Steve George
Barry Gibson
Lewis Gillingham, VMRC
Angela Giuliano, MD DNR
Rick Golden
Willy Goldsmith, SGA
Frank Goncalves
Kurt Gottschall, CT DMF
Severio Governale, NYS DEC
Michael Griffiths
Pam Lyons Gromen, WildOceans
Kyle Gronostajski
Daniel Hadler, NYS DEC
Paul Haertel
Jake Hardy
Brendon Harrison, NYS DEC
Chouaib Hihi, U Penn
Peter Himchak, Cooke Aqua
Rich Hittenger
Carol Hoffman, NYS DEC
Bill Hoffman, MA DMF
Joseph Holbeche
Jeffrey Horne, MD NR
Jesse Hornstein, NYS DEC
Edward Houde, UMCES
Rachel Howland, NC DENR
Bob Humphrey
Jim Hutchinson
Taylor Ingraham
Stephen Jackson
Peter Jenkins
Blaise Jenner
James Jewkes
Jeff Kaelin, Lund's Fisheries
Desmond Kahn
Julia Kaplan, MA DMF
Greg Kenney, NYS DEC
Adam Kenyon, VMRC
Shawn Kimbro
Dale Kirkendall
Thomas Kosinski
Carl Koziol
Wilson Laney, NCCF
Toby Lapinski, *Fisherman Magazine*
Allen Lawrence
Ed Liccione
Steven Liesman
Mike Luisi, MD DNR
Chip Lynch, NOAA
Mark Magrath
John Maniscalco, NYS DEC
Aram Maranian
Steve Mason
Robert McCarthy
Genine McClair, MD DNR
Ashley McCord, NOAA
Joshua McGilly, ODU
Nichola Meserve, MA DMF
Steve Meyers, Williamsburg, VA
Steve McKinnen, FL FWS
Chris Moore, CBF
Patrick Moran, MA Env. Police
Jerry Morgan
Clinton Morgeson, VA DWR
Brandon Muffley, MAFMC
Kennedy Neill
Josh Newhard, FL FWS
Gerry O'Neill, Cape SeaFoods
Bob O'Rino, NYS DEC
Derek Orner, NOAA
Peter Owens
Patrick Paquette, MA SBA
Ian Park, DE DFW
Clayton Patles
Justin Pellegrino, NYS DEC
Rich Pendleton, NYS DEC
Olivia Phillips, VMRC
Chris Piatek
Michael Pierdinock
Kelly Place, Williamsburg, VA
Mike Plaia
Steve Poland, NC DENR
Nick Popoff, FL FWS
Will Poston
Dominick Pucci
Jill Ramsey, VMRC
Courtney Roberts
Cody Rubner
Mike Ruccio, NOAA
Patrick Rudman
Lenny Rudow
Tim Sartwell, NOAA
Kyle Schaefer
Tara Scott, NOAA
McLean Seward, NC DENR
Alexei Sharov, MD DNR
Gregory Shute
Jared Silva, MD DMR
Jack Skammels
Thomas Sminkey, NOAA

Guests (continued)

Michael Spinney
Ross Squire
David Stormer, DE DFW
Michael Thompson, NC DENR
Michael Toole
Wes Townsend, Dogsboro, DE
Edward Tully
Jim Uphoff, MD DNR
Chris Uraneck, ME DMR
Dave Vanderbeck
Robert Vanasse
Taylor Vavra, Stripers Forever
Beth Versak, MD DNR
Meg Viviano, *Ches. Bay Magazine*
Joseph Vukas
Mike Waine, ASA
Peter Whelan, Portsmouth, NH
Patrick White
Kate Wilke, TNC
Angel Willey, MD DNR
Steve Witthuhn, Greenland, NY
Zach Whitener, GMRI
Meredith Whitten, NC DENR
Chris Wright, NOAA
Bob Yagid
Harvey Yenkenson
Sarah York, NOAA
Robert Young
David Zajano
Phil Zalesak, Timbers, MD
Dennis Zambrotta, Newport, RI
Arek Zenel
Erik Zlokovitz, MD DNR
Rene Zobel, NH F&G

The Atlantic Striped Bass Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Wednesday, February 3, 2021, and was called to order at 1:45 p.m. by Chair David V. Borden.

CALL TO ORDER

CHAIR DAVID V. BORDEN: I'm going to call the meeting to order. Good afternoon all! My name is David Borden; I'm the Governor's Appointee from Rhode Island, and I'm also the Board Chairman for this meeting. We've distributed an agenda with a number of major reports and actions that we'll take up.

We also have issues that we need to deal with, in regard AP appointments, and the tagging project will also be discussed. The first thing I would like to do is to start by welcoming our new FMP Coordinator, Emilie Franke, who will be participating occasionally in this discussion, Toni Kerns. We had the majority of the staff work on various issues after Max's departure, and thus he will be staff lead at this meeting.

APPROVAL OF AGENDA

CHAIR BORDEN: The first item of business is Approval of the Agenda. I have reordered the agenda for everyone's information, so that we will take up the PID prior to the Circle Hook issue, as a means of providing more time for the circle hook discussion. I also have an update scheduled on the tagging survey under other business, as I indicated previously.

My question for the Board, are there any other additions, deletions, or modifications to the agenda? If you want to do so, please raise your hand. I see no hands up, so by consensus we'll take the issues in the order that I described.

APPROVAL OF PROCEEDINGS

CHAIR BORDEN: The first order of business is approval of the proceedings.

Are there any additions, deletions or corrections to the proceedings? If so, please raise your hand. I see no hands up. Toni, please interject if I somehow miss somebody's hand. Without objection, the proceedings stand approved unanimously.

PUBLIC COMMENT

CHAIR BORDEN: Public Comment. On the issue of public comments, we always take public comments at our meeting; particularly at the start of a meeting.

We normally limit the opportunity to a minute or so, so that individuals can raise issues specifically on points that are not on the agenda. In other words, this is not the opportunity for someone to comment on issues that are being discussed on the agenda. If a member of the public would like to take the opportunity now, and discuss an issue that is not on the agenda, I'll recognize the individual. I've got two or three, so I can probably be a little bit more liberal. It looks like Dale Kirkendall, please.

MR. DALE KIRKENDALL: Yes, my comment that I wanted to bring up as we're going into the Addendum VII here is quantifiable science, especially on the recreational side. There have been several things recently that have been implemented that have not been given any quantifiable numbers to the recreational community on what the expected return would be on making changes, one of which is the circle hook.

The circle hook, I mean at last year's CE meetings the Technical Committee itself said that they could not quantify what that difference would be, and how much that savings would be. There are other things coming up, as far as temperature issues, where the number are not quantifiable, they are just feel-good, we think.

It does make a difference to the recreational fishermen, especially the charterboat captains, as to when we apply these things, especially in regards to temperature, because of the time of year and how it affects businesses and such. We need to get the system, as far as I can see, more on a science base, where we can say, this is what we expect to see.

Then we can evaluate on what we have seen, and then we can make changes to what needs to be done.

This is even more important as more and more today; people are becoming more efficient. The fishery ran into the buzz saw of recreational efficiency. That is what I see as the biggest problem with the stock itself.

We have fishermen out there that can actually take a picture of a fish 125 feet away from their boat on their sonar. We have 25 mile an hour radar on $70,000.00 skiffs, and the system is not addressing that. We need to address effort, but we're not addressing efficiency, and the combined between the two have to be the numbers that we chase with science.

More often, micromanaging feel-good items like temperature and circle hooks and moving inches, in the Chesapeake Bay we moved from an 18-inch fish to a 20-inch fish to a 19-inch fish, not taking into account that we just put more fish in harm's way. We just had a scientific number that we were chasing that we did not follow up on, that the state itself did not do any additional science on to prove.

I just wanted to take a moment to say that what's going on with the Maine issues is something more states need to do, so that we can have better science going to the Atlantic States Marine Fisheries, instead of an umbrella science, specific science that details what happens in each fishery. That's all I have to say.

CHAIR BORDEN: Thank you very much, I've got Desmond Kahn.

MR. DESMOND KAHN: For those who don't know me, I'm a past Chair of the Striped Bass Technical Committee, I'm a past President of the Northeastern Division of the American Fisheries Society; and I submitted a written comment, which is in your supplemental, talking about a historical inaccuracy in the recent stock assessment about the date when the Delaware River spawning stock was declared restored. It was not until 1998.

This brings up the problem with the current quota system for commercial quota of the striped bass management plan, because it's based on landings, commercial landings in the 1970s.

The Delaware River stock was basically almost extinct in the 1970s. Some biologists considered it extinct. We didn't have landings from the Delaware producer stock during that period, to speak of, and yet that is what our quota is based on.

This is not reasonable or fair, because the most recent peer reviewed estimate is that the Delaware River stock comprises between 15 and 20 percent of the total coastal assemblage. My last comment is about the inaccuracy and bias in the catch at age model estimates of fishing mortality, and the female spawning stock biomass.

I mention a paper in my comment that showed the aging bias, which the Technical Committee is well aware of. We conducted studies on it, we know it's significant. The aging bias using scales, produced a 20 percent underestimate of the spawning stock biomass, and it produced a 20 percent overestimate of the terminal year fishing mortality in this 2013 paper.

Yet this, since this is supposedly a science-based organization, the Atlantic States Marine Fisheries Commission. This peer reviewed scientific plan has been ignored by the Commission to my knowledge. I want to bring this issue up, and I hope the Board will adjust the issue of bias due to our bias scale ages. We're underestimating the older fish. Thank you very much.

CHAIR BORDEN: Thank you, Desmond. I've got Paul Haertel, please.

MR. PAUL HAERTEL: Yes, I'm not exactly sure what is on the agenda, but my name is Paul Haertel, and for most of my life I've been an avid striped bass fisherman. I would like to thank the Board for the opportunity to comment. I would like to go on record as supporting the position of the Jersey Coast Angler's Association, in regard to use of circle hooks, and the definition of natural bait when fishing for striped bass.

Defining natural baits as any living or dead organism, or parts thereof, would actually prohibit feathers and bucktails being tied to flies, jigs and teasers. I agree with JCAs simple definition that natural bait means any bait that in its live, preserved, or original form or parts thereof that would normally be consumed by striped bass.

This definition would allow pork rind, bucktails and feathers to be used, as stripers do not eat bird, deer, or pigs. Stripers do not normally eat things like horn or dough balls, like catfish do, so I don't believe there is a need to include plant life in this definition. I would like to go a step further though than from what JCA recommended.

I believe that there should be exceptions for rigged eels, eel skin plugs and tube and worm rigs, provided they are being used with lures such as tubes, jigs, pin or lead squids, squid heads or plugs, provided they are actively being trolled or cast and retrieved. I see no reason why there needs to be a study on tube and worm rigs.

Any average striper fisherman knows that these types of lures rarely, if ever, gut hook a striper. Please review mortality on stripers through use of circle hooks on baits that are normally swallowed, but please do not destroy our historical, traditional methods of fishing for them. Thank you.

CHAIR BORDEN: Thank you, Paul. I see no other hands up, so we're going to move on in the agenda.

TECHNICAL COMMITTEE REPORT ON RELEASE MORTALITY SENSITIVITY RUNS

CHAIR BORDEN: The next item that's scheduled is a TC Report, and I would just remind everybody that the October '20 meeting, the Board reviewed a TC report on release mortality, and how release mortality was calculated.

There were a lot of questions on the part of the Board. Following a review by the Board, the Board basically tasked the TC to explore the relative impact of different release mortality rates in estimate. We're going to receive a report by Kevin Sullivan from New Hampshire Fish and Wildlife. Kevin.

DR. KATIE DREW: Hi Mr. Chair, sorry, this is Katie Drew. Our TC Chair is having technical difficulties joining the webinar to speak, so I will be giving the presentation on the TCs behalf, as Maya flips through the slides. Thank you all for listening today. As the Chair said, we are following up on a task that was given to us at the October meeting, to conduct additional runs of the striped bass stock assessment model using different assumptions about the mortality rate, on fish released alive by the recreational fishery.

The intent of this was to explore the sensitivity of the model to this assumption, and see if it's affecting our perception of stock status or potential management actions, to kind of evaluate how important this factor is in the assessment. To do this the TC discussed a number of potential scenarios to explore.

We ended up deciding on four scenarios that made the best use of the available catch-at-age data. For each scenario we have to recalculate the total annual catch at age for each region, and by region we mean the bay versus the ocean, as it is defined within the stock assessment model. We recalculate the total annual catch at age for each region, using this new assumption about the release mortality rate for the recreational releases, and then rerun the model.

This produces new estimates of spawning stock biomass, recruitment, fishing mortality, et cetera, and we also recalculated the values of the SSB and F threshold for each scenario, so that we could evaluate stock status for each scenario based on its own internal reference points. For this analysis we looked at the base case, that is the value used in the previous assessment of 9 percent for all regions, all seasons, and all years, and compared that to four alternative scenarios that I'm outlining here.

We looked at a low release mortality rate scenario, where we assumed that 3 percent of all released alive

fish died across all regions, all seasons, and all years. This is kind of the best-case scenario. This value came from the best-case scenario in the Diodati and Richards Paper, and was consistent with some of the low values that we've seen in other studies.

On the flip side, we also looked at a high release mortality rate scenario of 26 percent for all regions and seasons, and this was considered sort of a worst-case scenario, based on the worst-case scenario results in the Diodati and Richards Paper, and some of the high-end values we've seen in other studies. These two are sort of bracketing our potential bias in the estimate of the release mortality of, what if it's not 9 percent, what if it's much higher or much lower? We also looked at two sort of finer scale scenarios, if you will. The first one being a seasonal release mortality rate, where we used a lower release mortality rate for warmer months, and a higher release mortality rate for colder months.

Sorry, reversed. Lower release mortality rates for colder months, and a higher release mortality rate for warmer months for both regions. We used 5 percent for January through June, and 12 percent for July through December for both regions. This was based on the regression tree analysis that we did for the 2013 Benchmark Assessment, and talked about briefly at the October meeting with you all.

The January to June and July to December split is based on the seasonal split that we had developed for the Two Stock Model, so that we already had the data broken down into these seasons, and did not have to recreate the catch at age for those seasons. We also looked at a regional release mortality rate of 16 percent for the Chesapeake Bay, and 9 percent for the ocean for all seasons and all years.

The 9 percent of course came from the Diodati and Richards Paper, which was based on ocean conditions, and the 16 percent for the Chesapeake Bay was calculated from different studies that were conducted in the Chesapeake Bay. These represent kind of the range of potential bias as well as some of the more fine-scale refinement to the overall estimate that the TC considers more realistic.

Quick snapshot of the results before I jump into some figures. Overall, the low and high release mortality rate assumptions had the biggest affect from the model estimates. The seasonal and regional scenarios were very similar to the base run. Stock status however, was the same across all of the scenarios.

What we're looking at here is female spawning stock biomass, and the legend is going to be the same in all of the figures that we're looking at, where the base case scenario, that 9 percent rate, is the solid black line, and then the different scenarios are in colored dashed lines. What you can see is that the high release scenario, the 26 percent rate, resulted in higher estimates of female SSB across the time series.

The low release rate resulted in lower estimates of female SSB across the time series, while the seasonal and regional scenarios ended up virtually identical to the base case. You can see that even though you have differences in scale between the low and high release mortality rate, you're really following the same overall trend across these different model runs.

This may seem a little counterintuitive, to say that a higher release mortality rate gives you more spawning stock biomass. But it's similar to what you see with changes to the natural mortality rate, where the higher release mortality rate gives you a higher total removal, and that means you need a higher population to support those removals. All we're changing here really is the total removals. We're changing the catch at age somewhat as well, but it really is a scaling factor, and we're not changing anything about the indices of abundance or the fishery independent age structure data that is going into these models. As a result, to see higher removals but the same population trend, you needed to have more fish to start with. With F you see a similar pattern that there are less differences across these different scenarios, and the high and low scenarios are still the outliers here, whereas the seasonal and regional scenarios are very close to the base case.

Overall, again, you're still tracking sort of that same trend, the same peak in fishing mortality, and the same modes in fishing mortality across all of the different scenarios. Again, with recruitment it's the same story. The high release rate gives you higher recruitment estimates, the low release rate gives you lower recruitment estimates.

You have to have more fish around in order to support that level of catch again, and those seasonal and regional differences are minor compared to the base case. We also looked at stock status. Even though you're seeing sort of a big change in scale, the question is, are you seeing a different stock status determination?

The answer is basically, no. You can see all of these scenarios end up in roughly the same place, that is overfished. You're below that line where your SSB equals your SSB threshold. You can see for the high release scenario, the trend is a little bit different than the other scenarios, that you become overfished sooner, but that you don't have as steep a decline in the most recent years. As a result, all of the scenarios are basically ending up in the same place at the end of this time series.

You see a similar result with the overfishing status of in the terminal year 2017, the stock was experiencing overfishing in all of the scenarios. Under the high release mortality scenarios, you are overfishing more, but all of them are above the F threshold. In conclusion, significant changes to the release mortality rate, the high and low release mortality rate scenarios, resulted in significant changes to the scale of the population, but did not affect the final stock status determination.

The stock was overfished and experiencing overfishing in 2017 in all scenarios. The seasonal and regional release mortality rates had minimal impact on the population scale and stock status. The TC feels that the seasonal and regional release mortality rate scenarios are sort of more accurate, or more likely to reflect what's going on, rather than a significant bias in the overall rate.

It's more likely that there are fine scale differences from across regions and seasons that are contributing to overall relatively minimal impact. A caveat with this conclusion is that the TC did not explore time varying release mortality rates, or different release rates for different sizes or ages of striped bass. We applied the same rate in all these scenarios across all years and across all size classes of striped bass in the catch.

If the release mortality rate has been increasing or decreasing over time, so for example increasing due to increasing warmer water temperatures, or decreasing due to changes in angler behavior, increased use of circle hooks, et cetera, or if the release mortality rate depends on the size of the fish, the results might be different, and you might see more differences in trend or stock status. We didn't have enough data to really parameterize this kind of a change at this point. As a result, we focused on the scenarios that we've already talked about. These are things that we would want to explore more for the benchmark in future work. Overall, refining the estimate of release mortality is not expected to have a significant effect on stock status from the assessment model. But the TC will work on this for the next benchmark assessment, and address a few of the things I just mentioned as caveats.

However, the TC does want to stress that reducing release mortality through management measures and angler education and outreach, is still important for the recovery of the stock. Even if we don't know for sure if we're going from 9 percent to 6 percent, or if we're going from 12 percent to 9 percent. The important thing is reducing the amount of mortality that is coming from those live releases. With that I will take questions. Thank you, Mr. Chair.

CHAIR BORDEN: Thank you, Dr. Drew, for filling in, excellent job. I've got Justin Davis with his hand up. We're going to take Board questions first.

DR. JUSTIN DAVIS: Thank you, Katie, for that presentation, really interesting results. Thanks to all

the people who worked on that. I thought it was important that last bullet in there, to make the point that even though these analyses suggest that now had we used a different estimate of release mortality in the modeling that was done, we wouldn't have ended up with a different picture of where the stock is at right now, or the actions we would have to take, according to the FMP.

But it doesn't mean that working towards improving release mortality couldn't have some benefit. I wonder if you would agree with the idea that, in particular, if release mortality is higher than we actually think it is right now, it's higher than that 9 percent number. That that means the stock is more productive than the current modeling is projecting, and that therefore we're able to bring down that release mortality through things like use of circle hooks and better practices.

There is real scope for improvement there, particularly if release mortality really is much higher than 9 percent. Whereas, we think 9 percent is sort of accurate, or release mortality is even a little lower. There is just really not much scope for improvement there. How much can you really bring it down, it's really 6 or 7 percent. You know, we can't get it down to 0 percent. But then if release mortality is much higher than 9 percent, it really suggests the stock is more productive, and there are some gains to be made there, if that makes sense.

DR. DREW: Yes, I think that's overall a correct assumption about kind of the results of this. The importance of the release mortality rates in the overall mortality that the stock is experiencing. You know from the model's perspective it maybe doesn't necessarily matter that much, but it definitely matters for a management response, and kind of the lever that you can pull on for getting a result out of rebuilding the stock.

CHAIR BORDEN: I've got John McMurray.

MR. JOHN G. McMURRAY: I want to be clear that I'm understanding the takeaway here. Of course, reducing discard mortality is still a goal. It's something that we need to do through education and management measures. But if I'm understanding correctly, with more precise estimation of release mortality rates, there is minimal impacts on SSB, F, recruitment, stock status. From a management perspective going up or down from that 9 percent estimate, well it's not really relevant in this case. Is that a correct assessment, or am I off the mark here?

DR. DREW: I would say, I think it depends a little bit on maybe the question that you're trying to answer. Are we going to spend a ton of time and money on developing say a coastwide study to get a refined, accurate estimate of release mortality that is region, season, size specific? Is that going to improve the estimates of coming out of the stock assessment, and is that going to be worth the money, from that angle?

The suggestion seems to be there may be other places that you could spend your money on, in terms of getting a better stock assessment. But, in terms of, I think, understanding the impact of regulations and the impact of management decision, that when it might become more valuable to understand things like, what is the prevalence of circle hooks used within the fishery right now, and how does that change with new management?

There is still, I think, which could benefit I think the question that Justin had brought up, of is putting a circle hook requirement in actually going to benefit the stock in any measurable way. One way you could find that out is to put it in and wait five years and see what happens to the stock. Do we see an improvement, or can we look at collecting data on fishing behavior and fishing practices to address this question more thoroughly?

I would say, you know you can get sort of targeted benefits from additional research that may help answer the management question. But it seems as though it's not going to provide a significant change to the overall model performance in the past, compared to where we're going in the future.

MR. McMURRAY: That was a very comprehensive answer. Thank you.

CHAIR BORDEN: All right, the next person I have on the list, Board member, is Emerson Hasbrouck. I've got a couple of hands up in the public, and depending upon how many more Board representatives want to speak, I may take a question or two from the public. Emerson.

MR. EMERSON C. HASBROUCK: Thank you, Katie, for your presentation. I had a question, in a way somewhat similar to the one that John McMurray raised, and Katie your response to that helped to clarify things. It also helped to clarify my question; I think. I don't know how the parameters are set in your model, and how they relate to each other, and which ones are our main effects.

But would it be accurate to say that the fact that the sheer number of discards is what's driving this, because you know if you change the discard mortality rate, it doesn't really change the outcome. Again, is that because the influence of the numbers of fish being discarded just overrides everything else?

DR. DREW: I think that is part of it. You know even the discards at 9 percent are still a significant. But they are a significant component, and historically they've been a significant component. But it's not the only thing driving it. I think the other issue is that you do have information from other sources that are providing information on trends and age structure.

With this kind of tweaking the scale of the population, which is what we're doing with the removals and the recreational release rate, doesn't affect the other sources of information on trend and on age structure. The model has to kind of balance all of that out, and that is why you don't see as much of an impact with simply scaling the population up and down.

As I said, I think earlier, you know the question of has this been changing over time, or is this affecting different size and age classes disproportionately, might give you a different answer. That is something we can certainly look at for the next benchmark assessment. But I think it's more, the release mortality rate as it is now is scaling the population, and it's getting information on trend and age structure from multiple other sources that aren't affected by this analysis.

CHAIR BORDEN: I've got Tom Fote and then Mike Luisi.

MR. THOMAS P. FOTE: I think this reminds me of the conversation I had about 20 years ago, when we basically reduced hook and release mortality on summer flounder. We went from 25 percent down to; I think it is 12 percent or 10 percent. I turned around to Mark Desoto and Bruce Freeman and said, well that means there is going to be more fish to harvest next year.

Mark and Bruce said, no it doesn't, because it doesn't really show there are more fish, there could be less fish out there, and why the mortality is different. After about an hour at lunch, the two of them explaining in a four-hour trip home from DC to New Jersey, Bruce and Mark finally convinced me of what was going on, and that's the way the model is working. It really doesn't do things immediately, but it takes four or five years to see the results of changing the hook and release mortality. Do I have that right?

DR. DREW: I would say right, are you changing it within the model? Is this a number that you're tweaking up and down, or is this something you're actually changing in practice? If you can find a way to reduce that hooking mortality in practice, then that will eventually provide benefits to the population, and you should see that down the road.

If you're not changing, if you're just changing your assumption, all you see is what we see here, which is this scaling factor of, you're taking that population trend you see from the indices and scaling it up or down by a bigger or lower number, based on our assumptions about release mortality.

CHAIR BORDEN: Mike Luisi.

MR. MICHAEL LUISI: I'll say that I'm struggling a little bit with the results of this analysis. I'm trying to figure out why the spawning stock biomass isn't affected by these different mortality rates. I understand the scaling issues. If model work, and you know the Technical Committee did a great job in putting together the report. I want to make sure that the Board does not lose sight of the importance of discard mortality, you know in moving forward. While changing the rate may not have an effect in the model, as to what the spawning stock biomass is, I just want to make sure that it's something that we keep as a priority in our discussions and decisions through Amendment 7.

CHAIR BORDEN: Are there any other Board members that have their hand up, Toni that you can see? I don't see any. If not, I'll take two questions from members of the public. Joshua McGilly, please?

MR. JOSHUA McGILLY: Thank you, Dr. Drew, for inviting me again. This is a question, kind of completely off topic from the micro discussions we've had during our own one-on-one meetings. But with the idea of the circle hooks, are there other ideas in the works for anglers to be able to decrease natural mortality? You brought up ideas that if the anglers are doing things to decrease release mortality.

Are you guys thinking of other ways, or setting up other kind of outreach programs to bring up other ideas that anglers can lower release mortality, kind of like better use of weighing of larger fish that are going to be released, proper management with taking photos, things like that? I don't know if there is kind of any ideas that you guys have, or events that you guys are going to kind of develop, to push those ideas kind of like the circle hook?

DR. DREW: Thanks, Joshua. Yes, I think this will tie into probably the discussion that the Board has about the PID coming up, in terms of getting feedback. I think at this point we're looking for feedback from the public. Actually, I would say on the PID discussion from the Board, from the angling public, et cetera.

As we send this out of what are things that we can do to improve education and outreach at the state level, at the ASMFC level, to address this specific question, in terms of you know circle hooks are one option, better release techniques and education are another. Are there other options for reducing release mortality through angler behavior?

I think there are definitely things we can pursue from an education standpoint? But we will also be looking through the PID process for public input on this as well. I think at this point we're more looking for input on this coming up. But that's something I think the Board can talk about during the PID discussion itself.

MR. McGILLY: Thank you so much.

CHAIR BORDEN: I'm going to go back to the Board. Are there any other Board members that want to speak that haven't had the opportunity to ask a question of Katie? If not, I think this concludes this report, and I would like to thank Dr. Drew and Kevin Sullivan, and the members of the Committee that worked on this. I think it's an excellent piece of work, and it will aid our deliberations in the future.

I would also like to point out, I know that we have, in fact almost 280 members of both the Commission and public listening to this discussion at this point, and I know that there are probably a lot of you that are listening to it that want to have input on these types of issues. The next item on the agenda is going to be talking about the PID process, and if that gets authorized, there will be public meetings up and down the coast, where all of you can attend and raise all of these types of concerns that you might have about different techniques and different results, and what happens if we do one thing versus another.

There is going to be a fairly elaborate process of public input that we'll follow, based on the PID. Without any other hands up, Toni, I see none.

CHAIR BORDEN: We're going to move on to the next agenda item, which is also Dr. Drew, which is the Stock Assessment Update and the Timing of the Assessment**.** Dr. Drew.

STOCK ASSESSMENT UPDATE AND TIMING OF THE ASSESSMENT

DR. DREW: This should be a fairly quick item. But basically, as you may or may not know, striped bass was scheduled to have an assessment update in 2021, which would give us a terminal year of 2020. However, given the uncertainty in the 2020 data, as a result of the current ongoing pandemic, the TC recommends postponing the assessment update until 2022, to give us a terminal year of 2021.

The reasons for this are, number one, the uncertainty in the data collection, especially on the recreational data collection, but also commercial and fishery independent data collection that has been impacted by the COVID-19 situation, is going to result in a very uncertain estimate of SSB and fishing mortality, and stock status determination in 2020.

Having an extra year of better data collection is going to give us a better estimate of stock status to base management off of in that final year. It will also give us more years under the new management measures. Obviously, we had new measures implemented in 2020, and for the Board to evaluate whether those new management measures are doing what they were intended to do.

I think we need to have more data on whether any changes we see in catch are a result of the new management measures, or if they are a result of the pandemic. The TC recommends, and ASC agreed when we ran this by them that the assessment update should be postponed for a year to give us a better result.

CHAIR BORDEN: Toni, a question to you. Does this require Board action, or where are we, in terms of what is required at this point?

MS. TONI KERNS: It doesn't require Board action; it would be a recommendation to the Policy Board to adjust the schedule. The Policy Board is the board that takes action on the assessment schedule itself. It could be a consensus of the Board to make that recommendation to the Policy Board, but we can also take questions on implications of moving this assessment, or any questions related to it.

CHAIR BORDEN: Okay, so let me go back to the Board and take questions or comments. You can do both at this point. I've got Ritchie White.

MR. G. RITCHIE WHITE: A question for Katie. The update would be, the assessment would be schedule for 2022. What would the timing be? When would the assessment be complete, when would the report come to the Commission? Would that be at the end of 2022, or early 2023? I'm just thinking about timing, if there are any actions that need to be taken when that process would start.

DR. DREW: Yes, so the intention would be that we would have the assessment report ready to go to the Board for the annual meeting in 2022 that would reflect a terminal year of 2021.

CHAIR BORDEN: Mike Luisi.

MR. LUISI: Thanks, Katie, for your presentation. If you can let me know, or let us all know, so this is a management track assessment. This would not be the benchmark assessment. Does a delay to 2022, does that postpone the benchmark another year, or is the benchmark still on the same schedule?

DR. DREW: You're correct, this is a management track, if you will, if you want to use the Council's terminology, so it is only an update. We will not be making any changes to the model, and it should not postpone the benchmark in any way. The focus of the benchmark will be on improving and adjusting the assessment model itself, and doing any update in between should not impact that timeline at all.

MR. LUISI: Yes, thanks, Katie. Do you have the date right now as to when the next benchmark is scheduled? I thought it was, is it 2025 still?

DR. DREW: I don't believe we have formally schedule it. Usually it goes through the SAW/SARC process, so I don't believe we have formally schedule it. But five years out would be 2024, and I think this is one where I think it will depend a little bit on how model development goes, that we want to put time and effort into the two-stock model. The current model there is no real benefit to taking that single-stock model to peer review, and so I think the focus is going to be on when the two-stock model will be ready for peer review again.

MR. LUISI: Understood, thank you very much.

CHAIR BORDEN: Toni, have we got any other Board members that want to speak on this?

MS. KERNS: Yes, you have Dave Sikorski, Dennis Abbot, Max Appelman, Jason McNamee, and John McMurray.

CHAIR BORDEN: All right, somehow, I'm not scrolling up to the top.

MS. KERNS: Then you have a couple members of the public.

CHAIR BORDEN: I'll take John McMurray, please.

MR. McMURRAY: I don't mean to be a fly in the ointment here, but I'm asking this because I've gotten more than one inquiry from the public. Is there any real benefit to postponing movement on Amendment 7 until we have this stock assessment update, which presumably will happen at the end of 2022?

DR. DREW: I think that is a question of ISFMP/The Board.

CHAIR BORDEN: Toni.

MS. KERNS: Thanks, Katie. I mean I think that's a Board decision. I think that you have a lot of information in the last assessment. It will still take a while to work through this document and make changes, or consider changes to the management program. I guess it depends on what type of information you want to see.

But you'll see the same kind of information coming out of an updated assessment. You know the results could or could not change, but we know the stock is overfished, and the Amendment is looking at those long-term changes to address the overfished status versus the overfishing, which is what the previous addendum was to address.

MR. McMURRAY: Okay, so just to be a little more specific. Knowing what sort of affect the slot limit is having on F or even on effort. I mean how could that benefit us in the development of Amendment 7? I'm not sure if that is a technical question or not, but I think it is answerable.

MS. KERNS: John, I think I'll try to answer it again, and Katie, if you have anything different you want to add, please do. I think that the Board has said that they want to address some longstanding issues that they believe should be addressed through an amendment process.

The overfishing status may or may not have some influence on decision making for some of those issues, but I think there are several issues in this document that the overfishing status would not weigh in on decisions for. I can't read into the minds of each Board member about what is impacting your decision-making status to know that for sure.

MR. McMURRAY: Okay, thank you.

CHAIR BORDEN: Next on the list I've got Max Appelman, please. Max, welcome back.

MR. MAX APPELMAN: Hello, Mr. Chair, thank you. Yes, just a quick question, and I don't know, Katie, if you can shed any light at this point that the same data concerns in 2020 that we have with COVID, that that might happen again with 2021 data. I'm just curious if

there is any potential that we might find ourselves scratching our heads about delaying this update even further, at this time next year.

DR. DREW: If we've learned anything from 2020, it's that nobody has any idea what's coming next with this pandemic. For sure, there is certainly the possibility that if APAIS and the states aren't able to get back into the field for a full year again, that we're going to be in a similar situation. In which case, we would probably come back to you at the end of this year and say, here is where we are. We're going to have crappy data for two years now. Is it more important to the Board to have an estimate of stock status that is very uncertain for two years, or is it more important to continue what you're doing and just wait until we can have better data, before you make any management decision? I think certainly our hope, and we're going forward with the idea that 2021 will be better data. But we can't promise that, and we may have to have this discussion again at the end of this year.

CHAIR BORDEN: Next I have David Sikorski. David.

MR. DAVID SIKORSKI: Excuse me, David, Dennis Abbott here.

CHAIR BORDEN: I'll come back to you, Dennis.

MR. DENNIS ABBOTT: I think this is supposed to be a Board discussion at this point, and not going to the public and back and forth, and my name was on with John McMurray and the like.

MS. KERNS: Dennis, Dave Sikorski is a Board member from Maryland, just as an FYI.

CHAIR BORDEN: Thank you, Toni. David, you're up.

MR. DAVID SIKORSKI: Thank you for clarifying. I have joined the Board as a legislative ongoing proxy to this meeting, and moving forward. I appreciate the time to ask a question here. This is for Dr. Drew. If I remember correctly, in following the ERP work for the menhaden assessment. I feel like the menhaden and striped bass assessments were linked from a timeline perspective. Does this unlink them, and does that affect anything moving forward?

DR. DREW: Good question. It's more important to have the benchmark assessment, I think linked up from the ERP perspective, to ensure that as the ERPs go forward, we're using the best available benchmark assessments for those. The menhaden assessment will line up.

I think we're still in the process of discussing whether we will make changes to the ERP assessment, in light of new assessments from striped bass or other species, or whether we will focus purely on the menhaden assessment, and keep the ERPs static for the assessment update. But I think we've sort of looked at the timeline, and there is still the potential to incorporate some of that striped bass data into the ERP assessment update, if we decide to go down that path.

CHAIR BORDEN: Next, let's see, I have Mike Luisi. Mike.

MR. LUISI: Sorry, Mr. Chairman, my hand was raised from before, I can put it down.

CHAIR BORDEN: Toni, go back to the list. Do you have any other Board members? Did Dennis Abbott want to speak?

MS. KERNS: Yes, you have Dennis and then Jason McNamee.

MR. ABBOTT: I did, but I don't want to speak now, thank you.

CHAIR BORDEN: Jason McNamee, please.

DR. JASON McNAMEE: I generally just wanted to voice support for, and thanks Dr. Drew and also thanks to the Technical Committee for thinking through this a bit. Generally supportive of this. This would really would be kind of a waste of time to stick to the

current schedule, given these issues with the data. I think what you've proposed here is a great idea.

Also, thanks to David Sikorski. I hadn't thought about that angle on this. But I appreciated your comments on that. Dr. Drew, it sounds like everything should work out, as long as we don't run into the situation that Max brought up, where we get bumped another year. But let's just roll forward with a good plan, and see where we end up.

CHAIR BORDEN: All right, let me ask one more time. Are there any other Board members that want to speak? I'm not seeing any hands. I've got a couple of members of the public that want to.

MR. FOTE: My hand is raised, Dave, Tom Fote.

CHAIR BORDEN: Tom Fote, sorry, Tom.

MR. FOTE: The reason I think we should postpone is because I'm hoping by the time we actually do the public hearings on the final amendment, not the information then, but when we say we probably do this, that we're able to have in-person meetings, so people from New Jersey can actually show up to a hearing, get the presentation in person, and actually give us the feedback in person, because again, some people don't like talking over microphones, they don't know how to basically handle it, and I'm hoping for those in-person meetings.

CHAIR BORDEN: There is one other hand of a Board representative that went up, Kurt Blanchard from Rhode Island, who is our enforcement representative. Kurt.

MR. KURT BLANCHARD: Hi David, I did not have my hand raised, I apologize for that. I did notice it was up earlier in the discussion, and I dropped it.

CHAIR BORDEN: Thank you very much. I'm going to go back to the members of the audience. Toni, I've only got, I don't know whether I'm having a technical issue or not, but I've only got Dale Kirkendall on the list for speakers. Do you have anybody else?

MS. KERNS: That is all I have as well. I don't know if folks all of a sudden put their hands down, but a bunch of hands went down, so there could have been a glitch in the system. If there is another member of the public that had their hand up before, please let us know. Just to remind everybody, your hand is up if the hand icon has the red arrow pointing down. That means your hand is up. Now we have Dale Kirkendall, and I'm so sorry that I'm not going to say this name correctly. I think it's Chouaib HiHi, I apologize.

CHAIR BORDEN: Okay, so I think what we'll do is, Chouaib, would you like to comment, please, and try to keep it brief, a minute or two, if you would please.

MR. CHOUAIB HiHI: Yes, hi. I just have a request, it's not a comment. The material of the research papers that have been used to produce presentations. If you guys could share them that would be great. Thank you.

CHAIR BORDEN: Next on the list I have Dale Kirkendall.

MR. KIRKENDALL: Yes, I just had a quick, I guess question or comment too. In regards to moving the date from 2021 to 2022. To me it does seem appropriate, because of the COVID issues. But additionally, is there going to be any change to the assessment to quantify the management changes that have been applied?

I mean we used this to say, hey we're doing good or doing bad. Will there be any change in the data that's collected, or data that's presented, specifically on the measures like circle hooks and such, and sizes of fish? From the last presentation on what you call the dead loss. The person was very clear in the conclusion that the percent of dead loss is not taking into account for which fish we're killing.

That is one of the reasons I brought up earlier. We have to have better data on which fish we're killing. Slot limits mean we target certain fish and we kill certain fish, as well as in the Bay. Raising slot limits or raising this by an inch or two, and having all one year class being decimated, needs to be addressed in the data.

DR. DREW: Sure, so first of all I will say we do have some information on which sizes are being killed, so we do collect information on which sizes are being released, and which sizes are being harvested. Obviously, the data on which sizes are being released is more limited than the data on which sizes are being brought back to the dock and can be measured.

But we do have information on that, and you can see that more younger, smaller fish are released alive than compared to the size structure of the fish that are harvested. We do have some of that information, and we will continue to collect that and use that in the assessment. However, we don't have good information on how many of the big fish that are released alive die, versus how many of the smaller fish.

There is some evidence that suggests big fish are more likely to die after being caught and released, but the data on that are limited, so we'll just apply that 9 percent to every size of fish that was caught. But we do have information on what sizes are being caught versus what sizes are being released, and that will be incorporated into the next assessment update. We will look at the data that we have to see if, we can see a change in the size frequency of what's been harvested versus what's been released alive.

You know, we may make a small tweak to the model to have a different selectivity block for these two new year's, to say is the fishery interacting with these fish in a different way than they were in the past, due to the new slot limit. I think with only two years of data, and where we know at least one of those years has not had great data collection, I can't guarantee that we're going to see a strong impact of these regulations at this point in time with this assessment update. We'll check in, and we'll see how things are going. We may need to add more years of data to get a better answer after that. But the intent is definitely to evaluate how well we've done, in terms of meeting our percent reduction, and whether that has an impact on the size structure of fish that are being harvested or being released.

MR. KIRKENDALL: I understand that. My point was more directed at, will there be science causing people to catch a certain fish intact, the number of other fish we have to go through to get to that legitimate fish. You have people that want to play with fish and you have people that want to keep fish. When we change sizes, we change the effort on other fish.

CHAIR BORDEN: Katie, follow.

DR. DREW: Yes, we would love to know that. To a certain extent, you know our data collection is limited. I think some of the things we can look at are the number of fish that are released versus the number of fish that are kept now, versus prior to the regulation change.

I think it can be hard to have to separate out the effects of that management change, compared to changes in effort, and changes in the availability of fish coming through. I think it is something that we need better data collection on, and I think we'll see what we can do with the data that we have, but it's certainly something that we try to consider when we are looking at these data overall.

CHAIR BORDEN: The last person I have on the list is Ryan Conceicao, if I have the pronunciation correct, and if not, I apologize.

MR. RYAN CONCEICAO: Hi, I just have a question in terms of, you know we're talking about postponement and pushing off due to, essentially numbers that we don't know, just because we don't think that again, stock status is accurate at this point. Looking at the spawning numbers of this year, I mean shouldn't

those numbers alone tell us what's going on with this population right now? Clearly, it's declining.

I mean the spawning status alone should be a very clear indication of what lies ahead for the future. I mean again, stock status at the moment, while we don't have immediate numbers. The spawning status is going to tell us what's happening in the future. Again, are we taking those numbers into consideration?

CHAIR BORDEN: Katie.

DR. DREW: Right, so I would say, I think there are two questions that the Board has been wrestling with, with this particular topic, and number one is, do we push the stock assessment update off into the future to get a better idea of what's happening in 2020 and 2021, which the TC recommends?

Then the second question is, do we push management action or Amendment 7 off into the future, until we can have an update on the assessment itself. The TC does not have an opinion on what the Board should do with that. I think that is, as Toni was saying, you know is another two years of stock status information really going to change what the Board wants to do with the options or the Amendment that it is considering? That I think is the question that the Board should wrestle with. You know from the scientific perspective, doing an update this year is not going to get you better information. Whereas, I think from a Board perspective, do you take management action on where we are now, based on the recent assessment is up to the Board.

CHAIR BORDEN: In terms of this issue, essentially, you've got a recommendation. Are there any Board members that disagree with this recommendation, and if so, raise your hand, and I'll call on you and you can say why you disagree? If not, I would just suggest that in the absence of individuals objecting to this, we simply forward this by consensus to the Policy Board. Any hands up, Toni?

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

CHAIR BORDEN: All right, I'm just going to note that by consensus we're going to forward this recommendation to the Policy Board for consideration and action. Any objections? No objections.

CONSIDER DRAFT AMENDMENT 7 PUBLIC INFORMATION DOCUMENT FOR PUBLIC COMMENT

CHAIR BORDEN: The next item on the agenda. Let me actually go off script here for a minute, and just say it is wonderful to have this many members of the public participating in this dialogue today.

We have literally, about 260 members of the public who are listening to this. I would like to just take two seconds before I speak to the Board, and talk about what we're going to take up next, which is the Draft Amendment 7 Public Hearing Document. I'm sure a lot of you have been around the process for a number of years and are familiar with this.

But if you're not, just for your own edification, a public information document is a document that goes out to the public with generally a range of very generalized issues that are designed to promote discussion and dialogue by the public. It is specifically designed to get public input, comments, and criticisms, whatever you like on certain concepts.

What we're about to talk about today with the Board is we've had a public information document that has been drafted, and I'm hopeful that at the conclusion of this meeting it's authorized for public hearing. When the hearings come, that is an opportunity for the public to actually bring forth any ideas they want.

The Board will have included a number of ideas as talking points, to stimulate discussion on the part of the public. But the public is not constrained to do that. If you are a member of the public, and you have different ideas about the way things should go, what data we should be using, what models we should be

using and so forth. This is a perfect opportunity for you to go and participate in a dialogue.

This is the mechanism to use, and I would point out it's the first step in the process. This is designed to get public input at the first stage in the development of an actual amendment, so it's really important for the members of the public to understand that, and attend these virtual meetings that will be scheduled. I'm going to go back to the Board and just outline a little bit of background on this. The Board initiated development of Amendment 7 to consider addressing a number of important issues and concerns involving striped bass management, including overfishing. The last time we did an amendment on striped bass was 2003, I believe. Staff can correct me if that is the wrong date. In essence, it's been a long time since we did a formal amendment. The first step in the process that we've been following, was to appoint a working group that prepared a very comprehensive list of issues to discuss.

Marty Gary and Megan Ware were the two co-chairs of that subcommittee, and did a really excellent job with the other members of the subcommittee, bringing forth a wide range of ideas to be discussed with the public. Following a presentation by Marty and Megan, the Board basically tasked the Plan Development Team to develop a draft PID.

The Board then reviewed the first draft of the PID at their October meeting, and offered a number of edits, all of which I think have been incorporated into the draft. In addition to that, we also allowed members of the Board to offer additional comments, suggestions, in regard to the edits, and at that point in the timing of all this, many of you brought forth additional ideas that you wanted integrated into the PID.

Then the final way that we've involved the Board is two weeks ago Toni sent an e-mail to all Board members, asking for any additional suggestions and improvements. She basically requested that you do so prior to the meeting. My point in recounting all of that is that we have had probably six months of discussion on this PID, and numerous opportunities for the Board to perfect the language in the PID, and identify issues that are critically important for development with the public discussion.

In my view, we're at the point where we need to approve this document and send it out for public hearing. I would like to remind everyone, including the Board members that a PID does not commit the Commission to adopt any particular strategy. It's a discussion document. We're trying to get the input of the public on this issue. The first thing I'm going to ask is, are there any members of the Board that would like to raise an issue that they think is critically important to add to this PID? If you do, then I would ask you to raise your hand. Any hands up, Toni?

MS. KERNS: I don't see any hands up, David.

CHAIR BORDEN: Okay, so I asked, given all the work that the staff has done with the members of the Commission, I anticipated this and asked the staff to prepare a draft motion, which I would like them to put up on the Board.

MS. KERNS: David, before you do that, I just wanted to note that there was one change that I made to the document that the Board did not see that was reflected in an e-mail that came back to me. I did have one person get back to me. I think it would be at least important for people to see that change. It's not a significant change, but I still feel it would be necessary to do that before we considered action on the document.

CHAIR BORDEN: Go ahead, Toni.

MS. KERNS: I had prepared a presentation to go over all the changes in the document, but I won't do that in full. But Maya, if you could do me a favor and go to Slide 5. Thank you, and it's the second small paragraph here that the language that is on Page 8 of the document. This language is to reflect the SSB target may be achievable, if fishing mortality is significantly reduced.

But it may go against other things that the Board is trying to achieve in the fishery regarding performance and economics. This language was tweaked just a little from what went out to the Board, and was on the meeting materials. I just wanted people to see that before making any considerations today.

CHAIR BORDEN: Any comments from Board members. I'm not seeing any hands up. Toby Frey is the only one with a hand up. Toby, do you want to comment on that?

MR. TOBY FREY: It seems like to me, whenever we try to work with Mother Nature, and either curb or increase populations, we're doing it with females. I still don't understand why we haven't addressed what we call the trophy season, which if a fish is over 32 inches it's 99 percent a female. It seems like to me that until we start addressing preserving the females, we're not going to make any headway on this whole subject.

MS. KERNS: Thanks, Toby, for that comment, and that is the kind of thing that we will want to definitely hear from you, if this document does get approved for public comment when we do public hearings. Much appreciate it.

CHAIR BORDEN: Thanks Toby, and Toni, could you put up the draft motion, please?

MS. KERNS: I can, and Maya will do that. I just wanted to let you know that John McMurray has his hand up.

CHAIR BORDEN: John.

MR. McMURRAY: Again, I don't want to be a fly in the ointment here. The slide that's up there now does not really make any sense to me. I mean is there anything in the benchmark assessment or in the data that I may have missed, that suggests that if we reduce or if we reduced to F target that SSB target couldn't be reached? This is speculation, it's not based on science. It seems to me to be editorial in nature, and shouldn't be in the document at all.

CHAIR BORDEN: Toni.

MS. KERNS: I'm going to go to, I think the two Board members that asked for these edits, if that's all right. Those two Board members, I believe were Megan Ware, and if I remember correctly from the original was John Clark, and both of them have their hands up, if that is all right, Mr. Chairman.

CHAIR BORDEN: All right, I'm going to recognize John Clark. John, we haven't heard from you today.

MR. JOHN CLARK: Yes, this was Delaware made the request. It is pretty widely accepted that the stock was at an all-time high level during the early 2000s. This led to the huge changes in other fisheries within Delaware Bay. As was pointed out earlier in the public comments by Dr. Kahn, the Delaware went from not producing striped bass to being a striped bass production dynamo, and responsible for upwards of 20 percent of the coastal stock, and yet we have a huge resident population now in the Bay.

As I said, that was still not hitting the SSB target. You can talk to anybody that saw the Bay during those years. I just think these, and not just me, but I think it's pretty well accepted in our area that to reach some of these target levels, would just mean there would be nothing in Delaware Bay except for striped bass, and they would probably be emaciated at that, because the population would have to be so high.

CHAIR BORDEN: Thanks John, Megan Ware.

MS. MEGAN WARE: John, I was the one who suggested an edit to this. Just for clarification, the sentence originally stopped after the word unattainable, so it said the current reference points may be unattainable. I think maybe I'm in line with your comment. I felt a little uncomfortable with that sentence, given that it also talks about, you know we've been overfishing for such a long time, so I suggested the end language there.

But something about the fact of fishery performance, because I don't know what would happen if we dropped that. But I also understand that different states have different priorities, and there are different objectives we're trying to meet. I just tried to qualify that sentence, so it addressed that concern of mine, which it sounds like maybe was the same as yours.

CHAIR BORDEN: John, do you want to follow?

MR. McMURRAY: Yes, thank you, and thank you for that, Megan. It is helpful, but that passage is still very misleading. It makes the public think that you referenced the spawning stock biomass, the target is not attainable, and that's not true. It's clearly intentional that it's in there. Let the record show I don't think it's appropriate, and I would like to have it taken out. But if there is not Board support there is nothing I can do, clearly.

CHAIR BORDEN: All right, any suggestions for process, in terms of how we deal with that issue? Do people want to let the parties that are concerned about that consult, and revise the language, or do you want to deal with it at this point? Any guidance from anyone? I've still got John McMurray and John Clark with your hands up. Emerson Hasbrouck.

MS. KERNS: I think John Clark wanted to respond, Mr. Chair.

MR. CLARK: Yes, Mr. Chair, I just want to say that if we're going to start looking at things, there are other revisions in this document that we're not wild about either. But in the spirit of compromise, you know we figure we would leave things in there. But if we're going to start picking this apart point by point, then this is going to be an extremely long meeting.

CHAIR BORDEN: The last thing I want to do, John, is pick this document apart. We've gone over it for six months in various meetings and discussions. It's time to get it out to the public. Let me suggest that we just deal with the motion, and if somebody wants to perfect the motion to deal with this issue, then they have the ability to do that. Does anyone care to make this motion?

MS. KERNS: You have Tom Fote with his hand up.

CHAIR BORDEN: Tom, are you making the motion?

MR. FOTE: Yes, I'll make the motion, then I would like to say why I'm making the motion, and I think we should go with this.

CHAIR BORDEN: Wait, do I have a second.

MS. KERNS: Marty Gary.

CHAIR BORDEN: Marty is making the second, back to Tom Fote. Tom.

MR. FOTE: Yes, there are things in this document I don't agree with. I have a difference of opinion with John McMurray on a lot of things. But we're going out to the public with this. We've worked on it for a long time. There are things in it that we are all not going to agree on, sitting around the Commission, and the public is not going to agree on it. The purpose of this is to go out and find out what the public feels about these issues, and let them comment. I would support not making any changes at this point, because we've basically beat this to death.

CHAIR BORDEN: Marty, do you want to comment on it as the seconder?

MR. MARTIN GARY: No, I concur with both Tom and John. We've had a pretty rigorous process, dating back as you pointed out to the workgroup. I would have thought maybe we would have heard this concern a little bit before now. But I haven't heard it, and I think we have an opportunity to get this out to the public and have that discussion. If there are concerns about that we'll address it then and there, so thank you.

CHAIR BORDEN: Anyone else on the Board? If not, does anyone object to the motion? Do we have any objections, Toni?

MS. KERNS: I don't see any hands raised from the Board. You have a member of the public.

CHAIR BORDEN: Okay, so by consensus this is approved. What I'm going to do, since we've been at it for quite a while. I'm going to take a five-minute break, and come back. Toni will post the time, I think it's 3:16. Everybody can get up and stretch your legs, and then we'll come back and deal with the circle hook issue.

MS. KERNS: We'll get that posted for you, David, thank you.

(Whereupon a five-minute break was taken.)

DISCUSS CIRCLE HOOK IMPLEMENTATION

CHAIR BORDEN: Let's reconvene. The next item we're going to take up is the issue of circle hooks, and tube and worm. I think as certainly most of the Board, and I think industry, recognize this issue has gotten a lot more complicated since we last discussed the issue. In terms of process, what I'm going to have take place is, for Toni to provide us with a background on the issue, what was proposed and what has been received by the Commission, in terms of correspondence and requests.

Following that we're going to allow Board members to ask questions on it. Then I would ask individuals to hold off on making any motions, and then following that we'll get a second presentation by the state of Maine. Megan Ware in particular will give a presentation on what they have proposed and why. Then following that we'll take general comments and questions, in terms of process, and then we'll get into motions. Toni, do you want to start?

MS. KERNS: Sounds great, thanks, David. I don't have a presentation, just a quick overview here. After the last Board meeting there were a couple of states that asked for exemptions to the circle hook requirement. Some of those exemptions were for a tube and worm jig. Those exemptions did not pass for the Board approval, and so the Board approved no exemptions to the circle hook requirement.

Implementation of the circle hook requirement was the beginning of this year. We received a letter from Representatives of 11 for-hire angler groups, and the associations that represented them. It asked the Board to reconsider the elimination of all exemptions for circle hooks, and this letter is seeking an exemption for trolling with a tube and worm rig and jig with a J hook.

While the letter goes on to state that while they are fully supportive of the circle hook provision, the nature in which the tube and worm rig is fished will not gut hook a fish, and it's a reliable method to reduce release mortality, because the fish is hooked in the jaw. The letter also states that circle hooks are not effective with this type of rig, and this type of rig is really important to the industry to bring young anglers into the fishery, because it is a simple method of fishing.

The letter also states and describes the negative economic impacts that could occur without the exemption. In this letter they also ask for an exemption of jigs, those with the led head style that are dressed with natural or synthetic hair to be exempt, as long as the jig has a single hook, providing from the end portion where the bait may be attached. Lastly, the letter asks for an exemption for pork rinds attached to a trolled lure to be exempted. Then I will pass it on to Megan Ware to describe the request that the state of Maine and Massachusetts is asking for.

CHAIR BORDEN: Before we do that, are there any questions of Toni at this stage? I'm not seeing any hands up, so we'll move on to Megan. Megan.

MAINE AND MASSACHUSETTS PROPOSAL

MS. WARE: This is a joint proposal between Maine and Massachusetts, so I'm not letting Mike Armstrong off the hook here. He's going to help me out. But that proposal can be found in supplemental materials, for those who want to follow along. We're just going to give a verbal, kind of overview, of what was included in our proposal, and why we submitted it. Mike, feel free to pop in at any point while I'm talking, if I say

something incorrectly or you want to add something. I guess I'll start by acknowledging that both Maine and Massachusetts are working to come into compliance with the Addendum VI circle hook provision. For Maine we completed an emergency regulation, which now requires circle hooks when fishing with bait. I believe Massachusetts is pretty far along in their process, so both states are committed to coming into compliance with the FMP.

The proposal is trying to address a problem regarding lack of data and information in the tube rig fishery. Maine and Massachusetts tube rig fishery has certainly been a source of industry comments regarding the circle hook provision. Based on the letter Toni just referenced, it appears maybe there is broader conversations happening along the coast. But that said, you know we are data poor in this portion of the fishery.

We don't have MRIP data that is specific to this term of tackle, or we don't have a specific gear study that we are aware of. When industry comes to us with these claims, some of which are concerning, it's hard to respond either to be able to support them or refute them. It feels like this is a similar conundrum the Board faced in October. You know as a state we could provide anecdotal information, but unfortunately, we didn't have data to provide on the potential impact of the circle hook exemption for the tube rig fishery.

From these concerns the proposal was born to be able to gather this data that we need, and hopefully let that data inform our future management decisions. We're proposing a two-year study, and some of our objectives are to understand the size of the fishing population that is using this gear, so who are the pool of impacted stakeholders, understand where the tube rig gear hooks on the fish.

As Toni just read in that letter, you know we've heard comments that the gear doesn't gut hook, so there may be a little conservation value of using the circle hooks, but I don't have anything to ground truth that with, or like data to respond to that with. Then Maine is also interested in effecting impacts to the worming industry, and kind of noting that the tube and worm fishery is greater than just the anglers, but also involve tube manufacturers and those who harvest worms.

To carry out the study, we are asking for a two-year exemption to the circle hook requirement for the traditional baited tube rig gear. The reason we would need this exemption for the proposal is, as I mentioned, both Maine and Mass are currently or have taken action to come into compliance with the circle hook provision.

Industry right now, at least in Maine, I can't ask them to go fish with a traditional tube rig gear with a J hook, because circle hooks are required. The exemption allows us to collaborate with industry and carry out this study. We did include a sunset date of two years for that circle hook exemption, so that without further Board action that exemption would expire.

Then I'll just note, there are kind of three elements of the study. The first was the broader angler study, to better understand the proportion of anglers using the tube rig gear, and questions in that survey would ask about knowledge on tube rigs, level of engagement, choice of bait. The second element of the study is Maine's angler logbook program, where we would expand that to ask specific questions about tube rig gear. Some of the questions we would ask are in the proposal. I'll just note that Maine's logbook program is pretty targeted at striped bass anglers, and we are excited this year, because we are introducing an electronic version of the logbook. In many ways it's kind of a perfect opportunity to expand the data we're collecting through our logbooks. Then the third element of this study is at-sea data collection by the state agencies. We feel that this is important, because logbooks are a great way to engage industry and collect a lot of data, and collect a lot of data without a lot of cost.

But we do acknowledge that that data is self-reported, so we want to be able to ground truth any of the trends we see in that data, or identify discrepancies. At the end we would write a report and bring that

back to the Board and the TC. If the data collected in the study doesn't support a circle hook exemption for tube rig gear, then we won't carry on with it.
If it does, then the Board can consider future options at that point. Obviously, we're looking to get feedback from the Board today on the proposal. I'll just call attention to one specific part of the proposal in particular. If the proposal is accepted, we provide two ways that the exemption could work. One is a circle hook exemption for tube rig gear just in Maine and Massachusetts, the other is a coastwide approach, where the Board could delay implementation of the circle hook requirement for the specific gear type.

I think there are pros and cons with both options, one may be receiving more of a coastwide equity, and the other is more of a focused study. I would be interested in hearing Board comments on that. Mike, I will pass it off to you. Please let me know if I forgot anything or you want to add anything.

CHAIR BORDEN: Thanks, Megan, Mike Armstrong.

MR. MICHAEL ARMSTRONG: Megan did a good job. I'll add a couple things. This is a mode of fishing that is very popular. The fact that we got a letter from charter associations from Maine down to New Jersey, and in fact I've talked to anglers from Chesapeake Bay and further south that also use it.

But I think it illustrates a problem that we overlooked. We moved with this circle hook stuff pretty fast. There were some oversights. One is we didn't define bait. We've pulled out all the definitions on the coast, and they are very, very different on what you can use. But in all honesty, we were going with data that showed circle hooks have a lower deep hooking rate, and thus lower mortality.

All those studies are done on chunk bait and live bait. None of them are on artificial. In fact, most of the studies show that artificial, just because of the way they are actively fished and towed through the water with jigs, that the fish bite it in a whole different way than a chunk sitting on the bottom, or a fish swimming around.

I'll tell you, when I voted for this, I didn't intend to include artificial. I understand how it happened. You know we talked about it at the end of last meeting, and no one wants to wordsmith, and we're all tired. But I think that was an oversight. Anyway, we don't expect you to just accept it without data. I like data, you like data. We're going to collect it, so we are asking for this exemption. But I do think we also, and I don't know that we want to open this now, but later discussion of defining bait, and defining that what we really meant was chunk and live bait, and not artificial. When you put bait on an artificial, it's not really bait, it's an attractant. It flops around, it puts out a scent. But the lure is still actively fished, and the fish will strike it in a completely different manner, usually ending up in hooking on its lip.

Now there are other problems, you know treble hooks catching on the side of the face and all the rest, and that is a whole different discussion. We'll hope you give us this exemption for a couple years. The question is whether we exempt it coastwide, and just let it ride for a couple years until we have data, or if you just exempt us and Maine, so that we can do the study. I'll leave it there.

CHAIR BORDEN: Questions for either Megan or Mike on the proposal? I would ask while the questions are coming forward. We've got a bunch of hands up already. I would ask you to think about the question of whether or not this should be two states or the entire coast would have the ability to participate in this. First, I'm going to just take these in the order I've got them. Jason McNamee and then John McMurray, you're on deck.

DR. McNAMEE: Thanks Megan and Mike, really appreciate the thought that went into this, very much support what you are trying to do. I know you guys, both states have top notch analysts in your state. I know it will have high statistical rigor, and I think it will be pretty cool, and useful information.

This is just quick advice. The at-sea data collection. I really like that part of it. I think, so it sounds like Mass DMF you're using your own staff. I'm not sure if at any point you'll be kind of observing like a normal fishing trip. I would just suggest that I think would be good, in particular if you have a consistent participant collecting information.

If you have some samples where you've got staff onboard to observe, because that gives you that internal sample that you can sort of look at to compare observed versus non-observed, and see if there are any statistical differences. If not, that will give you some confidence that that self-reported data is good data, and can be expanded.

That was just something that popped into my head I wanted to share with both of you. Then the other aspect, which Chairman just mentioned is, you know I'm certain Rhode Island would love to be involved and expand this study further into southern New England. I won't commit to it, in that we have not identified the funding source to be able to do it, or that we could identify that funding source, and we could contribute as well.

However, I wonder if there is something we can do today, where we have more of a general exemption allowed, if the state is able to pull together, you know a research fleet or study like Massachusetts and Maine. It would be great to have a little flexibility, because we would love to participate as well. We've just not thought through it to the extent that Massachusetts and Maine have yet. I'll just kind of put that out into the ether, see if others are thinking the same way, and then maybe we can figure out a way to allow for that.

CHAIR BORDEN: I have John McMurray, and then I've got Mike Luisi.

MR. McMURRAY: The gentleman from JCAA made this point in the meeting's initial public comment, and I'm going to frame it as a question if I can. Mr. Armstrong also talked about the clear intent of the circle hook requirements was to prevent the use of J hooks and trebles, and live and cut bait fisheries, not as an attractant in troll lures.

I appreciate and respect the fact that Mass and Maine are going to need to move forward with this study, but everyone on this call probably knows and understands that a troll tube and worm rig and a bucktail jig tipping with a pork rind does not gut hook fish, except in very rare circumstances.

If you don't know this then you are disconnected with the realities and details of this fishery. I'm wondering if the state of Massachusetts and Rhode Island had considered just moving to approve those exemptions, because they make no sense to me. I don't think they make sense to the public, and I don't think they make sense to most of the people on this call.

CHAIR BORDEN: I've got Mike Luisi and then Justin Davis.

MR. LUISI: I'm supportive of the states of Maine and Massachusetts moving forward. I guess where I'm confused a little bit. When I think about this, I think about the consistency across the states. If there is going to be an exemption for a particular method, and it's exempted in two states, and there is going to be information collected by those states that have agreed to provide that information.

If we approve this coastwide, which I think for consistency purposes I would support that. How does information gathering translate to the other states? I guess that is a question that I have for you, Mr. Chairman, or staff. If we decide that this is across the board something that we're going to allow all states to be exempted from. Are there going to be requirements on those states for data collection?

I guess my second question to Megan and to Mike, have to do with those circle hook regulations. There is a request now to exempt certain methods, but are you still moving forward with circle hook requirements for bait purposes? I would assume you are. But I just want to make sure that if I'm going to

support this, that it's not going to be a delay in circle hook requirements across the board in your state, but it would be just for this particular method.

CHAIR BORDEN: Megan, do you want to take that question at this point, in terms of how you intend to implement, if it's approved?

MS. WARE: Yes, sure. Thank you, Mike, for the question. Correct, and I guess I'll just remind the Board. Maine actually had the circle hook requirement for the last seven years, maybe we're going on eight years now. The only exemption we had previously was for tube rig gear, and then at the October Board meeting, when we brought that forward as part of our implementation plan, that didn't pass. That was the only part of our regulation that we needed to change to come into compliance with the FMP. All of the requirements for the use of circle hooks, outside of the tube rig fishery, would remain and be what we had for the last seven or eight years.

CHAIR BORDEN: Mike, have you got a follow on?

MR. LUISI: Oh no, no. Thanks, Megan. I knew you guys had those rules in place for quite some time. I was wondering about Massachusetts as well. But it sounds like, so if I understand it, and correct me if I'm wrong. The exemption is only for these gears, it's not for the delay in circle hook implementation, because I think Massachusetts as well has rules on the books, but Mike can correct me if I'm wrong on that.

CHAIR BORDEN: Mike, to that point.

MR. ARMSTRONG: Sure, yes, we put in circle hook requirements last year, and we did exempt for-hire. In response to the Board's request, we are putting in new regulations that get rid of the exemption for the for-hire. What we're proposing is keep all the circle hook regulations except for the tube and worm lure.

CHAIR BORDEN: Justin Davis.

DR. DAVIS: At this point I don't really have a question; I just have some comments I would like to make. Is that okay at this point?

CHAIR BORDEN: Certainly.

DR. DAVIS: You know I think Mike Armstrong did a good job of framing the general issue here that back in October, I guess that was 2019 when we took the vote to implement this circle hook mandate. I think everybody thought it was a good idea, and then as we're coming along here and looking to implement it, the devil is always in the details, and we're finding out that it's maybe a little bit more complicated than we might have thought.

There are questions around definition, what is or isn't a natural bait. There is question around, should this be applied to all bait fishing methods or not? I think there are issues around enforceability, because we're talking about, in many cases, intent of the angler and whether law enforcement can actually use that as a basis for enforcement or not.

I think there are also issues around whether this was intended as a prohibition on all take of striped bass with anything other than a circle hook. That's an issue that I plan to bring up later today, and try to get some clarity on. With respect to this issue, we're talking about right now, with exemptions for artificial lures. You know I heard a lot about this in recent months from anglers in our state. This isn't just an issue with the for-hire industry, even though that letter the Board received was from for-hire organizations.

I've heard from plenty of sort of average-Joe rank and file anglers. What I've been encouraged about is I've heard almost unanimous acceptance for the idea of a circle hook mandate, that it makes sense. People are willing to do it. They already use circle hooks in their fishing, or they're willing to switch. But they want to do it under instances that make sense, where there is going to be a conservation benefit. I think some people are sort of scratching their heads as to why they would be required to use it, and other instances where it is not likely to provide a benefit. I'm really grateful that Maine and Massachusetts have come forward here with a proposal and a way forward. I

think it's great that we're proposing, doing some actual work and getting some data to justify the decision, rather than just making a decision based on anecdotal data, although I would agree with John McMurray that if you talk to anybody who is involved in this fishery, they would tell you, you know an eel skin plug, or a tube and worm rig, or a trolled bucktail of pork rind. Those are not gear to gut hook fish.

I'm very supportive of this exemption. I would hope that it would be extended to all states, and that all states would potentially consider collaborating on the data gathering that's going to go on. Connecticut would certainly be interested in participating, at least in that stage of sending out a questionnaire or survey to anglers, to try to find out about how widespread the use of these various gears is.

I hope there would be some consideration, maybe thinking about something, or gears beyond the tube and worm, because I've heard anglers in our state mention other things that they think ought to be exempted. I hope maybe there will be some room to collaborate a little bit on at least that portion of the study, design the questionnaire.

But overall, I think this is really good. It's important, I think that we make these changes sort of in conversation and concert with our constituents, that we listen to what our folks in the public are telling us, about what makes sense and doesn't. I'm really hopeful this Board will approve some sort of exemption here for all states, and allow us to move forward with those things.

CHAIR BORDEN: The next three speakers, I've got people agitating about being called on. I've got Mary Gary, Max Appelman, and Ritchie White. Tom Fote, you're after that. So, Marty.

MR. GARY: It's been a very thoughtful conversation. I appreciate all the perspectives that have been shared, and thanks to Megan and Mike for your diligence on supplemental materials that were provided, and your explanations. I was aware of the fishery, but certainly not fluent on it, so I've done some outreach to folks and learned a lot.

For all the reasons that have been mentioned, John McMurray and others, you know there is a common-sense theme that runs through all this. Jason and Justin just answered part of my question about the regional applicability of this exemption, interest by both Rhode Island and Connecticut.

I guess I still have a little bit of peaked curiosity though. New Hampshire is kind of wedged in between Maine and Massachusetts, and I would just be curious if it isn't putting you too much on the spot, if Dennis or Ritchie or Cheri could provide perspective. I would have thought maybe they would want to be part of this as well, just curious. Thank you.

CHAIR BORDEN: Ritchie, do you want to speak to that question, and I'll call on you in the same order. But if you want to address that question, please do.

MR. WHITE: Okay, thank you. Yes, I would like to make a general statement, and I think it will answer at least how I feel New Hampshire going forward or not going forward on this issue, Marty. With all due respect to my good friend in the north, Maine, and to the south, the Commonwealth of Massachusetts. I hope they remain good friends after my remarks on this issue. I'm opposed to proceeding with this process for a number of reasons. First is process, in my opinion this is a backdoor attempt for conservation equivalency, but the process is backwards.

The conservation equivalency process would provide data to the Technical Committee and Law Enforcement Committee, both of which would provide recommendations to the Board. This proposal sets the regulations for two years, then provides data to the Board. If this process is successful, I predict a number of conservation equivalency proposals that lack data will initiate this method. I don't dispute that tube lures do not gut hook. What needs to be studied is, do circle hooks work in tube lures with worms?

I have over 60 years of fishing experience with striped bass. I've never fished a tube lure, but I do fish live mackerel and pollock with a trolling weight and a circle hook, in a method that is very similar to tube lure fishing. It' an extremely successful method, and I find it is not an issue hooking fish with a circle hook using that type of method.

What I'm really worried about here, is creating a loophole that people that look for loopholes will jump through. We're not seeking Law Enforcement input, as to how enforceable this is. I already in my mind have a design, in which I can create a rig for all bait fishing that I feel would qualify as a tube lure.

I think what needs to be studied is, does a circle hook work or not, not to open the gate on loopholes for use of J hooks in general, without Law Enforcement playing a much larger role in this, and if Kurt Blanchard is on the phone, I would love to hear his input on this. I certainly will not be supporting this, and that would be your answer, at least from my standpoint, Marty. I haven't talked to Dennis or Cheri yet.

CHAIR BORDEN: Ritchie, I would point out you managed to generate a few more hands.

MR. ARMSTRONG: Mr. Chair, could the Commonwealth address that?

CHAIR BORDEN: At the appropriate time, Mike, you're on a list.

MR. ARMSTRONG: Okay.

CHAIR BORDEN: I've got Max Appelman and then Mike Armstrong.

MR. APPELMAN: I really appreciate the discussion, and I appreciate the situation here, and certainly appreciate the intent of the proposal. I was going to say a lot of the things that Ritchie just said, so I'll shorten my comment and just echo those. You know we certainly support research; we support collecting data, improving our understanding of this and any other facet of the striped bass fishery, and impact to the stock.

You know, NOAA Fisheries has a mechanism to permit otherwise unlawful fishing in the name of research through exempted fishing permits, and you know this proposal appears similar to an EFP, except that we don't know how much effort we would be exempting in this case. That is inherently one of the questions that we're trying to answer.

One of our primary concerns is that of procedure. As Ritchie pointed out, typically this would go to the TC first for review, prior to a Board vote. I particularly am interested in hearing from the Technical Committee, if there is, I'll say a less invasive way to answer these questions on prevalence, and whether or not the cure does gut hook fish, something on a smaller scale, a level of effort that we know we're exempting in order to collect that data. I'll just leave it there for now, thank you.

CHAIR BORDEN: I've got Mike Armstrong.

MR. ARMSTRONG: If I could, yes, Ritchie, you're still my friend. But I think you are off base on this. I don't see this as conservation equivalency at all. I see it as trying to correct, I think, some errors we made, with kind of a hasty passage. As I think Justin said, it turns out this whole issue of circle hooks and bait is more complicated than we thought, and we passed a very simple rule.

But I hear your concern, that it is a little bit different process, and I really share your concern that other people will come out of the word work and say, okay here's another one I want, which is precisely why, in addressing John McMurray's concern, not a concern, but his statement that we all know you don't deep hook with a tube and worm lure. Let's just do it. We want to present data, so that other people, if you want to exempt something you need to bring data, and that's a high bar. As other states have said, we don't know if we have the resources.

But we're going to do it, and that is why we went this path to collect data. It makes it harder, and I think will

prevent people from just nit picking, and trying to find little exemptions, because I definitely don't support that at all. This is one of those things that just stuck out, and it was a glaring error, and we heard from our constituents, as did many people in other states. Thank you.
CHAIR BORDEN: I've got Tom Fote next.

MR. FOTE: Yes, I made the motion, the last one not to approve the exemptions, for a couple of reasons, and I'll go to my reasons why I did at the last meeting. It was not about the efficacy of using a tube lure the way it is designed, and the way it is supposed to be used. My concern is all of a sudden somebody throws a tube on a line, and goes back to drift the same ones, because it's one of the ways I use to fish also, especially during the rips.

That's a whole different ballgame, but how is Law Enforcement basing enforcement if somebody has a tube on? There are some things that we need to discuss today about, you know rigged eels I've never gut-hooked a fish on a rigged eel, and I rigged a lot of eels in my time. I've been fishing for striped bass probably about 60 years or 64, tells me I started like 10 years old. Anyway, you know the pork rind issue. We need to clarify what is bait, but we need to do it coastwide. If we're going to make an exemption, it's got to be coastwide, and you can't penalize one state because they don't have the resources of doing a study, and Massachusetts, who has a much bigger budget than New Jersey does, on marine fisheries. That is probably why our folk were not getting a bigger budget as fishermen, but don't penalize the fishermen in the states, because we can't get more money.

If we do any of these exemptions, if you change the use of pork rinds, then it should be up to the state to make the exemption coastwide. Then if a state does not want to implement the rules and the regulation, they should be able to not implement, as we always tend to. But we can't make regulations that are different for each state, because there is enough controversy going on about what we can fish and what we can't fish with a circle hook.

I don't need exemptions that are coastwide, because it is going to be hell, because the guys will say, this is the way it is in Massachusetts, I guess I can do it in my state. You know how hard it is to get the information out to the public to begin with. We need to be consistent among all the states about what we do. Whether we do this tube lures or not, we need to be consistent on the whole coast, and do that for every state.

CHAIR BORDEN: The next person I've got on the list is Roy Miller, and before Roy talks, Toni, there are a lot of names on the list, some of them have been called on already. If they are new hands that's great, leave them on the list, and if not, if you could delete them that would help. Roy.

MR. ROY W. MILLER: A couple of comments. Until Ritchie spoke, I was prepared to consider voting for this particular exemption for Maine and Massachusetts. But after listening to Ritchie, I would like to change my comment somewhat. Would it be possible to do this study just a little differently?

In other words, the first two questions in the logbook could be asked whether there is any collateral tube and worm fishing in 2021 or 2022, so those questions could be asked without a special exemption. Then I'm wondering if the studies, if Massachusetts could use some charter captains as contractors, and give a special exemption for a group of charter captains to do the tube and worm study.

Similarly, in Massachusetts, since apparently state employees are going to be doing the sampling. They won't have to open it up to the general public. What I'm getting at is, could the study be done without opening up tube and worm fishing in those states for a two-year period. That is one question.

The other question, if other states want to participate in this, there is a timing problem, because these studies are proposed, I presume, to start as soon as bass are available in 2021. If other states are going to submit a proposal, they're coming up short on the

amount of time they would have to submit a study proposal and get it approved. Those are my two, let's call one a question the other a comment. Thank you.

CHAIR BORDEN: Roy, I'm just going to interject a comment from the Chair. Given my background, having worked for a state agency. I think one of the dilemmas that we all confront here, Maine and Massachusetts have brought this proposal forward, and I'm not sure that the rest of the states have necessarily thought about it in the context of, should they prepare.

I'm fairly confident that if we were to give this another week or two, and let the state agencies go back and talk to their constituents', it would be a number of states that would probably come forward and say they want to participate, but they can't do it at this point, at least on the record, because as Jason McNamee pointed out, they don't have the funding for it.

But if they had a little bit of time to develop that, I think you would find that a number of states would want to participate in it, and especially if it's a blanket option for the coast. In other words, states can opt in to this program. It's almost like we need some mechanism to authorize it, and then conceptually, and give the states that are interested in doing this the opportunity to kind of talk together, talk with your constituency about funding activities and so forth, but then have the ability to get into it.

Now if you're opposed to it, clearly Ritchie is opposed to it for a number of reasons, then you just vote it down, that's all. I think it's important for people to kind of factor in, we're in a situation where we have an awkward timing issue. Because states don't necessarily have the money to commit to all of the work that's required by this proposal.

The next person I've got on the list is Loren Lustig.

MR. LOREN W. LUSTIG: I would like to complement several people that have been on our list, who have led the discussion. First of all, I would like to complement Marty Gary, from the Potomac River Fisheries Commission. Marty was the one who asked if someone from New Hampshire could please comment, there in their key location between Maine and Massachusetts, and Ritchie stepped forward.

I'm not sure I would have had the bravery to step forward like he did. He was sort of shooting from the hip. What I realized is that we had a person in Mr. White who spoke with wisdom and insight, and helped us to get right to the bottom line. As soon as Mr. White was done speaking, I think you, Mr. Chairman, said that there were suddenly many hands that were raised.

What that provides is the benefit of friendly debate, something that we sometimes don't see in the politics of America. A friendly debate is a very, very valuable thing, because that tends to clarify the issues. We're certainly not duplicates of each other. I consider myself to be the only environmental educator at ASMFC, for goodness sake.

I'm not a fisheries biologist, so I don't have a whole lot of duplicates, so I speak to the children of Pennsylvania and Maryland, for example. One of our strengths is that we are not duplicates of each other, and I really appreciate this discussion. I do have a background in law enforcement, and I appreciated Tom Fote speaking of law enforcement, as well as Ritchie White speaking of law enforcement. Those are my comments, and I do thank you, Mr. Chairman.

CHAIR BORDEN: Thank you, Loren. Next, I've got Megan Ware, your hand is up.

MS. WARE: I've been scribbling frantically here, trying to write down everyone's comments. I'm going to try to respond to as many as I've heard so far, and Ritchie, we are still friends, don't worry. I think the first comment I heard was that the study should focus on, do circle hooks work with the tube lure. I guess I was remiss in describing the study.

That is one of the things we proposed testing as part of the at-sea portion of the study. That is something we also have a question about, and plan to investigate. I think there was a comment about TC review or processes with TC for review. You know I think we're happy to do that. I guess from my perspective, and maybe that is just because I've been working on the proposal. I don't feel like it's overly technical.

If there is like a specific question someone has for the TC about its technical nature, that would be helpful for me to hear, and then I'm sure for the TC to hear, so we kind of focus that discussion. Another comment I heard, I think it was kind of a question about data then exemption or exemption then data.

I think this might tie into Roy's comment about, could you do this study without an exemption. For the angler logbook part, I think if you were going to ask those first two questions, it would be would you have used a traditional tube rig gear, not necessarily are you. I think there could be complications with the logbook.

You know we could do the at-sea portion. We have special licenses that we can issue in Maine, and I assume Massachusetts is a similar process. I think the challenge there is in the amount of data you get for the cost, and really one of the benefits of using logbook data is that we can get a lot of data for not a lot of cost.

When you go on the water and you hire a charterboat captain or use a state boat, the costs multiply pretty quickly, and for a days' worth of time on the water, you're only getting a limited amount of data. That would be my concern there. I guess I would also just kind of reiterate, I think Mike Armstrong said this really well.

You know obviously the letters that we've seen have asked for other exemptions besides this. This is a more conservative proposal than those letters, and so this is kind of creating the bar thing. You know we need data to be able to act on those in an informed matter. I think those are all my comments for now. Sorry, that was a little disjointed, but just trying to respond to what people have said, thank you.

CHAIR BORDEN: I've got a couple of people, Board members that have not spoken yet. Justin Davis, I'm going to call on you, but I'm going to first take Joe Cimino, and then Chris Batsavage, and then Justin. Joe.

MR. JOE CIMINO: That is kind of ironic, because if I was able to speak closer to Justin, I would have been much briefer, saying I agree with everything he said. To that extent, one of my concerns is the fate of striped bass that are caught using bait on J hooks or non-circle hooks. Are they returned to the water immediately? Are they kept anyway? As Justin mentioned, you know there are a lot of complications that this Board hasn't discussed. I have some grave concerns with every state having different regulations, as Tom Fote said, that makes not only enforcement so much harder, but just so that people know what the regulations are so much more difficult.

Regarding the issue at hand on the tube worms that we keep discussing. I would say that I do support this as an exemption that should go forward for all states. The concept of data collection is fantastic, I love what the proposal has put forward. I think those states that can do something like that should work on that.

I think that that kind of discussion should go back to the Technical Committee on how to kind of standardize that for data collection for any states that are interested and able to pull that off. My hope is that we'll see a motion on this at some point, to have a vote. I appreciate all the wrangling that you are doing here as Chair, and I do hope that Justin comes back with a discussion on the fate of those fish that are either caught incidentally, or caught with bait on non-circle hooks.

CHAIR BORDEN: Chris, you're up.

MR. CHRIS BATSAVAGE: I'll try not to repeat too many of the comments so far, but I will say I do support Massachusetts and Maine's proposal for studying this

tube and worm rig, because it's a very narrowly defined gear. You know the regulations talk about, you know the length of the gear, dimensions, things like that.

Because with any kind of circle hook regulations, with more exemptions and ambiguity becomes more loopholes. Our Marine Fisheries Commission here is considering circle hook regulations for all our fisheries. Crafting the proposed rulemaking trying to craft things to allow certain fisheries to occur gets tricky, when you really kind of roll up your sleeves and look at what could occur.

Due to the fact that the tube and worm rig is very narrowly defined, I could support that exemption for the rest of the states. At the end of the day, it's up to the states, as far as whether or not they want to allow that from their waters. That's kind of just one of the points to put on the record. I know we talked about some other things, as far as other bait types, some lures, and you know bucktails and things, as far as natural bait. I guess we'll talk about that more, and I'll hold those comments for later.

CHAIR BORDEN: Thanks, Chris, Justin, you're up.

DR. DAVIS: Thank you, Mr. Chairman, I appreciate you giving me a second opportunity. I just wanted to touch on a few things, one was that I really liked the idea that was put forward that all states should have a chance to maybe just go back and discuss, maybe talk to Massachusetts and Maine, and thing about to what degree they might want to participate in those studies, or do some of their own work. I would not support the idea that potentially a state would have to propose to do a study, in order to be able to take advantage of an exemption that's offered, for the reasons that have been brought up around funding, and also just because I don't know that it really makes sense. Massachusetts DMF can do a great scientific study showing that tube and worm rigs don't result in gut hooking a striped bass. I don't think we need to replicate that in New Jersey and Connecticut, and other states, because a tube and worm rig is the same no matter where it's fished.

To Ritchie's comment, I fully agree that we have to be smart about any sort of exemptions that are created, to make sure they don't create loopholes, and provide opportunities for people to do bad things. To me that is an argument for what Mike was suggesting, of slowing down here and making sure we're doing this the right way, and doing it deliberatively.

I just think that's an argument for really considering these exemptions carefully, and how we write the language. I just think there is real danger here, if this Board is dismissive of these concerns that have been brought by the public, and just sort of decide, you know what, no, we're not going to consider these exemptions. I think there is a real crisis of public faith right now in this Commission's management of this species.

I think coming out of the Addendum VI process, the one thing everybody in the public seemed to agree that the Commission got right was the circle hook mandate. I just don't want to see us sort of snatch defeat from the jaws of victory, and find a way to turn this mandate into something that isn't viewed positively by the public. I would really hope we can consider slowing down, you are considering some of these issues and allowing for some exemptions.

CHAIR BORDEN: Toni, let me just ask, do we have any Board members, because there are a number of hands up here. Do we have any Board members that have not had the opportunity to speak at least once? I think Emerson falls into that category. Is there anyone else?

MS. KERNS: I don't know if Pat Geer spoke. I am not 100 percent sure. Kurt Blanchard has his hand up, your LEC Rep, and then Eric Reid just put his hand up as well, and Dave Sikorski put his hand up, and I don't think he's spoken, I don't think Jim Gilmore has spoken either.

CHAIR BORDEN: Let's take Dave Sikorski, please.

MR. SIKORSKI: To me, I really appreciate all the perspectives on both sides, and coming into this meeting I didn't support this exemption, because I had asked a simple question in my mind of, will this lead to more dead fish, by exempting? I don't think it will. I think the anecdotal evidence we have from these really knowledgeable and you know important parts of our fishing community, the recreational and for-hire community know how this gear works.

I don't think they're trying to jump through a loophole here. But I appreciate that this process does exist, and I also don't think that this is a backdoor to a CE situation. I hope that we can move forward and see a motion on this, and I plan to support a motion.

CHAIR BORDEN: Next I have Eric Reid, and then I'm going to call on Emerson after that.

MR. ERIC REID: I am in support of the exemption for the tube and worm rig. But you know to me, it's all about what damage does a hook do to the fish in general? My comment to that would be, you know we've had I don't know how many comments in support of this exemption. But I don't think one of them mentioned the use of a barbless hook in the tube and worm rig. I think that's an interesting lack of thinking.

CHAIR BORDEN: I've got Emerson Hasbrouck, then I'm going to go to Kurt Blanchard.

MR. HASBROUCK: Thank you, Mike and Megan for your presentations. I'm not sure what specific data elements you are going to collect in this proposed study, particularly when you've got state personnel onboard. But I think it would be helpful if you're not already considering this, is to have length frequency information included, you know is it fish that are within a slot that are going to mostly eat?

I'm wondering what the size distribution is going to be, in terms of most of the fish that are caught on this type of rig. Are they outside of the slot? You know, are most of them going to end up being discarded? Also, I think it would be helpful to have or to track, to see if these fish are within the slot. Would they be kept by the number of anglers on the boat, or would they be discarded? You know if you've got four people on the boat, and you've already caught four fish in the slot, then all subsequent ones are going to be discarded. I would like to see those data elements included in the study.

CHAIR BORDEN: Kurt Blanchard.

MR. KURT BLANCHARD: I just wanted to comment. There have been a few mentions of Law Enforcement and our input on this. Just to support the vote on this, is typically this is a proposal for a study, a science study. Typically, Law Enforcement would not necessarily be asked to comment on that.

If this was a rule change, or conservation equivalency measure or something to that effect, we would absolutely be commenting on it. If the Chair feels that you would like our comments on it, we could absolutely get a call together and provide you some input, and we would be happy to do that. Just a couple other observations in the discussion. If it is a study for Mass and Maine as an identified participant group, or is it across the fishery?

If it were to be across the fishery, I would have some concerns and ask that it be consistent from jurisdiction to jurisdiction for an enforceability standpoint. You know we've commented on the past about consistency within regions, within jurisdictions, and also clearly defined definitions, and define measure what the tube and worm is, and things like that. If we had those in place, we could probably support this. But again, I would ask for consistency, I would ask for clearly defined measures, and that the input as a whole, we would be happy to do that.

CHAIR BORDEN: Let me go back to Ritchie White. Since Ritchie was the one that raised the original concern. Let me just ask you, Ritchie, whether or not, there has been a lot of dialogue on this and a lot of suggestions on how you might pull it together. Joe Cimino talked about a process, Justin Davis talked

about elements of a process whereby there would be more technical input, and kind of standardizing the study criteria. Has any of that changed your position on this?

MR. WHITE: Yes, if there is consensus that this would not be a backdoor conservation equivalency, so if the Board can make that determination and be on the record, then I would certainly change my feeling in that regard. The comments that Kurt just made, where states are exempting all fishermen in the state. To me that goes beyond a study. I am all in favor of a study.

I think the study though, I think the focus of the study should be whether circle hooks work or not, because I think we don't need to study the fact that J hooks don't gut hook or rarely gut hook using the tube lure method. But does a circle hook work, and therefore that would eliminate loopholes that, as I say, I already have a design that could be sold for all base fishing of striped bass that would absolutely work, and would meet the legal requirements, from what I've seen written so far.

I think Law Enforcement needs to look at that. That's what I'm very worried about, opening the door on. I fully support the idea of leaving the circle hook in place, and then doing the study with a few charter boats and some individual vessels that are authorized to fish both, but it would have to be both types at the same time, to see how the circle hook works, how many bites do you miss or not miss, compared to a J hook. But I fully support that going in that method, not opening it up to everybody for two years.

CHAIR BORDEN: Thank you, Ritchie, for providing that perspective. My suggestion here, one of the dilemmas with remote meetings is that when we normally meet, we sit around a table, and frequently any of the members of the public that have gone to Commission meeting, we'll take a five-minute break, and allow the Commissioners to kind of caucus. During that type of break, it's not inconceivable that members of the public walk up and talk to Commissioners, and provide insight on different aspects of the discussion.

What I would like to do here is to take a, it's 4:22, and I would like to break until 4:30, for the purpose of the Commissioners being allowed to talk among themselves. Then what I would like to do is reconvene at 4:30, and basically ask someone to place a motion on the table. For members of the public, and I would just like to quickly add that we have received terrific and really useful information from members of the public.

It was really useful to have that letter come in from all the associations. It provided excellent guidance to us and direction. I mean I would encourage you, if you can get through to one of your Commissioners, if you think there is something that's really important to raise at this point, then do so during the break.

We're going to break until 4:30, and then I'm going to reconvene, and ask if someone has a motion that kind of reflects the sentiment of what we just heard, the points that Ritchie made, the points that Joe Cimino and Justin made, in terms of qualifications and so forth. I know that's a tall order, but we'll reconvene at 4:35, actually. Thank you. Toni, if you could please, post that time.

MS. KERNS: We'll change it. Maya, if you don't mind switching it to 4:35.

(Whereupon a recess was taken.)

CHAIRMAN BORDEN: Okay, so we'll reconvene. In terms of process here, the process I would like to follow is, as I indicated before, I would like to have the Board make a motion, somebody on the Board make a motion. Then once we get a motion up on the board, then what I would like to do, I want to take some public comments, because I will acknowledge that I have not gone to the public on this particular issue.

Although we cannot take public comments from 200 people today who are still on this webinar, I will try to take a representative group of comments and let a few of you comment on the motion. That is in advance of the Board debate. I'm switching this

around, so that we get some public input. Let me ask the Board, does anyone have a motion? I see Megan Ware; do you have a motion? Your hand is up.

MS. WARE: Yes, Mr. Chair, I do, and I sent it to staff during the break, if they are able to pull it up for me.

CHAIR BORDEN: Would you like to read it into the record, please, Megan?

MS. WARE: Yes. Move to accept the Maine/Massachusetts proposal to study the tube rig fishery and for the duration of the study, delay implementation of the circle hook requirement for tube rig gear through 2022 for all states within the striped bass management unit. Other states wishing to participate in the study on the tube rig fishery should submit a letter of intent to ASMFC within two weeks, to ensure consistency in data collection.

CHAIR BORDEN: All right, so we have a motion on the table, do we have a second? Toni, you're going to have to help me.

MS. KERNS: Mike Armstrong.

CHAIR BORDEN: Mike Armstrong has seconded this. Okay, so as I said I was going to do. I would like to take a few public comments, specifically on the motion. I would ask that any members of the public limit your comments to about a minute. We'll run a clock on it, which will be on the screen. If you limit your comments to a minute, then I can have more members of the public comment. Rich Hittinger is first, and I've got Rick Bellavance second. Rich.

MR. RICH HITTINGER: Yes, thank you very much, Mr. Chairman. I'm Rich Hittinger, the Vice President of Rhode Island Salt Water Anglers. We represent 7,500 saltwater anglers in southern New England. I wanted to point out that that letter that you referenced is from private anglers as well. We signed on to that letter. RISA has a history of promoting circle hooks to conserve striped bass, and reduce release mortality. But we don't feel that it's necessary with tube and worm rigs, and other trolled rigs. The reason is, because we don't believe that there is an increased mortality using J hooks, and that comes from many, many thousands of hours on the water doing this type of fishing. We would like to see this exemption for all states, and I can say that our organization is willing to participate in whatever we can on that study that Massachusetts and Maine discussed. Thank you very much, Mr. Chairman.

CHAIRMAN BORDEN: Thank you Rich, Mike Waine, you're up, and I should have said, when you speak please identify who you are representing, so that we have a record of it.

MR. MIKE WAINE: Mike Waine from the American Sportfishing Association, and we represent many tackle manufacturers, so I appreciate the opportunity to comment on this. The results from the TC analysis earlier about the sensitivity of the stock assessment catch and release mortality estimates, means that from an assessment standpoint this exemption will not have measurable impact on the stock.

Then we have to ask ourselves, out of principal, will this exemption kill fish unnecessarily? As many people said, if you know this gear type and understand how it's used, it does not pose a risk. I also don't think there is risk of creating a loophole in the circle hook regulation, because I'm confident that the LE officers can weed out the bad actors on this. If the gear type that Ritchie is referring to is developed and creates a loophole, then we'll hear about it from Law Enforcement, and we can address it then.

As many have said, I think anglers have shown pretty wide support for circle hooks over all, and you all know that as an association we've supported it, creating education and outreach materials with on the water media to help the states roll this out. If I actually thought this exemption would erode the intent here, I wouldn't be supporting it. I appreciate the opportunity to comment, and hope the Board approves the exemption. Thanks.

CHAIR BORDEN: Next one on the list, I said I was going to take Rick Bellavance, but I am going to take two other gentlemen first, Rick, so we don't get too many comments from Rhode Island. I've got Rick Golden and then Ross Squire, and then Rick Bellavance.

MR. RICK GOLDEN: Thank you, Mr. Chairman, and to the Commission for allowing me to provide public comment. My name is Rick Golden, I'm the Secretary of the Stellwagen Bank Charterboat Association, and I along with many other charterboat captains and recreational anglers, belonging to many associations like ours up and down the Atlantic coast, believe there should be an exemption for Addendum VI circle hook provision.

I've conducted several polls with my social media following, which is up to 700 anglers locally here in Massachusetts, and have averaged an overwhelming angler response that they have never gut hooked a striped bass while trolling tube and worm. We are definitely in favor of the exemption to Addendum VI circle hook provision, so thank you very much. I really appreciate your time in allowing me to comment.

CHAIR BORDEN: Thanks, Rick, Ross Squire, you're next and then Rick Bellavance.

MR. ROSS SQUIRE: Thank you, Mr. Chairman, my name is Ross Squire, I'm the President of the New York Coalition for Recreational Fishing. I just want to be sure that the Board is not losing sight of the forest from the trees. The intent of this regulation is to reduce dead discards from gut hooking a fish, and that almost always occurs in situations where the rod and reel is being fished in a static manner, not being fished actively.

It just seems to me as if the Board added some language, in terms of how the bait is being used. That would resolve a lot of the problems, would provide more information to the public, and would also be enforceable, so something that would say, you know that these are the regulations, except when used on an actively fished lure certainly could be one way around it. It would encompass everything from tubes and worms to bucktails to pork rinds, as well as eel skins. Thank you very much for the opportunity to make a comment.

CHAIR BORDEN: Rick Bellavance and then Dominick Pucci.

MR. RICK BELLAVANCE: Thank you, Mr. Chairman, I appreciate the opportunity to comment. I'll be very brief. I'm really hoping that the Board can get to a position that you also include pork rinds in their action today. We signed on to that letter from industry, most being because of that part of it. I'm hopeful that there is a little modification to this motion going forward, and we can get that also included. Thank you.

CHAIR BORDEN: Thanks, Rick. That is an issue for Megan and Mike Armstrong, the maker of the motion and the seconder to consider. Dominick, you're next.

MS. KERNS: Dominick, we cannot hear you. I see that your microphone is open. It could be that you don't have the right microphone chosen. Dominick, we still can't hear you. I see that you've asked a question. Dave, could we go to another person? I can look at his question, and then come back?

CHAIR BORDEN: Certainly, Julie Evans.

MS. JULIE EVANS: Hi, thank you for recognizing me. It's been a long time. I was making a cup of tea. I've listened to everybody speak, and everybody seems so smart in what they're doing. I think taking a little bit of time and looking at this more closely is a great idea.

As the Fisheries Advisory Committee representative for the town of East Hampton and Port Montauk, I know our guys there are very concerned about this issue, and would like to see the tube rig looked at more closely. If I can throw my two cents in there, I won't take up any more of your time. Thank you.

CHAIR BORDEN: All right, I'm going to take a few more, Dennis Zambrotta. Dennis, you're going to have to unmute yourself.

MR. DENNIS ZAMBROTTA: I think I am, am I unmuted?

CHAIR BORDEN: You are indeed.

MR. ZAMBROTTA: Dennis Zambrotta from Newport, Rhode Island, representing Surf Casters. I want to let the Board know that keep in mind that this has a significant impact on Surf Casting community also, in the methods of using a bucktail and a pork rind, and a method of using a dead eel as a rigged eel, and fished as a lure, and also using eel skins on plugs.

Keep that in mind, I mean those are our heavy hitters for us here in the northeast. You know with the diminished population of striped bass to catch, taking three of our primary methods of having any success with this fish, are very important to us. I wish you would let the states go back and reconsider what their proposals are, and let them reevaluate what they are going to do, thank you.

CHAIR BORDEN: Thank you, Dennis, Ross Squire, you've got the last word.

MR. SQUIRE: I actually already made my comment, but thank you.

CHAIR BORDEN: I'm sorry, I apologize for that. They should have taken your name down. All right, we're going to go back to the Board. I'm going to start out with Emerson Hasbrouck, on the motion, Emerson.

MR. HASBROUCK: I'm just wondering, Mr. Chair, if we're going to have a subsequent conversation and discussion about a definition of what is bait, or is it your preference to incorporate that discussion at this present time?

CHAIR BORDEN: I guess my reaction to that would be, if this motion were to pass, I would hope that would be part of any dialogue that would take place with the participants in the study, if that answers your question.

MR. HASBROUCK: Not really, Mr. Chairman. You know, we're hearing comments about bucktail with pork rinds, rigged eels, eel skins on lures. I know that amongst the Board there was some discussion about perhaps coming up with a definition of bait that can be consistent across all states. I didn't know if it was your intent to have a subsequent discussion relative to that subject, or if the Board was interested in pursuing that, that we do it as part of this discussion.

CHAIR BORDEN: I really wouldn't mind keeping that issue separate. In other words, if you want to raise that issue after we decide what we're going to do with this. It might make sense to handle it in that manner, if that is acceptable to you.

MR. HASBROUCK: Yes, but I don't speak for the entire Board, but thank you, Mr. Chairman.

CHAIR BORDEN: All right, what other Board members? Cheri.

MS. CHERI PATTERSON: I thought we spent plenty of time talking about the circle hook aspect of these rules and such when we voted on it. I don't mind seeing a study. I would prefer to see a very defined study, which I think Mass and Maine have put together, and have those individuals that are going to be participating in this study to be exempted from the circle hook requirement, but to not allow an exemption for circle hook requirement for everywhere. I prefer to see the result of the study first, before reversing any of the rules that we have already discussed and put into place.

CHAIR BORDEN: I've got William Hyatt.

MR. WILLIAM HYATT: Yes, first off, I'll say that I like the motion. It addresses pretty much all of my concerns. I do however question, and it does play off a little bit of what Emerson was asking before. When Kurt was speaking, he talked a little bit about needing clearly defined measures to be comfortable with this.

Mr. Chair, I would like to ask through you, if I may, to find out from Kurt if he is comfortable with this, relative to the clearly defined measures that he had mentioned previously.

CHAIR BORDEN: Kurt, that's a question directed to you, please.

MR. BLANCHARD: Typically, we would not comment on the motion on the floor here, but the way this is worded, we're comfortable with that, it's a clearly defined study. As far as, you know the definitions and other pieces of this. I really think that is up for further review or further discussion, and prefer to see some proposed language to comment on.

CHAIR BORDEN: Thank you, Kurt. I'm going back to the list here. Toni, what other Council members, William Hyatt.

MS. KERNS: You already did Bill.

MR. HYATT: I just talked.

CHAIR BORDEN: You already did it?

MR. HYATT: I did, but I'll follow up if I'm allowed to. Based upon what Kurt just said, I would assume that if you choose to approve this motion, we would be doing so with the assumption that there will be fairly extensive follow up to get clearly defined measures and specificity that he is talking about. Thank you.

CHAIR BORDEN: Next I've got Jason McNamee. While I've got the floor, Toni, would you take the names off who are not Board members, because it gets very complex looking at the list, and trying to scroll down it. Just Board members. Jason.

DR. McNAMEE: I will also start it off my saying, I like the motion that is before us here. That kind of, you know I think gets at the tube and worm issue that we've heard about, and we'll collect some data. It allows Rhode Island the chance to potentially get involved, so I like this one.

I also appreciated Emerson's comment, and also Bill's comment just a moment ago. I wonder if I could ask Toni a question, and that would be. Maybe I'll start it by offering what I'm thinking, and that is, Mike Armstrong earlier mentioned, we need a better definition of bait, and I agree with that. I don't think we should make a definition on the fly here. What I was wondering is how long it would take, and if there is an opportunity to develop an addendum, where we address that, the bait definition. While the Addendum is being developed, in the same way that this motion is delaying things.

I was thinking we could delay implementation until we get that definition squared away, although I don't want that if we're talking about years. We would need to think of another mechanism. I'm hoping to have some more time to think through a good definition for bait, and I'm wondering if someone can advise as to the best mechanism for doing that, to address the pork rind bucktail part of this.

MS. KERNS: Mr. Chairman, I think that's a question to me. The timeframe to develop the Addendum would really depend on all the issues that you include in it. A definition for bait probably is something pretty simple. We already have a list of what everybody uses. But note that during this time we have quite an extensive and lengthy PID that will be going out to public comment. I'm assuming we are going to have many hearings on that.

We'll have to balance the workload to do those hearings, and write an addendum at the same time. I don't know if you're looking for an addendum to go out sooner than, like you wanted it fast tracked, or is it something that we would bring back to the Board for their review in May? If we start to include additional gear types or rigs, or other issues. I guess it depends on what the background is for those things, and how much work we need to put into it, to write up those regulations.

DR. McNAMEE: Well, thanks, Toni. I appreciate everything you said, Toni, and it would be my intent to do something focused on the definition of bait as

quick as possible. I think you've offered some good feedback, and I'll think on that for a minute, and maybe others will chime in while I'm contemplating writing up a motion here.

CHAIR BORDEN: I've got Justin Davis and then Jim Gilmore.

DR. DAVIS: I completely agree with everything Jason just said. You know we've spent a couple hours now talking about this issue about tube and worm exemption. This is only one of the sorts of unresolved areas around this mandate. I mean there is the definition of bait, there is the whether or not we're going to let people use pork rind.

There is this issue that I've mentioned previously about whether or not this rule is a prohibition on all take of striped bass with a J hook. To me, these are issues that we have to work through, and we have to do it relatively quickly, because Connecticut and I think a lot of states, we already have rules on the books about this circle hook mandate.

We've already been engaged in outreach to our anglers. I'm getting questions from our anglers that I don't have a good answer to. You know the fishing season is coming in a few months here. If we're not going to just full-scale delay implementation of the circle hook mandate full stop, which I don't sense there is a lot of approval for on the Board. I do think we need to resolve some of these issues. I think it has to happen in concert with the Law Enforcement Committee. I don't know, I suspect an Addendum is going to take too long. I wonder if we're maybe just talking about something like a Technical Guidance Document that a workgroup can work on, in conjunction with the Law Enforcement Committee, and essentially develop definitions and interpretations of the mandate, that then give guidance to states on how they are supposed to interpret it.

I just have real concerns that we have all these unresolved issues, but we already put the mandate in place, and you know the fishing season is coming in a few months. I just need to find some way to get clarity, to communicate to my anglers about what exactly the rules are. I'm not sure exactly what the answer is, but I think it's got to happen on a fairly short timeline, and it's something which we really need input from the Law Enforcement Committee on in some of these issues.

CHAIR BORDEN: I voice my own view that I think that was a useful point that you raised about a Technical Guidance Document. Maybe we could do something like that, and kind of put a small group together with Enforcement, maybe a couple of Board members, and work through the issues that have come up, you and Emerson and others have raised, and try to standardize it.

Basically, send it out to the states, and suggest that it be part of a package that they finally implement now. I guess the problem that I'm having with trying to rush an Addendum. We haven't even crafted or identified all of the issues we want to kind of sort through. This is going to take a little bit of time. But I think you probably could do it, have meetings over the next couple of weeks with a few participants, sort through the issues, and then kind of standardize the language, and get something we could immediately send out.

Granted, it wouldn't be a plan requirement, but I think most of the states are trying to make good faith efforts to not only standardize the regulations, but do something that is in the best interest of the striped bass resource. I also think the constituency is trying to encourage us to do that. I think that is a really useful suggestion, and I would encourage people to think about it more. I've got Jim Gilmore.

MR. JAMES J. GILMORE, JR: Justin and J. Mac beat me to the punch, because I'm on the same page. I don't have an issue with the motion before us, but when we went to caucus, we got phone calls from the surf community, and then we heard that public comment that we've got surf fishermen that have the same argument, that they are using bucktails and eel skins, whatever.

Again, they don't gut hook the fish, but that is a different technique. Then if we start doing it this way, we're going to get to exactly what the concern was two hours ago, that we're going to have this list of 7,000 things on here that are exempted. We really, unfortunately, aren't ready for prime time, because we have to define this better.

I think Emerson's comment before was that when we've got some exemptions on fishing techniques that really don't gut hook fish, and then some of those exemptions, actually may fall into a definition for natural bait. You really can't separate the two issues. Unfortunately, we're going to have to take a pause here, because if we put this thing through and did a couple of exemptions, I think this thing will be worse, as opposed to taking a little bit of time and trying to better define this. But my concern like everyone is, I've got my rule out on the street right now, and you know we're trying to get it in place before the fishing season opens up. Again, if we can do this quickly, I think that's the prudent path forward at this point, so we can get this right, and we don't have some group excluded, because we didn't really examine it properly.

MR. HASBROUCK: Mr. Chairman.

CHAIR BORDEN: Who just said, Mr. Chairman?

MR. HASBROUCK: Emerson Hasbrouck.

CHAIR BORDEN: Emerson. Go ahead.

MR. HASBROUCK: I have a possible way forward here, if you want me to make a motion to amend at this time.

CHAIR BORDEN: If you would like Emerson, or I would give you the flexibility to just say what you want, or are suggesting, so that people can think about it, and we don't bog down in the process.

MR. HASBROUCK: Okay, what I'm thinking about then, I'll just give you my thoughts, rather than making a motion to amend. That we charge the Technical Committee and whatever other participants they choose, to develop a definition of bait to be used with the circle hook requirement, and the Technical Committee will report back to the Striped Bass Board at a special Board meeting early March, 2021.

CHAIR BORDEN: Okay, so that is a different motion, Emerson. My actual preference would be to deal with this motion, and then go to your motion, and any other motions. I think Jason McNamee may have another motion he wants to put up. Comments on the motion, any further comments on the motion? Do the members need a time for caucusing?

MR. APPELMAN: I have a hand up, Dave.

MS. KERNS: Can I give the list? There have been a series of people that have had their hands up in waiting for a while, if that's helpful, David. It was Megan Ware then Ritchie White and then Max.

CHAIR BORDEN: Okay, and then Toni, you got an e-mail from one of the members of the public that wanted to speak. Do you want to say what that individual wanted to suggest?

MS. KERNS: I had promised that I, when we were going to the public, I promised Dominick Pucci that I would relay his comments, because he couldn't speak. Here is his comment; that folks are tired of hearing insane things. We all know that tube and worm rigs do not gut hook fish. Fifty years of fishing taught him that. It would be nice for your fishing public to see sanity reign, and you allow this study to be done. It would give the Council a better position in the public's eyes.

CHAIR BORDEN: Okay, so next on the list I've got Megan Ware and then Max, and then Ritchie.

MS. WARE: I think talking about the study for tube and worm and the definition of bait are two separate things. I would encourage the Board to keep those separate. It certainly sounds like we need a conversation on the definition of bait, but perhaps

that's the next agenda item. The other thing I'll comment.

I think there was a question about specific regulations for tube rig exemption, and I would just note that within the Maine/Massachusetts proposal, Maine regulatory language is in there that we have been using, so that could be a template for other states, if you're interested. Thank you.

CHAIR BORDEN: I've got Max and then Ritchie White.

MR. APPELMAN: Listening to all the comments here. I want to first just say that I agree with a lot of the comments that were made from several Board members now, I can't keep track of them, about pursuing some sort of Technical Guidance Document to clarify some of the issues that have come out related to circle hooks.

I think I'm very interested to hear how that dialogue continues. However, on the motion before the Board. I'm going to have to reiterate some of the concerns I noted earlier. That we don't support this motion right now, on the basis of procedure, you know without technical review of the study design.

I heard a couple Board members earlier in the conversation, Dr. McNamee, and maybe Roy Miller. They offered ways to improve the study design, just in conversation. I think this Board could really benefit from a thorough TC review, just to ensure the data collected will actually answer these questions, perhaps the TC could even offer another way to answer these questions. For those reasons, we just can't support this motion right now.

CHAIR BORDEN: Let's see, I've got Ritchie White.

MR. WHITE: First of all, after Kurt's weighing in on a study. This is not a study. This is allowing all the states to open up and exempt the use of circle hooks for tube lures for two years. Then part of that will also saying that Maine and Massachusetts will do a study. We have no details on the study, so we don't know if the study includes both circle hooks and mortality on the J hooks.

How many people are going to be studied? What kind of data, how is the data analyzed? We have no details on that, and we have no details from the Law Enforcement, talking about the issues of loopholes with this regulation. I just think we're rushing this thing. This is not the way the Commission normally acts.

The Commission wants to get information, and then we make a decision on the information we have. We don't have information here. I certainly am going to be opposed to this. I'm in favor of studying this. I'm in favor of figuring out whether we can do this use of J hooks. But this is not the method to do it.

CHAIR BORDEN: Toni, do we have any other Council members that have their hand up?

MS. KERNS: You have Mike Millard and Jim Gilmore.

CHAIR BORDEN: Mike Millard, and then Jim Gilmore. Then I'm going to call the question.

MR. MIKE MILLARD: The Fish and Wildlife Service is opposed to this motion as it's written now, primarily for the same reasons as the previous two speakers; Max and Ritchie. The process could use a little more vetting, I think, especially the study plan. Another issue, I guess a question in my mind is, the impetus for this seems to be a fundamental assumption that circle hooks won't work, and Ritchie brought this up earlier.

We've heard from a lot of experienced fishermen, who say there is no need to switch off J hooks. I suspect that might be true. But another view might be well, I haven't really heard a good reason why we shouldn't switch, or there is no need to not switch to circle hooks. Several professional fishermen have spoken, and not answered that question. The Services, has it been to grant exemptions to a conservation-oriented measure on a resource that is

overfished, and overfishing is occurring on a coastwide basis.

CHAIR BORDEN: Jim Gilmore.

MR. GILMORE: A question, and maybe a suggestion. If this motion passes, then the only thing we would be doing would be allowing the tube-rig fishery. However, those other techniques that were raised, for instance an eel skin or a pork rind on a bucktail, those different things. Those still would not be allowed, so that's the question.

If that's the case, then my suggestion would be is that we would postpone this motion until we have at least the work done by this group we're putting together, and maybe up until the next meeting. But we could do it quicker, but I think we need that information, before we can actually act on this motion, if it's only going to allow for the tube-rig fishery.

CHAIR BORDEN: All right, I've got another hand that just came up. Mike Armstrong.

MR. ARMSTRONG: I just wanted to, there have been some comments about the study, and needing to see more details, and that's fine. We can provide that to the TC. But I will say that for the last five years we've been doing mortality studies with state-of-the-art acoustics, we've done cod, haddock cusk, all published. We're in the middle of a huge striped bass terminal tackle study, which will actually be an adjunct to this. If anyone is not confident that we can accomplish the study very effectively and scientifically rigorous, I would like to lay that to rest.

CHAIR BORDEN: I think the only other Board member that I have a hand up for is Tom Fote.

MR. FOTE: Yes, Dave, I think we have to answer before. These regulations about bucktails and things like that need to be addressed. We're more moving ahead with regulations. Are we going to postpone the regulations? Basically, is that a decision we're going to make today? We need to address this after we finish with this.

Again, because of the way it's written, I know that New Jersey cannot participate in this, because I don't think we have the funds or the money to do any of the studies. I can't support just allowing two states to do that, but I'm not sure what my other two Commissioners will basically vote on.

CHAIR BORDEN: My suggestion here is we vote on the motion, and then we'll deal with whatever situation develops as a result of the vote. I mean if it passes that sends us in one direction, if it fails it's going to send us in a slightly different direction. I'll give everyone a two-minute caucus break.

MS. KERNS: David, I think there was an issue. I'm sorry to interrupt. Bill Gorham, who is a Commissioner had his hand up, but I think there is a confusion in what was up and down, and he did say he wanted to speak, and then you also have Bob.

CHAIR BORDEN: Bill Gorham, and then we always listen to our Executive Director. Bill.

MR. BILL GORHAM: This is my thoughts on this, being from someone in the industry. It's clear that this fishery is kind of caught up in this circle hook rule that is geared towards a stationary bait, and this tube rig season used to be the unique fishery, in that it's not necessarily stationary, but it's moving.

I think even from an industry standpoint, the one or two years allows them to transition out. I can only imagine how many tube rigs are made up with J hooks. I think with the pandemic going on, that it would be very mindful for the Commission to hear, and allow this to happen. Hats off to the state to coming to us with a research proposal. Thank you, Mr. Chair.

CHAIR BORDEN: Bob Beal.

EXECUTIVE DIRECTOR ROBERT E. BEAL: I just want to follow up on Tom Fote's comment from a moment ago. Make sure everybody knows, that everybody is on the same page what this motion means. You know

this motion means that all states would be allow to delay implementation of the circle hook requirement for tube and worm rig for the next two years, through the end of 2022.

Two of the states, Maine and Massachusetts would conduct a study, the way it's written now. Well, I don't know, maybe the second sentence doesn't say that. But it seems to be ambiguous on, do you have to be in the study to avail yourself of this exemption, or not, because the first sentence says delay implementation for all states, and the second, other states wishing to participate in the study need to submit a letter within two weeks to do that. I think maybe we need to go back to Megan to get exactly a clarification for what the motion means.

CHAIR BORDEN: Megan, do you want to comment, or Mike Armstrong?

MS. WARE: Yes, I'll comment, and Mike if I say anything wrong, just hop in. I think your original interpretation is correct, Bob, where this is going wit the second option in this proposal that delays implementation of the circle hook requirement for tube rig gear for all the states, and then subsequently, if any of those states want to participate in this study, they need to submit a letter to ASMFC.

EXECUTIVE DIRECTOR BEAL: Mr. Chairman, so Tom, just so it's clear. Under this motion, if you vote in favor of this motion, all states would be exempt from the requirement, and as of now, Maine and Massachusetts would do the study. If other states want to sign on to the study, you know, send a letter within two weeks to ensure data consistency. This does apply to all states and does delay implementation of circle hook requirement.

MR. FOTE: I just want to say, I didn't understand it that way, but now I understand it, and I can support it.

CHAIR BORDEN: All right, I'm going to have a two-minute caucus. Maya, if you could set the clock, that way everyone will use the same two minutes, and then we'll call the question. All right, you've had two minutes; is everybody finished with their caucus? What I would suggest is that we vote, and then deal with the situation after the vote. All those in favor, Toni, if you could clear all the hands up, please. All those in favor of the motion, signify by raising your hand, and then I would ask that Toni read the list of states that vote yes.

MS. KERNS: Well, Dave, I'm just trying to get it settled. Okay, we have Connecticut, Rhode Island, Pennsylvania, Maine, Virginia, Delaware, Massachusetts, Maryland, New Jersey, North Carolina, and PRFC. That is 11 by my count. I'm going to clear the hands.

CHAIR BORDEN: All those states that want to vote no, please raise your hand.

MS. KERNS: I have U.S. Fish and Wildlife Service, NOAA Fisheries, New Hampshire and New York. Mike Armstrong, your hand is up, I don't think it is supposed to be. Okay, just confirming. That is 4 by my count.

CHAIR BORDEN: Any abstentions?

MS. KERNS: Let me put the hands down really quick, now you can raise your hand for abstentions.

CHAIR BORDEN: Any abstentions? There are no hands up, so it's 0, any null votes? I don't see any null votes. We have 11 to 4, 0, 0 is the vote, the motion passes. Now we had a suggestion for a follow up motion, and I can't recall who made that. Does someone want to make a follow up motion on forming a subgroup to develop technical guidance on the definition?

MS. KERNS: I believe it was Jason, Mr. Chairman.

CHAIR BORDEN: Jason McNamee or Emerson. Jason, I'll call on you first, and then Emerson is next.

DR. McNAMEE: To not hone in on Emerson's turf, maybe. I have one clarification question. We have

talked about two things to address the bait definition issue. We've talked about a fast-track addendum, or a guidance document, and my question is, and I think it's to Toni or Bob is, will a guidance document, I'm assuming that can be done quicker, so would a guidance document that accompanies the original action. Is that adequate? Does that carry weight in this process, or do you believe we need an addendum?

MS. KERNS: Jason, I'll give you a try, and I guess Bob can correct me if I'm wrong. A guidance document will provide information to the Board, relative to an interpretation of, I guess what's in the Addendum. Whether it has regulatory teeth to that. I'm going to pass that buck to Bob.

EXECUTIVE DIRECTOR BEAL: Is it okay if I chime in, Mr. Chair.

CHAIR BORDEN: Yes, Bob. Before you do that. Let me just kind of repeat what I said before. Technical guidance, if we were to put together a small group and work, so a small group of Commissioners, experts, enforcement. They'll get together, they would talk through these issues that have been floated about jigs and pork rind and eel skins on plugs, and so forth.

Then they come up, they write up a technical guidance document. It seems to me that it's advice to the states. But the states then have the ability, through their own regulatory process, which is fairly short in some cases, to then use that technical guidance to go out and promulgate regulations. The thing that we lack here is the teeth of the Commission power, forcing everyone to use the same regulations.

But in this case, I would just offer the personal opinion that I think the states are acting in good faith collectively, on this issue. We may be able to get by with at least initially, with a document that's technical guidance, and if we think that doesn't do the work that it's intended to do, then follow it up with an addendum. Let me just close by saying, Bob, you're free to disagree with me, if you have a different opinion.

EXECUTIVE DIRECTOR BEAL: Thanks, David, I don't know if it's different. If we go down the road of establishing a definition of bait, and establishing the definition of other gears that are exempt, and we do that through a technical guidance document. You know we've never gone down this road of compliance, relative to like a technical guidance document, or an interpretation of an existing addendum.

I think the more enforceable way of doing it would be through an addendum. However, maybe the technical guidance document works as a placeholder for a couple years, while the larger amendment that we're working on gets wrapped up, but we can roll it into that toward the end of that process. But you know, I think if some states need a binding document to force their hand, to make sure these regulations are implemented, an addendum is a cleaner process to do that. I get the drawback to the length of doing an addendum. The other part of this, which is essentially time consuming is, what level of public comment, public interaction does the Board want to have when coming up with these definitions. Obviously, the public has chimed in here a lot. I think a working group and all the members of the Board have a strong understanding of what the public is looking for.

A number of different gear configurations that would need to be considered as this document moves forward, and the definition of bait moves forward, and everything else. The bottom line is a technical guidance document can work, but it may be less enforceable and less binding, should a compliance question come up down the road.

CHAIR BORDEN: Jason, back to you.

DR. McNAMEE: I would like to hear, if Emerson is still in the queue. I know he had kind of put forward something he was thinking about that was kind of similar, and Emerson has a lot more experience about this sort of thing than me, so I would be interested in hearing from him first, if that's okay.

CHAIR BORDEN: Emerson.

MR. HASBROUCK: I had a draft motion, I sent it to Toni. Toni, I don't know if you can post it? I'm not sure who has control of the meeting board here. But if you needed to send it to somebody else. I don't know if this works, but I'll make the motion, and if I get a second then we can have some discussion, and I'm certainly open to friendly amendments here, in terms of the wording, to get it to do what we need it to do.

MS. KERNS: Emerson, I sent it to Maya, let me go back to it, I opened it up. My first reaction is that you are charging the Technical Committee to develop a policy question. I don't think it's the right body. I would say maybe if a group of Commissioners or a Plan Review Team, focus it on more, well maybe not even the Plan Review Team, because that has a lot of the TC members on it. But those folks that are normally writing regulations.

MR. HASBROUCK: Yes, that is what I was getting at, you know when I said the Technical Committee to work with others, right to develop a definition of bait that would require the use of circle hooks, and then this group will report back to the Striped Bass Board at a special board meeting, to take place early March, 2021. That way the Board can craft a motion, and vote it up or down or amend it, similar to what we just did today. I mean we didn't take this tube and worm rig out through an addendum, we just brought it up today and voted on it as the Board.

I don't know why we can't do something similar here in a few weeks, to take care of this issue, at least short term anyhow. We can revisit it if we need to during the season or after the season, a year from now we can revisit if we need to. But at least let's get some consistency here from state to state, in terms of what has to be used with the circle hook. Therefore, other things that don't have to be used for a circle hook are exempt by definition, or we can define them, however we want to craft it going forward.

MS. KERNS: Emerson, there are a couple things in there, just to follow up on. I'm just not sure the Technical Committee is the right body to work on this issue, and that it might behoove us to have different folks do it than them. Then the second part is, you know what we did today, I think, was in bounds of, the process that we followed was in bounds of the Addendum, where the Addendum had noted that states could ask for exemptions through their state implementation plans. I think that is where Maine and Mass felt that they were going through.

Whereas, the Addendum has a very loose definition of bait that is not very definitive for everybody, and there were different interpretations with states of that definition. That is where I think a working group of Commissioners, or policy type makers would be best served to come up with a definition, and then I would leave it to this body to determine, as Bob said, if there wants to be a regulatory teeth behind it or not.

Then I think this body also can then speak to other exemptions, and then those exemptions could then be run past the Technical Committee if necessary, but we would need to provide some boundaries in which you want the Technical Committee to evaluate those exempt. What are you looking for from them in order to do that? Of course, you would want to include Law Enforcement representatives on this regulatory body as well.

CHAIR BORDEN: Toni, do you have a language change that you want to suggest to Emerson?

MR. HASBROUCK: How about if we change it to, we create an ad hoc committee to develop a definition of bait that would require the use of circle hooks, and a possible list of items exempt from the use of circle hooks, and this ad hoc committee will report back to Striped Bass Board, et cetera. Again, I'm willing to change this however we need to, to make it work.

CHAIR BORDEN: Toni.

MS. KERNS: Maya, if you could change the language to say create an ad hoc committee established by the Chair, and then in the second sentence say this committee. Emerson, I think we can do this for early March, but only if it's just a definition of bait. If any other issues are in there, I don't want to make any promises that we can resolve those sooner than that.

MR. HASBROUCK: Oh, I thought you wanted to see something in here with language about exemptions.

MS. KERNS: I wasn't sure if that was where you were going, since that was part of the Board's discussion. But if it's just the bait definition, we can definitely do that, you know early March. If it's other exemptions, I just don't want to promise that timeframe.

MR. HASBROUCK: Well, I think there is some expectation on the part of the public that there could be other exemptions. For instance, and I'll just use this as one of those. A pork rind on a bucktail. But if the definition of bait does not include, for instance a pork rind or animal hair, then that would be excluded, right? We could probably get around it that way.

CHAIR BORDEN: All right, so Emerson, are you satisfied with the motion?

MR. HASBROUCK: Yes, as long as it satisfies whatever requirements we need to do as a Board, and I'll defer to Bob and Toni, as to whether or not this is adequate. But if it is, I'm fine with it.

CHAIR BORDEN: All right, Jason McNamee, you indicated you might want to second this. Are you seconding it?

DR. McNAMEE: Yes, I have my hand up to that affect.

CHAIR BORDEN: I've got like 10 hands up, so I can't discern who is voting or not. We have a motion and a second. Discussion by the Board on this motion. I've got a bunch of hands up. Justin, do you want to talk on this motion?

DR. DAVIS: Yes, thank you, Mr. Chairman. I think this is a step in the right direction. My concern is that developing a definition of bait, and it sounds like also relatively talking about additional exemptions that should be considered, are not the only issues that need to be addressed.

Particularly this thing I've alluded to a couple times about, you know whether this circle hook mandate is intended as a prohibition of all take of striped bass with a hook other than a circle hook. I haven't really discussed that at length yet, but I think that's another issue that needs to be addressed, and also given that we've just decided there is going to be an exemption for tube and worm rigs.

Somebody needs to draft consistent standard regulatory language that states can use or refer to when implementing that exemption. I don't think it makes sense for states to all go back home and come up with ten different definitions of a tube and worm rig, to write into their regulations. I just think this doesn't fully capture the scope of the issues that need to be addressed.

CHAIR BORDEN: Emerson, is it your intent with this, and just looking at the motion, is it your intent with the ad hoc committee that we would have members of the Law Enforcement Committee participate in this dialogue, because that's been discussed a number of times. I would just as soon avoid a lot of wordsmithing on this. But is that what your intent is?

MR. HASBROUCK: I think it would be very helpful to have Law Enforcement involved in this discussion.

CHAIR BORDEN: Okay, thank you very much. The next person I have on the list is Roy Miller, and then Megan Ware.

MR. MILLER: I can be very brief. I would just add that Law Enforcement and someone from our Striped Bass Advisory Panel ought to be on this ad hoc committee, someone who is familiar with the type of fishery, and that type of fishing. Also, I would urge them to

consider plastic baits that look, smell and taste like real bait, power baits, swimming shads, those kinds of things, become somewhat indistinguishable from bait, because they have an odor and a taste. Thank you.

CHAIR BORDEN: Megan.

MS. WARE: I guess maybe I feel like there is like a two-step process here, and the first step is what are our existing definitions of bait in the states. I know Maine has a definition of bait, sounds like it's maybe different from other states. If this ad hoc committee gets established, I might recommend that that is the first step that they do, is just to understand what definitions are out there, and then identify a preferred one.

CHAIR BORDEN: I've got Mike Luisi next, and then Joe Cimino.

MR. LUISI: Yes, so I just wanted to comment on the fact that I know at least in Maryland we have a definition of bait, and we would be happy to share that with this Committee. I just don't know, at the end of the day is it the intent that this Committee is going to provide a definition that the states would formally have to implement, or are we going to need to consider changing the current definitions that we already have?

You know I guess that is where my, it's not concern, I'm just trying to figure out from a state perspective, what this Committee is going to, if the definition is going to be determined. Is it going to be, I guess this is a question for you, Mr. Chairman, is it going to be a mandate that the states then need to change their own definitions of bait, or is it a suggestion that this is what they would be considered at? I'm just wondering, as far as process how that goes.

Then while I have the floor, I'll just mention that I believe that at the conclusion of the public hearings on the nine elements of the amendment that we're discussing, that there is probably going to be some discussion about maybe not moving forward with all nine elements. If an amendment or a parallel addendum was going to be considered. My hope would be that we would delay that initiation of that addendum until after we decide what's going to be part of the amendment. I'll stop there, thanks.

CHAIR BORDEN: Mike Armstrong.

MR. ARMSTRONG: This solves one of the problems, like we could define unnatural baits like a pork rind, to eliminate that problem. But it doesn't get rid of the worm, just the definition of bait, because clearly worm is a bait. But we're looking at the manner of fishing too, because on the end of a tube lure it's fine.

But if you just throw it with a weight, and throw it to the bottom, then I don't want to see J hooks being used for that. That is a circle hook application. I don't know if the maker of the motion, I don't know how to perfect it. The definition of bait and method of fishing. They are kind of combined together.

CHAIR BORDEN: Mike, are you suggesting that as a perfection?

MR. ARMSTRONG: Well, if that makes sense. I guess I would ask others, to develop a definition of bait and method of fishing that would require the use of circle hooks. Maybe that gets it there.

CHAIR BORDEN: To you, Emerson, and Jason. Do you accept that perfection?

MR. HASBROUCK: Are you calling on me, Mr. Chairman?

CHAIR BORDEN: Yes.

MR. HASBROUCK: I understand what Mike is trying to get at here, but I think what we need to do is to get a definition of what bait is going to require the use of circle hooks, and I think if we start to talk about how a method of fishing. I'm wondering if we're going to be able to accomplish that in short order here, early March.

We just allowed a two-year exemption for tube and worm. I don't have a concern, right that the tube and

worm issue is going to be at all compromised by what comes out of this ad hoc committee. If we need to revisit that we can at the end of two years, or even just have something in place for a year from now to talk about method of fishing. That is my take on it anyhow.

CHAIR BORDEN: We do not have a perfected motion, we have the existing motion, so if you would, just generate your comments and focus them on the motion. Joe Cimino, and then William Hyatt.

MR. CIMINO: I think that is unfortunate, because now I'm not sure I can really support this, because I think there is a lot more needed. I liked what Mr. Armstrong was suggesting as an amendment, and again going back to what Justin Davis has said, and my concern. All of our staffs are going to have to answer the question, if I accidently catch a striped bass fishing for something else that is otherwise legal, do I have to throw it back, since it was caught on a J hook?

If we don't have that discussion, I think we're doing ourselves some disservice. An ad hoc group like this may be the one to answer that, because biologically and for the resource, the best thing may be to do is to keep that fish. But from a Law Enforcement standpoint that may make these regulations completely impossible to enforce. I really would like some discussion at something like an ad hoc committee to happen on that issue.

CHAIR BORDEN: Joe, I guess my only question, just following up on the point you made. Do you want to perfect this motion? Do you want to amend this motion?

MR. CIMINO: Yes, I appreciate that Mr. Chair. **Yes, I think I will. I mean I would like to add the concept of method of fishing, and perhaps my hope is that the idea of, or maybe add method of fishing and incidental catch.**

CHAIR BORDEN: Is that a perfection? You've got two choices, you can perfect it with the maker of the motion and the seconders agreement, or you can propose it as a motion to amend.

MR. CIMINO: I would propose it as a motion to amend. I understand that especially since Emerson has already said that he would prefer to keep it the way it is. I would make that as a motion to amend.

CHAIR BORDEN: All right, is there a second on the motion to amend? Toni, you're going to have to help me with the hands.

MS. KERNS: Yes, and if I can just help Maya with the motion to amend. Maya, if you can write move to amend to add method of fishing, and Joe, I missed, I just wasn't writing down fast enough. I was too focused on what I was writing down.

MR. CIMINO: No problem, Toni, I'm here, so method of fishing, again that would require the use of circle hooks, and how to handle incidental catch.

CHAIR BORDEN: All right that's a motion by Joe Cimino, and who would like to second it?

MS. KERNS: I think we have Justin Davis.

CHAIR BORDEN: Justin Davis is the seconder, discussion on the motion to amend. We've had a lot of discussion on the motion to amend already. Does somebody want to make a new point on it? Toni, I can't call on the hands up, because they are the same hands that have been up.

MS. KERNS: I think Bill Gorham had his hand up, it wasn't up before. You had called on Bill Hyatt before, I thought. I don't think he spoke, and then you have Tom Fote, Maureen Davidson, and Max Appelman.

CHAIR BORDEN: Okay, so Bill Hyatt is next, and then Toni, would you revise the list of hands to reflect who has their hand up, please?

MS. KERNS: Will do.

CHAIR BORDEN: Bill Hyatt.

MR. HYATT: Before this amendment was put forward, I was going to suggest that the problem we're facing is pretty clearly evident in the record of this discussion. I thought it was sort of implicit in the original motion that this ad hoc work group would be asked to address the suite of issues that came up over the course of this discussion, and report back with guidance.

That guidance could be subject to further discussion, and could be decided what could move forward, (breaking up) the need to do an amendment. However, that being said, I'm absolutely fine with the motion, and I'm absolutely fine as amended, so thank you.

CHAIR BORDEN: All right, Maureen, you haven't spoken I think today, or maybe once. I'm going to call on you next, Maureen.

MS. MAUREEN DAVIDSON: Hello. I just wanted to add, if we were to vote on the motion to amend, might we also consider changing the early March 2021 date, since we're going to be adding more work for the ad hoc committee to do in the next month?

CHAIR BORDEN: I can't respond to that, Maureen, because you are broken up. If somebody on the staff heard here full question, please respond.

MS. KERNS: I can respond, I heard you, Maureen. As I said before, I was a little concerned, but depending on what this committee has to do, it could be difficult. I would suggest maybe we add a qualifier to the end of the motion to say, or as early as possible.

MS. DAVIDSON: Okay, that's fine with me if the makers of the motion would agree with that.

CHAIR BORDEN: All right, next I have, William Hyatt has already spoke, Max, I think you're next.

MR. APPELMAN: I didn't take my hand down quick enough. I was going to make the comment on timing. It seemed like a pretty tall order for March, given how complex we already know all these topics to be.

CHAIR BORDEN: I've got Bill Gorham, oh excuse me, Tom Fote and then Bill Gorham.

MR. FOTE: Yes, somebody said in the early part of this meeting that we've lost credibility, because people were supporting the circle hooks, but they didn't support how we're interpreting the circle hooks by some of the states. We really need to get this straight, since we have lost confidence in the public out there, in the processes that we've been using. They thought they got a circle hook; and now it's basically, they didn't realize it was going to come up bucktails and pork rinds and things like this. That's the reason I support both of these, the motion and the amended part of the motion.

CHAIR BORDEN: Bill Gorham.

MR. GORHAM: I apologize. I know I'm going to add to a lot of discussion here. But I'm just looking over some of the state definitions of natural bait, and it will probably have to happen after this motion, or if somebody wants to add it now. But I believe we need to clearly state that natural bucktail and feathers aren't included as natural bait. Again, looking at some of these definitions in states, right now bucktails and feathers fall within natural bait.

CHAIR BORDEN: I've got Emerson and then, actually just Emerson, you're the last one. Then I'm going to call the question.

MR. HASBROUCK: I don't know if I can do it at this point or not, I'm just responding to a couple of comments that were made on timing. But I would be willing to say, or to add in there, or as early as possible. I don't know if I can go back and do that now, since we have the motion to amend in front of us. But just to let people know, I'm open to that suggestion.

CHAIR BORDEN: All right, so Emerson, if this passes you'll have an amended main motion on the table,

and then if you want to perfect it at that point, I think it would be appropriate.

CHAIR EMERSON: Thank you.

CHAIR BORDEN: Is there anyone else who has not spoken at this point? I think pretty much all the hands have had multiple opportunities to speak on this subject. I'm going to call the question, and a one-minute caucus, please. All right, we're back live. As we've done before, if you want to vote you have to raise your hand. After you vote, you take your hands down, and we'll do the next vote. All those in favor of the motion to amend, please raise your hand, and then Toni, would you please call off the states so it's part of the record, and give me the total.

MS. KERNS: Yes. I have Connecticut, Rhode Island, Pennsylvania, Maine, Virginia, Delaware, U.S. Fish and Wildlife Service, NOAA Fisheries, Maryland, New Jersey, New Hampshire, North Carolina, New York, and PRFC, 15. Set the hands down.

CHAIR BORDEN: Total please.

MS. KERNS: That's 15. That is, I believe a unanimous, yes.

CHAIR BORDEN: Total yesses, Toni.

MS. KERNS: Fifteen.

CHAIR BORDEN: Okay, thank you. We have 15 yesses, take all the hands down. All those opposed to the motion, please raise your hand, there are no hands up, any abstentions? Any null votes, 15, 0, 0, motion passes, so you have an amended main motion. Emerson, you had spoken about the need to address the timing so that it would say, or as soon as possible. Is that still your intent?

MR. HASBROUCK: Yes, Mr. Chairman, if Roberts Rules allows me to do that now that it has been amended, but if everyone is okay with it, I'm fine with adding in at the end there, after it says March 2021, add in, or as early as possible.

CHAIR BORDEN: Jason, is that acceptable with you as the seconder?

MS. KERNS: Hey Maya, if you can stop adding that there. You can copy that motion, the original motion, we need to add this amended language, and then that new language will go after the period of the first sentence, and take away the add part, just the word add. If you can put the definition of bait that will require the use of circle hooks and method of fishing that would require the use of circle hooks. I know that grammatically we could make this better, but let's just leave it at this.

CHAIR BORDEN: Are there any other perfections on this motion? If not, I'm going to call the question. Do the states need time to caucus? Anyone request time to caucus? Given the fact that the last vote was the way it was. Mike Luisi, you want time to caucus?

MR. LUISI: Yes, Mr. Chairman, just 30 seconds. I just need to ask my other Commissioners, 30 seconds.

CHAIR BORDEN: All right, 30 second caucus, please.

DR. McNAMEE: Mr. Chair, this is Jason McNamee. I just wanted to, for the record, affirm that I also am fine with the addition of that, or as soon as possible, just for the record.

CHAIR BORDEN: Thank you.

MR. LUISI: Mr. Chairman, I will nominate Dave Sikorski to be part of this committee as the newest member of the Striped Bass Board. I told him I was going to do that. I will certainly recommend Dave.

CHAIR BORDEN: Okay, what I would suggest. Let's deal with the motion. We're going to vote in the same manner. Let me see if I can do this in the interest of time, since we're significantly by our timeline. Is there any objection to this motion? If you're opposed to it then raise your hand. I've got Jim Gilmore is opposed to it. Anyone else?

MR. GILMORE: No, I'm not, I'm not. Trying to do seven things, sorry, I am in favor of the motion.

CHAIR BORDEN: I have no hands up, any objections to ruling that the motion passes by consent? No objection, so the motion passes by consent. Okay, so what else do we need to deal with on this issue? I have a couple of comments that I would like to make, but I want to first go to the staff. Is there anything else we need to deal with on this issue?

MS. KERNS: Not that I'm aware of, Mr. Chairman. See what I need to do, we'll need to put out a quest for membership via e-mail I think will be the fastest thing. We'll work from there. Jim Gilmore, your microphone is live, just so you know.

CHAIR BORDEN: That was partly what I wanted to address, Toni. I would urge the states to caucus among yourself, and if you want somebody on this ad hoc committee, then please recommend them. Do that within a week, because we're trying to move this along. You've got a one-week deadline, and then we'll pick a committee. I would just state for the record that enforcement will be a part of this committee.

The other thing I would suggest is, a number of you have raised issues that have come up, and I'm not picking on Justin, but Justin has raised a few issues that I had not considered, which is really useful for him to do that. If anybody has specific issues that they think fall into the category that this ad hoc committee will be dealing with, please put them in writing, and just send Toni an e-mail and say, think about this, think about that.

It doesn't need to be a lot of words, just try to flag it, so that when this ad hoc committee gets together, hopefully they can sort through those issues, and try to come back with some kind of recommendation that addresses those concerns. Toni, is there anything else under this agenda item?

MS. KERNS: No.

CHAIR BORDEN: The next.

MR. GILMORE: Actually, David, Mr. Chairman, just a question, it's Jim Gilmore. Just so we understand it, the state directors that have to go back that have rulemakings in process, and they have to go back to their attorneys and say, oh yes, we have a rule, but we don't know what the language is yet. But we have to get it in by April 1st when the season opens. I'm assuming we're going to have some latitude, or some understanding, because this is going to be very difficult, in terms of the legal process.

CHAIR BORDEN: Good point, Jim, and from my perspective, I think the states are going to have to have latitude, in order to deal with the really unusual circumstance. If we had known about a number of these concerns four or five months ago, we wouldn't be dealing with this at the spur of the moment.

REVIEW AND POPULATE ADVISORY PANEL MEMBERSHIP

CHAIR BORDEN: I would like to deal with the issue of, we need to populate the Advisory Panel. Tina. Do you have Advisory Panel recommendations?

MS. TINA L. BERGER: I do, Mr. Chair. One second, please. There have been several new nominees to the Striped Bass Advisory Panel; Andrew Dangelo, a Rhode Island for-hire representative, Michael Plaia, a commercial fisherman, recreational angler, and for-hire operator from Rhode Island.

Dennis Fleming, a commercial fisherman and recreational fishing guide from the PRFC, and we also received earlier this week a nomination from New York for Nat Miller, a commercial fisherman. Mr. Miller replaces Arnold Leo on the AP, so I would offer those nominees for your consideration and approval.

CHAIR BORDEN: Thank you very much, Tina. Are there any questions or comments on any of these advisors in particular? If you want to comment on any of them, please raise your hand, and lacking that I think we'll approve them by unanimous consent. Any concerns or any questions?

MS. KERNS: Mr. Chairman, could we get a maker and a seconder of this motion, please? I see a maker as Marty Gary, with his hand up, and a seconder with Dave Sikorski.

CHAIR BORDEN: Okay.

MR. GARY: Mr. Chairman, this is Marty speaking, move to approve Andrew Dangelo and Michael Plaia, representing Rhode Island, Dennis Fleming representing the Potomac River Fisheries Commission, and Nathaniel Miller, representing New York, to the Striped Bass Advisory Panel.

MR SIKORSKI: For the record, this is David Sikorski, I second.

CHAIR BORDEN: Okay, thank you, gentlemen. **We have a valid motion on the table, any discussion? I don't see any hands up. Any objections to approving the recommendation by consent? I have no hands up, the recommendation is adopted by consent**.

OTHER BUSINESS

CHAIR BORDEN: The next issue under other business. We have at least one issue, which Toni wanted to brief everyone on the striped bass tagging survey. Toni.

MS. KERNS: I don't know if Josh Newhard is still on the webinar. Josh, if you are, if you could raise your hand. There we go. Josh is going to give the update on the tagging survey.

UPDATE ON THE TAGGING SURVEY

MR. JOSH NEWHARD: I will try to be brief, but I am happy to answer any questions if anybody has any concerns or anything. The trip for tagging this year, as it has been in the previous two years, many of you may know that ASMFC has actually been funding these offshore tagging trips, as part of a coastwide tagging database that we have with our office in the Fish and Wildlife Service in Annapolis, Maryland.

We had pretty low catches in 2019 and 2020, and historically these operations have always been operated under Rudy Inlet, Virginia Beach. We just weren't seeing the fish like we have been in previous years, so this year we actually started a little bit earlier, and we started out of Ocean City, Maryland. We've completed 11 of the 13 trips, and we've had a pretty successful year so far, we've tagged 886 fish.

The fish were off Ocean City when we started, so that was nice to see, and they were pretty plentiful, especially compared to recent history. I will say that the last two trips will be conducted out of Rudy Inlet. We had a couple with a few days in a row, where we could not get out due to weather, and it was kind of a cold snap we had a couple weeks ago.

Then we had a couple days when we could get out, and we didn't see any fish, and we also got some reports of fish back where they usually are out of Rudy, so that is kind of where we are now. Like I said, it's been good. We're above our long-term average of fish caught with these hook and line tagging trips. The year has already been a success, but hopefully we can have two more good trips out of Virginia Beach.

CHAIR BORDEN: Thank you, any questions? I don't see any hands up. Toni, what other items do we have under other business?

MS. KERNS: I just have one quick item that I was going to do in my review of the Addendum document. Derek Orner has switched jobs within NOAA Fisheries, and is no longer, as you can all tell, serving on the Striped Bass Board, which also means he's no longer on the Plan Development Team.

Max Appelman is now serving for NOAA Fisheries on the Striped Bass Board, and NOAA Fisheries has nominated Max to serve on the Plan Development Team, and this would be working on specifically Amendment 7. I just need to get Board approval for that membership.

CHAIR BORDEN: Does someone care to make a motion?

MS. KERNS: David, I don't even need a motion, I just need to make sure there is no objection.

CHAIR BORDEN: Any objection to adding Max to those committees? Everyone knows his background. I see no hands up, welcome, Max, he's adopted by consensus. Any other business here? If not, let me just say that in concluding. This is a really awkward meeting we just went through on the circle hook provisions, and aside from having a few technical difficulties. It's a difficult thing for all of us to get through, with almost 300 people on it. I know the public is probably somewhat frustrated, because of the lack of ability to participate and comment. But I simply had to limit the amount of public participation on certain agenda items, otherwise we simply wouldn't have gotten through them. I apologize for that, but it is part of what we're dealing with, with the COVID crisis. Any other business to come before the Board? If not, the meeting is adjourned.

MS. KERNS: You have a member of the public with their hand raised, it's up to you.

CHAIR BORDEN: Mike.

MR. MICHAEL PLAIA: Yes, I just wanted to thank everybody for my appointment, and I look forward to working with you.

ADJOURNMENT

CHAIR BORDEN: Thank you, welcome. All right, meeting is adjourned.

(Whereupon the meeting adjourned at 6:00 p.m. on February 3, 2021)

Assessment of the Albemarle Sound-Roanoke River Striped Bass (*Morone saxatilis*) in North Carolina, 1991–2017

L.M. Lee, T.D. Teears, Y. Li, S. Darsee, and C. Godwin (editors)

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Update with corrections to text for caption of Figure 4.1
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We are appreciative of Richard Methot (NOAA Fisheries) for his help in development of the Stock Synthesis stock assessment model.

We are especially grateful to the external peer reviewers for offering their time and effort to review this striped bass stock assessment: Jeff Kipp at the Atlantic States Marine Fisheries Commission, Dr. Michael Allen at the University of Florida, and Dr. Rod Bradford at the Department of Fisheries and Oceans Canada.

EXECUTIVE SUMMARY

The North Carolina Fisheries Reform Act requires that fishery management plans be developed for the state's commercially and recreationally important species to achieve sustainable levels of harvest. Stock assessments are the primary tools used by managers to assist in determining the status of stocks and developing appropriate management measures to ensure the long-term viability of stocks.

The Albemarle Sound-Roanoke River (A-R) striped bass stock is managed jointly by the North Carolina Division of Marine Fisheries (NCDMF), the North Carolina Wildlife Resources Commission (NCWRC), and the South Atlantic Fisheries Coordination Office (SAFCO) of the U.S. Fish and Wildlife Service (USFWS) under guidelines established in the Atlantic States Marine Fisheries Commission (ASMFC) Interstate Fishery Management Plan (FMP) for Atlantic Striped Bass and the North Carolina Estuarine Striped Bass FMP. The Albemarle Sound Management Area (ASMA) includes Albemarle Sound and all of its joint and inland water tributaries, (except for the Roanoke, Middle, Eastmost, and Cashie rivers), Currituck Sound, Roanoke and Croatan sounds and all of their joint and inland water tributaries, including Oregon Inlet, north of a line from Roanoke Marshes Point to the north point of Eagle Nest Bay. The Roanoke River Management Area (RRMA) includes the Roanoke River and its joint and inland water tributaries, including Middle, Eastmost, and Cashie rivers, up to the Roanoke Rapids Lake Dam.

A forward-projecting statistical catch-at-age model was applied to data characterizing landings/harvest, discards, fisheries-independent indices, and biological data collected from the 1991 through 2017 time period. Both observed recruitment and model-predicted recruitment have been relatively low and declining in recent years. Fisheries-dependent and fisheries-independent data indicate a truncation of both length and age structure in recent years.

Reference point thresholds for the A-R striped bass stock were based on 35% spawner potential ratio (SPR). The estimated threshold for female spawning stock biomass (SSB; $SSB_{Threshold}$ or $SSB_{35\%}$) was 121 metric tons. Terminal year (2017) female SSB was 35.6 metric tons, which is less than the threshold value and suggests the stock is currently overfished ($SSB_{2017} < SSB_{Threshold}$). The female SSB target (SSB_{Target} or $SSB_{45\%}$) was 159 metric tons. The assessment model estimated a value of 0.18 for the threshold fishing mortality ($F_{Threshold}$ or $F_{35\%}$). The estimated value of fishing mortality in the terminal year (2017) of the model was 0.27, which is greater than the threshold value and suggests that overfishing is currently occurring in the stock ($F_{2017} > F_{Threshold}$). The fishing mortality target (F_{Target} or $F_{45\%}$) was estimated at a value of 0.13.

An independent, external peer review of this stock assessment approved the stock assessment for use in management for at least the next five years.

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1 INTRODUCTION

1.1 The Resource

The common and scientific names for the species are striped bass, *Morone saxatilis* (Artedi et al. 1792). In North Carolina it is also known as striper, rockfish, or rock. Striped bass naturally occur in fresh, brackish, and marine waters along the western Atlantic coast from Canada to Florida, and through the U.S. coast of the Gulf of Mexico. Striped bass are anadromous, conducting annual spawning migrations in the spring of each year up to the fall line in freshwater tributaries. In addition, after spawning portions of the stocks from the Albemarle Sound-Roanoke River, Chesapeake Bay, Delaware Bay, and the Hudson River migrate along the Atlantic coast north in the summer and south in the winter. The stocks from the Chesapeake Bay constitute the majority of this migrating population. Due to these facts, striped bass have been the focus of fisheries from North Carolina to New England for several centuries and have played an integral role in the development of numerous coastal communities (ASMFC 1998). Striped bass regulations in the United States date to colonial times; in 1639 the Massachusetts Bay colony passed a law that prohibited striped bass from being used as fertilizer to promote fishery commerce with Europe (Hutchinson, T. [1764] 1936; McFarland 1911).

1.2 Life History

1.2.1 Stock Definitions

There are two geographic management units and four striped bass stocks inhabiting the estuarine and inland waters of North Carolina. The northern management unit is comprised of two harvest management areas: the Albemarle Sound Management Area (ASMA) and the Roanoke River Management Area (RRMA; Figure 1.1). The striped bass stock in the two harvest management areas is referred to as the Albemarle-Roanoke (A-R) stock, and its spawning grounds are located in the Roanoke River in the vicinity of Weldon, NC. The ASMA includes the Albemarle Sound and all its tributaries, (except for the Roanoke, Middle, East-most, and Cashie rivers), Currituck, Roanoke and Croatan sounds and all their tributaries, including Oregon Inlet, north of a line from Roanoke Marshes Point across to the north point of Eagle Nest Bay in Dare county. The RRMA includes the Roanoke River and its tributaries, including Middle, East-most, and Cashie rivers, up to the Roanoke Rapids Lake Dam. Management of recreational and commercial striped bass regulations within the ASMA is the responsibility of the NCDMF. Within the RRMA, commercial regulations are the responsibility of the NCDMF while recreational regulations are the responsibility of the North Carolina Wildlife Resources Commission (NCWRC). The A-R stock is also included in the management unit of Amendment 6 to the Atlantic States Marine Fisheries Commission (ASMFC) Interstate Fishery Management Plan (FMP) for Atlantic Striped Bass (ASMFC 2003).

1.2.2 Movements & Migration

Numerous tagging studies have been conducted on striped bass in North Carolina and along the Atlantic Coast since the 1930s. Several older studies suggest the A-R stock is at least partially migratory, with primarily older adults participating in offshore migrations. Tag-recapture studies (Merriman 1941; Vladykov and Wallace 1952; Davis and Sykes 1960; Chapoton and Sykes 1961; Nichols and Cheek 1966; Holland and Yelverton 1973; Street et al. 1975; Hassler et al. 1981; Boreman and Lewis 1987; Benton, unpublished) indicated that a small amount of offshore

migration occurs; however, these studies occurred when the stock was experiencing very high exploitation rates and the age structure was truncated. Most of the fish tagged during these early studies were young and male. Recent research on the A-R stock demonstrates that as A-R striped bass get older they migrate out of the ASMA into North Carolina's near shore ocean waters, and then as they continue to age they participate in summertime coastal migrations to northern areas including Chesapeake Bay, Delaware Bay, Hudson Bay, and coastal areas of New Jersey, New York, Rhode Island, and Massachusetts (Callihan et al. 2014). The probability of a six-year-old striped bass (average size 584 mm or 23 inches total length, TL) migrating out of the ASMA is 7.5%. This probability increases with age, and by age 11 (average size 940 mm or 37 inches TL) the probability of migrating outside North Carolina's waters is 72.5%. (Callihan et al. 2014). Callihan et al. (2014) also found that when the total A-R stock abundance is higher there is a greater likelihood that smaller striped bass utilize habitat in the Pungo, Tar-Pamlico, and Neuse rivers and northwestern Pamlico Sound.

1.2.3 Age & Size

Striped bass have been aged using scales for more than 70 years (Merriman 1941). Scales of striped bass collected in North Carolina show annulus formation taking place between late April through May in the Albemarle Sound and Roanoke River (Trent and Hassler 1968; Humphries and Kornegay 1985). Annuli form on scales of striped bass caught in Virginia between April and June during the spawning season (Grant 1974).

Age data have been a fundamental part of assessing A-R striped bass since the first A-R assessment (Gibson 1995). The oldest observed striped bass in the A-R stock to date (in 2017) was 23 years old from the 1994 year class. The fish was originally collected and tagged on the spawning grounds during the 2007 season by the NCWRC, aged to 13 years old and was then recaptured by an angler on June 10, 2017 near Sandy Hook, New Jersey. The fish was 40 inches long and weighed 35 pounds when originally tagged. Historically, Smith (1907) reported several striped bass captured in pound nets in Edenton in 1891 that weighed 125 pounds each. Worth (1904) reported the largest female striped bass taken at Weldon that year for strip spawning weighed 70 pounds. The oldest striped bass observed in the data used for this assessment was 17 years old.

1.2.4 Growth

As a relatively long-lived species, striped bass can attain a moderately large size. Females grow to a considerably larger size than males; striped bass over 30 pounds are almost exclusively female (Bigelow and Schroeder 1953; NCDMF and NCWRC, unpublished data).

Growth rates for the A-R stock are rapid during the first three years of life and then decrease to a slower rate as the fish reach sexual maturity (Olsen and Rulifson 1991). Growth occurs between April and October. 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). From November through March growth is negligible.

Available annual age data (scales) were fit with the von Bertalanffy age-length model to estimate growth parameters for both female and male striped bass. This model was weighted by the number of data points and applied to fractional ages. Unsexed age-0 fish were included in the fits for both the males and females. Estimated parameters of the age-length model are shown in Table 1.1. Fits to the available data performed well for both females (Figure 1.2) and males (Figure 1.3).

Parameters of the length-weight relationship were also estimated in this study. The relation of total length in centimeters to weight in kilograms was modeled for males and females separately. Parameter estimates of the length-weight model are shown in Table 1.2. Predicted weight at length performed well based on both the female (Figure 1.4) and male (Figure 1.5) striped bass data.

1.2.5 Reproduction

Striped bass spawn in freshwater or nearly freshwater portions of North Carolina's coastal rivers from late March to June depending on water temperatures (Hill et al. 1989). Peak spawning activity occurs when water temperatures reach 16.7°–19.4°C (62.0°–67.0°F) on the Roanoke River (Rulifson 1990, 1991). Spawning behavior is characterized by brief peaks of surface activity when a mature female is surrounded by up to 50 males as eggs are broadcast into the surrounding water, and males release sperm, termed "rock fights" by locals (Worth 1904; Setzler et al. 1980). Spawning by a given female is probably completed within a few hours (Lewis and Bonner 1966).

1.2.5.1 Eggs

Mature eggs are 1.0–1.5 mm (0.039 to 0.059 inch) in diameter when spawned and remain viable for about one hour before fertilization (Stevens 1966). Fertilized eggs are spherical, non-adhesive, semi-buoyant, and nearly transparent. The incubation period at peak spawning temperatures ranges from 42 to 55 hours. At 20.0°C (68.0°F), fertilized eggs need to drift downstream with currents to hatch into larvae. If the egg sinks to the bottom, its chances of hatching are reduced because the sediments reduce oxygen exchange between the egg and the surrounding water. Hassler et al. (1981) found that eggs hatch in 38 hours. After hatching, larvae are carried by the current to the downstream nursery areas located in the western Albemarle Sound (see section 1.3.3; Hassler et al. 1981).

1.2.5.2 Larvae

Larval development is dependent upon water temperature and is usually regarded as having three stages: (1) yolk-sac larvae are 5–8 mm (0.20 to 0.31 inch) in total length (TL) and depend on yolk material as an energy source for 7 to 14 days; (2) fin-fold larvae (8–12 mm; 0.31–0.47 inch TL) having fully developed mouth parts and persist about 10 to 13 days; and (3) post fin-fold larvae attain lengths up to 30 mm (1.18 inches) TL in 20 to 30 days (Hill et al. 1989). Researchers of North Carolina stocks of striped bass (primarily the A-R stock) divide larval development into yolk-sac and post yolk-sac larvae (Hill et al. 1989; Rulifson 1990). Growth occurs generally within the same rates described above depending upon temperature. At temperatures ≥ 20°C (68°F) larvae develop into juveniles in approximately 42 days (Hassler et al. 1981).

1.2.5.3 Juveniles

Most striped bass enter the juvenile stage at about 30 mm (1.18 inches) TL; the fins are then fully formed, and the external morphology of the young is like the adults. Juveniles are often found in schools and associate with clean sandy bottoms (Hill et al. 1989). Juveniles spend the first year of life in western Albemarle Sound and lower Chowan River nursery areas (Hassler et al. 1981). There is evidence of density-dependent habitat utilization; when large year classes are produced juveniles are collected in early June as far away from the western Albemarle Sound as the lower Alligator River (63 water miles) and Stumpy Point, Pamlico Sound (75 water miles; NCDMF, unpublished data).

1.2.5.4 Maturation & Fecundity

Early research conducted on the A-R stock indicated that females began reaching sexual maturity in approximately three years, at sizes of about 45.7 cm (18 inches) TL (Trent and Hassler 1968; Harris and Burns 1983; Harris et al. 1984). In the most recent maturation study conducted on a recovered stock with expanded age structure, Boyd (2011) found that 29% of A-R females reached sexual maturity by age 3, while 97% were mature by age 4, and 100% were mature at age 5 (Table 1.3). In general, there is a strong positive correlation between the length, weight, and age of a female striped bass and the number of eggs produced. Boyd (2011) estimated fecundity ranging from 176,873 eggs for an age-3 fish to 3,163,130 eggs for an age-16 fish.

1.2.6 Mortality

1.2.6.1 Natural Mortality

Striped bass are a long-lived species with a maximum age of at least 31 years (Atlantic coastal stock) based on otoliths (Secor 2000), suggesting overall natural mortality is relatively low. Previous assessments have assumed a constant natural mortality (M) of 0.15 across all ages, consistent with Hoenig's (1983) regression on maximum age (ASMFC 2009; NCDMF 2010).

Harris and Hightower (2017) estimated annual total instantaneous natural mortality for striped bass using both an integrated model and a multi-state only model based on VEMCO acoustic, Passive Integrated Transponder, and traditional external anchor tagging data. The integrated model produced a study-wide natural mortality rate of 0.70 while the multi-state only model produced an estimate of 0.74 (average of 0.72 over the two methods). The estimates apply to striped bass ranging in length from 45.8 cm to 89.9 cm (18 inches to 35 inches, approximately 3 to 9 years old).

There are a number of methods available to estimate natural mortality based on life history characteristics. These include approaches based on parameters of the von Bertalanffy age-length relationship (Alverson and Carney 1975; Ralston 1987; Jensen 1996; Cubillos 2003) as well as approaches based on maximum age (Alverson and Carney 1975; Hoenig 1983; Hewitt and Hoenig 2005; Then et al. 2015). Several of these methods were applied to A-R striped bass to produce estimates of age-constant natural mortality for females and males. Values for the life history parameters required by some of these approaches were those estimated in this stock assessment (see section 1.2.4). For approaches that depend on maximum age, a maximum age of 17 was assumed for females and a maximum age of 15 was assumed for males. These maximum ages are based on the maximum ages observed in the available data within the ASMA and RRMA over the assessment time series (1991–2017). Life history-based empirical estimates of age-constant natural mortality ranged from 0.099 to 0.37 for females and from 0.090 to 0.44 for males (Table 1.4).

Natural mortality of long-lived fish species is commonly considered to decline with age, as larger fish escape predation. Several approaches are available to derive estimates of age-varying natural mortality (e.g., Lorenzen 1996, 2005). Here, the Lorenzen (1996) approach was used to produce estimates of M at age. As expected, estimates of M decrease with increasing age (Table 1.5; Figure 1.6).

1.2.6.2 Discard Mortality

Discards from the commercial gill-net fishery are broken into two categories, live and dead discards as recorded by the observer. Live discards are multiplied by a discard mortality rate, which for gill-net fisheries is estimated at 43% (ASMFC 2007).

Nelson (1998) estimated short-term mortality for striped bass caught and released by recreational anglers in the Roanoke River, North Carolina as 6.4%. Nelson found that water temperature and hooking location were important factors affecting catch-and-release mortality, consistent with previous studies (Harrell 1988; Diodati 1991).

1.2.7 Food & Feeding Habits

Several food habit studies have been conducted for juvenile and adult striped bass since 1955 in the Roanoke River and Albemarle Sound. Studies of juvenile striped bass diets in Albemarle Sound found zooplankton and mysid shrimp as primary prey items in the summer, with small fish (most likely bay anchovies) entering the diet later in the season (Rulifson and Bass 1991; Cooper et al. 1998). Adults feed extensively on blueback herring and alewives in the river during the spawning migration (Trent and Hassler 1968). Manooch (1973) conducted a seasonal food habit study in Albemarle Sound and found primarily fish in the Clupeidae (Atlantic menhaden, blueback herring, alewife, and gizzard shad) and Engraulidae (anchovies) families dominated the diet in the summer and fall. Atlantic menhaden (54%) was the most frequently eaten species and comprised a relatively large percentage of the volume (50%). In the winter and spring months, invertebrates occurred more frequently in the diet (primarily amphipods during the winter and blue crabs in the spring). Similarly, Rudershausen et al. (2005) found a diverse array of fish in the diets of age-1 striped bass whereas the diets of age-2 and age-3+ striped bass were primarily comprised of menhaden in 2002 and 2003 in the Albemarle Sound. Tuomikoski et al. (2008) investigated age-1 striped bass diets in Albemarle Sound where American shad comprised most of their diet in 2002, but yellow perch dominated the diet in 2003. The 2003 year class for yellow perch was one of the highest on record in NCDMF sampling programs, so the high occurrence of yellow perch in striped bass stomachs may not be typical (NCDMF 2010). However, it also supports other research that striped bass exhibit an opportunistic feeding behavior (Rulifson et al. 1982).

From the fall of 1995 through the spring of 2001, stomach contents from 1,796 striped bass collected from the NCDMF Striped Bass Independent Gill-Net Survey were analyzed. Unidentifiable fish parts were the dominant stomach content from western Albemarle Sound samples (35.9%), followed by river herring (33.2%) and Atlantic menhaden (16.5%). The dominance of river herring during the spawning migration supports results reported by Trent and Hassler (1968) and Manooch (1973). Blue crab accounted for 0.2% of the total stomach contents from the western sound. In eastern Albemarle Sound samples, unidentifiable fish parts accounted for 34.0%, followed by Atlantic menhaden (31.5%), Atlantic croaker (12.1%), anchovy spp. (11.1%) and spot (6.5%). Blue crab comprised 2.1% of the stomach contents from the eastern sound.

From the fall of 2001 through the spring 2010, the NCDMF analyzed 4,448 striped bass stomachs having food contents. In western Albemarle Sound samples unidentifiable fish parts accounted for 61.2% of stomach contents, followed by Atlantic menhaden (23.1%), anchovy spp. (4.0%), invertebrates (3.0%), Atlantic croaker (2.5%), and river herring (2.0%). Blue crab accounted for less than 1.0% of stomach contents in western sound samples. It is interesting to note the decline in the prevalence of river herring in striped bass diets in the western sound since 2001. In eastern

Albemarle Sound samples, unidentifiable fish parts accounted for 41.2% of the stomach contents, followed by Atlantic menhaden (40.8%), anchovy spp. (6.4%), spot (6.4%), and Atlantic croaker (2.9%). Blue crab accounted for less than 1.0% of stomach contents in the eastern sound samples as well.

From 2011 through 2017, the NCDMF analyzed 1,918 striped bass stomachs having contents. In western Albemarle Sound samples, unidentifiable fish parts accounted for 35.9% of stomach contents, followed by Atlantic menhaden (12.6%), Atlantic croaker (10.0%), and Clupeidae species (1.8%). Blue crab accounted for less than 1.0% of stomach contents in western sound samples. In eastern Albemarle Sound samples, unidentifiable fish parts accounted for 19.3% of the stomach contents, followed by Atlantic menhaden (2.4%) and invertebrates (1.7%). Blue crab accounted for less than 1.0% of stomach contents in the eastern sound samples.

1.3 Habitat

1.3.1 Overview

Habitat loss has contributed to the decline in anadromous fish stocks throughout the world (Limburg and Waldman 2009). Striped bass use a variety of habitats as described in the life history section with variations in habitat preference due to location, season, and ontogenetic stage. Although primarily estuarine, striped bass use habitats throughout estuaries and the coastal ocean. Striped bass are found in most habitats identified by the North Carolina Coastal Habitat Protection Plan (CHPP) including: water column, wetlands, submerged aquatic vegetation (SAV), soft bottom, hard bottom, and shell bottom (NCDEQ 2016). Each habitat is part of a larger habitat mosaic, which plays a vital role in the overall productivity and health of the coastal ecosystem. Although striped bass are found in all of these habitats, usage varies by habitat. Additionally, these habitats provide the appropriate physicochemical and biological conditions necessary to maintain and enhance the striped bass population. Therefore, the protection of each habitat type is critical to the sustainability of the striped bass stock.

1.3.2 Spawning Habitat

The main spawning habitat for A-R striped bass is in the Roanoke River in the vicinity of Weldon, NC, around river mile (RM) 130. This is the location of the first set of rapids at the fall line transition between the Coastal Plain and the Piedmont. Historic accounts indicate major spawning activity centered at Weldon (Worth 1904), but striped bass were known to migrate up the mainstem Roanoke River to Clarksville, VA (RM 200; Moseley et al. 1877) and possibly as far as Leesville, VA (RM 290; NMFS and USFWS 2016). Striped bass spawning migrations have been impeded since construction of the initial dam on the mainstem of the Roanoke River at Roanoke Rapids, NC (RM 137) around 1900 (NMFS and USFWS 2016). The dam was approximately 12-feet high (Hightower et al. 1996) and impeded striped bass migrations especially during low flow years. Completion of the John H. Kerr Dam, 42 river miles upstream of Roanoke Rapids Dam, by the U.S. Army Corps of Engineers in 1953 completely blocked access to upriver habitats, and construction of the current Roanoke Rapids Dam by Virginia Electric and Power Company in 1955 and Gaston Dam in 1964 eliminated striped bass usage of the 42 river miles below Kerr Dam (NMFS and USFWS 2016). Spawning activity now ranges from RM 78 to RM 137 with most of the activity occurring between RM 120 and RM 137, still centered around Weldon.

1.3.3 Nursery & Juvenile Habitat

Juveniles are found in schools; the location of the schools varies considerably with the age of the fish and apparently prefer clean sandy bottoms but have been found over gravel beaches, rock bottoms, and soft mud (Hill et al. 1989). The Roanoke River delta area does not seem to be an important nursery area for YOY striped bass. They appear to spend the first year of life (age-0) growing in and around the western Albemarle Sound and lower Chowan River (Hassler et al. 1981).

As they enter their second and third year, striped bass are found throughout Albemarle Sound and its tributaries. The presence of age-1 and -2 striped bass in the Albemarle Sound Independent Gill-Net Survey confirms this, as well as reports of discarded undersized fish from the striped bass recreational creel survey conducted throughout the Albemarle Sound and its tributaries (NCDMF, unpublished data).

1.3.4 Adult Habitat

Analysis of tagging data indicate younger, smaller adult A-R striped bass (from 35.0–60.0 cm TL) remain in inshore estuarine habitats, while older, larger adults (>60.0 cm TL) are much more likely to emigrate to ocean habitats after spawning; (Callihan et al. 2014). Further, smaller adults show evidence of density-dependent movements and habitat utilization, as the likelihood of recapture outside the ASMA in adjacent systems (i.e., northwestern Pamlico Sound, Tar-Pamlico, Pungo, and Neuse rivers, lower Chesapeake Bay, and the Blackwater and Nottoway rivers in Virginia) increases during periods of higher stock abundance (Callihan et al. 2014).

1.3.5 Habitat Issues & Concerns

Numerous documents have been devoted entirely to habitat issues and concerns, including the North Carolina Coastal Habitat Protection Plan (Street et al. 2005; NCDEQ 2016) and ASMFC's "Atlantic Coast Diadromous Fish Habitat: A review of Utilization, Threats, Recommendations for Conservation, and Research Needs" (Greene et al. 2009). Many contaminants are known to adversely affect striped bass at numerous life stages and can be detrimental to eggs and larvae (Buckler et al. 1987; Hall et al. 1993; Ostrach et al. 2008). Adequate river flows during the spawning season are also needed to keep eggs suspended for proper development (N.C. Striped Bass Study Management Board 1991).

Hassler et al. (1981) indicated that adequate river flow during the pre-spawn and post-spawn periods was the most important factor contributing to survival of fish larvae and the subsequent production of strong or poor year classes.

1.4 Description of Fisheries

Since 2015, the current total allowable landings (TAL) has been set at 124.7 metric tons (275,000 lb) and is split evenly between the commercial and recreational fisheries in the ASMA and RRMA (Table 1.6). In the ASMA, the commercial fishery has a TAL of 62.37 metric tons (137,500 lb) while the ASMA and RRMA recreational fisheries each have a TAL of 31.18 metric tons (68,750 lb). The TAL has changed throughout the previous two decades in response to changes in stock abundance and has ranged from for a low of 71.12 metric tons (156,800 lb) in the early 1990s to 249.5 metric tons (550,000 lb) from 2003 to 2014.

1.4.1 Commercial Fishery

Striped bass are landed commercially in the ASMA primarily with anchored gill nets and to a lesser degree by pound nets. Insignificant landings occur in fyke nets and crab pots. Since 1991, landings in the commercial fishery have ranged from a low of 31.03 metric tons (68,409 lb) in 2013 to a high of 124.2 metric tons (273,814 lb) in 2004 (Table 1.7). Total catch has shown an overall decline since 2004.

1.4.1.1 Historical

The Albemarle Sound area commercial striped bass fishery has been documented in numerous reports for over 100 years. Worth (1884) suggests an industry origin of 1872. During the early 1880s, a large fishery developed on Roanoke Island catching striped bass in the spring and fall (Taylor and White 1992). Gears included haul seines, drag nets, purse seines, fish traps, and gill nets. In 1869, pound nets were first used in the Albemarle Sound and became a more prominent aspect of the fishery in the early 1900s (Taylor and White 1992). The commercial fishery for striped bass has principally occurred from November through April in the Albemarle Sound, whereas, Roanoke River commercial effort was concentrated during the spring spawning run. During the summer months, landings from all areas were much lower (Hassler et al. 1981). Anchored and drift gill nets were the most productive gear types in the spring spawning run portion of the Roanoke River fishery. In 1981, anchored gill nets were prohibited in the Roanoke River, and the mesh size of drift gill nets was restricted, resulting in sharply curtailed landings during the spawning run (Hassler and Taylor 1984). Bow and dip netting was a productive method of harvesting spawning fish in the Roanoke River until it was prohibited in 1981. Prior to this rule, fishermen using bow nets in the upper Roanoke River could retain 25 striped bass per day when taken incidentally during shad and river herring fishing. A local law allowing the commercial sale of striped bass in Halifax and Northampton counties was enacted by the North Carolina General Assembly and created a prominent commercial fishery for striped bass in its principal spawning area (Hassler et al. 1981). This law was repealed in 1981 and commercial fishing for striped bass was eliminated in the inland portions of the Roanoke River. Limited commercial fishing seasons were implemented in Albemarle Sound in 1984 (October–May; Henry et al. 1992). State regulations enacted in 1985 prohibited the sale of hook-and-line-caught striped bass.

1.4.1.2 Current

The ASMA commercial striped bass fishery from 1990 through 1997 operated on a 44.45-metric ton (98,000-lb) TAL (Table 1.6). The TAL was split to have a spring and fall season. The commercial fishery operated with net yardage restrictions, mesh size restrictions, size limit restrictions, and daily landing limits. The A-R stock was declared recovered in 1997 by the ASMFC. In 1998, the commercial TAL was increased to 56.88 metric tons (125,400 lb) and additional increases in poundage occurred in 1999 and 2000. From 2000 through 2002, the commercial TAL remained at 102.1 metric tons (225,000 lb). In 2015, the TAL was adjusted to a total of 124.7 metric tons (275,000 lb) for all sectors, based on projections from the 2014 benchmark stock assessment (NCDMF 2014). Since the initial TAL was set in 1990, seasons, yardage, mesh size restrictions, and daily landing limits have been used to control harvest and maintain the fishery as a bycatch fishery.

1.4.2 Recreational Fishery

Striped bass are landed recreationally in the ASMA and RRMA by hook and line, primarily by trolling or casting artificial lures and using live or cut bait. In recent years, the catch-and-release

fly fishery in the RRMA has seen an increase in angler effort. Combined recreational harvest from both management areas has ranged from 5.9 metric tons (13,095 lb) in 1985 to 106.9 metric tons (235,747 lb) in 2000 (Table 1.7). Since 1997, harvest steadily increased from 25.2 metric tons (55,653 lb) to 106.9 metric tons (235,747 lb) in 2000. Since 2000, harvest has shown an overall decline, except for a slight increase in 2011–2012 for the ASMA, 2012 for the RRMA, 2015 for the ASMA, and 2015–2016 for the RRMA. The harvest estimate for 2017 in the ASMA stands as the third lowest on record since 1982.

1.5 Fisheries Management

1.5.1 Management Authority

Fisheries management includes all activities associated with maintenance, improvement, and utilization of the fisheries resources of the coastal area, including research, development, regulation, enhancement, and enforcement.

North Carolina's existing fisheries management system for striped bass is adaptive, with rulemaking authority vested in the North Carolina Marine Fisheries Commission (NCMFC) and the North Carolina Wildlife Resources Commission (NCWRC) within their respective jurisdictions. The NCMFC also has the authority to delegate to the fisheries director the ability to issue public notices, called proclamations, suspending or implementing particular commission rules that may be affected by variable conditions.

Fisheries management includes all activities associated with maintenance, improvement, and utilization of the fisheries resources of the coastal area, including research, development, regulation, enhancement, and enforcement. North Carolina's existing fisheries management system is powerful and flexible, with rulemaking (and proclamation) authority vested in the NCMFC and the NCWRC within their respective jurisdictions.

The North Carolina Department of Environmental Quality (NCDEQ) is the parent agency of the NCMFC and the NCDMF. The NCMFC is responsible for managing, protecting, preserving and enhancing the marine and estuarine resources under its jurisdiction, which include all state coastal fishing waters extending to three miles offshore. In support of these responsibilities, the NCDMF conducts management, enforcement, research, monitoring statistics, and licensing programs to provide information on which to base these decisions. The NCDMF presents information to the NCMFC and NCDEQ in the form of fisheries management and coastal habitat protections plans and proposed rules. The NCDMF also administers and enforces the NCMFC's adopted rules.

The NCWRC is a state government agency authorized by the General Assembly to conserve and sustain the state's fish and wildlife resources through research, scientific management, wise use and public input. The Commission is the regulatory agency responsible for the creation and enforcement of hunting, trapping and boating laws statewide and fishing laws within its jurisdictional boundaries including all designated inland fishing waters. The NCWRC and NCDMF share authority for regulating recreational fishing activity in joint fishing waters.

1.5.2 Management Unit Definition

There are two geographic management units defined in the estuarine striped bass FMP and include the fisheries throughout the coastal systems of North Carolina (NCDMF 2004). The management unit for this assessment is the ASMA and RRMA and is defined as:

Albemarle Sound Management Area (ASMA) includes the Albemarle Sound and all its joint and inland water tributaries, (except for the Roanoke, Middle, Eastmost and Cashie rivers), Currituck, Roanoke and Croatan sounds and all their joint and inland water tributaries, including Oregon Inlet, north of a line from Roanoke Marshes Point across to the north point of Eagle Nest Bay in Dare county. The Roanoke River Management Area (RRMA) includes the Roanoke River and its joint and inland water tributaries, including Middle, Eastmost and Cashie rivers, up to the Roanoke Rapids Dam. The striped bass stock in these two harvest management areas is referred to as the Albemarle Sound-Roanoke River (A-R) stock, and its spawning grounds are located in the Roanoke River in the vicinity of Weldon, NC. Management of recreational and commercial striped bass regulations within the ASMA is the responsibility of the North Carolina Marine Fisheries Commission (NCMFC). Within the RRMA commercial regulations are the responsibility of the NCMFC while recreational regulations are the responsibility of the North Carolina Wildlife Resources Commission (NCWRC). The A-R stock is also included in the management unit of the Atlantic States Marine Fisheries Commission (ASMFC) Amendment #6 to the Interstate Fishery Management plan (FMP) for Atlantic Striped Bass and includes Albemarle Sound and all its joint and Inland Water tributaries, (except for the Roanoke, Middle, Eastmost and Cashie rivers), Currituck, Roanoke, and Croatan sounds and all their Joint and Inland Water tributaries, including Oregon Inlet, north of a line from Roanoke Marshes Point 35 48'.5015' N – 75 44'.1228' W across to the north point of Eagle Nest Bay 35 44'.1710' N - 75 31'.0520' W (Figure 1.1).

1.5.3 Regulatory History

The ASMA commercial striped bass fishery from 1991 through 1997 operated on a 44.45-metric ton TAL (Table 1.6). The TAL was split to have a spring and fall season. The commercial fishery operated with net yardage restrictions, mesh size restrictions, size limit restrictions, and daily landing limits. The A-R stock was declared recovered in 1997 by the ASMFC. In 1998, the commercial TAL was increased to 56.88 metric tons and additional increases in the TAL occurred in 1999 and 2000. From 2000 through 2002, the commercial TAL remained at 102.1 metric tons. The ASMFC Striped Bass Management Board approved another TAL increase in 2003. From 2003 to 2014, the TAL remained at 249.5 metric tons. Based on a stock assessment benchmark, the TAL was reduced to 124.7 metric tons in 2015. Since the initial TAL was set in 1990, seasons, yardage, mesh size restrictions, and daily landing limits have been used to control harvest and maintain the fishery as a bycatch fishery.

Striped bass have been managed as a bycatch of the multi-species commercial fishery in the ASMA since 1991. Since 1991, when the striped bass season was open, commercial fishermen were allowed to land from seven to 15 fish per day, not to exceed 50% by weight of the total catch and fish had to meet the 18-inch TL minimum size limit. Gill nets continue to account for the highest percentage of the commercial harvest, followed by pound nets.

1.5.4 Current Regulations

Striped bass from the A-R stock are harvested commercially within the ASMA and recreationally in both the RRMA and the ASMA. Commercial harvest is currently limited to the ASMA although there was a small commercial fishery operating in the Roanoke River during the early 1980s. The commercial fishery is regulated as a bycatch fishery with a TAL, size limits, daily possession limits, seasonal (closed May 1 through September 30) and gear restrictions, net attendance

requirements, and permitting and reporting requirements all imposed to prevent TAL overages and limit discard losses. Finfish dealers who purchase striped bass are required to obtain a striped bass dealer permit from NCDMF. The dealers are required to report their landings daily to NCDMF for the quota to be monitored. Dealers are also required to affix striped bass sale tags, provided by NCDMF, to the fish when purchased from the fishermen.

The recreational fishery within the RRMA is regulated through a creel limit, minimum size limit including a protective slot, and a fixed length spring season, while the ASMA recreational fishery is regulated through a creel limit, minimum size, and the variable spring and fall seasons that close once harvest targets are reached or set season closure dates are reached (closed May 1 through September 30). The A-R striped bass stock is managed by the NCDMF, the NCWRC, and the South Atlantic Fisheries Coordination Office (SAFCO) of the U.S. Fish and Wildlife Service (USFWS) under guidelines established in the ASMFC Interstate FMP for Atlantic Striped Bass and the North Carolina Estuarine Striped Bass FMP.

1.5.5 Management Performance

Management strategies for the A-R striped bass stock have met with variable success over the last several decades. Unrestricted harvest and poor habitat conditions led to a stock collapse in the 1980s; however, severe harvest restrictions and Roanoke River streamflow improvements led to population recovery spurred by increases in recruitment, spawning stock biomass growth, and age structure expansion in the late 1990s and 2000s. Consequently, commercial and recreational harvest restrictions were eased, and the TAL was increased throughout the 2000s. From 1990 through 2002, harvest reached the TAL easily, with the season often having to close after only weeks or months to prevent harvest from exceeding the TAL. Starting in 2003, with the increase in TAL to 249 metric tons, harvest started to consistently decline through 2008, even with extended commercial and recreational seasons in the ASMA. From 2009 through 2014, harvest was still well below the TAL (Figure 1.7). The reason for the decline in harvest even with extended seasons is likely due to declining stock abundance due to several poor year classes produced from 2001 to present. Even with a reduction in the TAL in 2015 to 125 metric tons, harvest has not reached the TAL, although a reduced American shad season starting in 2014 could have contributed to the commercial quota not being reached as the majority of commercial harvest historically came during the American shad commercial season in the ASMA. Recent survey data and stock assessments have supported managers' concerns about declining landings, poor recruitment, reductions in population abundance, and a truncation of age structure (NCDMF 2014, 2018).

1.6 Assessment History

1.6.1 Review of Previous Methods & Results

The A-R stock has an extensive assessment history. Dorazio (1995) and Gibson (1995) prepared the first comprehensive assessment of the A-R striped bass stock based on a Virtual Population Analysis (VPA using CAGEAN, Deriso et al. 1985) and a Brownie tag-return model analysis (Brownie et al. 1985). Schaaf (1997) later provided CAGEAN-based VPA results through 1996 based on the methodology established in Gibson (1995). Smith (1996) used the MARK software program to estimate survival of striped bass in Albemarle Sound through analysis of release and recovery data. Carmichael (1998) updated the CAGEAN assessment through 1997 and later developed an ADAPT VPA assessment of the A-R stock using age-specific indices from the Albemarle Sound Independent Gill-Net surveys, the Roanoke River Electrofishing Survey, and

juvenile and yearling abundance indices from Albemarle Sound (Carmichael 1999). The 1999 assessment also included an analysis of tag-return data based on the MARK program. The ADAPT catch-at-age and MARK tag-return assessment framework was updated in 2000 (Carmichael 2000). Analysis of tag-return data for estimation of mortality was discontinued after 2000 as the results were deemed similar to those from the VPA and was duplicative work; subsequent assessments focused on the catch-at-age data. The VPA stock assessment was conducted annually until 2006 to determine stock status and to evaluate potential changes to the TAL (Carmichael 2001, 2002, 2003; Grist 2004, 2005; Takade 2006). The assessment shifted to an ASAP2 model for the 2010 assessment and a yield-per-recruit (YPR) model was used to calculate the benchmarks externally (Takade 2010). The 2014 assessment was performed similarly using an ASAP3 model and benchmarks were calculated with a YPR model. Projections were made using the Age Structured Projection Model (AGEPRO). The most recent stock assessments indicated that the stock was not overfished and overfishing was not occurring (Mroch and Godwin 2014; Flowers et al. 2016).

1.6.2 Progress on Research Recommendations

- Incorporate high reward tagging into the current tagging program to provide estimates of tag return rates for each sector; this will allow for more precise estimates of natural mortality and fishing mortality from tag-based analyses.

  There is an ongoing multi-species tagging study that was initiated in 2014 and funded through the NCDMF Coastal Recreational Fishing Fund. The study employs both high reward and double tags to estimate tag loss and angler reporting rates.

- Improve estimates of discard losses from the Albemarle Sound Management Area (ASMA) commercial gill-net fisheries.

  NCDMF's Programs 466 and 467 monitor commercial gill-net fisheries and record bycatch (see also section 2.1.2). These programs are continually expanding and should lead to improved estimates of commercial discards over time.

- Re-evaluate hook-and-release mortality rates from the ASMA and RRMA recreational fisheries incorporating different hook types and angling methods at various water temperatures (e.g., live bait, artificial bait, and fly fishing).

  No progress.

- Improve estimates of hook-and-release discard losses in the recreational fishery during the closed harvest season

  There is a plan in place starting in May 2021 to provide additional funding to the existing striped bass creel survey in the ASMA that will extend intercepts during the closed harvest season (May–September).

2 DATA

2.1 Fisheries-Dependent

2.1.1 Commercial Landings

2.1.1.1 Survey Design & Methods

Prior to 1978, North Carolina's commercial landings data were collected by the National Marine Fisheries Service (NMFS). Between 1978 and 1993, landings information was gathered through the NMFS/North Carolina Cooperative Statistics program. Reporting was voluntary during this period, with North Carolina and NMFS port agents sampling the state's major dealers (Lupton and Phalen 1996). Beginning in 1994, the NCDMF instituted a mandatory dealer-based trip-ticket system to track commercial landings.

On January 1, 1994, the NCDMF initiated a Trip Ticket Program (NCTTP) to obtain more complete and accurate trip-level commercial landings statistics (Lupton and Phalen 1996). Trip ticket forms are used by state-licensed fish dealers to document all transfers of fish sold from coastal fishing waters from the fishermen to the dealer. The data reported on these forms include transaction date, area fished, gear used, and landed species as well as fishermen and dealer information.

The majority of trips reported to the NCTTP only record one gear per trip; however, as many as three gears can be reported on a trip ticket and are entered by the program's data clerks in no particular order. When multiple gears are listed on a trip ticket, the first gear may not be the gear used to catch a specific species if multiple species were listed on the same ticket but caught with different gears. In 2004, electronic reporting of trip tickets became available to commercial dealers and made it possible to associate a specific gear for each species reported. This increased the likelihood of documenting the correct relationship between gear and species.

2.1.1.2 Sampling Intensity

North Carolina dealers are required to record the transaction at the time of the transactions and report trip-level data to the NCDMF on a monthly basis. For further information on the sampling methodology for the NCTTP, see NCDMF 2019.

2.1.1.3 Biological Sampling

Biological sampling occurs during the spring and fall fishery. NCDMF personnel have a target of 600 samples from the spring fishery and 300 samples from the fall fishery. Fish are sampled monthly from various fish houses throughout the ASMA, throughout each season. Fish are measured to the nearest mm for fork length (FL) and TL and weighed to the nearest 0.01 kg. Sex is determined using the Sykes (1957) method and scales are removed from the left side of the fish, above the lateral line and between the posterior of the first dorsal fin and the insertion of the second dorsal fin. Scales are cleaned and pressed on acetate sheets using a Carver heated hydraulic press. NCDMF employees read scales using a microfiche reader set on 24x or 33x magnification. For each sex, a minimum of 15 scales per 25-mm size class is read and subsequently used to assign ages to the remainder of the sample.

2.1.1.4 Potential Biases & Uncertainties

All fish that are caught are not required to be landed (discards) or sold so some fish may be taken home for personal consumption and are not reported in the landings. The reporting of multiple

gears on a single trip ticket could also be a source of bias since the order in which gears are reported are not indicative of the primary method of capture.

2.1.1.5 Development of Estimates

Commercial landings were summarized by year using the NCTTP data. Length data collected from the commercial fish house sampling program were used to compute annual length-frequency distributions by sex.

2.1.1.6 Estimates of Commercial Landings Statistics

The NCTTP is considered a census of North Carolina commercial landings, though reliability of the data decreases as one moves back in time. Commercial landings were highest in the late 1960s and have substantially decreased through recent years (Figure 2.1). Landings have been constrained with a TAL since 1991.

The minimum lengths and ages observed in the commercial fisheries landings are strongly tied to the minimum length regulations at the time fish are collected, measured, and aged. The most noticeable impact is the implementation of the 18-inch minimum TL length limit in 1991; striped bass less than 45 cm TL (~18 inches; Figures 2.2, 2.3) and younger than age 3 (Figures 2.4, 2.5) have been rarely observed since 1991. The length and age compositions show that fewer larger and older fish have been observed in recent years (Figures 2.2–2.5).

2.1.2 Commercial Gill-Net Discards

2.1.2.1 Survey Design & Methods

NCDMF's Program 466 (Onboard Observer Monitoring) was designed to monitor fisheries for protected species interactions in the gill-net fishery by providing onboard observations. Additionally, this program monitors finfish bycatch and characterizes effort in the fishery. The onboard observer program requires the observer to ride onboard the commercial fishermen's vessel and record detailed gill-net catch, bycatch, and discard information for all species encountered. Observers contact licensed commercial gill-net fishermen holding an Estuarine Gill-Net Permit (EGNP) throughout the state to coordinate observed fishing trips. Observers may also observe fishing trips from NCDMF vessels under Program 467 (Alternative Platform Observer Program), but these data were not used in this stock assessment due to the lack of biological data collected through the program.

2.1.2.2 Sampling Intensity

Fishing trips targeting striped bass are observed throughout the year; however, most observed trips occur during the fall when landings are the greatest in the Albemarle and the spring for the Pamlico Sound, both areas of which have a history of Atlantic sturgeon and sea turtle interactions.

2.1.2.3 Biological Sampling

Data recorded includes species, weight, length, and fate (landed, live discard, or dead discard).

2.1.2.4 Potential Biases & Uncertainties

Program 466 began sampling statewide in May 2010. To provide optimal coverage throughout the state, management units were created to maintain proper coverage of the fisheries. Management units were delineated based on four primary factors: (1) similarity of fisheries and management, (2) extent of known protected species interactions in commercial gill-net fisheries, (3) unit size, and (4) the ability of the NCDMF to monitor fishing effort. Total effort for each management unit

can vary annually based on fishery closures due to protected species interactions or other regulatory actions. Therefore, the number of trips and effort sampled each year by management unit varies both spatially and temporally.

Program 466 data do not span the entire time series for the assessment (no data are available for 1991–2000) and statewide sampling began in May 2010 decreasing the variability of observed trips with better spatial and temporal sampling beginning in 2012.

Striped bass discard data were not available in sufficient quantities to estimate discards or post-release mortality from commercial pound net or gig fisheries; however, these fisheries and others are known to have discards of striped bass. Additionally, commercial discards likely occur in other states, so the estimates presented here likely underestimate the total number of striped bass commercial discards removed from the A-R stock.

It is also important to note that this survey was designed to target trips that occur in times and areas where protected species interactions are highest; the program does not target striped bass trips. For this reason, a high number of zero-catch trips relative to striped bass occur in the data.

2.1.2.5 Development of Estimates

A generalized linear model (GLM) framework was used to predict striped bass discards in the A-R gill-net fishery based on data collected during 2012 through 2017. Only those variables available in all data sources were considered as potential covariates in the model. Available variables were year, season, mesh category (small: <5 inches and large: ≥5 inches) and management area (Figure 2.6), which were all treated as categorical variables in the model. 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. The offset term was included in the model to account for differences in fishing effort among observations (Zuur et al. 2009, 2012). Using effort as an offset term in the model assumes the number of striped bass discards is proportional to fishing effort (A. Zuur, Highland Statistics Ltd., personal communication).

Examination of the data indicated they were significantly zero inflated for both the live and dead discards. There are two types of models commonly used for count data that contain excess zeros. Those models are zero-altered (two-part or hurdle models) and zero-inflated (mixture) models (see Minami et al. 2007 and Zuur et al. 2009 for detailed information regarding the differences of these models). Minami et al. (2007) suggests that zero-inflated models may be more appropriate for catches of rarely encountered species; therefore, zero-inflated models were initially considered though were unable to converge. For this reason, zero-altered models were pursued.

The best-fitting model for live discards and for dead discards was applied to available effort data from the NCTTP to estimate the total number of live discards and dead discards for the A-R gill-net fishery.

In order to develop estimates of commercial discards for years prior to 2012, a hindcasting approach was used. The ratio of live or dead discards in numbers to A-R gill-net landings was computed by year for 2012 to 2017. As these ratios were variable among years (Figure 2.7), the working group decided to apply the median ratio over 2012 to 2017 separately for live and dead discards. The median ratio for either live or dead discards was multiplied by the commercial gill-

net landings in 1991 to 2011 to estimate the live and dead commercial gill-net discards for those years.

Because only dead discards were input into the assessment model, the estimates of live commercial gill-net discards were multiplied by 43%, an estimate of post-release mortality described in section 1.2.6.2. These estimates of live discards that did not survive were added to the estimates of commercial dead discards to produce an estimate of total dead discards for the commercial gill-net fishery for 2012 to 2017.

The available length samples from the NCDMF's Program 466 were summarized by year and used to characterize the length distribution of striped bass commercial discards by year.

2.1.2.6 Estimates of Commercial Gill-Net Discard Statistics

The best-fitting GLM for the commercial gill-net live discards assumed a zero-altered Poisson distribution (dispersion=2.9). The significant covariates for both the count and binary part of the model were year, season, mesh, and area. The best-fitting GLM for the dead discards assumed a zero-altered Poisson (dispersion=2.7). The significant covariates for the count part of the model were year, season, mesh, and area and the significant covariates for the binary part of the model were season and mesh.

Estimates of annual commercial dead discards ranged from a low of 2,500 striped bass in 2008 to a high of just over 11,600 striped bass in 2001 between 1991 and 2017 (Table 2.1; Figure 2.8). Total lengths of commercial discards have ranged from 10 cm to 85 cm (Figure 2.9). The majority of discards have been less than 60 cm TL.

2.1.3 Albemarle Sound Recreational Fishery Monitoring

From the 1950s through the late 1980s, various researchers conducted creel surveys in the Albemarle Sound and Roanoke River, although the Roanoke River has the most complete historical time series of catch and effort data (Hassler et al. 1981). Starting in 1988 and 1990 respectively, the NCWRC and NCDMF initiated annual creel surveys in the RRMA and ASMA that have continued to date.

2.1.3.1 Survey Design & Methods

The NCDMF collects catch and effort data through on-site interviews at boat ramps during allowed harvest days for each of four ASMA sampling zones (Figure 2.10). Statistics were calculated through a non-uniform probability access-point creel survey (Pollock et al. 1994). Site probabilities were set in proportion to the likely use of a site according to time of day, day of week, and season. Probabilities for this survey were assigned based on seasonal striped bass fishing pressure observed during past surveys, in addition to anecdotal information (S. Winslow and K. Rawls, NCDMF, personal communication). Probabilities can be adjusted during the survey period according to angler counts to provide more accurate estimates. Morning and afternoon periods were assigned unequal probabilities of conducting interviews, with each period representing half a fishing day. A fishing day was defined as one and a half hours after sunrise until one hour after sunset. These values varied among sites within zones due to differing fishing pressure.

2.1.3.2 Sampling Intensity

The ASMA striped bass creel survey data series includes estimates of effort, catch, and discards for years 1990–2017. The survey does not operate during the closed harvest season, so estimates of catch and release during this time are not available. In the early years of the survey when the

TAL was very low, the seasons may have only lasted a few days to a few weeks. In recent years as the TAL has increased, the harvest season occurs from October 1 through April 30. Creel clerks work all three weekend days (Friday–Sunday) and two weekdays. Interview sessions are approximately five hours and 45 minutes long, either in the morning or afternoon.

2.1.3.3 Biological Sampling

In the ASMA creel survey, all striped bass are sampled during the surveys and measured for TL (mm) and weighed to the nearest 0.1 kg by NCDMF personnel. No scales are collected for ageing purposes. Striped bass are not sexed during the creel survey.

2.1.3.4 Potential Biases & Uncertainties

One bias that has increased over time in the ASMA creel survey is the number of private access sites that are not included in the pool of public access points available to the survey. The increase in private sites is due to increased development of single-family dwellings and developments on the Albemarle Sound and tributaries in the last 20 years.

Another bias inherent in any non-uniform probability access-point creel survey is accurately matching the site probabilities to actual fishing pressure throughout the harvest season. Determining accurate probabilities is made more difficult when the harvest area is a large, open system such as a coastal estuary, and the species of interest is migratory in nature and movement (and hence fishing pressure) varies throughout the harvest area seasonally.

The bias associated with the increase in the number of private access points not included in the survey serves to systematically underestimate harvest and effort statistics, while the bias associated with varying probabilities throughout the season is not systematic and can produce under or over estimates of harvest and effort on an annual basis.

2.1.3.5 Development of Estimates

In the ASMA from 1990 to the spring season of 2005, a non-uniform probability roving access-point creel survey was used to estimate recreational hook-and-line effort and catch and release of striped bass during the allowed harvest seasons. Catch and effort data are collected daily for each of four ASMA sampling zones. Fishing effort was estimated by counting empty boat trailers at public and private boating access sites and using interview data to remove trailer counts for other users, including recreational fishermen targeting other species, hunters, recreational boaters, and commercial fishermen. Harvest was estimated as the product of catch rates and total fishing effort stratified by day and zone (Pollock et al. 1994).

In the ASMA from the fall of 2005 to present, angler catch statistics were calculated through a non-uniform probability access-point creel survey (Pollock et al. 1994). Site probabilities were set in proportion to the likely use of a site according to time of day, day of week, and season. Probabilities for this survey were assigned based on seasonal striped bass fishing pressure observed during past surveys, in addition to anecdotal information (S. Winslow and K. Rawls, NCDMF, personal communication). Probabilities can be adjusted during the survey period according to angler counts to provide more accurate estimates. Morning and afternoon periods were assigned unequal probabilities of conducting interviews, with each period representing half a fishing day. A fishing day was defined as one and a half hours after sunrise until one hour after sunset. These values varied among sites within zones due to differing fishing pressure. Harvest was estimated by applying the sample unit probabilities to interview data stratified by day and zone (Pollock et al. 1994).

Dead discards (no live) were input into the assessment model, so the estimates of Albemarle Sound recreational discards were multiplied by 6.4%, an estimate of post-release mortality described in section 1.2.6.2.

Lengths sampled from the Albemarle Sound recreational creel survey were used to characterize the length distribution of striped bass harvested by the Albemarle Sound recreational fishery by year.

In the absence of length samples from the recreational fisheries characterizing the releases, tagging data of striped bass recaptured by recreational anglers was used to develop length frequencies for the recreational releases. The composition of the total catch was derived first and then the length composition of the harvested fish was subtracted to estimate the length composition of the recreational releases. Due to the very low numbers of recaptured fish in some years, the recaptured fish length data were pooled across all years. For recaptures without lengths associated with them, if they were caught within three months of initial release, negligible growth was assumed and they were assigned a recapture length equal to the initial tagging length. The number of recaptures with associated lengths per year for the Albemarle Sound ranged from 3 to 127 with a mean of 39. Effective sample size was determined as the average number of unique locations and dates per year for recaptures in the associated management area. The proportion of fish recaptured per 2-cm length bin, t_l, was calculated from these pooled data such that:

$$t_l = \frac{\sum_{y=1997}^{y=2017} T_{y,l}}{\sum_{y=1997}^{y=2017} T_y}$$

where $T_{y,l}$ is the number of fish tagged in year y and length bin l. A smoother was applied across the resulting proportion data using the following centrally-weighted five-point moving average:

$$Smoothed[t_l] = \frac{[t_{l-2} + t_{l-1} + 3t_l + 2t_{l+1} + t_{l+2}]}{9}$$

The length composition of the total catch per year and length bin, $C_{y,l}$, was then estimated as:

$$Smoothed\left[C_{y,l}\right] = Smoothed[t_l]C_y$$

where C_y is the total catch numbers of striped bass per year.

A smoother was applied to recreational harvest length frequencies, $H_{y,l}$, and the numbers of recreational releases per year and length bin, $D_{y,l}$, were then estimated as:

$$D_{y,l} = Smoothed\left[C_{y,l}\right] - [H_{y,l}]$$

In some instances, this produced length bins with negative discard values. The negative values were truncated to zero, and the data set for each year was then rescaled to match the original total number of releases per year.

2.1.3.6 Estimates of Albemarle Sound Recreational Fishery Statistics

Annual recreational harvest of striped bass in the Albemarle Sound has ranged from a low of 3,500 fish in 2010 to a high of just over 40,000 fish in 2001 (Table 2.2; Figure 2.11). No overall trend is apparent in the recreational harvest time series, but estimates in the most recent two years (2016 and 2017) are among the lowest observed since 1991.

Estimates of recreational dead discards in the Albemarle Sound have been variable from 1991 through 2017 (Table 2.2; Figure 2.12). Recreational dead discards have ranged from a low of 605 striped bass in 2006 to a high of over 5,800 striped bass in 1998.

The length distribution of recreational harvested striped bass has remained relatively consistent from 1996 through 2017 (Figure 2.13). The majority of lengths fall between 45 and 60 cm TL. Lengths of striped bass observed in the Albemarle Sound recreational discards have also demonstrated consistency over the years in which lengths are available (1997–2017; Figure 2.14); the majority of these recreational discards range between 40 and 60 cm TL.

2.1.4 Roanoke River Recreational Fishery Monitoring

2.1.4.1 Survey Design & Methods

The NCWRC conducts the RRMA striped bass creel survey to estimate angler effort, catch, and harvest during the spring harvest season. In some years, estimates of angler effort and catch and release of striped bass after the harvest season closes are also made (depending on available funding). The creel survey employs a non-uniform probability, stratified access-point creel survey design (Pollock et al. 1994) to estimate recreational fishing effort (angler hours, and angler trips), harvest of striped bass, and numbers of striped bass caught and released. The creel survey is stratified by area (upper zone or lower zone), time (AM or PM), and type of day (weekdays and weekend days). The upper zone includes the river segment from Roanoke Rapids Lake dam downstream to the U.S. Highway 258 Bridge near Scotland Neck (Figure 2.15). The lower zone extends from U.S. Highway 258 Bridge downstream to Albemarle Sound. Because past analyses depict differential catch rates through progression of the open harvest season, the survey was stratified into two-week sample periods. Within periods, samples and estimates are further stratified by type of day because fishing effort and catch is also known to vary as a function of day type. Selection of access points where interviews occurred was based on probability of boat trailer counts generated from prior RRMA creel surveys as well as expert opinion by biological and enforcement staff. Probabilities of fishing activity for time of day (0.4 for AM and 0.6 for PM during periods one and two and equal probabilities during all other periods) are estimated based upon prior experience with the RRMA striped bass fishery.

2.1.4.2 Sampling Intensity

The RRMA striped bass creel survey data series includes 1988–2017 for harvest season estimates and 1995–1999, 2005–2008, and 2010–2017 for closed season catch and effort estimates. The creel survey is conducted during March, April, and May of each year. Creel clerks typically work two weekdays and both weekend days each week. Interview sessions last three hours and one session is conducted in each zone each sample day.

2.1.4.3 Biological Sampling

RRMA striped bass creel clerks record the total number of striped bass caught and the number of striped bass harvested. Creel clerks measure TL (mm), weight (kg), and determine sex of each striped bass harvested when possible. Counts and total weights of harvested striped bass (i.e., no individual data) are recorded for angling parties when interview sessions are busy. In some years, creel clerks also record the number of striped bass released within length limit categories (e.g., short, legal, slot, over-slot), type of bait used, angler residency, and trip expenditures.

2.1.4.4 Potential Biases & Uncertainties

In the RRMA creel survey, sample unit probabilities are adjusted each year depending on current conditions and expected trends in angler effort. Additionally, construction of new boating access areas has necessitated addition and deletion of creel locations. The NCWRC Jamesville-Astoria Rd. boating access area was added to the survey in 2011, and the two private ramps in Jamesville were subsequently removed from the survey. In 2016, a new boating access area in Lewiston-Woodville was added to the survey. Calculation of fishing effort was made using expansions of trailer count data from 1988–2001, but from 2002–2017, fishing effort was calculated by expanding interview data by the sample unit probability.

2.1.4.5 Development of Estimates

From 1988–2001, total fishing effort was estimated from counts of empty boat trailers at boating access areas along the entire river. Trailer counts were conducted each day of the open season. Total numbers of anglers were estimated by expanding trailer counts by the mean number of anglers per party as determined from interviews at access areas. The starting point for effort counts was randomly selected. Counts were made during mid-morning, or mid-afternoon periods. Based on interview data, trailer counts were adjusted to eliminate commercial fishermen, hunters, and recreational boaters. Data were adjusted based on the proportion of recreational anglers interviewed by creel clerks within each zone by period and kind of day. Harvest was estimated as the product of catch rates and total fishing effort stratified by period, zone, and kind of day (weekday or weekend day).

From 2002–2017, a specifically designed creel survey program was used to provide estimates of catch, harvest, and effort using formulas derived from Pollock et al. (1994). Estimates of striped bass catch, harvest, and effort for each sample day were made by expanding interview data by the sample unit probability (product of the access point probability and time of day probability). Within sample periods, catch, harvest, and effort estimates for weekdays and weekend days are separately averaged. The averages are then expanded to the total number of days of each type for that sample period. Separate estimates of total catch, harvest, and effort are made for each zone. Finally, sample period and zone totals are added to calculate the annual estimates.

Only dead discards were input into the assessment model, so the estimates of Roanoke River recreational discards were multiplied by 6.4%, an estimate of post-release mortality described in section 1.2.6.2.

As discard estimates were only available starting in 1995, a hindcasting approach was used to develop estimates back to 1991. The ratio of dead discards to harvest in numbers was calculated for 1995 through 2017 (Figure 2.16). The median ratio over those years was multiplied by the Roanoke River recreational harvest in 1991 to 1994 to estimate the dead discards for these earlier years.

Lengths sampled from the Roanoke River recreational creel survey were used to characterize the length distribution of striped bass harvested by the Roanoke River recreational fishery by year.

Roanoke River discard length compositions were derived using the same methodology as the Albemarle Sound discard length compositions described in section 2.1.3.5. The number of recaptures with associated lengths per year for the Roanoke River ranged from 18 to 191 with a mean of 88.

2.1.4.6 Estimates of Roanoke River Recreational Fishery Statistics

Estimates of recreational harvest in the Roanoke River have ranged from a low of about 3,100 fish in 1985 to a high of just over 38,000 fish in 2000 (Table 2.3; Figure 2.17). Recreational harvest increased from the beginning of the time series in 1982 to the early 2000s. Since then, recreational harvest in the Roanoke River has shown an overall slight decline.

Discards from the Roanoke River recreational fishery have been variable (Table 2.3; Figure 2.18). Estimates have ranged from a low of 4,215 striped bass in 2017 to a high of over 18,600 striped bass in 1997. There is no clearly discernable trend in these discard estimates over time.

As was observed with the Albemarle Sound recreational harvest and discard lengths, there was consistency in the total lengths observed in the Roanoke River recreational harvest (Figure 2.19) and discards (Figure 2.20) observed over time. The majority of striped bass collected from the Roanoke River recreational fishery were between 40 cm and 55 cm TL for both the harvest and discards.

2.2 Fisheries-Independent

2.2.1 Juvenile Abundance Survey (Program 100)

2.2.1.1 Survey Design & Methods

The NCDMF Juvenile Anadromous Survey, also known as Program 100 (P100), targets young-of-year (YOY) striped bass using a bottom trawl in Albemarle Sound. The survey was taken over by the NCDMF in 1984 and continues to sample the same seven fixed stations in western Albemarle Sound initiated in 1955 by Dr. William Hassler of N.C. State University, making it one of the longest continuous time series of striped bass fisheries-independent abundance data on the east coast (Figure 2.21). The sampled habitats are preferred nursery habitat for YOY striped bass in the Albemarle Sound as they increase in size and move from near-shore nursery areas to more open water habitats (Hassler et. al 1981).

The survey uses an 18-foot semi-balloon trawl with a body mesh size of 0.75-inch bar mesh and a 0.125-inch bar mesh tail bag. Tow duration is 15 minutes. Temperature, salinity, and dissolved oxygen are recorded.

2.2.1.2 Sampling Intensity

Trawl sampling is conducted bi-weekly for eight weeks starting in mid-July at seven established locations in the western Albemarle Sound area for a total of 56 samples. Trawl sites are located at the edge of breaks and contours, usually within the 2.4 m–3.7 m (8 feet–12 feet) depth profile.

2.2.1.3 Biological Sampling

All striped bass captured are counted and a subsample (maximum of 30) is measured (mm; TL and FL). In the event a striped bass is captured that may overlap with the size range of a YOY and a 1-year old striped bass, the specimen is brought back to the lab for examination of otoliths and/or scale samples to determine its age. In recent years, a subsample of YOY and age-1 striped bass has been weighed to the nearest gram for improved length at age relationships.

2.2.1.4 Potential Biases & Uncertainties

The Juvenile Abundance Survey is a fixed survey that the division appropriated from another source, so the fixed stations were retained for the continuity of data. A fixed-station survey can run the risk of bias if the sites selected do not adequately represent the sampling frame.

Additionally, even if the sites adequately cover the sampling frame, the increased variation that would come about from sampling randomly is not accounted for and is therefore at risk of being neglected.

Indices derived from fixed-station surveys such as P100 may not accurately reflect changes in population abundance (Warren 1994, 1995). The accuracy of the estimates is tied to the degree of spatial persistence in catch data of the species (Lee and Rock 2018). The persistence of the P100 data were evaluated following the approach of Lee and Rock (2018) and results suggested a lack of year*station interaction, which indicates the presence of spatial persistence and so suggests the survey is likely tracking trends in relative abundance.

2.2.1.5 Development of Estimates

A nominal index was calculated by year using a standard arithmetic mean (numbers per tow). A generalized linear model (GLM) framework was also used to model the relative abundance of YOY striped bass. Potential covariates were evaluated for collinearity by calculating variance inflation factors. Collinearity exists when there is correlation between covariates and its presence causes inflated p-values. The Poisson distribution is commonly used for modeling count data; however, the Poisson distribution assumes equidispersion; that is, the variance is equal to the mean. Count data are more often characterized by a variance larger than the mean, known as overdispersion. Some causes of overdispersion include missing covariates, missing interactions, outliers, modeling non-linear effects as linear, ignoring hierarchical data structure, ignoring temporal or spatial correlation, excessive number of zeros, and noisy data (Zuur et al. 2009, 2012). A less common situation is underdispersion in which the variance is less than the mean. Underdispersion may be due to the model fitting several outliers too well or inclusion of too many covariates or interactions (Zuur et al. 2009).

Data were first fit with a standard Poisson GLM and the degree of dispersion was then evaluated. If over- or underdispersion was detected, an attempt was made to identify and eliminate the cause of the over- or underdispersion (to the extent allowed by the data) before considering alternative models, as suggested by Zuur et al. (2012). For example, the negative binomial distribution allows for overdispersion relative to the Poisson distribution whereas a quasi-Poisson GLM can be used to correct the standard errors for overdispersion. If the overdispersion is the result of an excessive number of zeros (more than expected for a Poisson or negative binomial), then a model designed to account for these excess zeros can be applied. There are two types of models that are commonly used for count data that contain excess zeros: zero-altered (two-part or hurdle models) and zero-inflated (mixture) models (see Minami et al. 2007 and Zuur et al. 2009 for detailed information regarding the differences of these models). Minami et al. (2007) suggests that zero-inflated models may be more appropriate for catches of rarely encountered species; therefore, zero-inflated models were considered here when appropriate.

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.

2.2.1.6 Estimates of Survey Statistics

Available covariates were year, depth, surface and bottom temperature, and surface and bottom salinity. The best-fitting GLM model assumed a negative binomial distribution (dispersion=1.4) and the significant covariates were year and bottom temperature.

The nominal and GLM-standardized indices were similar throughout the time series (Figure 2.22). Both exhibit substantial inter-annual variability over time.

2.2.2 Independent Gill-Net Survey

2.2.2.1 Survey Design & Methods

In October 1990, the NCDMF initiated the Striped Bass Independent Gill-Net Survey, also known as Program 135 (P135). The survey was designed to monitor the striped bass population in the Albemarle and Croatan sounds.

The survey follows a random stratified design, stratified by geographic area. This survey divides the water bodies comprising the Albemarle region into six sample zones that are further subdivided into one-mile square quadrants with an average of 22 quadrants per zone (Figure 2.23). Albemarle Sound, Croatan Sound, and Alligator River sample zones (Zones 2–7) were selected for this survey, based on previous sampling and historical abundance information (Street and Johnson 1977). Sampling in Zone 1 was discontinued shortly after the survey began in favor of sampling Zone 7, to allow for tagging to produce estimates of mixing of the Albemarle-Roanoke striped bass stock and the migratory portion of the Atlantic migratory stock which may utilize the eastern portion of the Albemarle Sound during the winter months while overwintering. The survey gear is a multi-mesh monofilament gill net. Four gangs of twelve meshes (2.5-, 3.0-, 3.5-, 4.0-, 4.5-, 5.0-, 5.5-, 6.0-, 6.5-, 7.0-, 8.0-, 10.0-inch stretched mesh, ISM) of gill nets are set in each quadrant by the fishing crew. One two-gang set is weighted to fish at the bottom (sink net), and the other is floating unless the area is unsuitable for gill-net sampling (marked waterways and areas with excessive submerged obstructions). The use of 12 different mesh sizes allowed for the capture of fish age one and older. Alternate zones and quadrants are randomly selected if the primary selection cannot be fished. A fishing day is defined as the two crews fishing the described full complement of nets for that segment for one day. One unit of effort is defined as each 40-yard net fished for 24 hours.

The fishing year is divided into two segments: (1) fall/winter survey period, 1 November through 28 February; and (2) spring survey period, 1 March through late May. The sampling methods remain the same during each sampling season. Areas fished, sampling frequency, and sampling effort is altered seasonally.

For the fall/winter segment, two survey crews fish replicate 40-yard anchored, floating, and sinking monofilament gill nets from 2.5- to 4.0- ISM in one-half inch increments with a twine size of 0.33 mm (#104), 5.0- to 7.0-ISM with a twine size of 0.40 mm (#139), and 8.0-ISM and 10.0-ISM, with a twine size of 0.57 mm (#277). Heavier twine sizes in the larger mesh nets are intended to improve retention of larger, heavier fish. Gill nets were constructed with a hanging coefficient of 0.5. Gear soak time is 48 hours for each selected quadrant.

In the spring segment, gill-net effort is concentrated in western Albemarle Sound (Zone 2) near the mouth of the Roanoke River (Figure 2.23). The shift to Zone 2 was designed to increase the chance of intercepting mature striped bass congregated in this area during their migration to the Roanoke River spawning grounds. Effort is concentrated in this zone to determine differences in the size, age, and sex composition of the spring spawning migration relative to the fall/winter resident population. Zone 2 is sub-divided into southern and northern areas.

2.2.2.2 Sampling Intensity

The NCDMF monitors the adult striped bass population in Albemarle Sound through spring (March–May) and fall (November–February). The fishing year is divided into two segments: (1) fall/winter survey period, 1 November through 28 February; and (2) spring survey period, 1 March through late May. All zones are sampled equally, except in the spring when effort is shifted to Zone 2. Each crew samples each of the six zones, providing 24 fishing days per month and a total of 96 fishing days for the season. A fishing day is defined as one crew, fishing the full complement of nets specified, for that segment for one day (24 hours).

The southern area, adjacent to the Roanoke River, received increased effort at a 2:1 ratio south to north, based on the historical seasonal abundance of mature striped bass (Harris et al. 1985). Quadrants sampled are randomly selected as previously noted. Fishing effort is conducted continuously, seven days a week weather permitting, until the end of late May.

2.2.2.3 Biological Sampling

All striped bass are counted and measured and healthy striped bass that survived entanglement are tagged with internal anchor tags and then measured to the nearest mm for FL and TL. Scales are removed from the left side of the fish, above the lateral line and between the posterior of the first dorsal fin and the insertion of the second dorsal fin. When possible, sex is determined by applying directional pressure to the abdomen towards the vent and observing the presence of milt or eggs.

For both the fall/winter and spring segment, fish that did not survive entanglement are processed at the NCDMF laboratory. Fish are measured to the nearest mm for FL and TL and weighed to the nearest 0.01 kg. Sex is determined by visual inspection and scales are removed as previously described. Scales are cleaned and pressed on acetate sheets using a Carver heated hydraulic press. Scales are read using a microfiche reader set on 24x or 33x magnification. For each sex, a minimum of 15 scales per 25 mm size class is read and subsequently used to assign ages to the remainder of the sample.

2.2.2.4 Potential Biases & Uncertainties

The P135 Survey deploys a passive gear of an array of nets with varying mesh size over a variety of randomly selected locations. The effort expended on survey design should result in estimates with relatively low bias. The survey design was informed by previous abundance and sampling data. It is possible that changes in the stock (habitat use, migration corridors, etc.) since the implementation of the sampling program may cause estimates to vary.

Many factors affect gill-net catch efficiency including net visibility and turbidity (Berst 1961; Hansson and Rudstam 1995), though setting nets overnight may offset some concerns of net visibility. Efficiency can also decrease if nets become tangled or fouled with debris. In the P135 Survey, performance of individual net panels is evaluated and recorded and catch is evaluated at the sample level (catch from a gang of nets is a sample), so performance of individual net panels may not have a large impact on catch from a sample.

2.2.2.5 Development of Estimates

Nominal indices of abundance were developed for both the fall/winter and spring components of the P135 Survey and were calculated using stratified average estimator (numbers per gang of net, 480 yards of 12 mesh sizes). For both the fall/winter and spring segments, only catches observed during the first 24 hours of the soak were included in the development of the index. Standardized indices were also calculated using the GLM approach described in section 2.2.1.5.

Biological data collected during the survey were summarized to characterize both the length and age frequencies of striped bass observed by sex and survey component.

2.2.2.6 Estimates of Survey Statistics

Available covariates for the GLM standardization included year, quad (fall/winter only), depth, and surface temperature. The best-fitting GLM for the fall/winter index assumed a negative binomial distribution (dispersion=1.6) and the significant covariates were year, quad, and surface temperature. The best-fitting GLM for the spring index assumed a negative binomial distribution (dispersion=1.5) and the significant covariates were year, depth, and surface temperature.

The GLM-standardized indices tracked well with the nominal indices for both the fall/winter (Figure 2.24) and spring (Figure 2.25) components of the P135 Survey. Indices from both components of the survey indicate decreasing trends in the most recent years of the time series (Figures 2.24, 2.25).

Females observed during the fall/winter component of the P135 Survey have ranged from 15 cm to 95 cm TL and males have ranged from 15 cm to 80 cm TL (Figure 2.26). Striped bass observed during the spring component of this survey were generally larger; females have ranged from 20 cm to 115 cm TL and males have ranged from 15 cm to 90 cm TL (Figure 2.27).

Females ranging from ages 1 to 10 have been collected during the fall/winter component of the P135 Survey (Figure 2.28). Males collected during the fall/winter have ranged in age from 1 to 7. Older striped bass tend to be observed during the spring component of this survey (Figure 2.29). Female striped bass as old as 15 and males as old as 10 have been observed in the spring. The modal age has varied over time for both females and males in both the fall/winter and spring components of the P135 Survey.

2.2.3 Roanoke River Electrofishing Survey

2.2.3.1 Survey Design & Methods

The NCWRC Electrofishing Survey on the Roanoke River spawning grounds began in 1991 to meet the ASMFC FMP requirements to monitor spawning stock abundance (Figure 2.30). A boat-mounted electrofishing unit (Smith-Root 7.5 GPP) is used (1 dip netter) to capture fish during daylight hours. Sampling is conducted at stations within strata. Sampling stations are located on main and secondary river channel habitats. Three strata are sampled each day, and strata selection is dependent on flow conditions. Flows of approximately 7,000 cubic feet per second (cfs) or less restrict access to strata above the rapids in proximity to the Weldon boating access area. To minimize size selection during sampling, striped bass were netted as they were encountered regardless of size. Water temperature (°C) is recorded each sample day.

2.2.3.2 Sampling Intensity

NCWRC personnel collect striped bass weekly between mid-April and May, on the historic spawning grounds of the Roanoke River near Weldon (RM 130) and Roanoke Rapids (RM 137), North Carolina. Sampling begins as the water temperature approaches 15.0°C (59.0°F) and continues through the range of optimal spawning temperatures until water temperatures surpass 22°C or until striped bass spawning is complete; optimum spawning temperatures range from 18.0° to 22.0°C (64.4° to 71.6°F) for striped bass in the Roanoke River.

2.2.3.3 Biological Sampling

Information on sex, age, and size composition of the spawning stock is also collected. Each fish is measured to the nearest mm for TL and sex is determined by assessing the presence of eggs or milt when pressure is applied to the fish's abdomen. Weight (kg) and scales are obtained from a subsample (target maximum of five fish of each 25-mm size group and sex per sample day) of fish. Weight and scales are collected from all fish greater than 700 mm. Scales are removed from the left side of the fish, above the lateral line and between the posterior of the first dorsal fin and the insertion of the second dorsal fin. Scales are aged using an EyeCom 3000 microfiche reader at 24x or 36x magnification. A primary reader ages up to 15 individuals per 25-mm length group per sex, and a subsample (20% of aged scales) is aged by a secondary reader for age verification. Age discrepancies between the readers are reconciled in concert.

2.2.3.4 Potential Biases & Uncertainties

The electrofishing survey spans a seven-mile section of the Roanoke River, determined to be the spatial extent of the spawning grounds. Site selection in early years of the survey was opportunistic to some degree, but multiple strata were always sampled so that sites were spread out within the spawning habitat/survey area each sample day. In more recent years, sites have been randomly selected within each of the three strata and the strata selections are based on flow conditions; however, some sample sites cannot be sampled due to flow conditions or angling activity. Inability to access sampling sites due to flow conditions or angler presence could bias the abundance estimates either by concentrating striped bass in the accessible areas or allowing striped bass to go undetected. Additionally, it is possible that fish may be missed by the dip netter. If striped bass are not universally available to the dip netter at all population densities, it could bias abundance estimates.

Other biases could be due to the gear itself; striped bass of abnormal size may not be as vulnerable to the stunning effects of the electrofishing gear and could escape capture. Electrofishing tends to select for larger fish as they are more visible to the dip netters and have a lower immobilization threshold (Sullivan 1956; Reynolds 1996; Dolan and Miranda 2003; Ruetz et al. 2007). For this reason, the relative abundance of smaller fish is likely biased too low (Reynolds 1996). Collection of fish by netting may be associated with bias. Daugherty and Sutton (2005) demonstrated that capture efficiency was affected by moderate flow rates due to movement of fish out of range of the netters. Schoenebeck and Hansen (2005) indicated how gear saturation caused electrofishing catch rate to be non-linearly related to abundance. Some fish may be less likely to be immobilized by electrofishing gear. Dolan and Miranda (2003) demonstrated how immobilization thresholds were inversely proportional to body size. Conductivity, water temperature, water transparency, dissolved oxygen, depth, flow, and electric current are some of the factors that can impact the efficiency of electrofishing gear (Reynolds 1996; McInerny and Cross 2000; Speas et al. 2004; Buckmeier and Schlechte 2009).

2.2.3.5 Development of Estimates

A nominal index was calculated using a ratio estimator (numbers per minute; Pollock et al. 1994). A standardized index was also calculated using the GLM approach described in section 2.2.1.5. An offset term was included in the model to account for differences in survey effort (measured in minutes) among sampling events (Zuur et al. 2009, 2012).

Biological data collected during the survey were summarized to characterize both the length and age frequencies of striped bass observed by sex.

2.2.3.6 Estimates of Survey Statistics

Available covariates for the GLM were year, stratum, discharge, and temperature. The final best-fitting model assumed a negative binomial distribution (dispersion=1.3) and the significant covariates were year, stratum, and temperature. The nominal and GLM-standardized indices were similar throughout the time series (Figure 2.31). Both series exhibit inter-annual variation and both demonstrate a general declining trend since the early 2000s.

The total lengths of females observed in the Roanoke River Electrofishing Survey have ranged from 20 cm to 120 cm TL (Figure 2.32). Males have ranged in length from 10 cm to 110 cm TL. Some truncation of the length distributions is apparent in the most recent years of the survey.

A broad range of ages have been collected during this survey (Figure 2.33). Females have ranged in age from 1 to 17 years while males have ranged in age from 1 to 15 years. The age distributions have shown a truncation in the last few years of the survey.

3 ASSESSMENT

3.1 Method—Stock Synthesis

3.1.1 Scope

The unit stock was defined as all striped bass within the ASMA and RRMA.

3.1.2 Description

This assessment is based on a forward-projecting length-based, age-structured model. A two-sex model is assumed. The stock was modeled using Stock Synthesis (SS) text version 3.30.14 software (Methot 2000; Methot and Wetzel 2013; Methot et al. 2019). Stock Synthesis is an integrated statistical catch-at-age model that is widely used for stock assessments throughout the world. SS was also used to estimate reference point values. All input files are available upon request.

3.1.3 Dimensions

The assessment model was applied to data collected from within the range of the assumed biological stock unit (ASMA-RRMA; section 1.2.1).

The time period modeled was 1991 through 2017 using an annual time step based on the calendar year. The year 1991 was selected as the start year because it was the earliest year for which landings from the Albemarle Sound recreational fleet were available (section 2.1.3). The terminal year, 2017, was selected because it was the most recent year from which data were available at the start of the assessment process.

3.1.4 Structure / Configuration

3.1.4.1 Catch

The model initially incorporated three fishing fleets: ASMA commercial fishery (ARcomm), ASMA recreational fishery (ASrec), and the RRMA recreational fishery (RRrec). Landings (i.e., "retained" catch) were entered for each of these fleets (ARcomm: weight; ASrec: numbers; RRrec: numbers; Table 3.1; Figure 3.1). Dead discards (in numbers) were also included for each of the three fleets (Table 3.2; Figure 3.2). After evaluation of initial model runs, it was decided to treat the RRrec discards as a separate fleet (see section 3.1.4.8).

3.1.4.2 Survey Indices

Four indices of relative abundance were selected for input into the model. All indices were derived from fisheries-independent surveys (Table 3.3; Figure 3.3). The index derived from the Program 100 Juvenile Trawl Survey (P100juv) was input as an index of age-0 recruitment and so associated biological data (lengths or ages) were not required as inputs into the model. Indices derived from the fall/winter component of the Program 135 Independent Gill-Net Survey (P135fw), the spring component of the Program 135 Independent Gill-Net Survey (P135spr), and the Roanoke River Electrofishing Survey (RRef) were also used.

Changes in indices over time can occur due to factors other than changes in abundance; the fisheries-independent indices were standardized using a GLM approach to attempt to remove the impact of some of these factors (Maunder and Punt 2004; see sections 2.2.1–2.2.3). Catchability (q) was assumed to be time-invariant for each survey and all survey indices were assumed to have a linear relation to abundance.

3.1.4.3 Length Composition

Annual length frequencies were input for each fleet's landings and discards for the years in which lengths were available for the particular fleet (see sections 2.1.1–2.1.3). Annual length frequencies characterizing the P135fw, P135spr, and RRef surveys were also input (see sections 2.2.2 and 2.2.3). Where possible, sex-specific length frequencies were used. Length frequencies were input by 2-cm length bins ranging from 10 cm to 130 cm TL.

3.1.4.4 Age Composition

Annual sex-specific age data were input for the AScomm landings as well as the P135fw, P135spr, and RRef surveys. The age data were input as raw age-at-length data, rather than age compositions generated from applying age-length keys to the catch-at-length compositions. The input compositions are therefore the distribution of ages obtained from samples in each length bin (conditional age-at-length). This approach is considered a superior approach because it avoids double use of fish for both age and length information, it contains more detailed information about the age-length relationship and so improves the estimation of growth parameters, and the approach can match the protocols of sampling programs where age data are collected in a length-stratified program (Methot et al. 2019).

Age 15 was treated as a plus group that included ages 15 through 17, the maximum age within the data input into the stock assessment model. Ages were assumed to be associated with small bias and negligible imprecision.

3.1.4.5 Biological Parameters

Natural Mortality

Natural mortality is one of the most important parameters in a stock assessment and one of the most difficult to estimate. The availability of an empirical estimate is rare. The empirical estimate of natural mortality from the Harris and Hightower (2017) study (0.72, see section 1.2.6.1) was assumed for both females and males in the model presented to the peer reviewers (see section 5) and treated as an age-invariant, fixed input. While the peer reviewers were pleased with the working group's attempt to incorporate an empirical estimate of natural mortality, they felt the value was too high given the species maximum age (see section 1.2.6.1).

Given the uncertainty in the assumed rate of natural mortality, a series of sensitivity runs were performed at the second peer review workshop in which the assumption regarding natural mortality

was varied (see section 3.1.7.2). The values assumed for natural mortality in these runs were selected from the range estimated based on the species life history (Table 1.4; section 1.2.6.1). After discussion between the working group and the peer review panel, a value of 0.40 was settled on for use in the final base run. This value was assumed for both sexes and treated as an age-invariant, fixed input. Both the working group and the peer review panel felt this value was more appropriate given the species' life history and maximum age and was closer to the empirical estimate of natural mortality estimated in the Harris and Hightower (2017) study than other values explored.

Growth

Growth (age-length) was assumed to be sex specific and was modeled using the von Bertalanffy growth curve. In the SS model, when fish recruit at the real age of 0.0, their length is set equal to the lower edge of the first population length bin (here, 10 cm; Methot et al. 2019). Fish then grow linearly until they reach a real age equal to a user-specified age (here, age 1). As the fish continue to age, they grow according to the von Bertalanffy growth equation.

Allowing SS to estimate the growth curve ensures that the assumptions about selectivity are consistent with other parts of the model and that uncertainty in the growth estimates is incorporated into the estimates of spawning stock biomass, fishing mortality, and reference points (Hall 2013). All age-length growth parameters were estimated for both sexes. The estimated growth parameters for each sex were L_∞, K, coefficient of variation (CV) for length at age 1, and CV for L_∞. Initial values for L_∞ and K were derived by fitting the von Bertalanffy model to the available age-length data by sex (see also section 1.2.4; Table 1.1). Initial values for the CVs for length at age 1 and L_∞ were derived empirically for each sex. The initial values for the growth parameters were treated as informative priors (prior standard deviation=0.05 for L_∞ and K; prior standard deviation=0.8 for CV1 and CV2) assuming a normal distribution. Examination of the observed data was used to set reasonable bounds on all growth parameters for males and females.

Parameters of the length-weight relationship were fixed (i.e., not estimated) for both males and females. The assumed values were those estimated in this report as described in section 1.2.4 (Table 1.2).

Maturity & Reproduction

Female maturity at age as estimated by Boyd (2011; section 1.2.5.4) was treated as a fixed input in the model. Reproduction was assumed to occur on January 1 each year.

Fecundity

The selected fecundity option in SS was such that causes eggs to be equivalent to spawning biomass.

3.1.4.6 Stock-Recruitment

A Beverton-Holt stock-recruitment relationship was assumed. Virgin recruitment, R_0, was estimated within the model. Steepness, h, was fixed at 0.9 and the standard deviation of log(recruitment), σ_R, was fixed at 0.6. Recruitment deviations were estimated from 1980 to 2015. The deviations are assumed to sum to zero over this time period. Setting the first year in which to estimate recruitment deviations (1974) earlier than the model start year (1991) allows for a non-equilibrium age structure at the start of the assessment time series (Methot et al. 2019).

3.1.4.7 Fishing Mortality

SS allows several options for reporting fishing mortality (*F*). The *F* values reported here represent a real annual *F* calculated as a numbers-weighted *F* (see Methot et al. 2019) for ages 3–5. This age range was selected based on the high selectivity for this age range by the fleets and the large percentage of the total catch this age range comprises. Note the last NCDMF stock assessment for striped bass reported apical *F* values (*F* at age 4) and so are not directlycomparable to the results of this assessment (Flowers et al. 2016).

3.1.4.8 Selectivity

In SS, selectivity can be a function of length and/or age. In the current assessment, selectivity was assumed to be a function of length for all fleets and surveys due to the high confidence in the length data for characterizing these data sources. Retention for the fleets was also assumed to be a function of length (the only option for retention parameters).

In initial runs, all selectivity patterns were modeled using the recommended double normal curve. The double normal curve is extremely flexible and can take on shapes ranging from asymptotic to dome shaped. Evaluation of the initial model fits to the length composition data indicated some potential issues with the predicted selectivity patterns (i.e., strong patterns in the length residuals). Fits to the RRrec harvest lengths were especially poor so the decision was made to fix the selectivity to match the protective slot (section 1.5.4) and treat the discard portion of this fishery as a separate fleet. The presence of strong residual patterns in the fits to the length composition data prompted consideration of an even more flexible selectivity function, the cubic spline. Use of the cubic spline for the ARcomm fleet (six nodes) and the P135fw survey (three nodes) provided improvements in fits to the length composition data associated with these fleets and so was assumed in the final base model.

Early model runs suggested difficulty in predicting the female and male length composition data from the RRef survey. Investigation of the data and discussion with the model developer suggested this was due to the highly skewed sex ratio and different length frequency patterns between female and male striped bass observed in the survey. The SS model allows for selectivity for male fish to differ from selectivity for female fish and this option was selected for the RRef survey. The male selectivity parameters were modeled as an offset of the female selectivity parameters.

3.1.4.9 Equilibrium Catch

The SS model needs to assume an initial condition of the population dynamics for the period prior to the estimation period. Typically, two approaches are used to meet this assumption. The first approach starts the model as far back as necessary to satisfy the notion that the period prior to the estimation of dynamics was in an unfished or near unfished state. For striped bass, reliable catch records back to the start of the fishery are not available. For this reason, the model developer recommended use of the second approach, which is to estimate (where possible) initial conditions assuming equilibrium catch (R.D. Methot Jr., NOAA Fisheries, personal communication). The equilibrium catch is the catch taken from a fish stock when it is in equilibrium with removals and natural mortality balanced by stable recruitment and growth.

3.1.5 Optimization

The SS model assumes an error distribution for each data component and assigns a variance to each observation. The ARcomm landings, ASrec and RRrec harvests, and RRrec discards were fit in the model assuming a lognormal error structure. These data were assumed precise and assigned

a minimal observation error. The standard errors (SEs) of the annual ARcomm landings were assumed equal to 0.02 prior to the start of the Trip Ticket program (1994; section 2.1.1) and were assumed equal to 0.01 for the remainder of the time series. As the commercial landings data are derived from a census and recreational data are derived from a survey, a slightly higher standard error was assumed for the annual ASrec and RRrec harvest estimates (SE=0.02). The RRrec discard estimates were based on a hindcast method in earlier years (1991–1994) of the time series and were assumed to have a CV equal to 0.06. Discard estimates from this fleet in subsequent years were assumed to have a CV equal to 0.04.

As dead discards are part of the overall total removals, they were also assumed to be precise, though were assumed to have higher variance than the landings and harvest due to the increased uncertainty in the estimation methods. The coefficient of variation (CV) assumed for the ARcomm discards was derived from the GLM standardization (see section 2.1.2.5). The CVs for discards from the ASrec fleet were derived empirically. A normal distribution was assumed for the error structure of the discards for each fleet.

Survey indices were fit assuming a lognormal error distribution with variance estimated from the GLM standardization.

Composition information was fit assuming a multinomial error structure with variance described by the effective sample size. For each fleet and survey, the effective sample size was the number of sampled trips and a maximum of 200 was imposed.

The objective function for the base model included likelihood contributions from the landings and harvest, discards, survey indices, length compositions, age data, and recruitment deviations. The total likelihood is the weighted sum of the individual components. All likelihood components with the exception of the age data, were initially assigned a lambda weight equal to 1.0. Based on a recommendation from the model developer, the likelihood components for the age data were reduced to 0.25 (R.D. Methot Jr., NOAA Fisheries, personal communication).

The model results are dependent, sometimes highly, on the weighting of each data set (Francis 2011). Francis (2011) points out that there is wide agreement on the importance of weighting, but there is lack of consensus as to how it should be addressed. In integrated models that use multiple data sets, it is not uncommon for the composition data to drive the estimation of absolute abundance when inappropriate data weightings are applied or the selectivity process is miss-specified (Lee et al. 2014). Francis (2011) argues that abundance information should primarily come from indices of abundance and not from composition data. Following the recommendation of Francis (2011), the model was weighted in two stages. Stage 1 weights were largely empirically derived (standard errors, CVs, and effective sample sizes described earlier in this section) and applied to individual data observations. Stage 2 weights were applied to reweight the length and age composition data by adjusting the input effective sample sizes. The stage 2 weights were estimated based on method TA1.8 (Appendix A in Francis 2011) using the SSMethod.TA1.8 function within the r4ss package (Taylor et al. 2019) in R (R Core Team 2019).

3.1.6 Diagnostics

Several approaches were used to assess model convergence. The first diagnostic was to check whether the Hessian matrix (i.e., matrix of second derivatives of the likelihood with respect to the parameters) inverted. Next, the model convergence level was compared to the convergence criteria (0.0001, common default value). Ideally, the model convergence level will be less than the criteria.

Model stability was further evaluated using a "jitter" analysis. This analysis is a built-in feature of SS in which the initial parameter values are varied by a user-specified fraction. This allows evaluation of varying input parameter values on model results to ensure the model has converged on a global solution. A model that is well behaved should converge on a global solution across a reasonable range of initial parameter estimates (Cass-Calay et al. 2014). Initial parameters were randomly jittered by 10% for a series of 50 random trials. The final model total likelihood value, annual estimates of spawning stock biomass (SSB), annual *F* values, and associated thresholds (see section 4) from the jitter runs were compared to the base run results.

Additional diagnostics included evaluation of fits to landings and harvest, discards, indices, and length compositions and comparison of predicted growth parameters to empirical values. The evaluation of fits to the various data components included a visual comparison of observed and predicted values and calculation of standardized residuals for the fits to the fisheries-independent survey indices and length composition data. The standardized residuals were first visually inspected to evaluate whether any obvious patterns were present. In a model that is fit well, there should be no apparent pattern in the standardized residuals. If most of the residuals are within one standard deviation of the observed value, there is evidence of under-dispersion. This is indicative of a good predictive model for the data. That is, the model is fitting the data much better than expected, given the assumed sample size.

Checking for patterns in standardized residuals over time can be done via the runs test, which was applied to the standardized residuals of the fits to the fisheries-independent survey indices. The runs test was applied using the RunsTest function in the DescTools package (Signorell et al. 2019) in R (R Core Team 2019). In a perfectly fit model, the standardized residuals have a normal distribution with mean equal to 0 and standard deviation equal to 1. The Shapiro-Wilk distribution test was applied to determine whether the standardized residuals of the fits to the fisheries-independent survey indices were normally distributed. This test was conducted using the shapiro.test function within the stats package in R (R Core Team 2019). An alpha level of 0.05 was used for both the runs test and Shapiro-Wilk distribution test to determine significance.

3.1.7 Uncertainty & Sensitivity Analyses

3.1.7.1 Evaluate Data Sources

Uncertainty can also be explored by assessing the contribution of each source of information (Methot 1990). The contribution of a data source or other parameter(s) can be manipulated by changing the weight, or emphasis, of the associated likelihood component.

The contribution of different fisheries-independent surveys was explored by removing the data from each survey one at a time in a series of model runs. In each of these runs, the survey under evaluation was effectively removed by assigning a lambda weight of 0.0 to the likelihood component for that survey's index and associated biological data (if present).

Annual estimates of female spawning stock biomass and *F* were compared to those from the base run.

3.1.7.2 Alternative Natural Mortality

Natural mortality was assumed to be constant across sexes and ages in the final base run (M=0.40; section 3.1.4.5); however, natural mortality that varies by sex and age may be more realistic. In one sensitivity run, natural mortality was assumed equal to the values derived using the modified Lorenzen approach described in section 1.2.6.1 (assumed sex-specific and age-variable).

Additionally, a run was performed in which natural mortality was assumed equal to the empirical estimate of 0.72 derived from the Harris and Hightower (2017) study (assumed sex- and age-constant). Finally, a run was performed in which natural mortality was assumed equal to 0.30 to provide a run that used a lower range value for natural mortality (assumed sex- and age-constant).

3.1.8 Results

A summary of the input data used in the base run of the striped bass stock assessment model is shown in Figure 3.4.

3.1.8.1 Base Run—Diagnostics

The final base run resulted in an inverted Hessian matrix, but the model's final convergence level was 0.00673183. This value is higher than the convergence criteria, which was set at 0.0001. It is not unusual for models with hundreds of parameters to produce higher convergence levels and so values less than 1.0 for such models are typically deemed acceptable (R.D. Methot Jr., NOAA Fisheries, personal communication). Four out of 111 estimated parameters were estimated near their bounds (Table 3.4). These are the CV for female age at L_∞, CV for male age at L_∞, initial equilibrium F for the RRrec discard fleet, and one of the selectivity parameters for the ARcomm fleet.

Twenty one of the 50 jitter runs successfully converged (Table 3.5). None of the converged jitter runs resulted in a likelihood value that was lower than the base run (Figure 3.5). The majority of the converged runs produced similar trends in female SSB and F to the base run (Figure 3.6). The results of one of the converged runs (run 46) was not included in these plots as it estimated female SSB to be an order of magnitude higher and F an order of magnitude lower than the other converged runs. Overall, the jitter analysis gives evidence that the base model converged to the global solution.

There is near identical agreement between observed and predicted landings and harvest for the ARcomm, ASrec, and RRrec fleets (Figure 3.7). This is not unexpected given the small amount of error assumed for these data (section 3.1.5). The SS model tended to underestimate discards for the ARcomm fleet (Figure 3.8A). For the ASrec discards, the model overestimated in some years and underestimated in others (Figure 3.8B). The RRrec discards were fit well by the model (Figure 3.8C).

Model fits to the fisheries-independent survey indices are reasonable (Figures 3.9–3.12). The model-predicted indices tended to capture the overall trend in the observed values for the P100juv (Figure 3.9), P135fw (Figure 3.10), and RRef (Figure 3.12) survey indices but did a poor job of predicting the trend for the P135spr survey index (Figure 3.11). The model did not capture the same degree of inter-annual variability seen in the observed index. Visual inspection of the standardized residuals indicates no clear temporal patterns for any of the survey indices and this was confirmed by the results of the runs tests, which produced non-significant (α=0.05) P-values (Table 3.6). None of the standardized residuals for the fisheries-independent survey indices were found to be significantly different from a normal distribution based on the results of the Shapiro-Wilk test for normality.

The fits to the length compositions aggregated across time appear reasonable for most of the fleets and surveys with the exception of the fit to the ARcomm discard lengths (Figure 3.13). This poor fit is likely due, in part, to the small effective sample sizes associated with the ARcomm discard length compositions. Examination of the fits to the length composition data by individual year

indicates fits ranging from good to poor (Figures 3.14–3.28). Again, the poor fit to the ARcomm discard lengths is evident (Figure 3.16). The presence of bimodality in the P135fw survey lengths provided some difficulty in model fitting (Figures 3.23, 3.24). This was also true for the P135spr survey lengths (Figures 3.25, 3.26). Residuals from the fits to the length composition data for the different data sources are shown in Figures 3.29–3.37. The fits to the length composition data from the P135fw survey (Figures 3.35), P135spr survey (Figure 3.36), and RRef survey (Figure 3.37) show residual patterns which suggest the periodic presence of strong year classes. The strongest length composition residual patterns are evident in the ASrec harvest (Figure 3.31) and ASrec discard (Figure 3.32) fits. Fits to the ASrec harvest lengths suggest underestimation at mid-range lengths and overestimation at the smallest and largest lengths (Figure 3.31). The opposite pattern is seen in the fits to the ASrec discard lengths, which shows overestimation at mid-range lengths and underestimation at the smallest and largest lengths (Figure 3.32).

The growth curves estimated by the model are similar to the curves derived empirically (Figure 3.38). The predicted growth curves for both females and males suggest a small degree of underestimation of length at age.

3.1.8.2 Base Run—Selectivity & Population Estimates

The predicted selectivity curves are shown in Figures 3.39–3.41 and are considered reasonable.

Annual predicted recruitment is variable among years and demonstrates a general decrease over the time series (Table 3.7; Figure 3.42). Predicted recruitment deviations are shown in Figure 3.43 and show no obvious concerning pattern.

There is less inter-annual variability in predicted female spawning stock biomass (SSB; Table 3.7; Figure 3.44) than that exhibited in the predicted recruitment values (Figure 3.42). Female SSB values were highest in the late 1990s through the mid-2000s and have generally decreased since. The predicted stock-recruitment relationship indicates the relation is not particularly strong (Figure 3.45). This is not unexpected given the model assumed a fixed value of 0.9 for the steepness parameter. Predicted values of spawner potential ratio (SPR) show a slightly decreasing trend over the time series (Table 3.7; Figure 3.46).

Predicted population numbers at age suggest 60–65% of the population has been dominated by age-0 and age-1 fish (Tables 3.8–3.9). These predicted numbers at age show an increase in the numbers of older fish through the mid-2000s, followed by a possible truncation of age structure in recent years. The predictions of landings at age for the ARcomm fleet indicate that most (~82%) of the fish captured are ages 3 through 5 (Table 3.10). The majority (84%) of the discards for the ARcomm fleet are ages 2 through 5 (Table 3.11). The harvest for the ASrec fleet is dominated (nearly 81%) by ages 3 through 6 (Table 3.12). Approximately 74% of the discards for the ASrec fleet are ages 3 and 4 (Table 3.13). The RRrec fleet captures mostly (93%) age-3 to age-5 striped bass in the harvest (Table 3.14) while most (67%) of the RRrec discards are age 3 and 4 (Table 3.15).

Model predictions of annual F (numbers-weighted, ages 3–5) exhibit moderate inter-annual variability throughout the assessment time series and peaks are observed in 2012 and 2016 (Table 3.16; Figure 3.47). Predicted F values range from a low of 0.15 in 1997, 1999, and 2003 to a high of 1.3 in 2012. There a decline in F in the last year of the time series.

3.1.8.3 Evaluate Data Sources

The removal of the different survey data sets had minimal impact on estimates of female SSB and *F* (Figure 3.48).

3.1.8.4 Alternative Natural Mortality

Assuming age-varying natural mortality (Lorenzen *M*) and a lower value of natural mortality (*M*=0.30) produced estimates of female SSB that were lower than those in the base run while the overall trends were similar (Figure 3.49A). Using the higher empirically-derived value of natural mortality (*M*=0.72) resulted in higher estimates of female SSB than those predicted in the base run. The model that assumed the empirical estimate of natural mortality resulted in lower estimates of *F* relative to the base run as did the run that assumed natural mortality varied with age and sex (Figure 3.49B). Predicted *F* values were slightly higher when the lower value of natural mortality was assumed (*M*=0.30). estimates of recruitment increased by an order of magnitude when using the empirically-derived natural mortality and when using the Lorenzen natural mortality (Figure 3.50).

3.2 Discussion of Results

The current stock assessment for striped bass indicates some concerning trends. Observed recruitment in recent years of the assessment time series (Figures 2.22, 3.3A) has been relatively low and predicted recruitment has been showing a general decline recently (Figure 3.42). Overall, recruitment is highly variable and has been generally lower in recent years relative to that observed and predicted from 1991 through 2000. From 1993 through 2000, the stock produced seven of the top nine year classes in terms of age-0 abundance. The 2000 cohort is the largest produced in the entire time series. Since then, from 2001 through 2006, five out of the six cohorts produced were below-average in terms of numbers and only the 2005-year class is considered a strong year class (Table 3.7; Figure 3.42). These observations suggest there is another factor besides simply the size of SSB that has an influence on producing strong year classes. Much research from the 1950s through the 1980s supports the importance of flow in the Roanoke River during the spawning period and subsequent weeks while eggs and larvae are being transported down the Roanoke River to the nursery habitat in the western Albemarle Sound and the importance of flow in supporting abundant striped bass year-class production (Hassler et al. 1981; Rulifson and Manooch 1990; Zincone and Rulifson 1991).

The length (Figures 2.2, 2.3) and age (Figures 2.4, 2.5) compositions of striped bass sampled from the commercial landings show that fewer larger and older fish have been observed in recent years. A truncation of the length (Figure 2.32) and age (Figure 2.33) structure is also evident in the observations from the Roanoke River Electrofishing Survey. Recent observations from the Roanoke River Electrofishing Survey of abundance are the lowest in the time series (Figure 2.31). The abundance of age 9+ fish in the survey has also been declining in recent years. Predicted population numbers at age show a truncation in the most recent years of the time series and an overall decline in total population abundance (Tables 3.8, 3.9). Predicted female SSB (Figure 3.44) has also shown a declining trend in recent years and, estimates in recent years have been the lowest in the entire time series. The 2016 estimate of fishing mortality was the second highest in the time series and declined in 2017 (Figure 3.47).

Performance of the stock assessment model was considered good in terms of predicting the observed data. The quality of the fits is strongly tied to the input variance and effective sample sizes. Fits to the observed landings, harvest, and discard were reasonable and this was expected

given the low variance assumed for these data sources. Of the fisheries-independent survey indices, all but the P135spr index were fit well and no issues were detected among the residuals for any of the survey indices. The model was insensitive to the removal of the various sources of fisheries-independent survey data suggesting the different surveys share similar signals in the data with regard to population trends.

Striped bass commonly migrate outside the bounds of the A-R management unit, either to other internal waters of North Carolina such as western Pamlico Sound and the Tar-Pamlico, Pungo, and Neuse rivers or by joining the migratory ocean stock. The probability of migration increases with age and has increased over time (Callihan et al. 2014). In the most recent years examined in Callihan et al. (2014), the probability has been most significant for fish age 6 and older (20% or greater). In addition, smaller adults show evidence of density-dependent movements and habitat utilization, as the likelihood of recapture outside the ASMA in adjacent systems increases during periods of higher stock abundance. When a striped bass migrates, it may not return to its natal waterbody; this could be due to harvest outside of the ASMA and RRMA and is not accounted for in the harvest losses here. This loss of fish from the system will likely be interpreted by the model as losses due to natural and/or fishing mortality. The most recent assessments of the A-R striped bass stocks attempted to account for these migration losses by adjusting the natural mortality rate by the probability of migration and fishing mortality occurring in the Atlantic Ocean, thereby creating an estimate of total unobserved mortality that accounted for both natural mortality and losses not attributable to North Carolina fisheries (Mroch and Godwin 2014; Flowers et al. 2016). In this assessment, migration losses were not specifically modeled; this total unobserved mortality was treated as fixed in the modeling process.

The ages in this assessment were derived from scales and were assumed to be associated with small bias and negligible imprecision; however, Welch et al. (1993) found that scales tend to underage striped bass for fish that are older than age ten. This suggests that the maximum age assumed for this assessment, age 17, may be an underestimate of the true maximum age. Assuming maximum age that is too young can positively bias the estimates of SPR (Goodyear 1993) and the derived reference points.

There is additional recent evidence that age 17 may not be the maximum age for the A-R stock. In 2017, an angler returned a striped bass tag from a fish that had been tagged on the spawning grounds in 2007, which was aged at the time to 13 years old, increasing the oldest know age fish in the A-R stock to 23. In April 2020, an angler caught and cut the tag off a striped bass in the Roanoke River that was originally tagged in 1995 and estimated to be age 6, which suggests the oldest known fish in the stock is now at 31 years old, likely from the 1989 year class. Note that these instances are of single tag returns and it is not known how reflective they are of the relative abundance of these older fish in the stock. The available observed data suggested few fish older than age 9 are present in the stock, especially in recent years.

4 STATUS DETERMINATION CRITERIA

The General Statutes of North Carolina define overfished as “the condition of a fishery that occurs when the spawning stock biomass of the fishery is below the level that is adequate for the recruitment class of a fishery to replace the spawning class of the fishery” (NCGS § 113-129). The General Statues define overfishing as “fishing that causes a level of mortality that prevents a fishery from producing a sustainable harvest.”

The working group decided that the spawner potential ratio (SPR) was an appropriate proxy for developing reference points. Levels of SPR ranging from 20% to 50% have been found to be appropriate for various stocks, but historical analysis of SPR shows increased risk of recruitment overfishing levels if SPR falls below 30% (Walters and Martell 2004). For this assessment, threshold values were based on 35% SPR and targets were based on 45% SPR.

The fishing mortality reference points and the values of F that are compared to them represent numbers-weighted values for ages 3 to 5 (section 3.1.4.7). The SS model estimated a value of 0.13 for F_{Target} ($F_{45\%}$). The estimate of $F_{\text{Threshold}}$ ($F_{35\%}$) from the SS model was 0.18. The estimated value of fishing mortality in the terminal year (2017) of the model was 0.27, which is greater than the threshold value and suggests that overfishing is currently occurring in the stock ($F_{2017} > F_{\text{Threshold}}$; Figure 4.1).

The target level for female spawning stock biomass (SSB_{Target} or $SSB_{45\%}$) was estimated at 159 metric tons by the SS model. The estimated threshold for SSB ($SSB_{\text{Threshold}}$ or $SSB_{35\%}$) was 121 metric tons. Terminal year (2017) female SSB was 35.6 metric tons, which is less than the threshold value and suggests the stock is currently overfished ($SSB_{2017} < SSB_{\text{Threshold}}$; Figure 4.2).

The estimates in the most recent years are often associated with large uncertainty in stock assessment models. Approaching the ending year of the time series, the estimates of the most recent years lack data support from subsequent years during calibration. Nevertheless, stock status is often based on the terminal year estimates of fishing mortality and population size (or a proxy) to address the management needs and interests.

5 SUITABILITY FOR MANAGEMENT

Stocks assessments performed by the NCDMF in support of management plans are subject to an extensive review process, including a review by an external panel of experts. External reviews are designed to provide an independent peer review and are conducted by experts in stock assessment science and experts in the biology and ecology of the species. The goal of the external review is to ensure the results are based on the best science available and provide a valid basis for management.

The review workshop allows for discussion between the working group and review panel, enabling the reviewers to ask for and receive timely updates to the models as they evaluate the sensitivity of the results to different model assumptions. The workshop also allows the public to observe the peer review process and better understand the development of stock assessments.

The external peer review panel first met with the working group in person in December 2019. The reviewers were concerned with the external fit of the von Bertalanffy growth model to the observed age-length data; model predicted size was consistently smaller than empirical size for larger, older fish. The reviewers were also concerned with residual patterns in the fits to the length composition data indicative of model misspecification. Another major concern was failure of the model to capture trends observed in the empirical data. The peer reviewers did not support the presented model for management use but agreed to a second review after the working group addressed their concerns. In preparing the updated model, the working group noted an error in the input data that invalidated the first model. The working group corrected the data issue and also addressed the peer reviewer concerns regarding model fitting. A second assessment was presented to the peer review panel via webinar in June 2020.

The external peer reviewers worked with the working group to develop a model (presented in section 3) that the peer review endorsed for management use for at least the next five years and

agreed the determination of stock status (overfished and overfishing) for the North Carolina Albemarle Sound-Roanoke River striped bass in the terminal year concurs with professional opinion and observations. The reviewers also agreed that: (1) the justification of inclusion and exclusion of data sources are appropriate; (2) the data sources used in this assessment are appropriate; (3) determination of stock status for the terminal year is robust to model assumptions on natural mortality and growth; (4) the extensive exploration of sensitivities to model assumptions and configurations, especially the sensitivity analysis regarding the natural mortality and growth assumptions, resolves the reviewers' primary areas of concerns such as the concerns over the fitting to growth data and length composition data and the concern regarding the overestimation of abundance for the last three years of the time series; (5) reviewers recommend future assessments consider key abiotic drivers of poor recruitment such as river flow and key biotic drivers such as catfish predation and competition; (6) reviewers also recommend collection of sex-specific growth data from juveniles and old fish to better inform growth estimates and length- or age-specific natural mortality estimates, and to resolve the concern on growth estimates showing little difference between males and females. Detailed comments from the external peer reviewers are provided in the Appendix.

While the peer reviewers did approve the model for management use and were confident in the declining trend in recruitment based on assessment results and results from the Juvenile Abundance Survey (P100; Figure 5.1), there was a great deal of uncertainty in the potential causes of the decline in recruitment (Appendix). One key uncertainty was related to the impacts of changes in river flow on YOY abundance. The review panel recognized the declining recruitment in the time series did not appear to result solely from reduced stock abundance due to harvest (i.e., overfishing). The review panel suggested future assessments consider formally incorporating the flow-recruitment relationship into the stock assessment as spring flow conditions are believed to influence recruitment and ultimately stock abundance. Another area of potential influence on the striped bass stock is the prevalence of the non-native blue catfish (*Ictalurus furcatus*). The population of blue catfish in the Roanoke River and western Albemarle Sound and tributaries has increased dramatically in recent years (Darsee et al. 2019; NCDMF 2019). The reviewers felt predation by blue catfishes could potentially impact recruitment of striped bass directly or could influence food resources for striped bass through competition for prey (e.g., Pine et al. 2005). The review panel recognized the degree to which this occurs is not known, but future assessments should consider this as a factor that may influence abundance but is not tied to striped bass harvest.

6 RESEARCH RECOMMENDATIONS

The research recommendations listed below are offered by the working group to improve future stock assessments of the A-R striped bass stock.

<u>High</u>

- Improve estimates of discard mortality rates and discard losses from the ASMA commercial gill-net fisheries (ongoing through observer program)
- Collect data to estimate catch-and-release discard losses in the ASMA recreational fishery during the closed harvest season
- Investigate relationship between river flow and striped bass recruitment for consideration of input into future stock assessment models

Medium

- Transition to an assessment that is based on ages derived from otoliths
- Improve estimates of catch-and-release discard losses in the RRMA recreational fishery during the closed harvest season
- Incorporate tagging data directly into the statistical catch-at-age model
- Improve the collection of length and age data to characterize commercial and recreational discards
- Explore the direct input of empirical weight-at-age data into the stock assessment model in lieu of depending on the estimated growth relationships

Low

- Re-evaluate catch-and-release mortality rates from the ASMA and RRMA recreational fisheries incorporating different hook types and angling methods at various water temperatures (e.g., live bait, artificial bait, and fly fishing)
- Investigate the potential impact of blue catfish on the A-R striped bass population (e.g., habitat, predation, forage)

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8 TABLES

Table 1.1. Parameter estimates and associated standard errors (in parentheses) of the von Bertalanffy age-length growth curve by sex. The function was fit to total length in centimeters.

Sex	n	L_∞	K	t_0
Female	29,991	160 (0.81)	0.071 (0.00063)	-0.62 (0.014)
Male	29,691	161 (1.3)	0.064 (0.00082)	-0.87 (0.017)

Table 1.2. Parameter estimates and associated standard errors (in parentheses) of the length-weight function by sex. The function was fit to total length in centimeters and weight in kilograms.

Sex	n	a	b
Female	28,814	2.8E-06 (4.4E-08)	3.2 (2.3E-03)
Male	33,411	5.9E-06 (1.0E-07)	3.1 (2.7E-03)

Table 1.3. Percent maturity of female striped bass as estimated by Boyd (2011).

Age	% Maturity
0	0
1	0
2	0
3	28.6
4	96.8
5	100
6	100
7	100
8	100
9	100
10	100
11	100
12	100
13	100
14	100
15	100
16	100
17	100

Table 1.4. Age-constant estimates of natural mortality derived from life history characteristics.

Method	Female	Male	Average
Alverson and Carney 1975	0.37	0.44	0.40
Hoenig 1983 (regression)	0.26	0.30	0.28
Hoenig 1983 (rule-of-thumb)	0.25	0.28	0.26
Ralston 1987 (linear regression)	0.16	0.15	0.16
Jensen 1996 (theoretical)	0.11	0.095	0.10
Jensen 1996 (derived from Pauly 1980)	0.11	0.10	0.11
Cubillos 2003	0.099	0.090	0.094
Hewitt and Hoenig 2005	0.25	0.28	0.26
Hoenig (nls; from Then et al. 2015)	0.37	0.41	0.39
Then et al. 2015	0.30	0.34	0.32
Average	0.23	0.25	0.24

Table 1.5. Estimates of natural mortality at age by sex based on the method of Lorenzen (1996).

Age	Female	Male
0	2.8	2.2
1	1.4	1.3
2	1.0	1.0
3	0.88	0.88
4	0.79	0.80
5	0.73	0.74
6	0.69	0.70
7	0.66	0.67
8	0.64	0.65
9	0.62	0.63
10	0.60	0.62
11	0.59	0.60
12	0.58	0.59
13	0.57	0.58
14	0.56	0.57
15	0.56	0.57
16	0.55	0.56
17	0.55	0.56

Table 1.6. Changes in the total allowable landings (TAL) in metric tons and pounds (in parentheses) for the ASMA-RRMA, 1991–2017.

Regulatory Period	ASMA Commercial	ASMA Recreational	RRMA Recreational	Combined TAL
1991–1997	44.45 (98,000)	13.34 (29,400)	13.34 (29,400)	71.12 (156,800)
1998	56.88 (125,400)	28.44 (62,700)	28.44 (62,700)	113.8 (250,800)
1999	62.57 (137,940)	31.28 (68,970)	31.28 (68,970)	125.2 (275,968)
2000–2002	102.1 (225,000)	51.03 (112,500)	51.03 (112,500)	204.1 (450,000)
2003–2014	124.7 (275,000)	62.37 (137,500)	62.37 (137,500)	249.5 (550,000)
2015–2017	62.37 (137,500)	31.18 (68,750)	31.18 (68,750)	124.7 (275,000)

Table 1.7. Striped bass commercial landings and discards and recreational harvest and discards from the ASMA-RRMA, 1991–2017.

Year	Commercial Landings	Commercial Discards	Recreational Harvest		Recreational Discards	
	ASMA	ASMA	ASMA	RRMA	ASMA	RRMA
	metric tons	numbers	numbers	numbers	numbers	numbers
1991	49.24	10,267	14,395	26,934	1,507	9,516
1992	45.65	8,434	10,542	13,372	1,279	4,725
1993	49.70	8,952	11,404	14,325	847.4	5,061
1994	46.48	4,302	8,591	8,284		2,927
1995	39.88	4,938	7,343	7,471		3,373
1996	40.92	4,150	7,433	8,367		10,461
1997	43.64	3,967	6,901	9,364	1,969	18,673
1998	56.26	5,817	19,566	23,109	5,881	12,159
1999	73.94	7,401	16,967	22,479	2,581	10,468
2000	97.17	10,500	38,085	38,206	5,052	5,961
2001	100.0	11,630	40,127	35,231	3,931	4,544
2002	101.2	6,633	27,896	36,422	3,300	3,570
2003	120.9	10,394	15,124	11,157	1,618	2,448
2004	124.2	4,475	28,004	26,506	2,627	11,989
2005	105.6	9,566	17,954	34,122	1,358	10,093
2006	84.62	6,715	10,711	25,355	605.1	4,194
2007	77.94	4,803	7,143	19,305	870.3	3,360
2008	34.01	2,538	10,048	10,541	2,366	12,137
2009	43.49	3,294	12,069	23,248	2,596	8,702
2010	90.72	10,017	3,504	22,445	1,037	7,930
2011	61.86	6,646	13,341	22,102	1,381	6,894
2012	52.48	4,256	22,345	28,847	1,598	4,033
2013	31.03	6,706	4,299	7,718	1,048	4,750
2014	32.23	2,794	5,529	11,058	1,478	10,594
2015	51.98	3,539	23,240	20,031	3,170	6,927
2016	55.89	3,989	4,794	21,260	662.5	3,369
2017	34.50	2,762	4,215	9,899	1,578	5,021

Table 2.1. Annual estimates of commercial gill-net discards (numbers of fish), 1991–2017. Note that values prior to 2012 were estimated using a hindcasting approach.

Year	Discards
1991	10,267
1992	8,434
1993	8,952
1994	4,302
1995	4,938
1996	4,150
1997	3,967
1998	5,817
1999	7,401
2000	10,500
2001	11,630
2002	6,633
2003	10,394
2004	4,475
2005	9,566
2006	6,715
2007	4,803
2008	2,538
2009	3,294
2010	10,017
2011	6,646
2012	4,256
2013	6,706
2014	2,794
2015	3,539
2016	3,989
2017	2,762

Table 2.2. Annual estimates of recreational harvest and dead discards (numbers of fish) for the ASMA, 1991–2017.

Year	Harvest	Discards
1991	14,395	1,507
1992	10,542	1,279
1993	11,404	847
1994	8,591	
1995	7,343	
1996	7,433	
1997	6,901	1,969
1998	19,566	5,881
1999	16,967	2,581
2000	38,085	5,052
2001	40,127	3,931
2002	27,896	3,300
2003	15,124	1,618
2004	28,004	2,627
2005	17,954	1,358
2006	10,711	605
2007	7,143	870
2008	10,048	2,366
2009	12,069	2,596
2010	3,504	1,037
2011	13,341	1,381
2012	22,345	1,598
2013	4,299	1,048
2014	5,529	1,478
2015	23,240	3,170
2016	4,794	663
2017	4,215	1,578

Table 2.3. Annual estimates of recreational harvest and dead discards (numbers of fish) for the RRMA, 1991–2017. Note that discard values prior to 1995 were estimated using a hindcasting approach.

Year	Harvest	Discards
1991	26,934	9,516
1992	13,372	4,725
1993	14,325	5,061
1994	8,284	2,927
1995	7,471	3,373
1996	8,367	10,461
1997	9,364	18,673
1998	23,109	12,159
1999	22,479	10,468
2000	38,206	5,961
2001	35,231	4,544
2002	36,422	3,570
2003	11,157	2,448
2004	26,506	11,989
2005	34,122	10,093
2006	25,355	4,194
2007	19,305	3,360
2008	10,541	12,137
2009	23,248	8,702
2010	22,445	7,930
2011	22,102	6,894
2012	28,847	4,033
2013	7,718	4,750
2014	11,058	10,594
2015	20,031	6,927
2016	21,260	3,369
2017	4,215	5,021

Table 3.1. Annual estimates of commercial landings and recreational harvest that were input into the SS model, 1991–2017. Values assumed for the coefficients of variation (CVs) are also provided.

	ASMA Commercial		ASMA Recreational		RRMA Recreational	
Year	**metric tons**	**CV**	**numbers**	**CV**	**numbers**	**CV**
1991	49.24	0.02	14,395	0.02	26,934	0.02
1992	45.65	0.02	10,542	0.02	13,372	0.02
1993	49.70	0.02	11,404	0.02	14,325	0.02
1994	46.48	0.01	8,591	0.02	8,284	0.02
1995	39.88	0.01	7,343	0.02	7,471	0.02
1996	40.92	0.01	7,433	0.02	8,367	0.02
1997	43.64	0.01	6,901	0.02	9,364	0.02
1998	56.26	0.01	19,566	0.02	23,109	0.02
1999	73.94	0.01	16,967	0.02	22,479	0.02
2000	97.17	0.01	38,085	0.02	38,206	0.02
2001	99.99	0.01	40,127	0.02	35,231	0.02
2002	101.18	0.01	27,896	0.02	36,422	0.02
2003	120.91	0.01	15,124	0.02	11,157	0.02
2004	124.20	0.01	28,004	0.02	26,506	0.02
2005	105.64	0.01	17,954	0.02	34,122	0.02
2006	84.62	0.01	10,711	0.02	25,355	0.02
2007	77.94	0.01	7,143	0.02	19,305	0.02
2008	34.01	0.01	10,048	0.02	10,541	0.02
2009	43.49	0.01	12,069	0.02	23,248	0.02
2010	90.72	0.01	3,504	0.02	22,445	0.02
2011	61.86	0.01	13,341	0.02	22,102	0.02
2012	52.48	0.01	22,345	0.02	28,847	0.02
2013	31.03	0.01	4,299	0.02	7,718	0.02
2014	32.23	0.01	5,529	0.02	11,058	0.02
2015	51.98	0.01	23,240	0.02	20,031	0.02
2016	55.89	0.01	4,794	0.02	21,260	0.02
2017	34.50	0.01	4,215	0.02	9,899	0.02

Table 3.2. Annual estimates of dead discards that were input into the SS model, 1991–2017. Values assumed for the coefficients of variation (CVs) are also provided.

	Albemarle/Roanoke Commercial		Albemarle Sound Recreational		Roanoke River Recreational	
Year	**numbers**	**CV**	**numbers**	**CV**	**numbers**	**CV**
1991	10,267	0.82	1,507	0.060	9,516	0.06
1992	8,434	0.67	1,279	0.051	4,725	0.06
1993	8,952	0.72	847	0.034	5,061	0.06
1994	4,302	0.34			2,927	0.06
1995	4,938	0.40			3,373	0.04
1996	4,150	0.33			10,461	0.04
1997	3,967	0.32	1,969	0.079	18,673	0.04
1998	5,817	0.47	5,881	0.24	12,159	0.04
1999	7,401	0.59	2,581	0.10	10,468	0.04
2000	10,500	0.84	5,052	0.20	5,961	0.04
2001	11,630	0.93	3,931	0.16	4,544	0.04
2002	6,633	0.53	3,300	0.13	3,570	0.04
2003	10,394	0.83	1,618	0.065	2,448	0.04
2004	4,475	0.36	2,627	0.11	11,989	0.04
2005	9,566	0.77	1,358	0.054	10,093	0.04
2006	6,715	0.54	605	0.024	4,194	0.04
2007	4,803	0.38	870	0.035	3,360	0.04
2008	2,538	0.20	2,366	0.095	12,137	0.04
2009	3,294	0.26	2,596	0.10	8,702	0.04
2010	10,017	0.80	1,037	0.041	7,930	0.04
2011	6,646	0.53	1,381	0.055	6,894	0.04
2012	4,256	0.17	1,598	0.064	4,033	0.04
2013	6,706	0.27	1,048	0.042	4,750	0.04
2014	2,794	0.11	1,478	0.059	10,594	0.04
2015	3,539	0.14	3,170	0.13	6,927	0.04
2016	3,989	0.16	663	0.027	3,369	0.04
2017	2,762	0.11	1,578	0.063	5,021	0.04

Table 3.3. GLM-standardized indices of relative abundance derived from fisheries-independent surveys that were input into the SS model, 1991–2017. The empirically-derived standard errors (SEs) are also provided.

	Program 100 Juvenile		Program 135 Fall/Winter		Program 135 Spring		Roanoke River Electrofishing	
Year	**Index**	**SE**	**Index**	**SE**	**Index**	**SE**	**Index**	**SE**
1991	0.709	0.19	0.44	0.043				
1992	2.12	0.51	0.44	0.037	0.48	0.034		
1993	42.4	8.8	0.42	0.039	0.28	0.021		
1994	59.4	12	0.79	0.071	0.18	0.017	125	21
1995	8.54	1.8	0.31	0.024	0.94	0.063	42.1	7.0
1996	35.0	7.2	0.59	0.051	0.67	0.048	29.0	5.0
1997	5.12	1.1	0.54	0.031	0.84	0.057	75.7	12
1998	5.24	1.3	0.94	0.066	1.1	0.074	102	16
1999	0.968	0.26	0.49	0.034	1.1	0.069	92.1	15
2000	55.9	12	0.37	0.042	0.92	0.061	72.1	12
2001	3.52	0.82	0.50	0.053	1.1	0.072	210	35
2002	5.68	1.2	0.31	0.028	0.83	0.057	110	24
2003	0.253	0.095	0.80	0.060	0.38	0.029	221	39
2004	1.72	0.43	0.47	0.036	0.86	0.064	57.1	11
2005	23.0	4.8	0.65	0.057	0.71	0.051	104	17
2006	2.87	0.64	0.20	0.016	1.0	0.072	120	20
2007	4.94	1.1	0.83	0.085	0.41	0.031	53.0	8.8
2008	5.35	1.2	0.55	0.058	1.2	0.089	77.2	12
2009	0.363	0.11	0.54	0.048	0.71	0.057	76.5	13
2010	6.75	1.4	0.60	0.081	0.99	0.081	106	19
2011	15.3	3.2	0.20	0.018	1.1	0.094	46.3	7.7
2012	3.42	0.79	0.23	0.020	1.2	0.11	58.2	9.1
2013	0.369	0.11	0.37	0.032	1.4	0.12	39.6	7.6
2014	17.0	3.6	0.32	0.037	0.93	0.081	66.7	13
2015	18.4	3.8	0.17	0.017	0.51	0.039	46.4	9.1
2016	5.39	1.1	0.12	0.018	0.31	0.026	20.1	3.7
2017	1.29	0.30			0.36	0.030	14.5	2.5

Table 3.4. Parameter values, standard deviations (SD), phase of estimation, and status from the base run of the stock assessment model. LO or HI indicates parameter values estimated near their bounds.

ID	Label	Value	SD[Value]	Phase	Status
1	NatM_p_1_Fem_GP_1	0.40		-2	fixed
2	L_at_Amin_Fem_GP_1	17	0.050	3	estimated
3	L_at_Amax_Fem_GP_1	160	0.050	3	estimated
4	VonBert_K_Fem_GP_1	0.065	0.0010	3	estimated
5	CV_young_Fem_GP_1	0.19	0.0053	3	estimated
6	CV_old_Fem_GP_1	0.0010	8.4E-07	3	LO
7	Wtlen_1_Fem_GP_1	4.6E-06		-3	fixed
8	Wtlen_2_Fem_GP_1	3.2		-3	fixed
9	Mat50%_Fem_GP_1	1		-3	fixed
10	Mat_slope_Fem_GP_1	0		-3	fixed
11	Eggs/kg_inter_Fem_GP_1	1		-3	fixed
12	Eggs/kg_slope_wt_Fem_GP_1	0		-3	fixed
13	NatM_p_1_Mal_GP_1	0.40		-2	fixed
14	L_at_Amin_Mal_GP_1	18	0.050	4	estimated
15	L_at_Amax_Mal_GP_1	161	0.050	4	estimated
16	VonBert_K_Mal_GP_1	0.060	0.0011	4	estimated
17	CV_young_Mal_GP_1	0.19	0.0060	4	estimated
18	CV_old_Mal_GP_1	0.0010	8.0E-07	4	LO
19	Wtlen_1_Mal_GP_1	7.5E-06		-3	fixed
20	Wtlen_2_Mal_GP_1	3.1		-3	fixed
21	CohortGrowDev	1.0		-1	fixed
22	FracFemale_GP_1	0.50		-99	fixed
23	SR_LN(R0)	6.2	0.039	1	estimated
24	SR_BH_steep	0.90		-4	fixed
25	SR_sigmaR	0.60		-4	fixed
26	SR_regime	0		-4	fixed
27	SR_autocorr	0		-99	fixed
28	Main_InitAge_17	-0.37	0.52	4	estimated
29	Main_InitAge_16	-0.20	0.55	4	estimated
30	Main_InitAge_15	-0.23	0.55	4	estimated

Table 3.4. (*continued*) Parameter values, standard deviations (SD), phase of estimation, and status from the base run of the stock assessment model. LO or HI indicates parameter values estimated near their bounds.

ID	Label	Value	SD[Value]	Phase	Status
31	Main_InitAge_14	-0.30	0.53	4	estimated
32	Main_InitAge_13	-0.36	0.52	4	estimated
33	Main_InitAge_12	-0.38	0.50	4	estimated
34	Main_InitAge_11	-0.53	0.48	4	estimated
35	Main_InitAge_10	-0.75	0.45	4	estimated
36	Main_InitAge_9	-0.77	0.39	4	estimated
37	Main_InitAge_8	-0.76	0.34	4	estimated
38	Main_InitAge_7	-0.79	0.31	4	estimated
39	Main_InitAge_6	-0.88	0.30	4	estimated
40	Main_InitAge_5	-0.70	0.28	4	estimated
41	Main_InitAge_4	-0.23	0.22	4	estimated
42	Main_InitAge_3	0.65	0.091	4	estimated
43	Main_InitAge_2	0.037	0.11	4	estimated
44	Main_InitAge_1	-0.48	0.12	4	estimated
45	Main_RecrDev_1991	-0.54	0.12	4	estimated
46	Main_RecrDev_1992	-0.25	0.11	4	estimated
47	Main_RecrDev_1993	0.72	0.081	4	estimated
48	Main_RecrDev_1994	1.2	0.076	4	estimated
49	Main_RecrDev_1995	0.89	0.099	4	estimated
50	Main_RecrDev_1996	1.6	0.074	4	estimated
51	Main_RecrDev_1997	0.81	0.11	4	estimated
52	Main_RecrDev_1998	1.2	0.086	4	estimated
53	Main_RecrDev_1999	0.36	0.14	4	estimated
54	Main_RecrDev_2000	1.5	0.062	4	estimated
55	Main_RecrDev_2001	0.38	0.098	4	estimated
56	Main_RecrDev_2002	0.00039	0.085	4	estimated
57	Main_RecrDev_2003	-0.92	0.13	4	estimated
58	Main_RecrDev_2004	-0.12	0.088	4	estimated
59	Main_RecrDev_2005	0.81	0.077	4	estimated
60	Main_RecrDev_2006	0.47	0.098	4	estimated

Table 3.4. (*continued*) Parameter values, standard deviations (SD), phase of estimation, and status from the base run of the stock assessment model. LO or HI indicates parameter values estimated near their bounds.

ID	Label	Value	SD[Value]	Phase	Status
61	Main_RecrDev_2007	0.56	0.083	4	estimated
62	Main_RecrDev_2008	-0.24	0.082	4	estimated
63	Main_RecrDev_2009	-1.6	0.12	4	estimated
64	Main_RecrDev_2010	0.065	0.077	4	estimated
65	Main_RecrDev_2011	0.77	0.059	4	estimated
66	Main_RecrDev_2012	-0.0074	0.089	4	estimated
67	Main_RecrDev_2013	-0.91	0.16	4	estimated
68	Main_RecrDev_2014	0.43	0.095	4	estimated
69	Main_RecrDev_2015	0.39	0.11	4	estimated
70	Main_RecrDev_2016	0.020	0.13	4	estimated
71	Main_RecrDev_2017	-0.47	0.15	4	estimated
72	InitF_seas_1_flt_1ARcomm	0.085	0.0064	1	estimated
73	InitF_seas_1_flt_2ASrec	0.011	0.00055	1	estimated
74	InitF_seas_1_flt_3RRrecharv	0.019	0.00089	1	estimated
75	InitF_seas_1_flt_8RRecdisc	0.0057	0.00031	1	LO
76	LnQ_base_P100juv(4)	-8.2	0.56	5	estimated
77	Q_power_P100juv(4)	0.60	0.086	6	estimated
78	LnQ_base_P135fw(5)	-3.0	0.17	5	estimated
79	Q_power_P135fw(5)	-0.54	0.033	6	estimated
80	LnQ_base_P135spr(6)	-1.7	0.19	5	estimated
81	Q_power_P135spr(6)	-0.74	0.033	6	estimated
82	LnQ_base_RRef(7)	1.8	0.22	5	estimated
83	Q_power_RRef(7)	-0.37	0.056	6	estimated
84	SizeSpline_Code_ARcomm(1)	2.0		-99	fixed
85	SizeSpline_GradLo_ARcomm(1)	0.060	0.046	3	estimated
86	SizeSpline_GradHi_ARcomm(1)	0.0010	9.0E-05	3	HI
87	SizeSpline_Knot_1_ARcomm(1)	29		-99	fixed
88	SizeSpline_Knot_2_ARcomm(1)	45		-99	fixed
89	SizeSpline_Knot_3_ARcomm(1)	49		-99	fixed
90	SizeSpline_Knot_4_ARcomm(1)	52		-99	fixed

Table 3.4. (*continued*) Parameter values, standard deviations (SD), phase of estimation, and status from the base run of the stock assessment model. LO or HI indicates parameter values estimated near their bounds.

ID	Label	Value	SD[Value]	Phase	Status
91	SizeSpline_Knot_5_ARcomm(1)	55		-99	fixed
92	SizeSpline_Knot_6_ARcomm(1)	88		-99	fixed
93	SizeSpline_Val_1_ARcomm(1)	-6.1	0.29	2	estimated
94	SizeSpline_Val_2_ARcomm(1)	-4.4	0.23	2	estimated
95	SizeSpline_Val_3_ARcomm(1)	-2.1	0.13	2	estimated
96	SizeSpline_Val_4_ARcomm(1)	-1.0		-99	fixed
97	SizeSpline_Val_5_ARcomm(1)	-1.1	0.072	2	estimated
98	SizeSpline_Val_6_ARcomm(1)	-2.6	0.30	2	estimated
99	Retain_L_infl_ARcomm(1)	30	3.6	1	estimated
100	Retain_L_width_ARcomm(1)	9.6	1.7	2	estimated
101	Retain_L_asymptote_logit_ARcomm(1)	999		-4	fixed
102	Retain_L_maleoffset_ARcomm(1)	0		-4	fixed
103	Size_DblN_peak_ASrec(2)	53	0.28	1	estimated
104	Size_DblN_top_logit_ASrec(2)	0.13	209	1	estimated
105	Size_DblN_ascend_se_ASrec(2)	3.7	0.057	2	estimated
106	Size_DblN_descend_se_ASrec(2)	3.5	123	2	estimated
107	Size_DblN_start_logit_ASrec(2)	-999		-4	fixed
108	Size_DblN_end_logit_ASrec(2)	15		-5	fixed
109	Retain_L_infl_ASrec(2)	40	0.38	1	estimated
110	Retain_L_width_ASrec(2)	5.1	0.19	2	estimated
111	Retain_L_asymptote_logit_ASrec(2)	999		-4	fixed
112	Retain_L_maleoffset_ASrec(2)	0		-4	fixed
113	Size_DblN_peak_RRrecharv(3)	46		-3	fixed
114	Size_DblN_top_logit_RRrecharv(3)	-2.2		-3	fixed
115	Size_DblN_ascend_se_RRrecharv(3)	-4.0		-4	fixed
116	Size_DblN_descend_se_RRrecharv(3)	-2.0		-4	fixed
117	Size_DblN_start_logit_RRrecharv(3)	-999		-4	fixed
118	Size_DblN_end_logit_RRrecharv(3)	-999		-5	fixed
119	SizeSpline_Code_P135fw(5)	2.0		-99	fixed
120	SizeSpline_GradLo_P135fw(5)	0.56	0.11	3	estimated

Table 3.4. (*continued*) Parameter values, standard deviations (SD), phase of estimation, and status from the base run of the stock assessment model. LO or HI indicates parameter values estimated near their bounds.

ID	Label	Value	SD[Value]	Phase	Status
121	SizeSpline_GradHi_P135fw(5)	-0.41	0.091	3	estimated
122	SizeSpline_Knot_1_P135fw(5)	25		-99	fixed
123	SizeSpline_Knot_2_P135fw(5)	42		-99	fixed
124	SizeSpline_Knot_3_P135fw(5)	57		-99	fixed
125	SizeSpline_Val_1_P135fw(5)	-4.6	0.38	2	estimated
126	SizeSpline_Val_2_P135fw(5)	-1.0		-99	fixed
127	SizeSpline_Val_3_P135fw(5)	-1.4	0.26	2	estimated
128	Size_DblN_peak_P135spr(6)	47	2.2	1	estimated
129	Size_DblN_top_logit_P135spr(6)	-0.018	222	1	estimated
130	Size_DblN_ascend_se_P135spr(6)	5.1	0.22	2	estimated
131	Size_DblN_descend_se_P135spr(6)	3.5	123	2	estimated
132	Size_DblN_start_logit_P135spr(6)	-999		-4	fixed
133	Size_DblN_end_logit_P135spr(6)	15		-5	fixed
134	Size_DblN_peak_RRef(7)	57	1.1	1	estimated
135	Size_DblN_top_logit_RRef(7)	0.014	219	1	estimated
136	Size_DblN_ascend_se_RRef(7)	4.4	0.099	2	estimated
137	Size_DblN_descend_se_RRef(7)	3.5	123	2	estimated
138	Size_DblN_start_logit_RRef(7)	-999		-4	fixed
139	Size_DblN_end_logit_RRef(7)	15		-5	fixed
140	SzSel_MaleDogleg_RRef(7)	59	1.8	1	estimated
141	SzSel_MaleatZero_RRef(7)	7.9	1.1	1	estimated
142	SzSel_MaleatDogleg_RRef(7)	0		-4	fixed
143	SzSel_MaleatMaxage_RRef(7)	-6.2	5.6	2	estimated
144	Size_DblN_peak_RRecdisc(8)	51	0.69	3	estimated
145	Size_DblN_top_logit_RRecdisc(8)	0.052	222	3	estimated
146	Size_DblN_ascend_se_RRecdisc(8)	4.4	0.095	4	estimated
147	Size_DblN_descend_se_RRecdisc(8)	3.5	123	4	estimated
148	Size_DblN_start_logit_RRecdisc(8)	-999		-4	fixed
149	Size_DblN_end_logit_RRecdisc(8)	15		-5	fixed

Table 3.5. Results of the base run compared to the results of 50 jitter trials in which initial parameter values were jittered by 10%. A single asterisk (*) indicates that the Hessian matrix did not invert. Two asteriskes (**) indicate that the convergence level was greater than 1.

Run	Total LL	SSB_{2017}	$SSB_{Threshold}$	F_{2017}	$F_{Threshold}$
base	4,879	35.6	121	0.266	0.18
1	*				
2	**				
3	**				
4	*				
5	*				
6	*				
7	5,061	41.7	115	0.22	0.18
8	4,879	35.3	121	0.27	0.18
9	*				
10	4,956	35.5	115	0.26	0.18
11	*				
12	6,138	51.3	29.7	0.05	0.30
13	*				
14	4,879	35.3	121	0.27	0.18
15	4,879	35.6	121	0.27	0.18
16	4,879	35.6	121	0.27	0.18
17	5,298	45.5	40.2	0.07	0.20
18	**				
19	**				
20	4,879	35.6	121	0.27	0.18
21	*				
22	**				
23	4,879	35.3	121	0.27	0.18
24	*				
25	*				

Table 3.5. (*continued*) Results of the base run compared to the results of 50 jitter trials in which initial parameter values were jittered by 10%. A single asterisk (*) indicates that the Hessian matrix did not invert. Two asteriskes (**) indicate that the convergence level was greater than 1.

Run	Total LL	SSB_{2017}	$SSB_{Threshold}$	F_{2017}	$F_{Threshold}$
26	4,879	35.3	121	0.27	0.18
27	4,879	35.3	121	0.27	0.18
28	*				
29	4,886	35.6	122	0.27	0.19
30	*				
31	4,879	35.3	121	0.27	0.18
32	**				
33	**				
34	**				
35	4,879	35.3	121	0.27	0.18
36	*				
37	*				
38	7,009	50.4	42	0.087	0.19
39	4,956	35.5	115	0.26	0.18
40	**				
41	*				
42	*				
43	4,879	35.6	121	0.27	0.18
44	4,879	35.6	121	0.27	0.18
45	**				
46	7,390	1,667	739	0.026	0.27
47	*				
48	**				
49	*				
50	4,879	35.6	121	0.27	0.18

Table 3.6. Results of the runs test for temporal patterns and results of the Shapiro-Wilk test for normality applied to the standardized residuals of the fits to the fisheries-independent survey indices from the base run of the assessment model. *P*-values were considered significant at $\alpha = 0.05$.

	Runs Test		Shapiro-Wilk	
Survey	**median**	***P*-value**	**W**	***P*-value**
P100juv	-0.029	0.70	0.98	0.80
P135fw	0.016	1.0	0.98	0.81
P135spr	0.017	0.31	0.97	0.70
RRef	0.019	0.30	0.97	0.67

Table 3.7. Annual estimates of recruitment (thousands of fish), female spawning stock biomass (SSB; metric tons), and spawner potential ratio (SPR) and associated standard deviations (SDs) from the base run of the stock assessment model, 1991–2017.

	Recruitment		SSB		SPR	
Year	Value	SD	Value	SD	Value	SD
1991	227	27	148	10	0.22	0.012
1992	299	30	129	8.0	0.30	0.011
1993	780	57	116	7.0	0.26	0.011
1994	1,211	83	87	6.1	0.25	0.013
1995	876	82	67	4.9	0.23	0.011
1996	1,720	110	66	4.0	0.23	0.0096
1997	850	88	105	5.5	0.31	0.012
1998	1,284	98	165	8.2	0.31	0.012
1999	564	79	203	10	0.35	0.012
2000	1,736	87	266	12	0.29	0.010
2001	583	53	255	12	0.28	0.010
2002	398	31	243	11	0.28	0.010
2003	157	20	220	10	0.32	0.010
2004	356	29	259	8.1	0.27	0.0062
2005	889	60	209	5.7	0.24	0.0061
2006	618	57	140	4.2	0.20	0.0065
2007	643	46	81	3.3	0.14	0.0061
2008	277	20	60	3.1	0.21	0.0078
2009	75	9	94	4.6	0.24	0.0096
2010	404	28	108	4.6	0.22	0.0082
2011	810	40	100	2.7	0.21	0.0054
2012	357	29	68	1.7	0.11	0.0044
2013	111	17	21	1.0	0.13	0.0053
2014	510	49	41	1.9	0.20	0.0065
2015	541	62	76	2.7	0.17	0.0058
2016	359	49	58	2.3	0.16	0.0076
2017	202	31	36	2.7	0.18	0.012

Table 3.8. Predicted population numbers (numbers of fish) at age at the beginning of the year from the base run of the stock assessment model, 1991–2017.

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1991	226,690	168,260	188,106	233,819	63,912	25,981	13,654	9,380	6,190	3,942	2,602	2,091	1,583	1,047	721	502	336	528
1992	298,814	151,951	112,634	125,023	136,282	24,395	7,538	4,169	3,328	2,451	1,652	1,118	908	690	457	315	219	378
1993	779,868	200,297	101,736	75,069	77,339	64,844	9,498	2,946	1,778	1,527	1,172	806	550	448	341	226	156	295
1994	1,211,036	522,750	134,083	67,734	45,664	34,408	22,844	3,376	1,163	766	690	542	376	258	210	160	106	212
1995	875,700	811,762	349,814	89,216	41,084	19,718	11,354	7,542	1,252	478	333	309	246	171	118	96	73	146
1996	1,720,200	586,983	543,056	232,456	53,319	16,624	5,845	3,361	2,552	476	195	140	132	106	74	51	41	94
1997	850,404	1,153,053	392,701	360,342	138,727	21,982	5,069	1,757	1,136	961	191	81	59	56	45	31	22	58
1998	1,283,700	570,034	771,993	261,187	222,840	67,949	8,925	2,033	754	520	457	93	39	29	27	22	15	39
1999	564,216	860,478	381,751	514,639	162,098	108,982	27,753	3,635	887	349	249	222	45	19	14	13	11	27
2000	1,736,040	378,201	576,252	254,690	323,729	83,014	47,650	12,152	1,702	440	179	130	116	24	10	7	7	20
2001	582,912	1,163,685	253,259	384,410	157,504	153,276	32,110	18,429	5,091	762	205	85	62	56	11	5	4	13
2002	398,252	390,732	779,193	168,910	236,515	72,748	56,893	11,898	7,437	2,208	344	94	39	29	26	5	2	8
2003	157,198	266,953	261,601	519,606	103,739	108,157	26,827	21,318	4,941	3,354	1,042	166	46	19	14	13	3	5
2004	355,698	105,371	178,669	174,420	326,834	51,302	43,366	10,649	9,240	2,326	1,659	528	85	24	10	7	7	4
2005	889,434	238,426	70,529	118,948	106,898	148,739	18,382	15,420	4,162	3,930	1,039	759	244	40	11	5	3	5
2006	617,552	596,193	159,578	46,919	71,316	44,860	48,553	6,191	5,931	1,778	1,777	483	357	115	19	5	2	4
2007	642,528	413,945	398,816	106,011	27,249	25,795	11,768	13,588	2,106	2,341	760	788	217	162	52	8	2	3
2008	277,352	430,673	276,335	263,098	56,240	6,450	3,405	1,699	2,766	562	726	253	271	76	56	18	3	2
2009	75,442	185,910	288,136	183,127	153,665	21,566	1,767	911	513	931	202	268	95	102	29	21	7	2
2010	404,054	50,569	124,449	191,666	109,788	65,088	7,117	592	343	212	404	90	121	43	46	13	10	4
2011	809,868	270,836	33,815	82,579	113,573	42,732	18,416	2,083	207	139	94	186	42	57	20	22	6	6
2012	357,286	542,855	181,202	22,451	48,267	42,752	11,647	5,122	675	76	55	38	77	17	24	8	9	5
2013	110,836	239,483	362,573	119,121	10,411	6,946	2,761	821	530	93	12	9	7	14	3	4	2	3
2014	509,662	74,290	159,688	237,869	61,499	2,172	691	274	115	100	21	3	2	2	4	1	1	1
2015	541,110	341,625	49,683	105,708	137,920	22,681	561	177	82	39	37	8	1	1	1	1	0	1
2016	358,590	362,706	228,496	32,914	59,484	44,092	4,617	110	40	21	11	11	2	0	0	0	0	0
2017	201,758	240,360	242,368	151,168	18,131	16,999	7,995	913	29	13	8	4	4	1	0	0	0	0

Table 3.9. Predicted population numbers (numbers of fish) at age at mid-year from the base run of the stock assessment model, 1991–2017.

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1991	185,596	137,665	153,355	178,506	39,479	13,994	7,544	5,587	3,895	2,551	1,706	1,378	1,046	692	477	332	222	349
1992	244,646	124,334	91,953	98,331	93,998	15,222	4,712	2,722	2,255	1,695	1,154	784	638	486	322	222	154	266
1993	638,495	163,879	83,012	58,548	51,580	38,486	5,662	1,851	1,167	1,027	797	551	377	307	234	155	107	202
1994	991,500	427,629	109,372	52,752	30,003	19,764	13,126	2,056	745	505	462	365	254	174	142	108	72	143
1995	716,952	663,952	285,161	68,969	26,130	10,735	6,177	4,387	772	305	216	202	161	113	77	63	48	96
1996	1,408,361	480,113	442,364	179,575	34,230	9,179	3,204	1,954	1,566	302	125	91	86	69	48	33	27	61
1997	696,247	943,477	320,264	283,368	97,083	14,007	3,210	1,151	768	662	133	56	41	39	31	22	15	40
1998	1,050,997	466,488	630,316	205,761	155,829	43,425	5,696	1,342	513	359	318	65	28	20	19	15	11	27
1999	461,938	704,168	311,814	408,170	115,996	72,061	18,364	2,487	624	250	179	161	33	14	10	10	8	19
2000	1,421,338	309,488	470,656	200,285	222,738	51,628	29,633	7,865	1,139	300	123	89	80	16	7	5	5	14
2001	477,245	952,227	206,828	301,525	107,033	93,380	19,546	11,707	3,352	512	139	58	42	38	8	3	2	9
2002	326,059	319,712	636,296	132,372	159,925	44,176	34,825	7,667	4,994	1,517	239	66	27	20	18	4	2	5
2003	128,701	218,394	213,608	412,096	72,947	68,484	16,902	14,035	3,390	2,359	742	119	33	14	10	9	2	3
2004	291,217	86,208	145,782	136,546	220,461	30,708	25,859	6,657	6,026	1,554	1,123	359	58	16	7	5	4	3
2005	728,199	195,058	57,526	92,102	69,239	84,979	10,668	9,562	2,720	2,643	708	520	168	27	8	3	2	3
2006	505,602	487,618	130,066	35,756	42,880	22,975	25,683	3,610	3,726	1,162	1,183	324	240	78	13	4	1	3
2007	526,041	338,213	323,925	77,210	13,248	9,370	4,470	6,127	1,088	1,303	438	462	128	96	31	5	1	2
2008	227,074	352,268	224,954	201,066	34,819	3,376	1,762	933	1,604	337	441	155	166	46	35	11	2	1
2009	61,766	152,106	235,001	141,791	99,996	12,389	1,023	559	329	614	134	180	64	68	19	14	5	1
2010	330,805	41,352	101,375	147,538	68,481	34,620	3,850	350	218	141	274	61	83	29	32	9	7	3
2011	663,054	221,530	27,553	63,132	69,667	22,308	9,712	1,185	125	87	60	120	27	37	13	14	4	4
2012	292,513	443,650	146,918	15,287	18,284	10,862	3,091	1,646	251	30	23	16	32	7	10	4	4	2
2013	90,741	195,557	293,675	85,586	4,751	2,190	870	306	230	44	6	5	3	7	2	2	1	1
2014	417,269	60,753	129,924	181,124	37,339	1,104	350	150	67	61	13	2	1	1	2	1	1	1
2015	443,017	279,392	40,438	79,294	77,954	10,232	249	84	42	21	20	4	1	1	0	1	0	0
2016	293,582	296,493	185,853	24,428	31,785	18,774	2,053	56	23	13	7	7	1	0	0	0	0	0
2017	165,182	196,503	197,152	114,032	10,402	7,901	3,755	476	16	8	5	3	3	1	0	0	0	0

Table 3.10. Predicted landings at age (numbers of fish) for the ARcomm fleet from the base run of the stock assessment model, 1991–2017.

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1991	1	71	343	5,471	6,939	4,564	2,537	1,507	802	424	249	188	139	91	62	43	29	46
1992	1	56	180	2,626	14,205	4,219	1,355	632	401	244	146	93	73	55	36	25	17	30
1993	3	84	185	1,781	8,912	12,240	1,869	492	237	168	115	74	49	40	30	20	14	26
1994	6	280	310	2,048	6,627	8,068	5,564	702	194	106	85	63	43	29	24	18	12	24
1995	5	509	948	3,137	6,788	5,182	3,098	1,768	237	75	47	41	32	22	15	12	9	19
1996	9	353	1,410	7,831	8,514	4,236	1,538	755	461	72	26	18	16	13	9	6	5	11
1997	3	414	609	7,365	14,253	3,764	897	261	133	93	16	6	5	4	3	2	2	4
1998	3	163	953	4,251	18,195	9,279	1,264	242	71	40	31	6	2	2	2	1	1	2
1999	2	253	485	8,674	13,903	15,772	4,171	458	88	29	18	15	3	1	1	1	1	2
2000	5	121	796	4,627	29,136	12,388	7,379	1,585	176	37	13	9	8	2	1	1	0	1
2001	2	401	377	7,519	15,131	24,258	5,271	2,552	560	69	16	6	5	4	1	0	0	1
2002	1	149	1,284	3,653	25,030	12,703	10,383	1,845	920	226	31	8	3	2	2	0	0	1
2003	1	130	553	14,578	14,580	25,101	6,437	4,322	799	449	124	19	5	2	2	1	0	1
2004	1	48	351	4,496	41,186	10,561	9,239	1,921	1,330	277	175	53	8	2	1	1	1	0
2005	4	113	145	3,178	13,613	30,847	4,009	2,893	628	492	116	80	25	4	1	0	0	0
2006	4	388	448	1,689	11,656	11,653	13,435	1,508	1,183	297	265	68	49	16	3	1	0	1
2007	8	540	2,241	7,346	7,529	10,445	5,107	5,422	717	686	201	198	53	39	13	2	1	1
2008	1	252	698	8,544	8,469	1,531	834	354	463	78	90	30	31	9	6	2	0	0
2009	0	79	527	4,351	17,469	3,992	342	151	68	102	20	25	8	9	3	2	1	0
2010	3	39	413	8,231	21,876	20,587	2,371	173	82	42	72	15	20	7	8	2	2	1
2011	4	160	86	2,714	17,182	10,254	4,629	453	37	20	12	23	5	7	2	3	1	1
2012	4	616	885	1,276	9,669	12,003	3,488	1,407	157	15	10	6	13	3	4	1	1	1
2013	2	396	2,580	10,352	3,474	3,242	1,343	363	200	31	4	3	2	4	1	1	0	1
2014	3	53	492	9,393	11,112	614	203	70	24	17	3	0	0	0	0	0	0	0
2015	3	234	147	3,949	22,544	5,624	143	39	15	6	5	1	0	0	0	0	0	0
2016	3	358	974	1,758	13,414	15,131	1,701	37	11	5	2	2	0	0	0	0	0	0
2017	2	220	955	7,576	4,002	5,752	2,837	286	7	3	2	1	1	0	0	0	0	0

Table 3.11. Predicted dead discards at age (numbers of fish) for the ARcomm fleet from the base run of the stock assessment model, 1991–2017.

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1991	3	112	257	856	714	376	163	70	24	7	2	1	0	0	0	0	0	0
1992	3	88	135	411	1,462	348	87	29	12	4	1	0	0	0	0	0	0	0
1993	9	133	138	279	917	1,008	121	23	7	3	1	0	0	0	0	0	0	0
1994	19	442	232	321	682	665	359	33	6	2	1	0	0	0	0	0	0	0
1995	16	804	710	491	699	427	200	82	7	1	0	0	0	0	0	0	0	0
1996	30	557	1,055	1,226	876	349	99	35	14	1	0	0	0	0	0	0	0	0
1997	9	653	456	1,153	1,467	310	58	12	4	2	0	0	0	0	0	0	0	0
1998	11	257	713	665	1,872	764	82	11	2	1	0	0	0	0	0	0	0	0
1999	5	399	363	1,358	1,431	1,299	269	21	3	0	0	0	0	0	0	0	0	0
2000	16	190	596	724	2,998	1,020	476	74	5	1	0	0	0	0	0	0	0	0
2001	6	633	282	1,177	1,557	1,998	340	119	17	1	0	0	0	0	0	0	0	0
2002	4	235	961	572	2,576	1,047	670	86	27	4	0	0	0	0	0	0	0	0
2003	2	206	414	2,282	1,500	2,068	415	201	24	8	1	0	0	0	0	0	0	0
2004	5	76	263	704	4,238	870	596	89	40	5	2	0	0	0	0	0	0	0
2005	12	179	109	497	1,401	2,541	259	135	19	8	1	0	0	0	0	0	0	0
2006	12	612	336	264	1,200	960	866	70	35	5	2	0	0	0	0	0	0	0
2007	24	852	1,678	1,150	775	861	329	252	21	12	2	1	0	0	0	0	0	0
2008	5	398	522	1,337	872	126	54	16	14	1	1	0	0	0	0	0	0	0
2009	1	124	395	681	1,798	329	22	7	2	2	0	0	0	0	0	0	0	0
2010	9	61	309	1,288	2,252	1,696	153	8	2	1	1	0	0	0	0	0	0	0
2011	14	253	65	425	1,768	845	299	21	1	0	0	0	0	0	0	0	0	0
2012	12	973	663	200	996	990	225	65	5	0	0	0	0	0	0	0	0	0
2013	5	625	1,931	1,620	358	268	87	17	6	1	0	0	0	0	0	0	0	0
2014	11	84	368	1,470	1,144	51	13	3	1	0	0	0	0	0	0	0	0	0
2015	11	369	110	618	2,321	464	9	2	0	0	0	0	0	0	0	0	0	0
2016	10	566	729	275	1,381	1,248	110	2	0	0	0	0	0	0	0	0	0	0
2017	5	347	715	1,186	412	474	183	13	0	0	0	0	0	0	0	0	0	0

Table 3.12. Predicted harvest at age (numbers of fish) for the ASrec fleet from the base run of the stock assessment model, 1991–2017.

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1991	0	0	76	3,143	3,292	2,256	1,548	1,232	876	576	385	311	236	156	108	75	50	79
1992	0	0	31	1,198	5,351	1,656	656	411	348	263	179	122	99	76	50	34	24	41
1993	0	0	33	834	3,448	4,933	928	328	211	187	145	100	69	56	43	28	19	37
1994	0	0	45	767	2,049	2,598	2,207	373	138	94	86	68	47	32	27	20	13	27
1995	0	0	130	1,120	2,002	1,592	1,172	897	161	64	45	42	34	24	16	13	10	20
1996	0	0	174	2,520	2,263	1,172	524	345	282	55	23	16	16	12	9	6	5	11
1997	0	0	66	2,072	3,312	911	267	104	71	62	12	5	4	4	3	2	1	4
1998	0	0	241	2,804	9,911	5,266	883	226	89	62	55	11	5	4	3	3	2	5
1999	0	0	80	3,742	4,953	5,854	1,908	281	72	29	21	19	4	2	1	1	1	2
2000	0	0	232	3,507	18,238	8,080	5,931	1,707	253	67	28	20	18	4	2	1	1	3
2001	0	0	113	5,851	9,724	16,241	4,349	2,823	827	127	34	14	10	9	2	1	1	2
2002	0	0	266	1,968	11,135	5,888	5,929	1,413	941	287	45	12	5	4	3	1	0	1
2003	0	0	50	3,423	2,827	5,071	1,602	1,442	356	249	79	13	3	1	1	1	0	0
2004	0	0	59	1,964	14,858	3,969	4,278	1,192	1,103	286	207	66	11	3	1	1	1	0
2005	0	0	19	1,089	3,854	9,097	1,457	1,409	409	399	107	79	25	4	1	0	0	1
2006	0	0	44	431	2,457	2,558	3,635	547	574	179	183	50	37	12	2	1	0	0
2007	0	0	150	1,281	1,084	1,566	944	1,346	238	283	95	100	28	21	7	1	0	0
2008	0	0	134	4,283	3,506	660	442	253	442	93	122	43	46	13	10	3	1	0
2009	0	0	104	2,230	7,394	1,759	186	110	66	124	27	36	13	14	4	3	1	0
2010	0	0	12	607	1,332	1,306	185	18	11	7	14	3	4	2	2	0	0	0
2011	0	0	14	1,147	5,995	3,726	2,072	272	29	20	14	28	6	9	3	3	1	1
2012	0	0	290	1,088	6,812	8,805	3,152	1,706	255	30	23	16	32	7	10	4	4	2
2013	0	0	219	2,285	633	615	314	114	84	16	2	2	1	2	1	1	0	0
2014	0	0	53	2,636	2,576	148	60	28	13	11	2	0	0	0	0	0	0	0
2015	0	0	47	3,310	15,606	4,053	127	46	23	11	11	2	0	0	0	0	0	0
2016	0	0	64	300	1,889	2,219	307	9	4	2	1	1	0	0	0	0	0	0
2017	0	0	79	1,627	710	1,062	645	87	3	1	1	0	0	0	0	0	0	0

Table 3.13. Predicted dead discards at age (numbers of fish) for the ASrec fleet from the base run of the stock assessment model, 1991–2017.

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1991	0	0	42	789	457	175	63	23	7	2	1	0	0	0	0	0	0	0
1992	0	0	17	301	743	129	27	8	3	1	0	0	0	0	0	0	0	0
1993	0	0	18	210	479	384	38	6	2	1	0	0	0	0	0	0	0	0
1994	0	0	25	193	284	202	90	7	1	0	0	0	0	0	0	0	0	0
1995	0	0	72	281	278	124	48	17	1	0	0	0	0	0	0	0	0	0
1996	0	0	96	633	314	91	21	7	2	0	0	0	0	0	0	0	0	0
1997	0	0	36	521	460	71	11	2	1	0	0	0	0	0	0	0	0	0
1998	0	0	133	704	1,376	410	36	4	1	0	0	0	0	0	0	0	0	0
1999	0	0	44	940	687	455	77	5	1	0	0	0	0	0	0	0	0	0
2000	0	0	128	881	2,531	628	241	33	2	0	0	0	0	0	0	0	0	0
2001	0	0	62	1,470	1,350	1,263	176	54	7	0	0	0	0	0	0	0	0	0
2002	0	0	147	494	1,546	458	241	27	8	1	0	0	0	0	0	0	0	0
2003	0	0	28	860	392	395	65	28	3	1	0	0	0	0	0	0	0	0
2004	0	0	32	493	2,062	309	174	23	9	1	0	0	0	0	0	0	0	0
2005	0	0	11	274	535	708	59	27	3	1	0	0	0	0	0	0	0	0
2006	0	0	24	108	341	199	148	10	5	1	0	0	0	0	0	0	0	0
2007	0	0	83	322	151	122	38	26	2	1	0	0	0	0	0	0	0	0
2008	0	0	74	1,076	487	52	18	5	4	0	0	0	0	0	0	0	0	0
2009	0	0	57	560	1,027	137	8	2	1	0	0	0	0	0	0	0	0	0
2010	0	0	6	152	185	102	8	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	8	288	832	290	84	5	0	0	0	0	0	0	0	0	0	0
2012	0	0	160	273	947	686	128	33	2	0	0	0	0	0	0	0	0	0
2013	0	0	121	574	88	48	13	2	1	0	0	0	0	0	0	0	0	0
2014	0	0	29	662	358	12	2	1	0	0	0	0	0	0	0	0	0	0
2015	0	0	26	832	2,167	316	5	1	0	0	0	0	0	0	0	0	0	0
2016	0	0	35	75	262	173	13	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	43	409	99	83	26	2	0	0	0	0	0	0	0	0	0	0

Table 3.14. Predicted harvest at age (numbers of fish) for the RRrec fleet from the base run of the stock assessment model, 1991–2017.

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1991	0	0	150	11,196	9,646	4,067	1,353	413	90	14	2	0	0	0	0	0	0	0
1992	0	0	35	2,402	8,825	1,683	323	77	20	4	0	0	0	0	0	0	0	0
1993	0	0	41	1,851	6,293	5,551	509	69	13	3	0	0	0	0	0	0	0	0
1994	0	0	47	1,449	3,186	2,491	1,031	67	7	1	0	0	0	0	0	0	0	0
1995	0	0	134	2,078	3,055	1,498	537	158	9	1	0	0	0	0	0	0	0	0
1996	0	0	154	4,022	2,971	950	207	52	13	1	0	0	0	0	0	0	0	0
1997	0	0	64	3,609	4,745	805	115	17	4	1	0	0	0	0	0	0	0	0
1998	0	0	221	4,628	13,454	4,405	361	36	4	1	0	0	0	0	0	0	0	0
1999	0	0	89	7,427	8,085	5,888	934	53	4	0	0	0	0	0	0	0	0	0
2000	0	0	202	5,501	23,526	6,421	2,294	254	12	1	0	0	0	0	0	0	0	0
2001	0	0	94	8,769	11,985	12,336	1,607	401	36	1	0	0	0	0	0	0	0	0
2002	0	0	338	4,512	20,998	6,843	3,355	307	62	5	0	0	0	0	0	0	0	0
2003	0	0	35	4,297	2,919	3,227	496	172	13	2	0	0	0	0	0	0	0	0
2004	0	0	50	2,987	18,583	3,060	1,607	172	48	3	0	0	0	0	0	0	0	0
2005	0	0	39	3,958	11,518	16,758	1,306	486	43	10	1	0	0	0	0	0	0	0
2006	0	0	131	2,306	10,811	6,941	4,797	277	88	7	1	0	0	0	0	0	0	0
2007	0	0	470	7,232	5,037	4,490	1,315	716	38	11	1	0	0	0	0	0	0	0
2008	0	0	102	5,843	3,936	458	150	33	17	1	0	0	0	0	0	0	0	0
2009	0	0	144	5,561	15,168	2,229	115	26	5	2	0	0	0	0	0	0	0	0
2010	0	0	60	5,631	10,168	6,147	425	16	3	0	0	0	0	0	0	0	0	0
2011	0	0	20	2,975	12,797	4,907	1,329	67	2	0	0	0	0	0	0	0	0	0
2012	0	0	376	2,545	13,113	10,458	1,823	378	17	1	0	0	0	0	0	0	0	0
2013	0	0	281	5,284	1,206	725	180	25	6	0	0	0	0	0	0	0	0	0
2014	0	0	67	5,976	4,805	171	34	6	1	0	0	0	0	0	0	0	0	0
2015	0	0	29	3,628	14,074	2,258	35	5	1	0	0	0	0	0	0	0	0	0
2016	0	0	244	2,061	10,685	7,749	524	6	1	0	0	0	0	0	0	0	0	0
2017	0	0	146	5,436	1,952	1,804	535	28	0	0	0	0	0	0	0	0	0	0

Table 3.15. Predicted dead discards at age (numbers of fish) for the RRrec fleet from the base run of the stock assessment model, 1991–2017.

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1991	0	7	446	3,809	2,058	1,043	624	470	327	214	143	115	87	58	40	28	19	29
1992	0	3	132	1,034	2,383	546	189	112	93	69	47	32	26	20	13	9	6	11
1993	0	5	153	789	1,683	1,782	292	98	62	54	42	29	20	16	12	8	6	11
1994	0	11	156	551	760	713	529	85	31	21	19	15	10	7	6	4	3	6
1995	0	20	505	895	825	486	312	226	40	16	11	10	8	6	4	3	2	5
1996	0	31	1,636	4,868	2,255	865	338	210	168	32	13	10	9	7	5	4	3	7
1997	0	65	1,288	8,341	6,878	1,400	359	132	88	76	15	6	5	4	4	3	2	5
1998	0	16	1,235	2,951	5,381	2,116	310	75	29	20	18	4	2	1	1	1	1	2
1999	0	16	421	4,036	2,756	2,410	685	95	24	10	7	6	1	1	0	0	0	1
2000	0	4	339	1,057	2,836	930	596	162	24	6	3	2	2	0	0	0	0	0
2001	0	10	123	1,309	1,122	1,387	324	199	57	9	2	1	1	1	0	0	0	0
2002	0	3	327	499	1,456	570	501	113	74	22	4	1	0	0	0	0	0	0
2003	0	1	72	1,013	432	573	158	134	33	23	7	1	0	0	0	0	0	0
2004	0	3	250	1,713	6,684	1,321	1,243	327	296	76	55	18	3	1	0	0	0	0
2005	0	7	119	1,393	2,542	4,440	620	567	161	156	42	31	10	2	0	0	0	0
2006	0	13	195	393	1,155	890	1,103	157	161	50	51	14	10	3	1	0	0	0
2007	0	11	590	1,036	453	484	254	342	59	70	23	25	7	5	2	0	0	0
2008	0	29	1,060	6,951	2,937	409	239	129	221	46	60	21	23	6	5	2	0	0
2009	0	7	592	2,618	4,480	789	73	41	24	44	10	13	5	5	1	1	0	0
2010	0	2	234	2,492	2,823	2,047	253	23	14	9	18	4	5	2	2	1	0	0
2011	0	10	72	1,206	3,255	1,497	726	90	9	7	4	9	2	3	1	1	0	0
2012	0	26	507	392	1,266	1,211	378	193	28	3	2	2	4	1	1	0	0	0
2013	0	14	1,231	2,646	379	272	121	42	30	6	1	1	0	1	0	0	0	0
2014	0	5	632	6,463	3,260	139	49	21	10	9	2	0	0	0	0	0	0	0
2015	0	14	120	1,731	4,213	810	22	8	4	2	2	0	0	0	0	0	0	0
2016	0	11	410	396	1,289	1,121	135	4	1	1	0	0	0	0	0	0	0	0
2017	0	11	634	2,693	607	672	356	45	2	1	0	0	0	0	0	0	0	0

Table 3.16. Annual estimates of fishing mortality (numbers-weighted, ages 3–5) and associated standard deviations (SDs) from the base run of the stock assessment model, 1991–2017.

	Fishing Mortality	
Year	**Value**	**SD**
1991	0.25	0.015
1992	0.23	0.012
1993	0.35	0.021
1994	0.32	0.020
1995	0.28	0.019
1996	0.20	0.012
1997	0.15	0.0082
1998	0.21	0.012
1999	0.15	0.0071
2000	0.26	0.013
2001	0.24	0.012
2002	0.29	0.017
2003	0.15	0.0066
2004	0.30	0.0099
2005	0.42	0.011
2006	0.52	0.026
2007	0.48	0.030
2008	0.21	0.013
2009	0.28	0.015
2010	0.34	0.0094
2011	0.44	0.010
2012	1.3	0.057
2013	0.35	0.023
2014	0.23	0.0091
2015	0.50	0.017
2016	0.75	0.045
2017	0.27	0.025

9 FIGURES

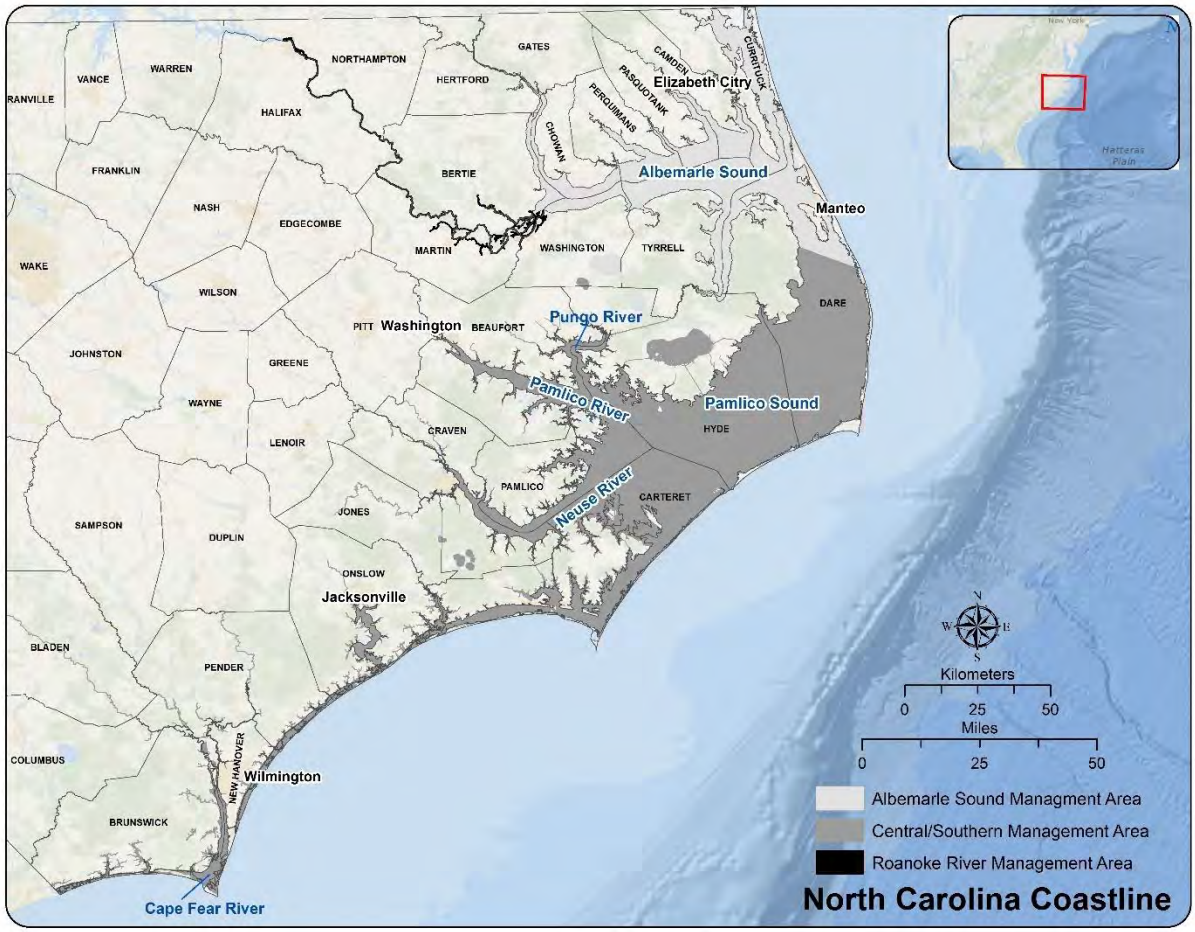

Figure 1.1. Boundary lines defining the Albemarle Sound Management Area, Central-Southern Management Area, and the Roanoke River Management Area.

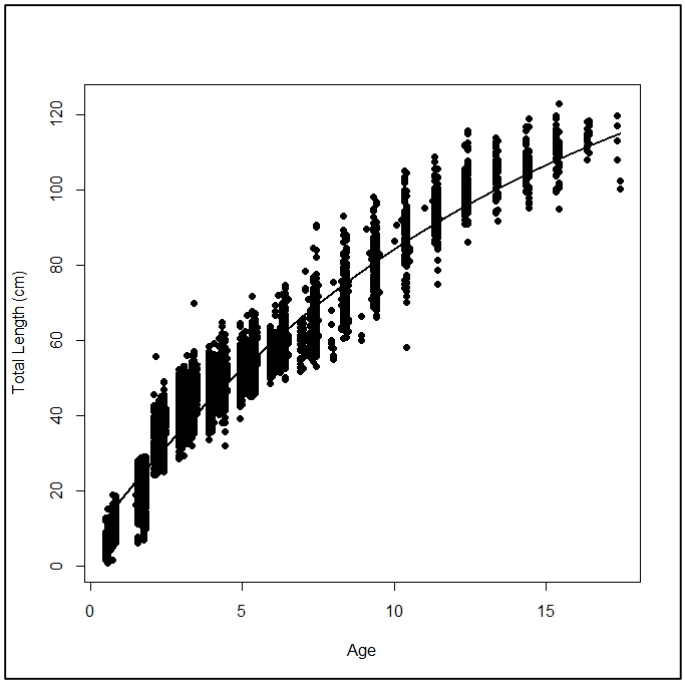

Figure 1.2. Fit of the age-length function to available age data for female striped bass.

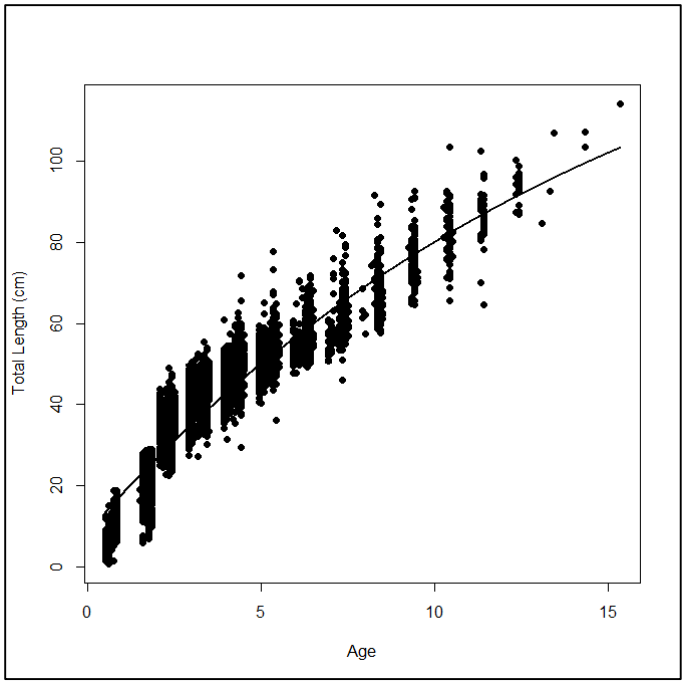

Figure 1.3. Fit of the age-length function to available age data for male striped bass.

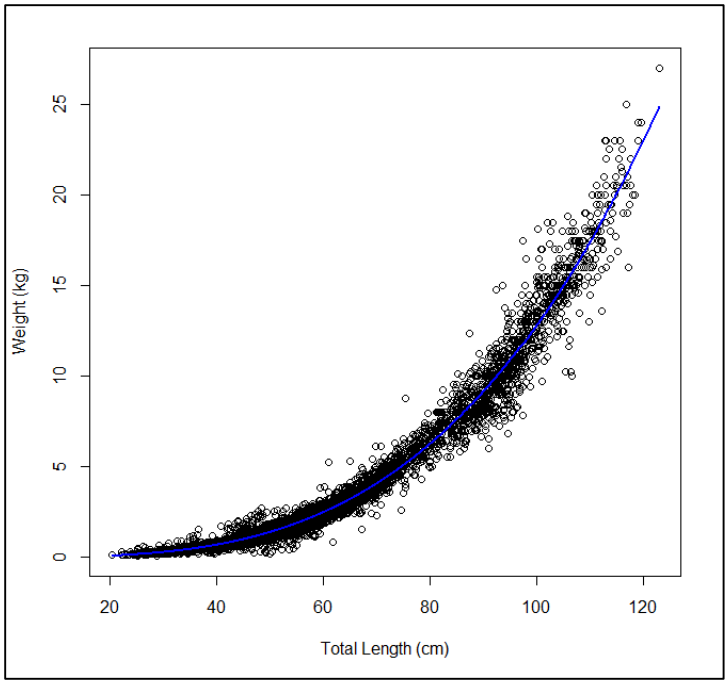

Figure 1.4. Fit of the length-weight function to available biological data for female striped bass.

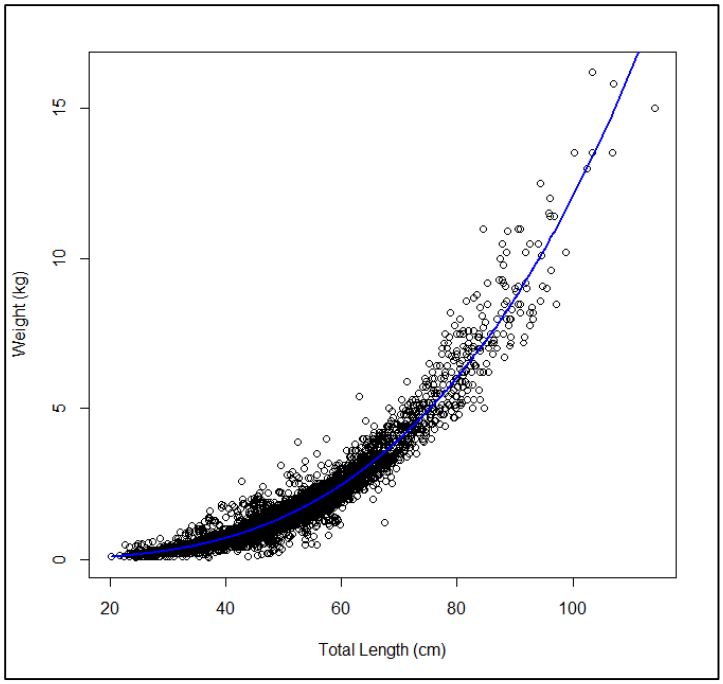

Figure 1.5. Fit of the length-weight function to available biological data for male striped bass.

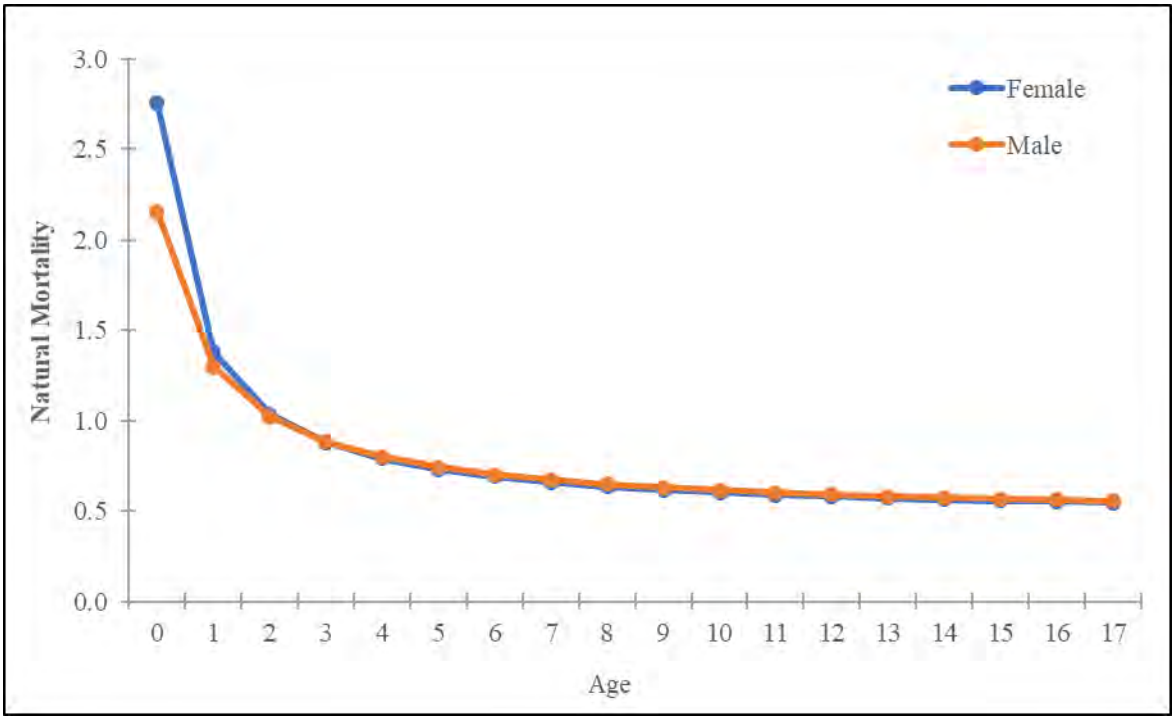

Figure 1.6. Estimates of natural mortality at age based on the method of Lorenzen (1996).

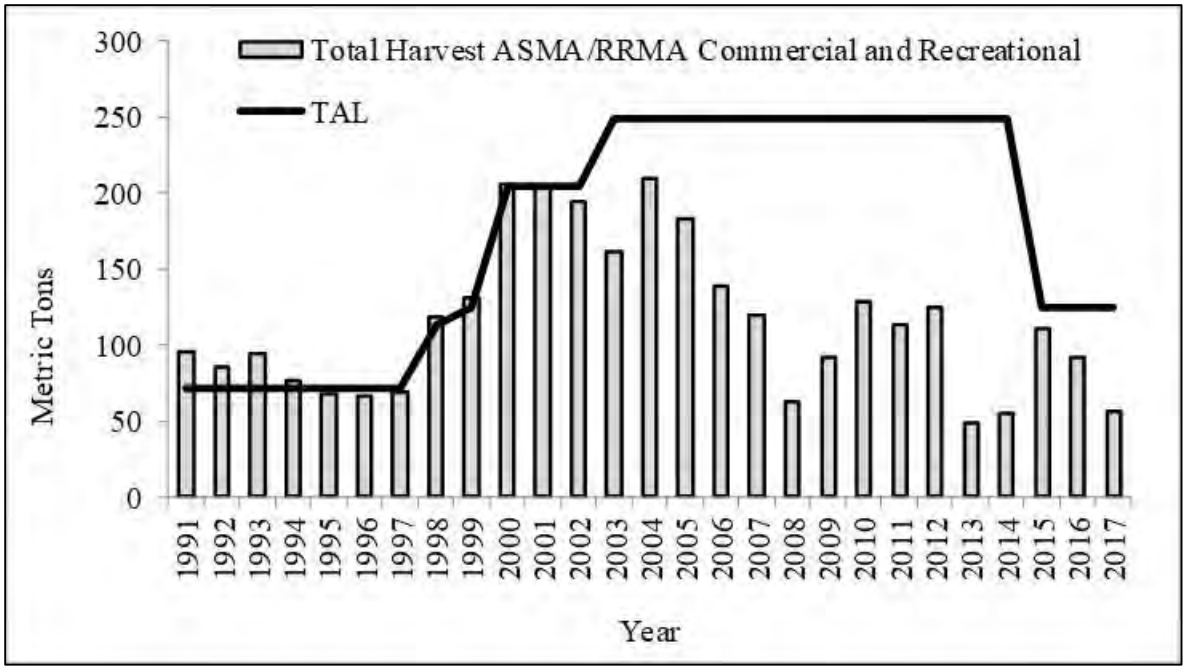

Figure 1.7. Annual total landings/harvest in metric tons of striped bass from the ASMA and RRMA commercial and recreational sectors combined compared to the TAL, 1991–2017.

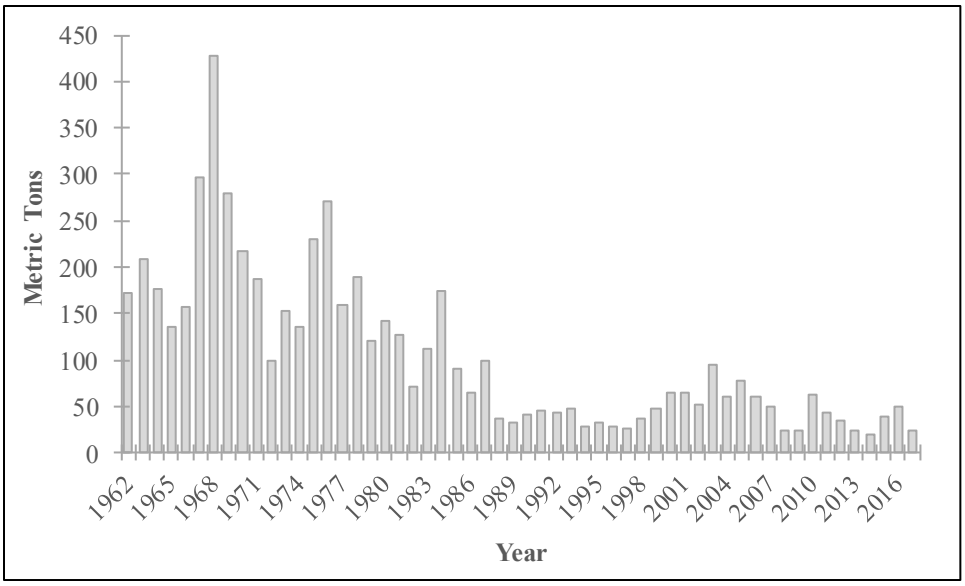

Figure 2.1. Annual commercial landings of striped bass in the ASMA-RRMA, 1962–2017.

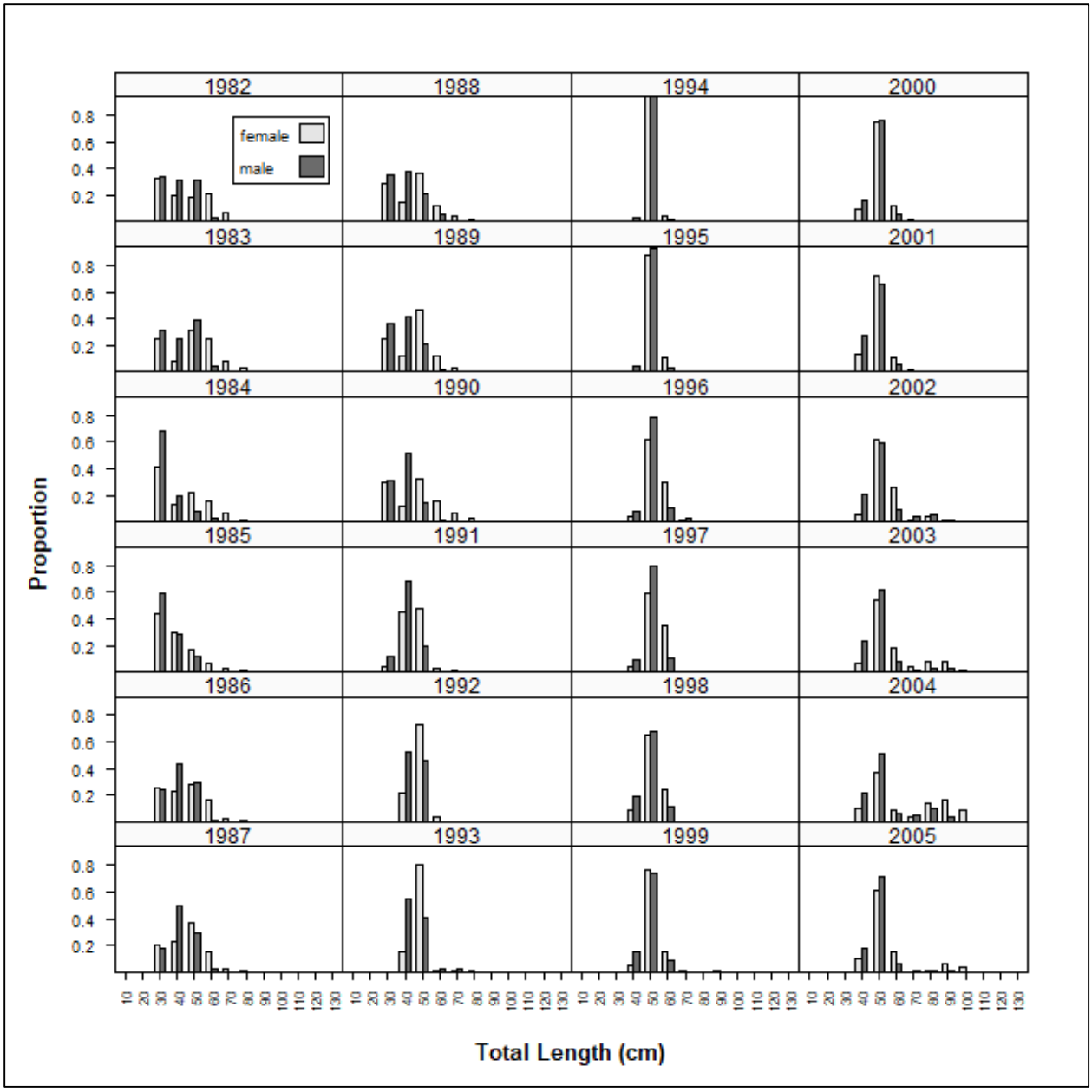

Figure 2.2. Annual length frequencies of striped bass commercial landings, 1982–2005.

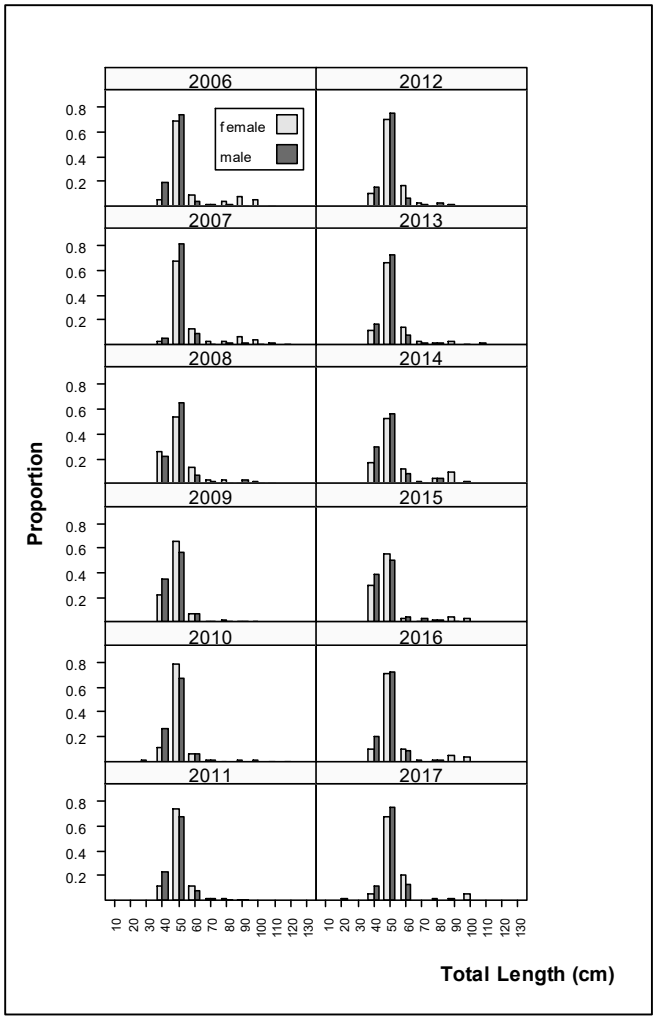

Figure 2.3. Annual length frequencies of striped bass commercial landings, 2006–2017.

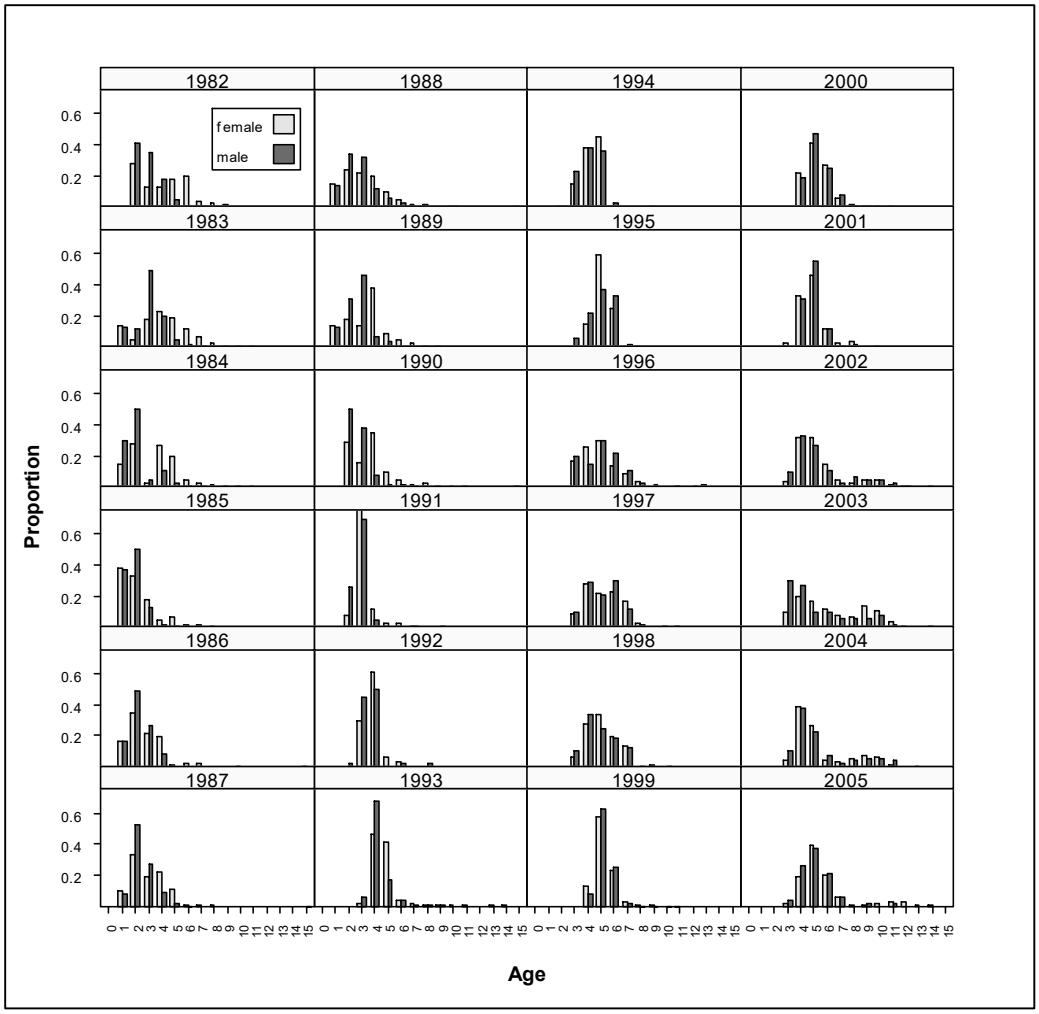

Figure 2.4. Annual age frequencies of striped bass commercial landings, 1982–2005. The age-15 bin represents a plus group.

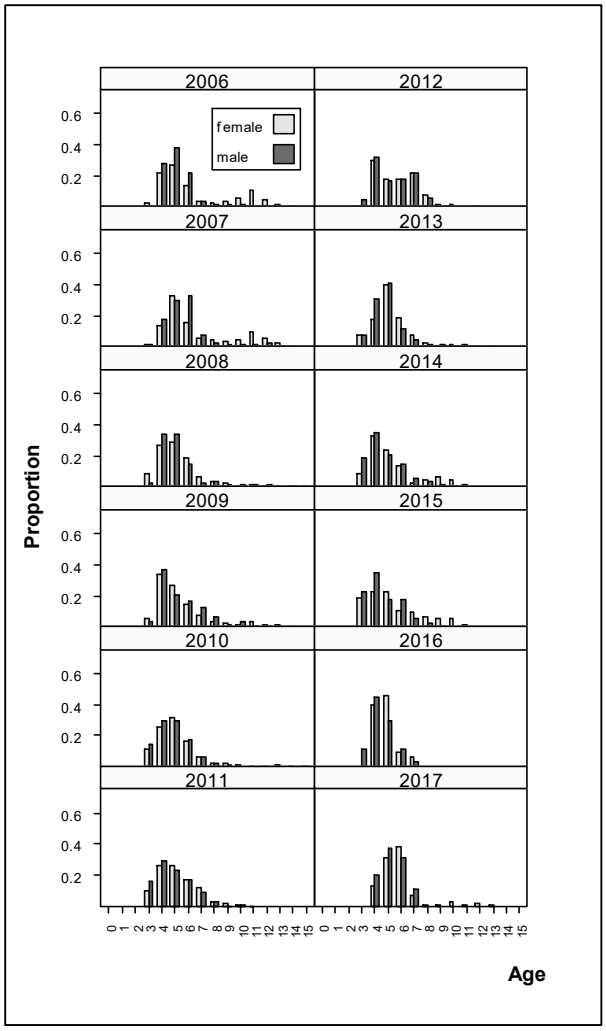

Figure 2.5. Annual age frequencies of striped bass commercial landings, 2006–2017. The age-15 bin represents a plus group.

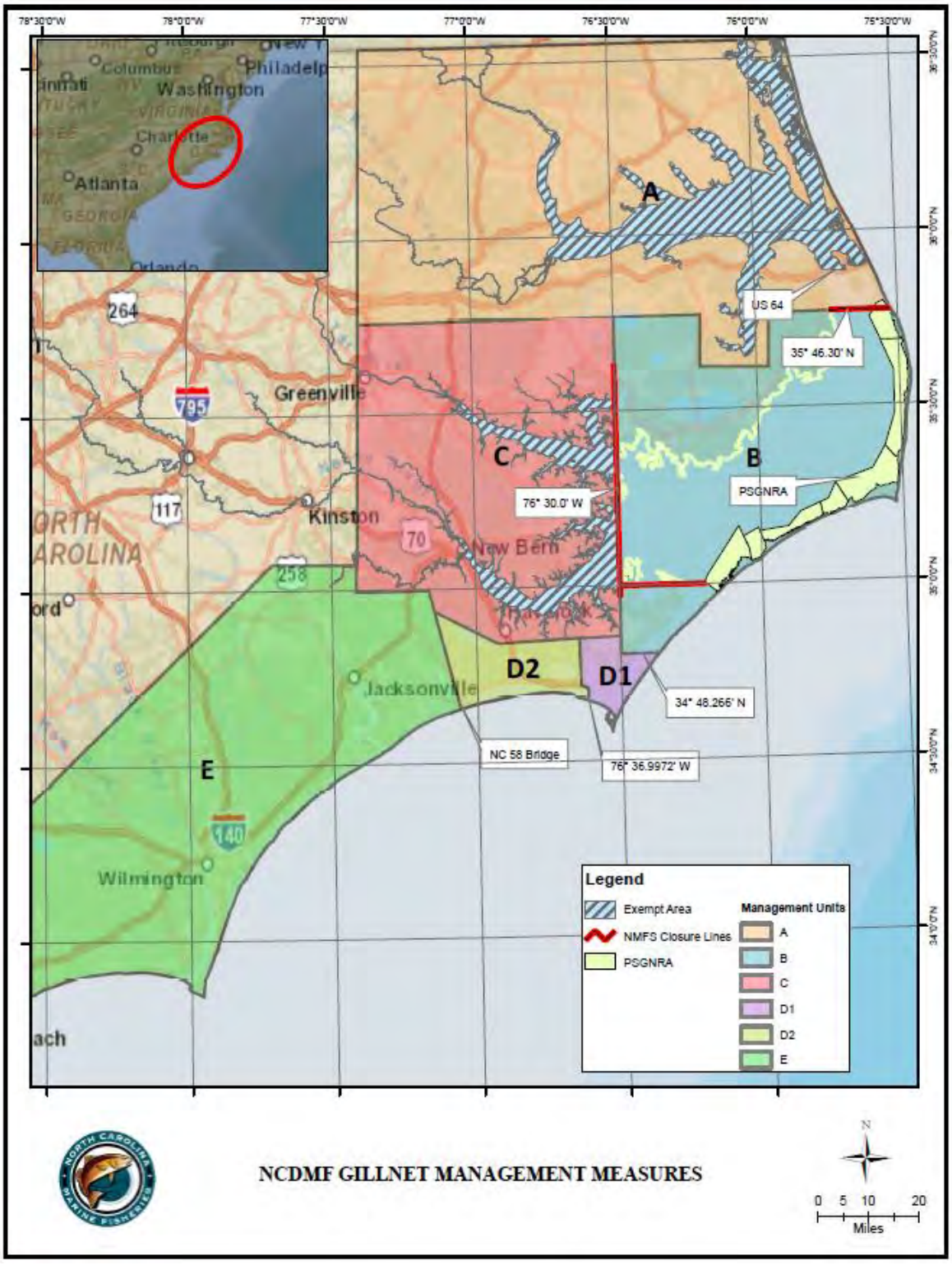

Figure 2.6. Management areas used in development of GLM for commercial gill-net discards.

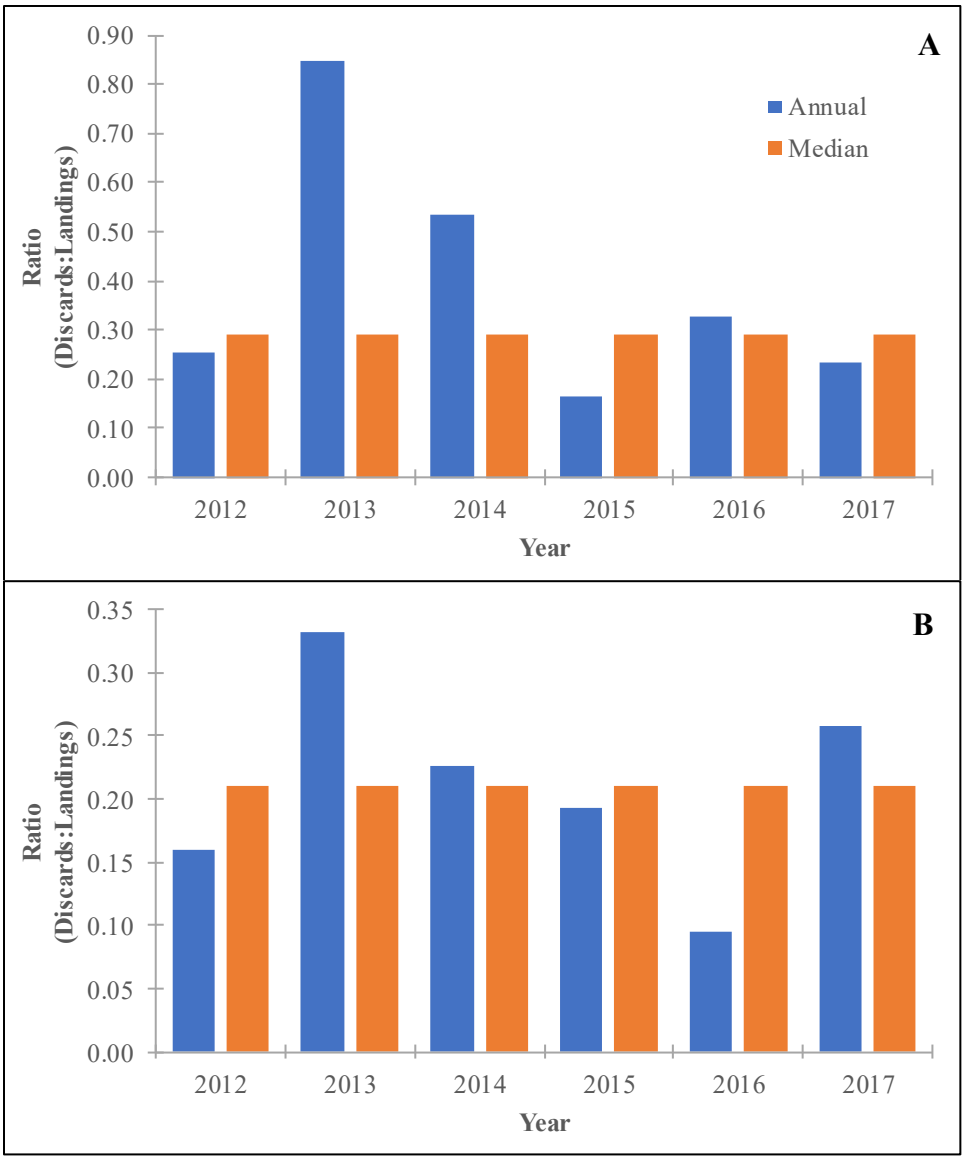

Figure 2.7. Ratio of commercial (A) live and (B) dead discards to commercial landings, 2012–2017.

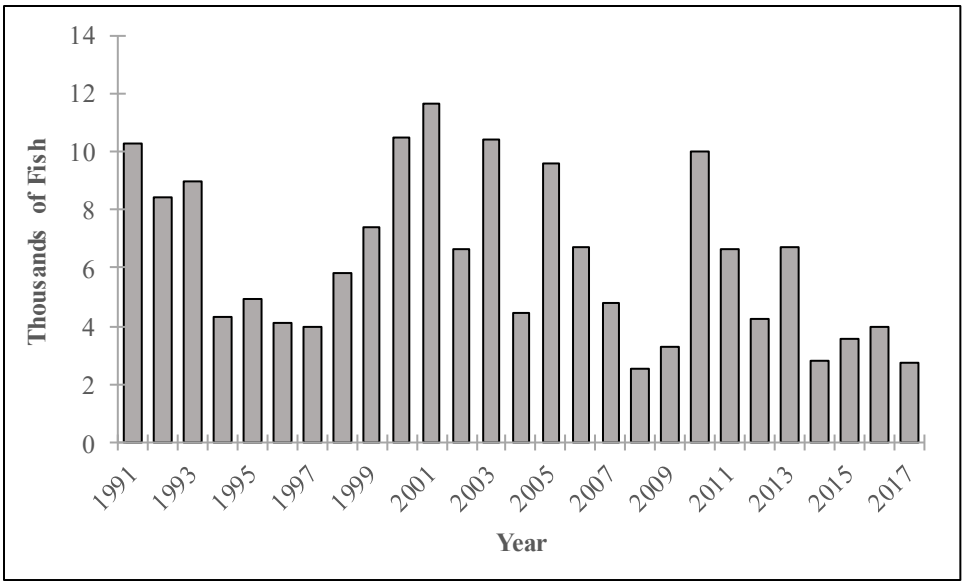

Figure 2.8. Annual estimates of commercial gill-net discards, 1991–2017. Note that values prior to 2012 were estimated using a hindcasting approach.

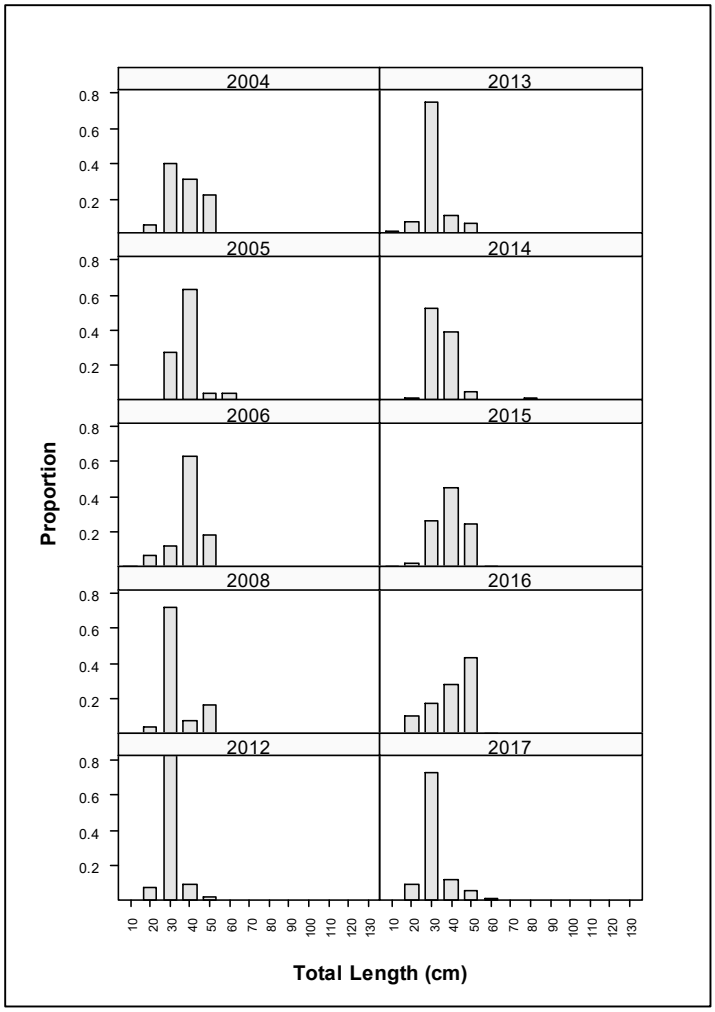

Figure 2.9. Annual length frequencies of striped bass commercial gill-net discards, 2004–2017.

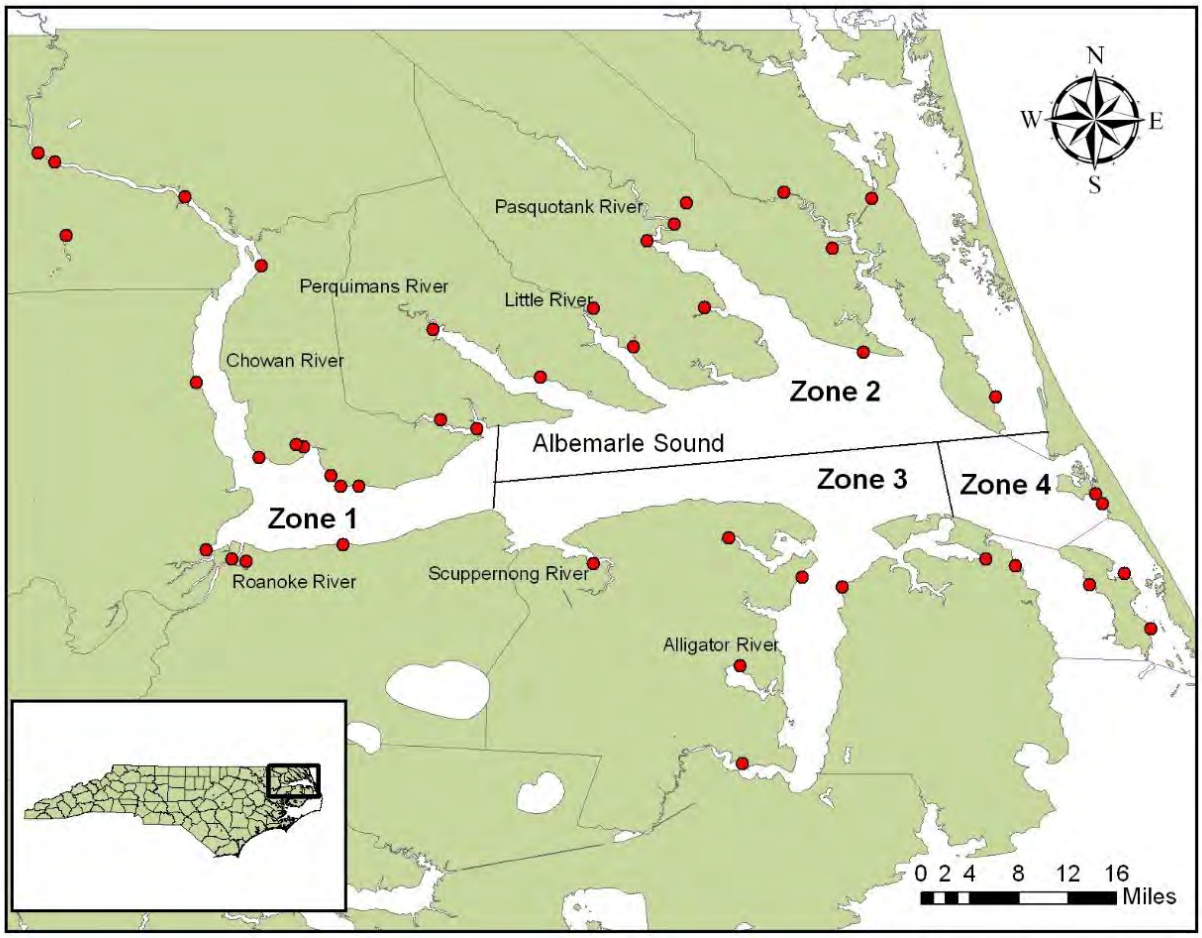

Figure 2.10. Sampling zones and access sites of the striped bass recreational creel survey in the ASMA.

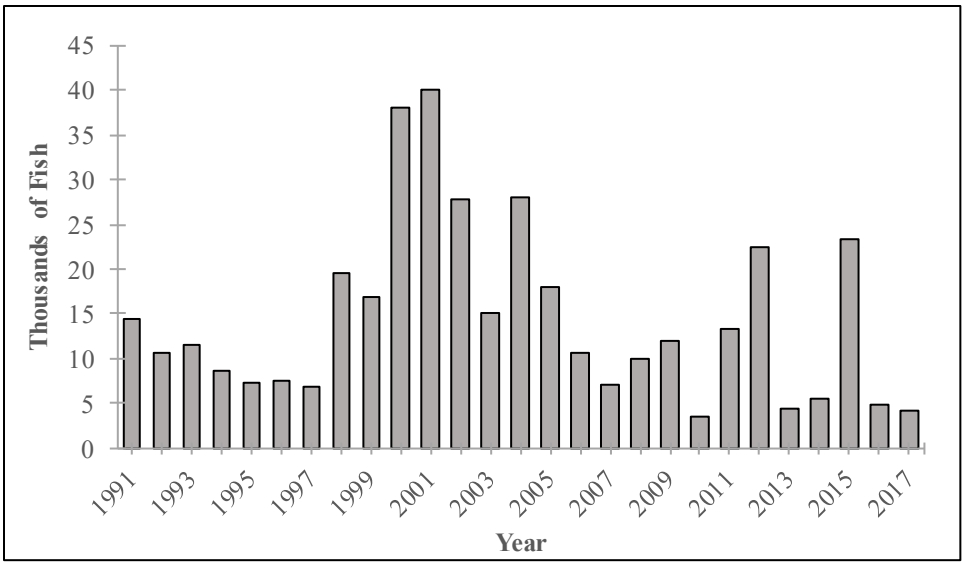

Figure 2.11. Annual estimates of recreational harvest for the Albemarle Sound, 1991–2017.

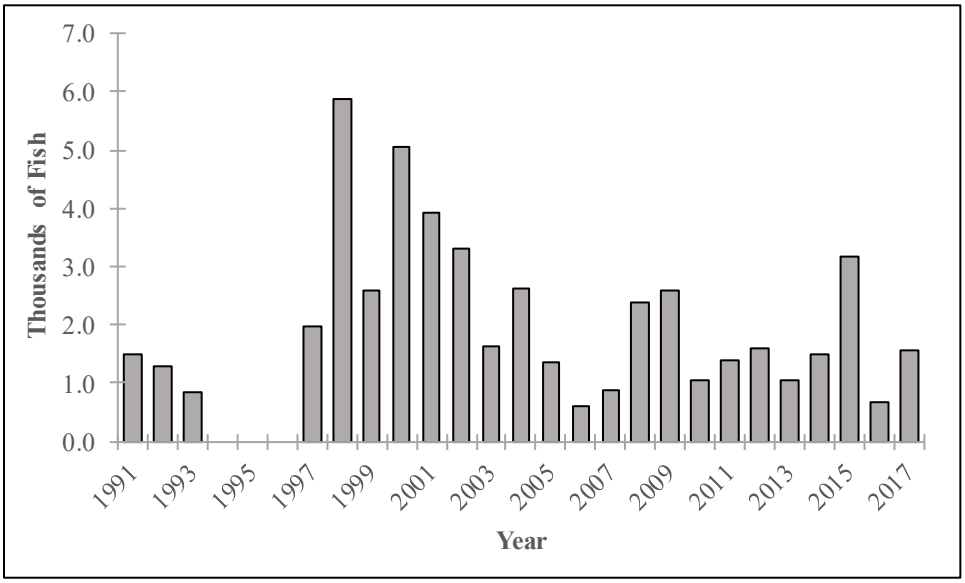

Figure 2.12. Annual estimates of recreational dead discards for the Albemarle Sound, 1991–2017.

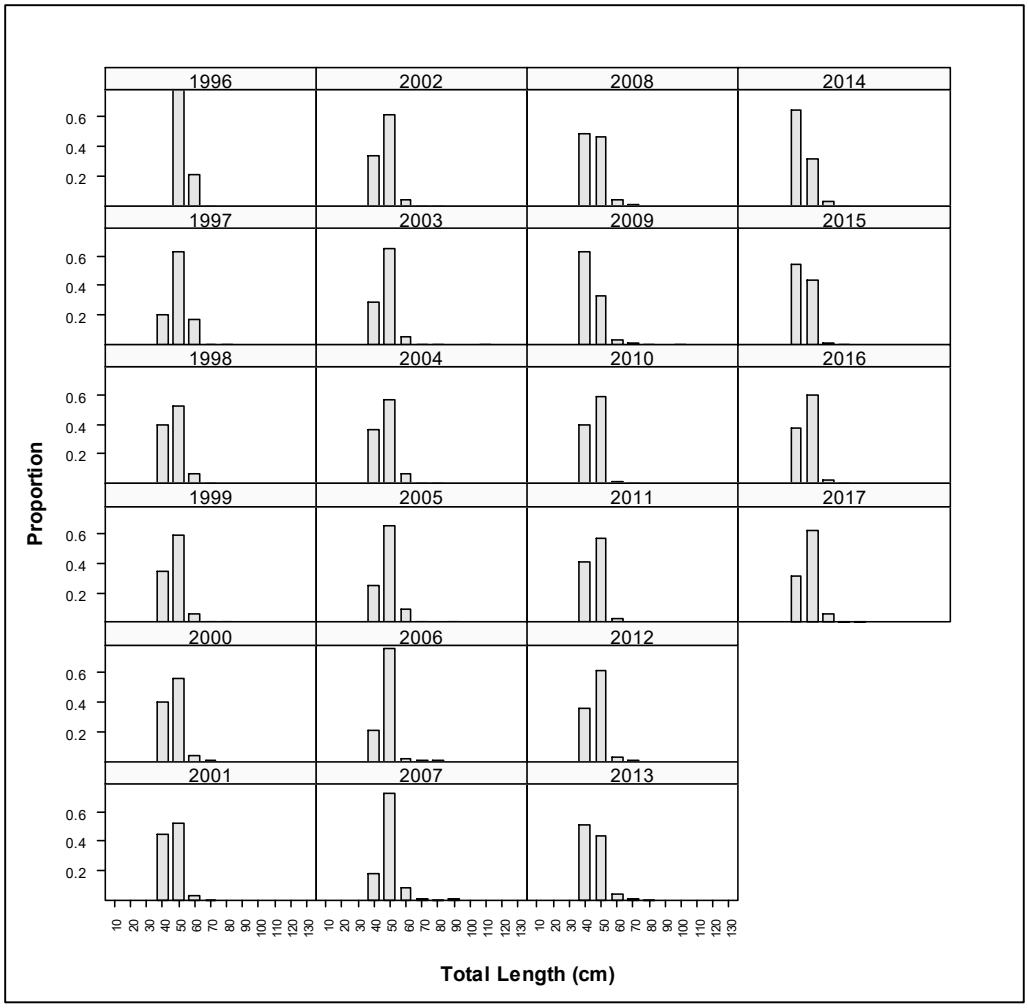

Figure 2.13. Annual length frequencies of striped bass recreational harvest in the Albemarle Sound, 1996–2017.

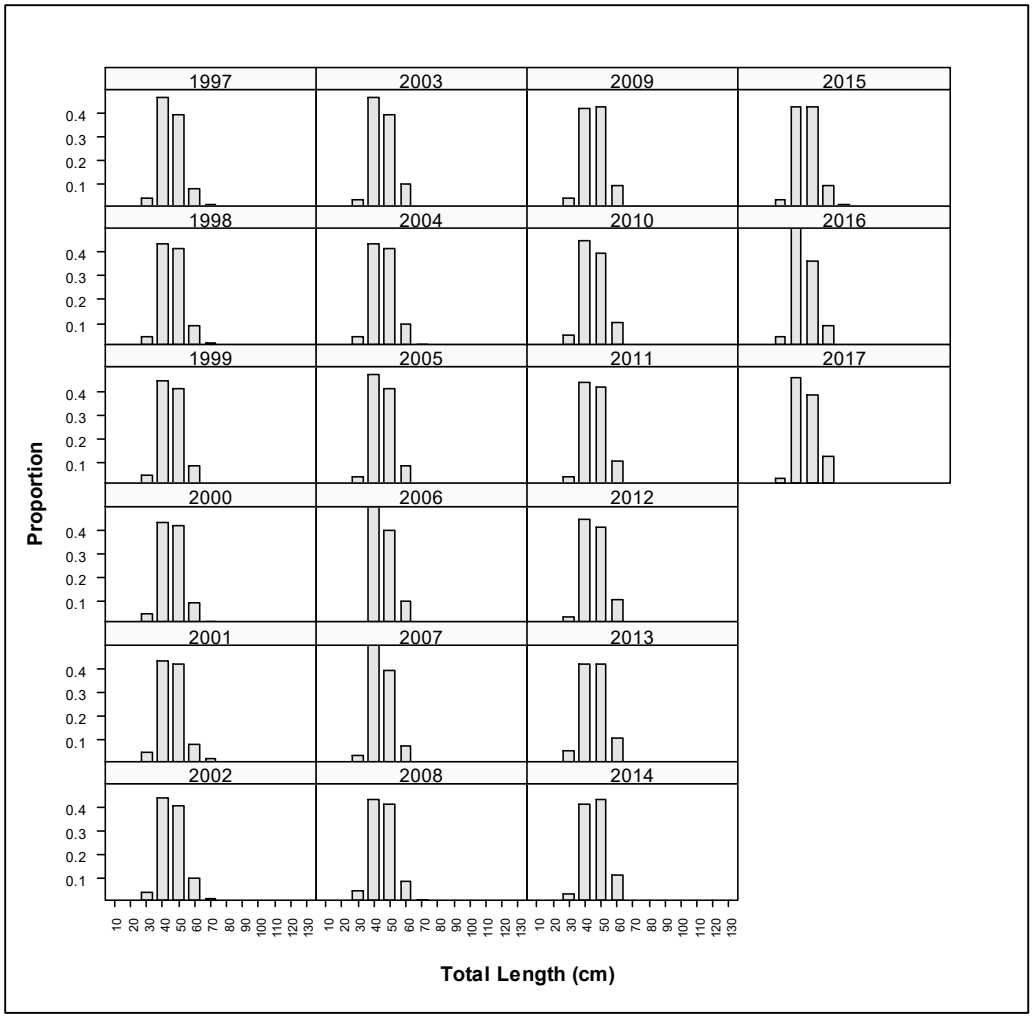

Figure 2.14. Annual length frequencies of striped bass recreational discards in the Albemarle Sound, 1997–2017.

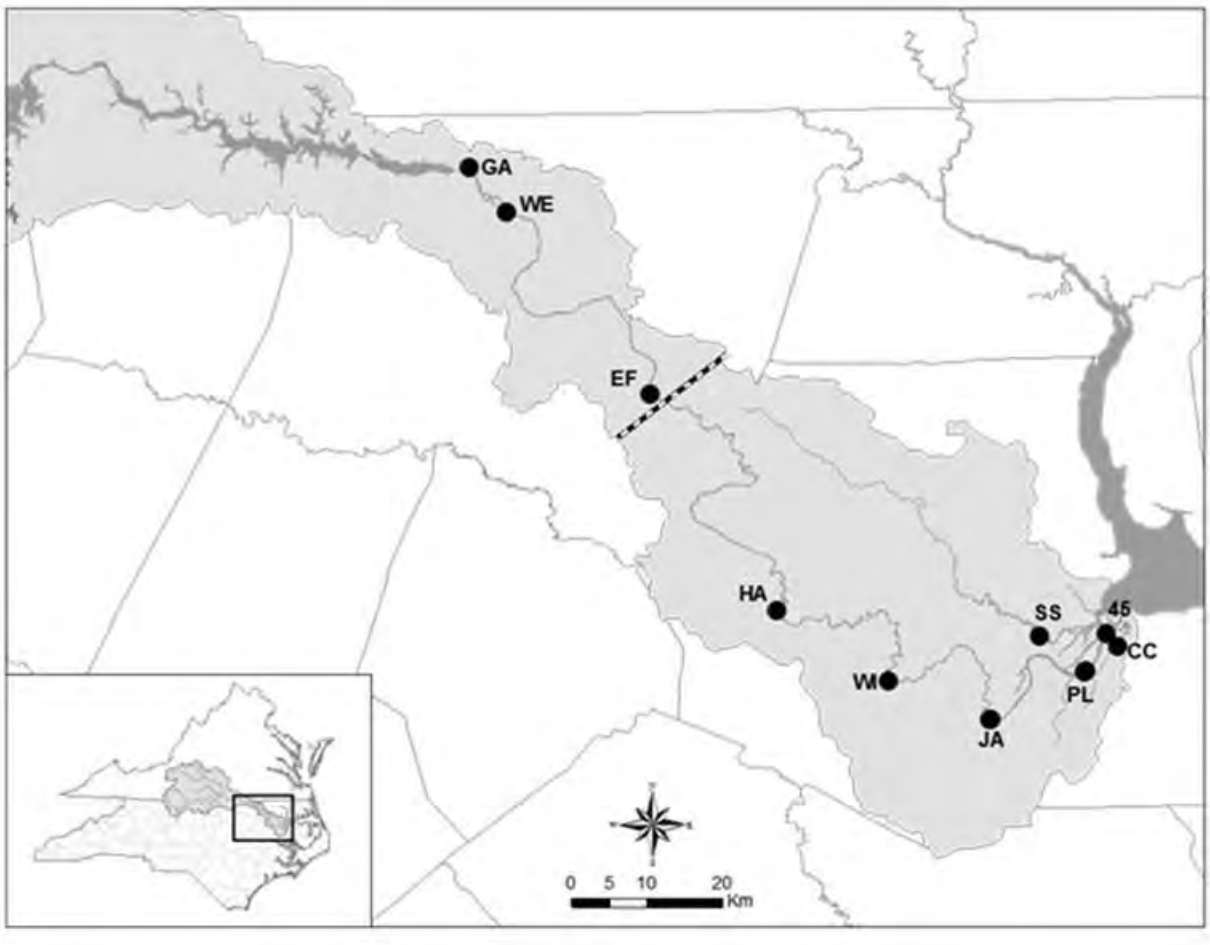

Figure 2.15. Map of angler creel survey interview locations in the RRMA, NC. The dashed line indicates the demarcation point between the upper and lower zones. Zone 1 access areas include (GA) Gaston (US HWY 48), (WE) Weldon, and (EF) Scotland Neck (Edwards Ferry US HWY 258). Zone 2 access areas include (HA) Hamilton, (WI) Williamston, (JA) Jamesville, (PL) Plymouth, (45) US HWY 45, (CC) Conaby Creek, and (SS) Sans Souci (Cashie River).

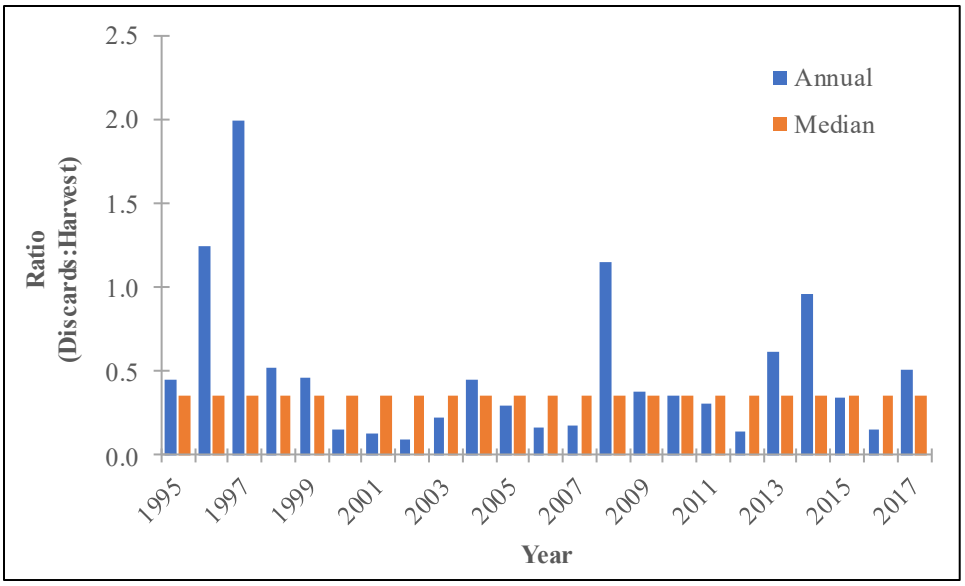

Figure 2.16. Ratio of recreational dead discards to recreational harvest in the Roanoke River, 1995–2017.

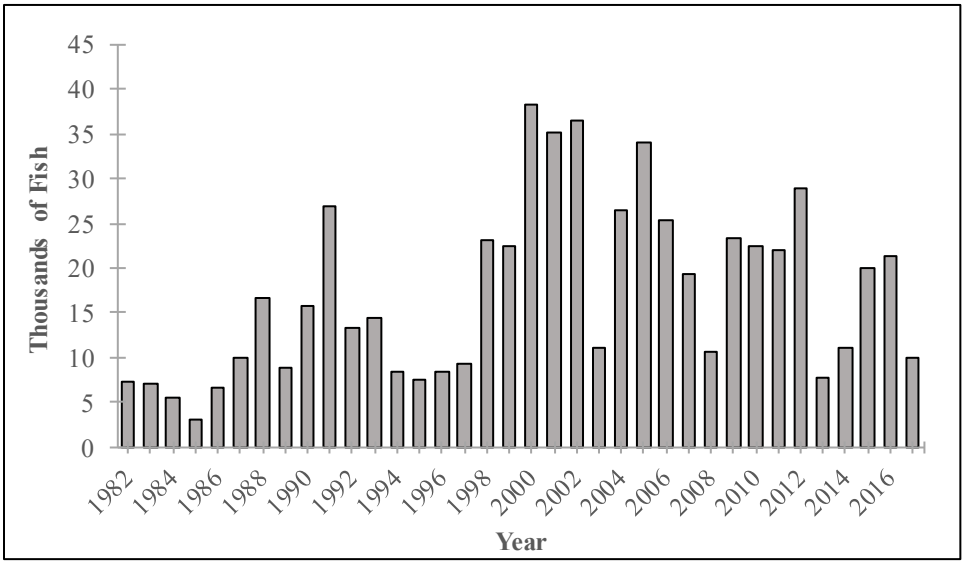

Figure 2.17. Annual estimates of recreational harvest for the Roanoke River, 1982–2017.

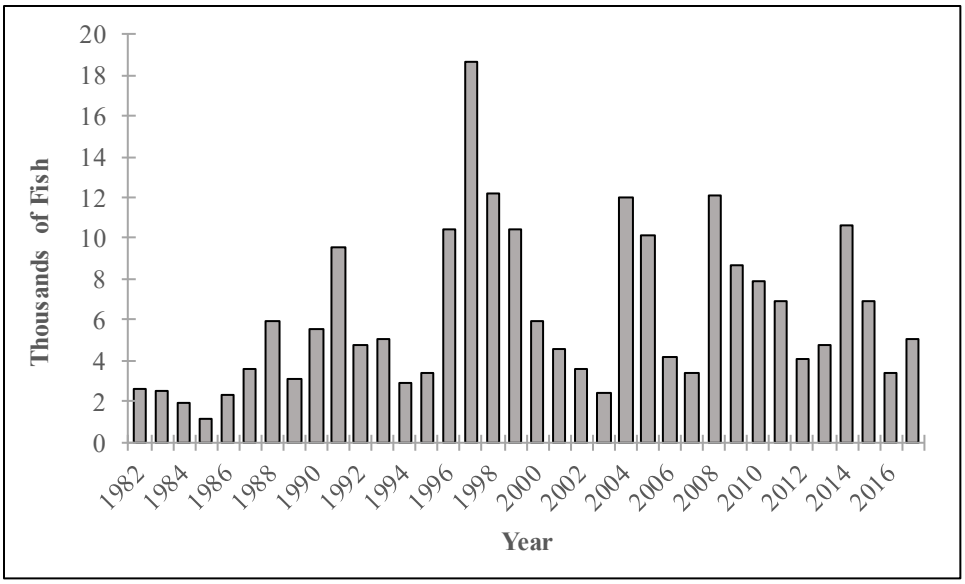

Figure 2.18. Annual estimates of recreational dead discards for the Roanoke River, 1982–2017. Note that discard values prior to 1995 were estimated using a hindcasting approach.

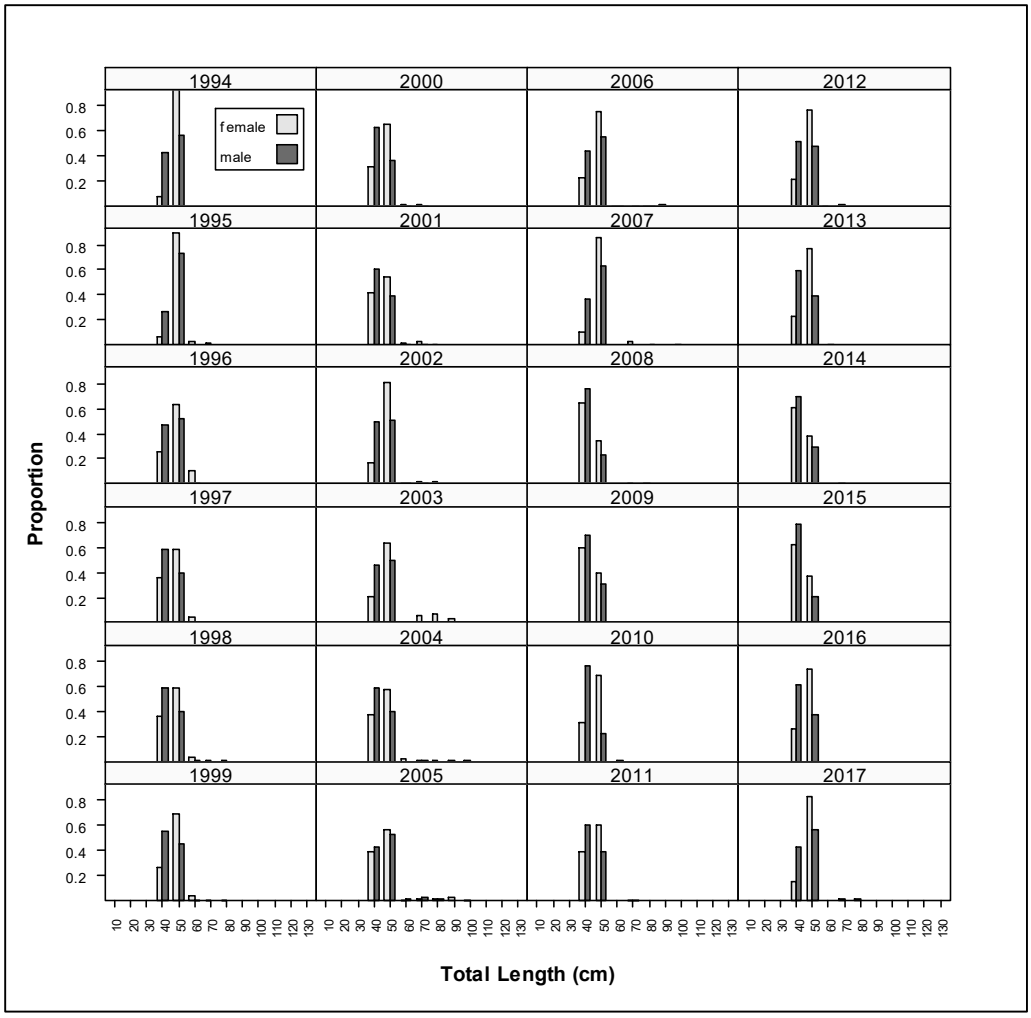

Figure 2.19. Annual length frequencies of striped bass recreational harvest in the Roanoke River, 1994–2017.

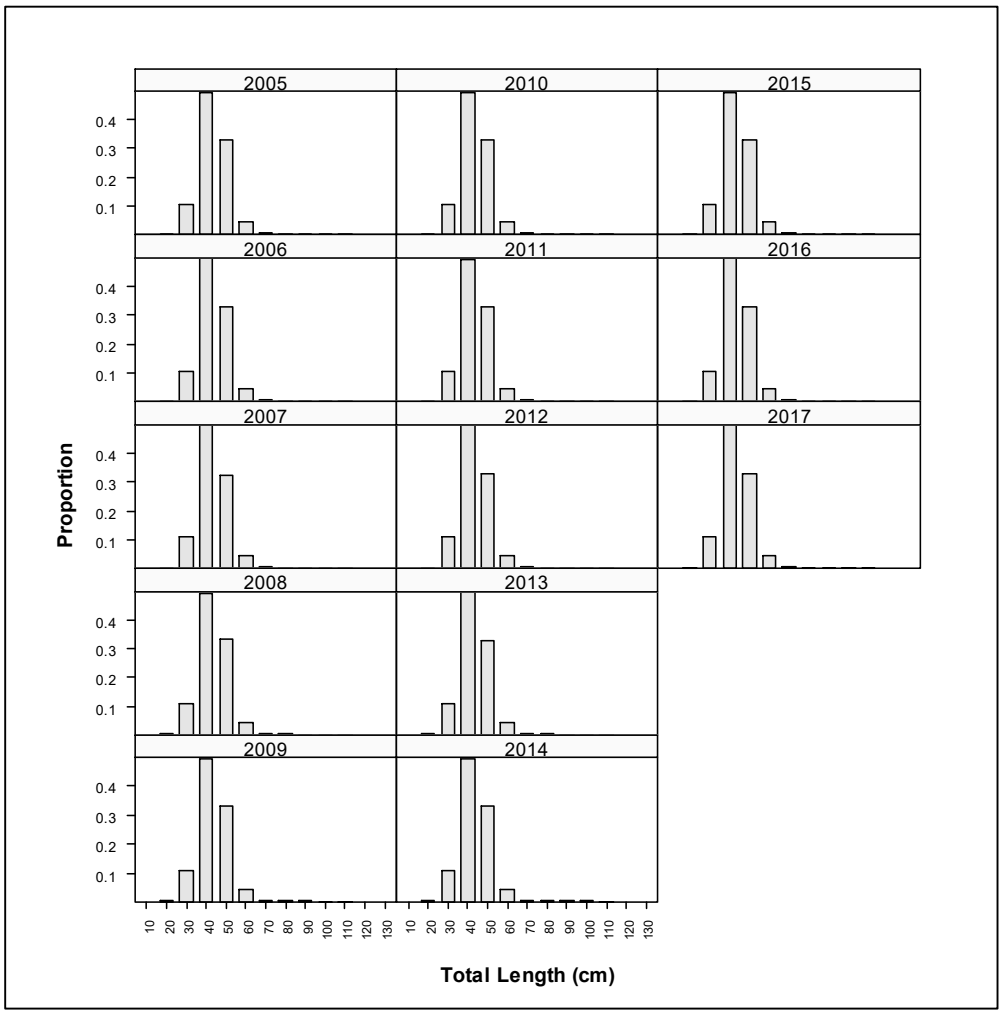

Figure 2.20. Annual length frequencies of striped bass recreational discards in the Roanoke River, 2005–2017.

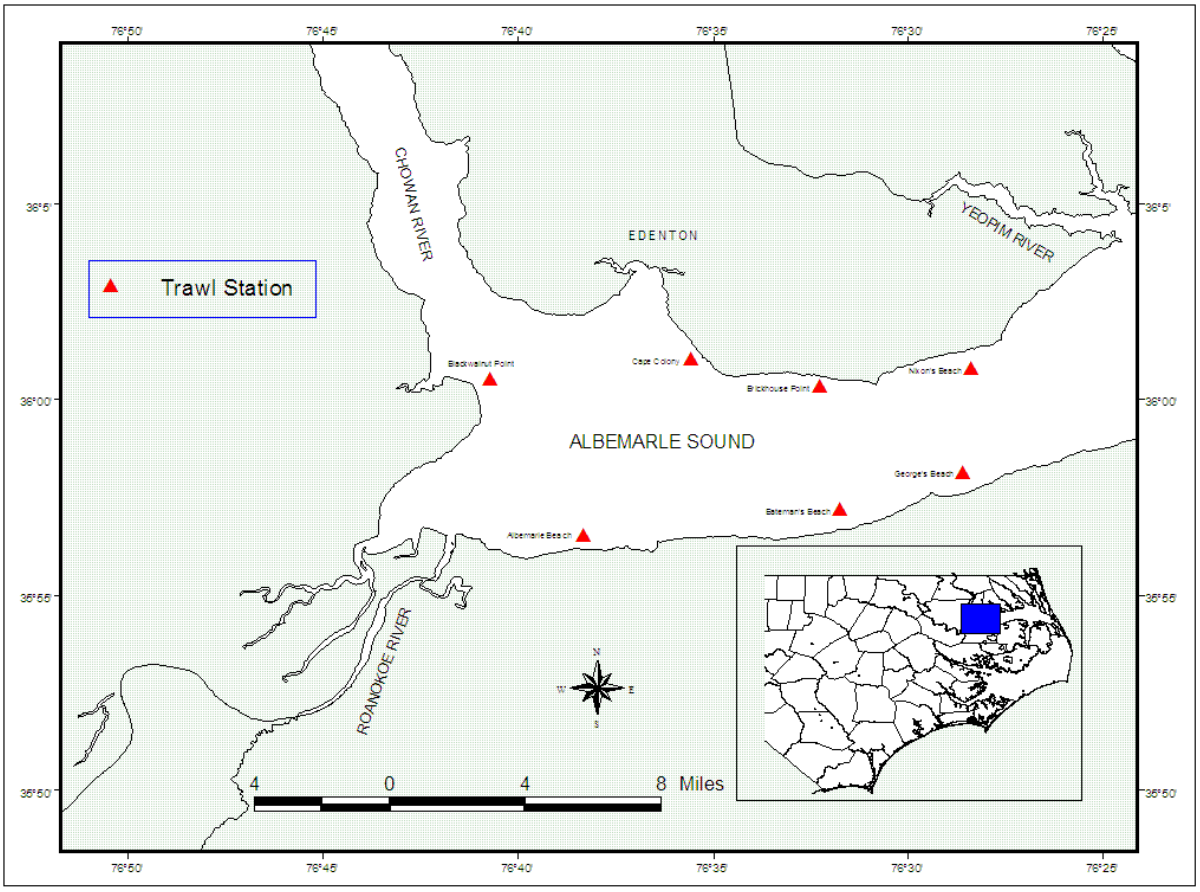

Figure 2.21. Map of NCDMF Juvenile Abundance Survey (Program 100) sampling sites.

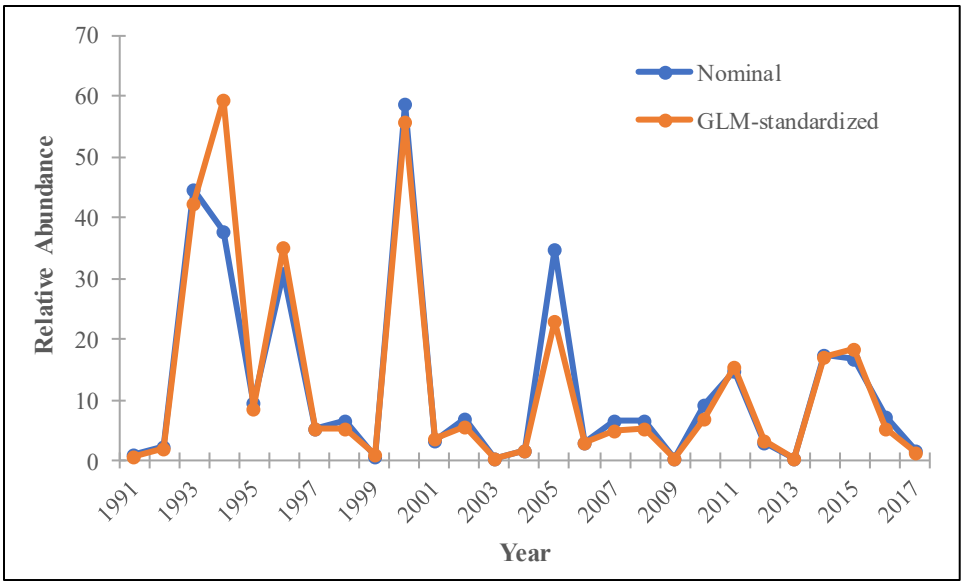

Figure 2.22. Nominal and GLM-standardized indices of relative age-0 abundance derived from the Juvenile Abundance Survey (P100), 1991–2017.

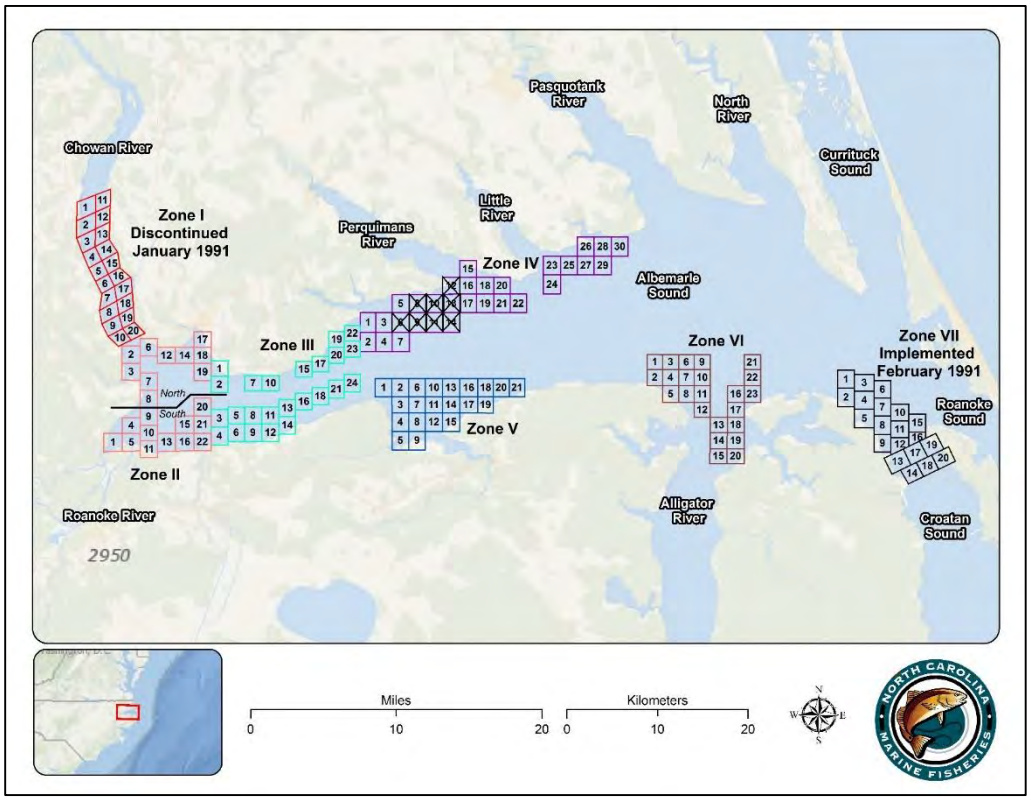

Figure 2.23. Map of sampling grids and zones for the NCDMF Independent Gill-Net Survey (Program 135).

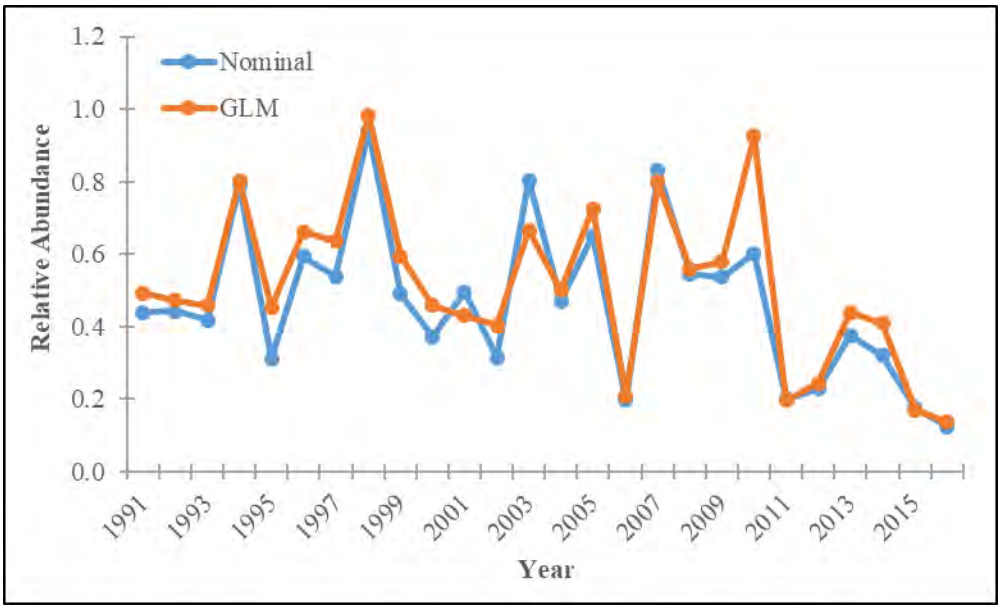

Figure 2.24. Nominal and GLM-standardized indices of relative abundance derived from the fall/winter component of the NCDMF Independent Gill-Net Survey (P135), 1991–2016.

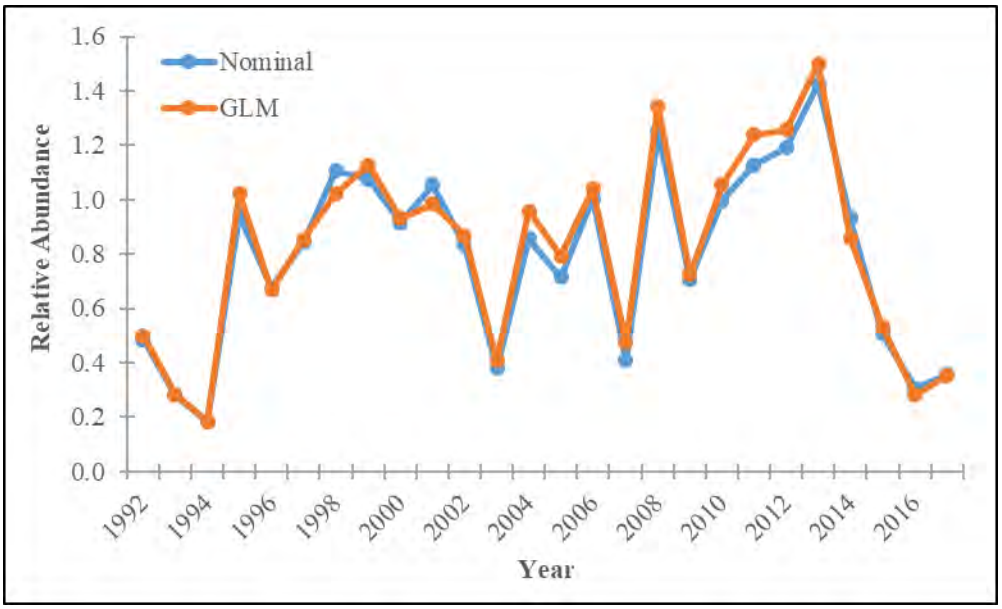

Figure 2.25. Nominal and GLM-standardized indices of relative abundance derived from the spring component of the NCDMF Independent Gill-Net Survey (P135), 1992–2017.

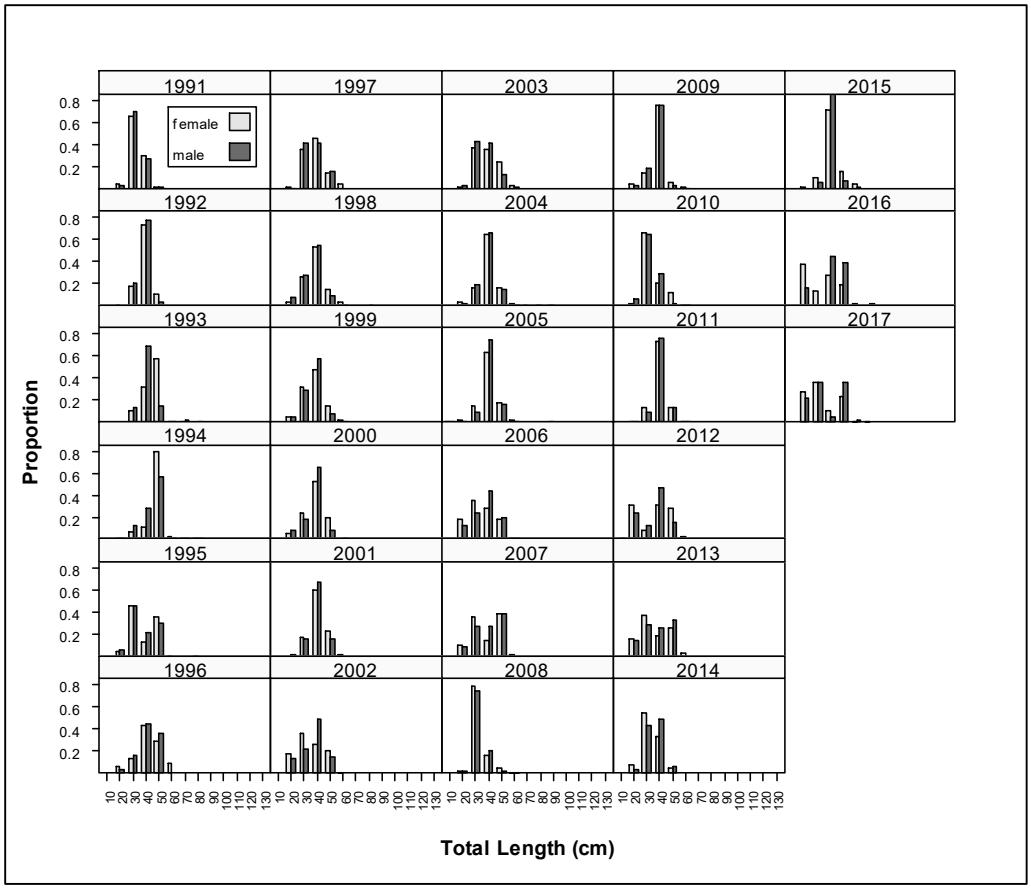

Figure 2.26. Annual length frequencies of striped bass sampled from the fall/winter component of the NCDMF Independent Gill-Net Survey (P135), 1991–2017.

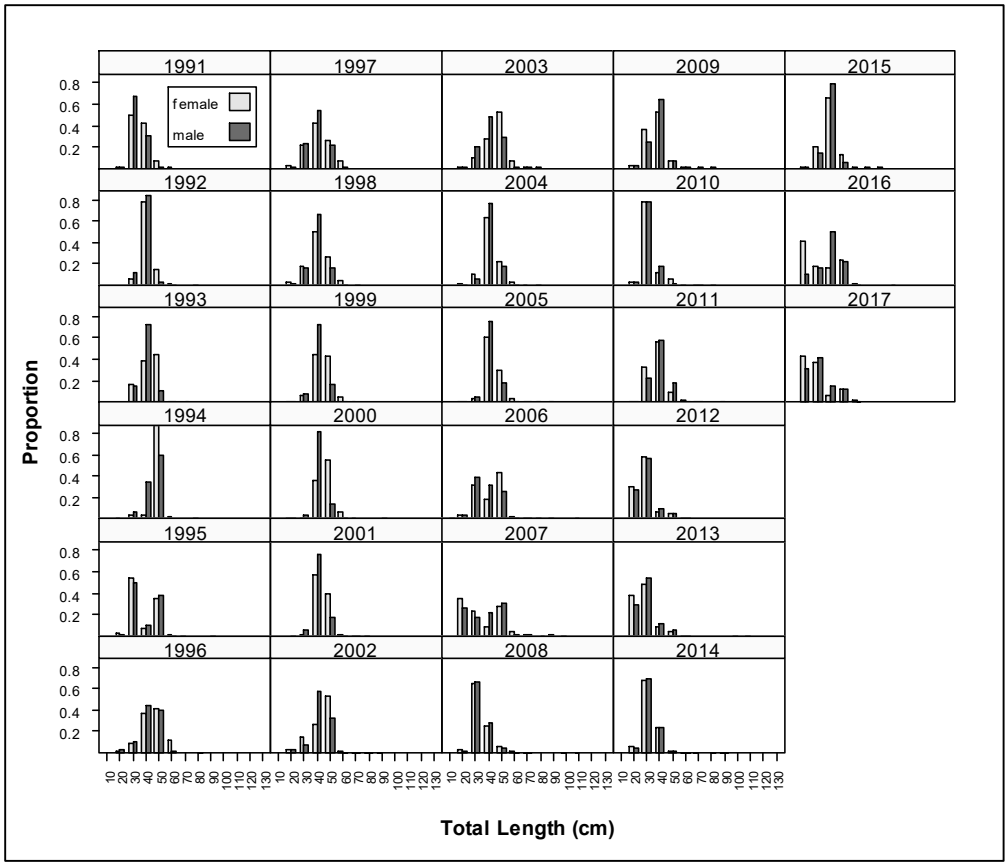

Figure 2.27. Annual length frequencies of striped bass sampled from the spring component of the NCDMF Independent Gill-Net Survey (P135), 1991–2017.

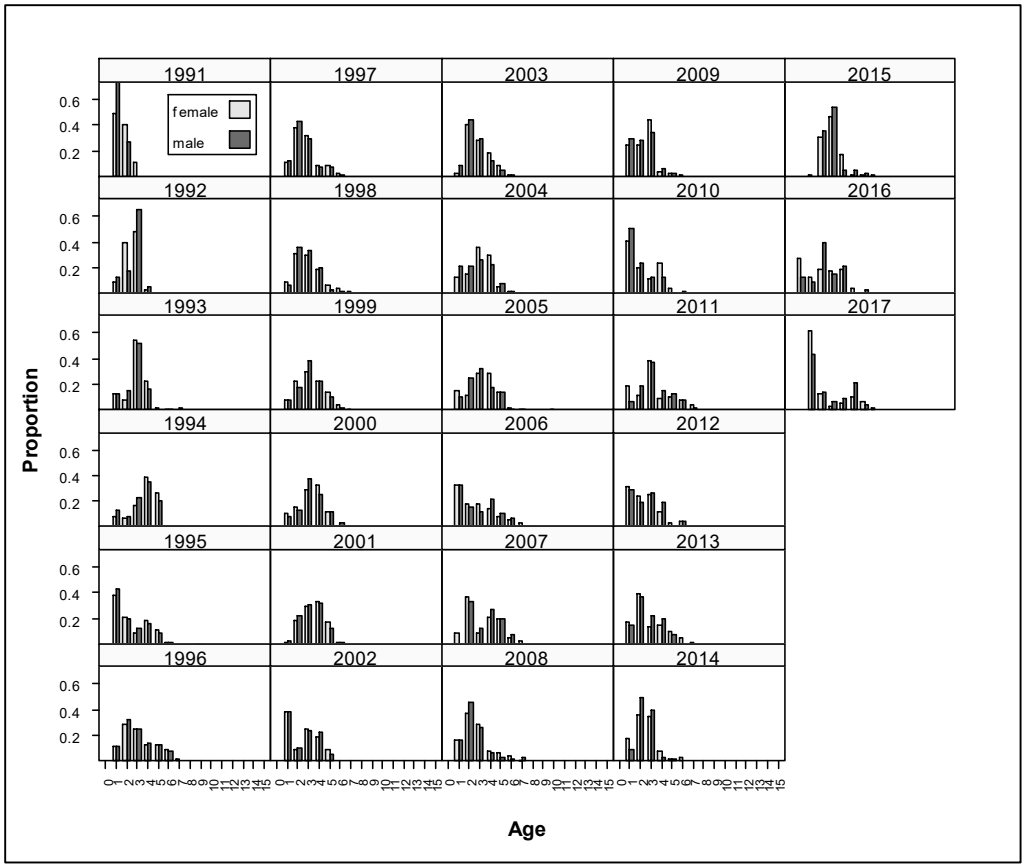

Figure 2.28. Annual age frequencies of striped bass sampled from the fall/winter component of the NCDMF Independent Gill-Net Survey (P135), 1991–2017. Thea age-15 bin represents a plus group.

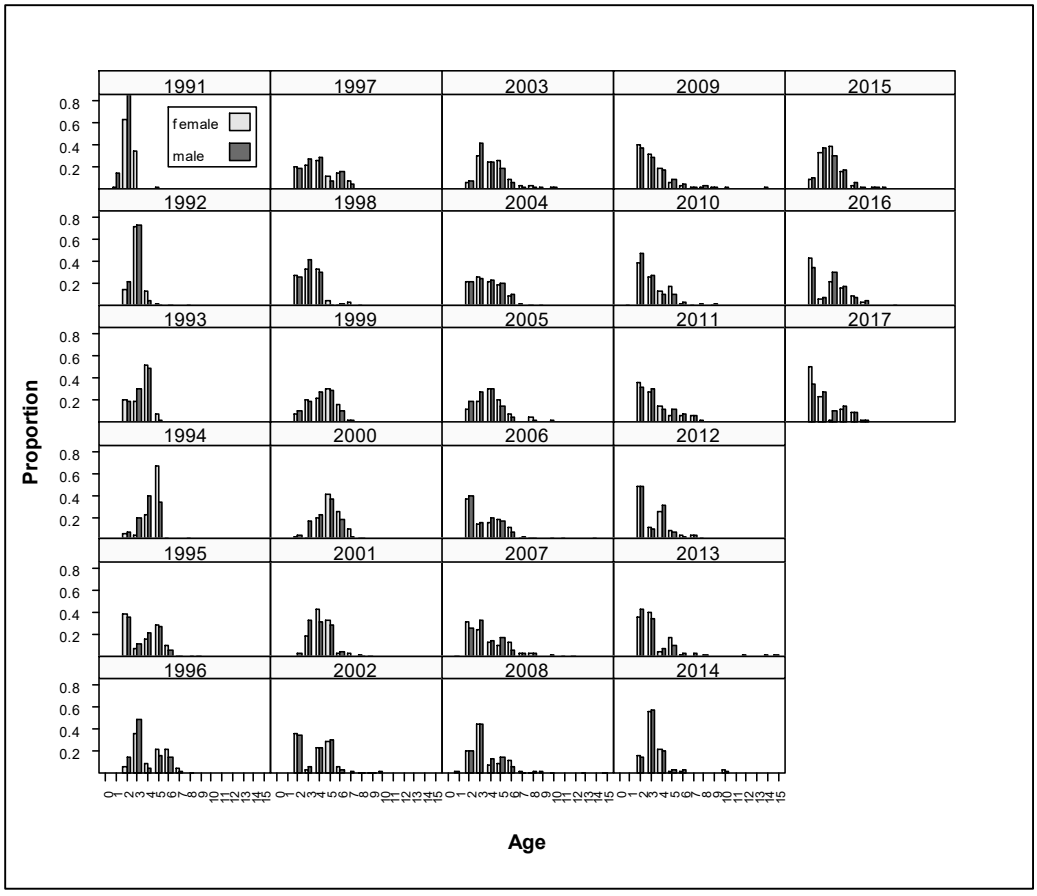

Figure 2.29. Annual age frequencies of striped bass sampled from the spring component of the NCDMF Independent Gill-Net Survey (P135), 1991–2017. The age-15 bin represents a plus group.

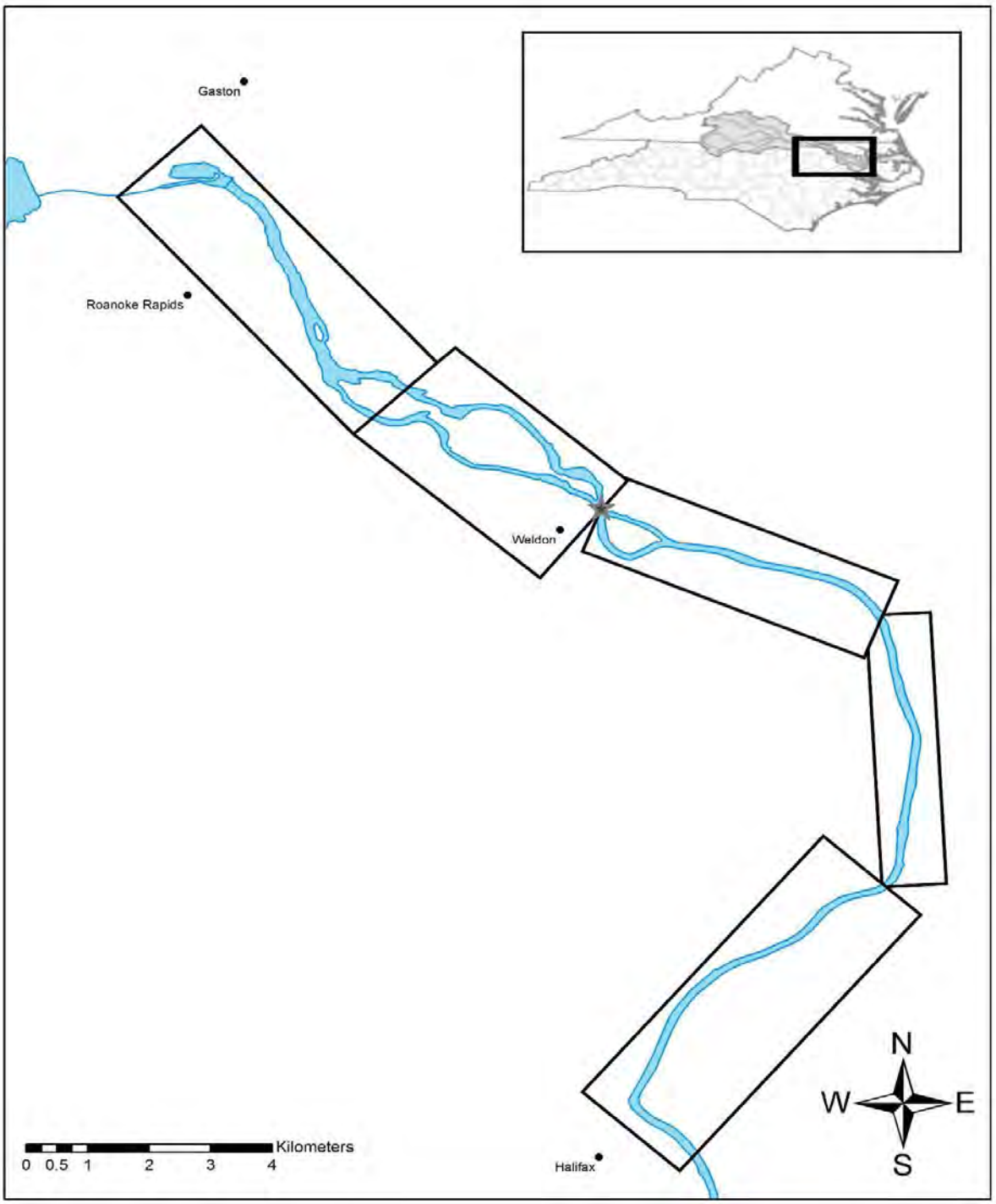

Figure 2.30. Striped Bass spawning grounds on the Roanoke River, near the vicinity of Weldon, North Carolina. Black boxes represent relative locations of river strata. The gray star indicates location of rapids near the Weldon boating access area; flows less than 7,000 cfs restrict access to the strata above this location.

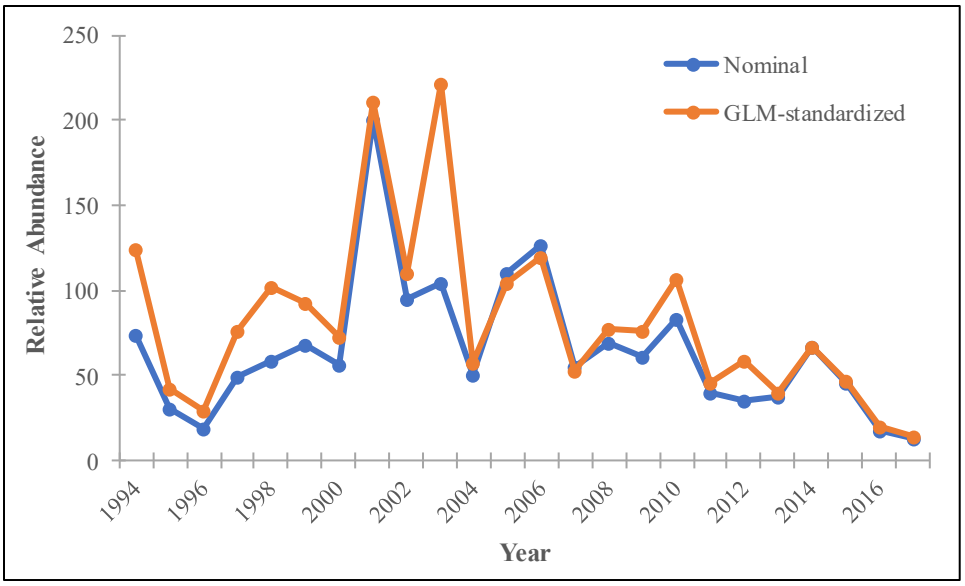

Figure 2.31. Nominal and GLM-standardized indices of relative abundance derived from the NCWRC Roanoke River Electrofishing Survey, 1994–2017.

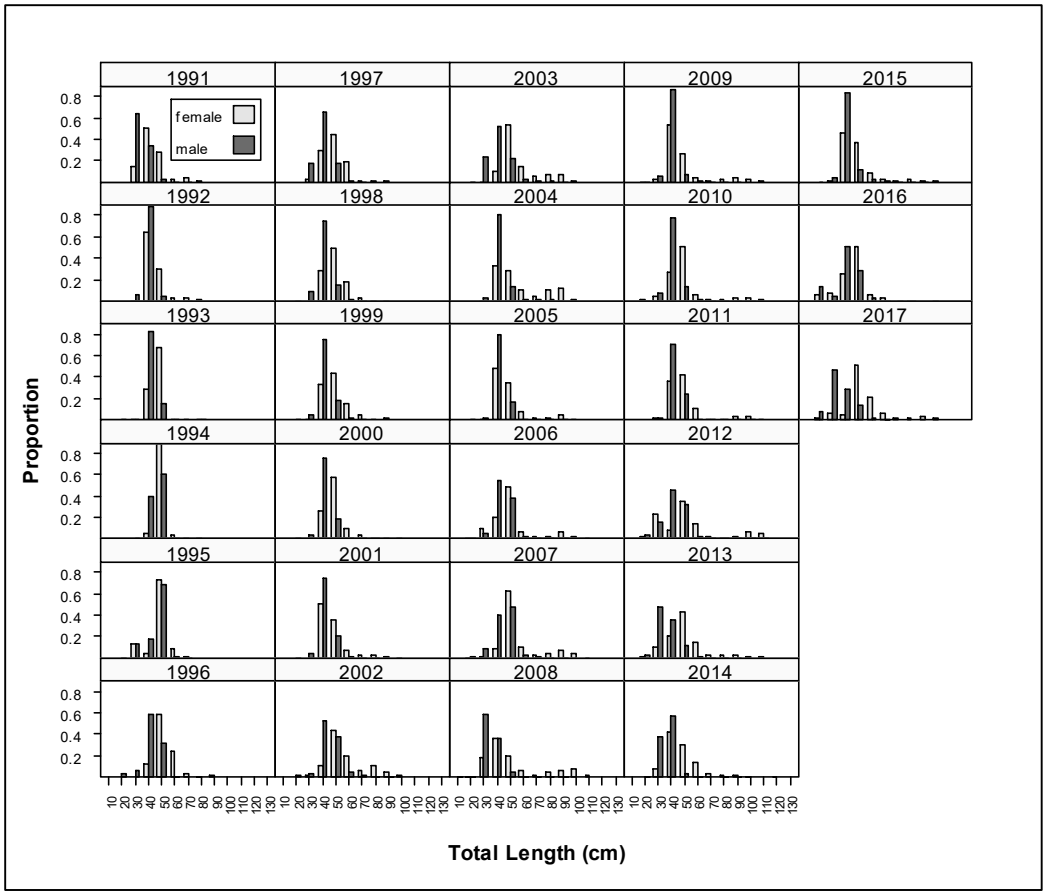

Figure 2.32. Annual length frequencies of striped bass sampled from the NCWRC Roanoke River Electrofishing Survey, 1991–2017.

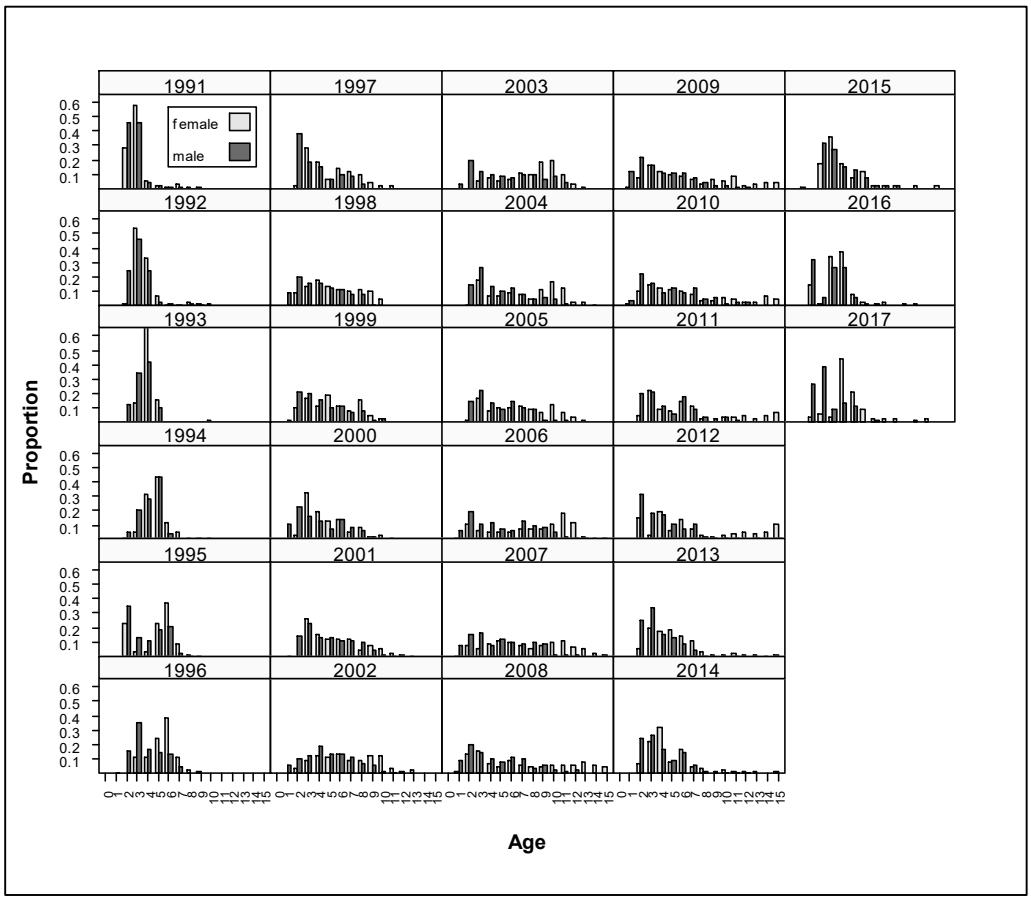

Figure 2.33. Annual age frequencies of striped bass sampled from the NCWRC Roanoke River Electrofishing Survey, 1991–2017. The age-15 bin represents a plus group.

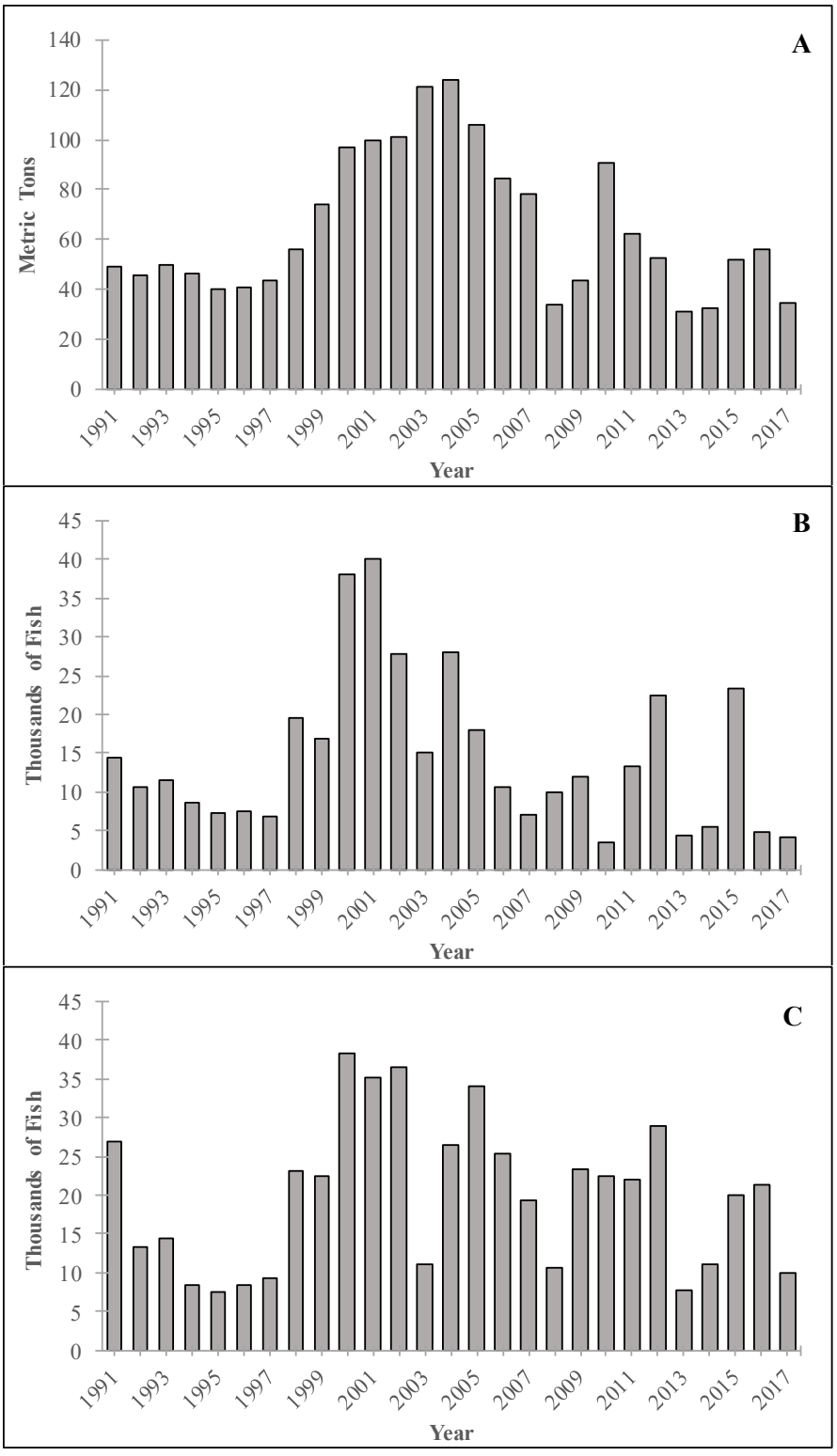

Figure 3.1. Annual (A) ARcomm landings, (B) ASrec harvest, and (C) RRrec harvest values that were input into the SS model, 1991–2017.

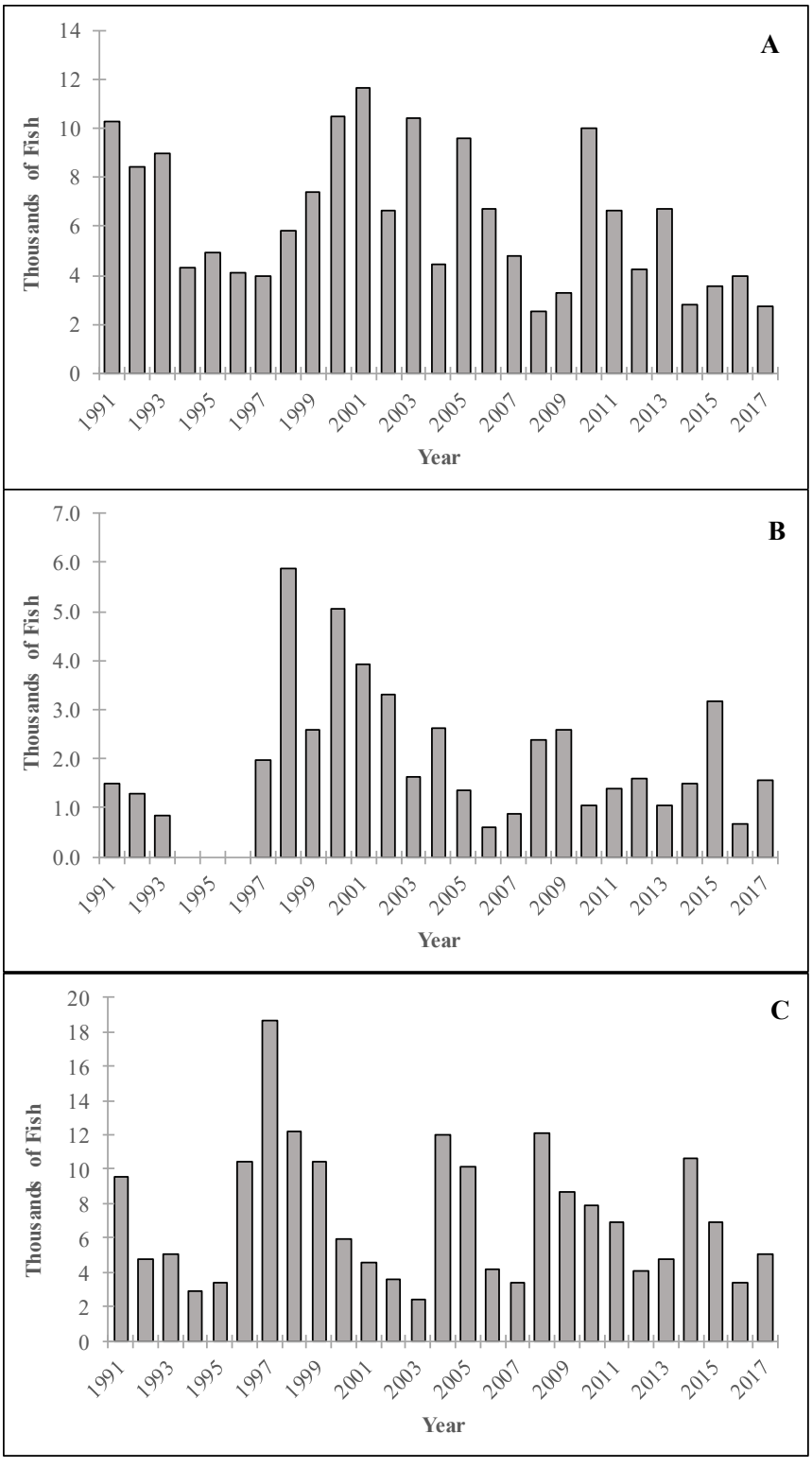

Figure 3.2. Annual (A) ARcomm, (B) ASrec, and (C) RRrec dead discards that were input into the SS model, 1991–2017.

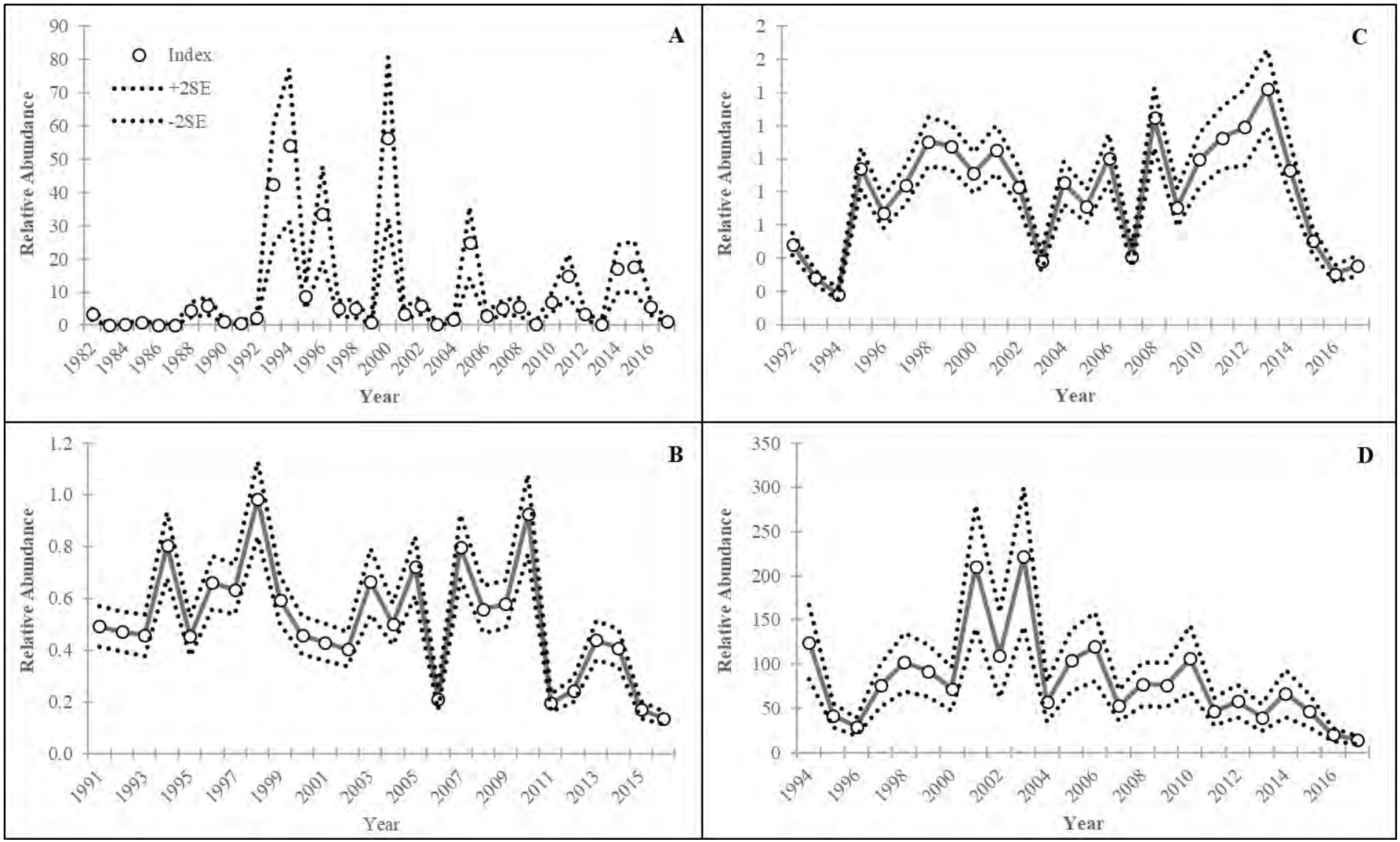

Figure 3.3. GLM-standardized indices of abundance derived from the (A) P100juv, (B) P135fw, (C) P135spr, and (D) RRef surveys that were input into the SS model, 1991–2017.

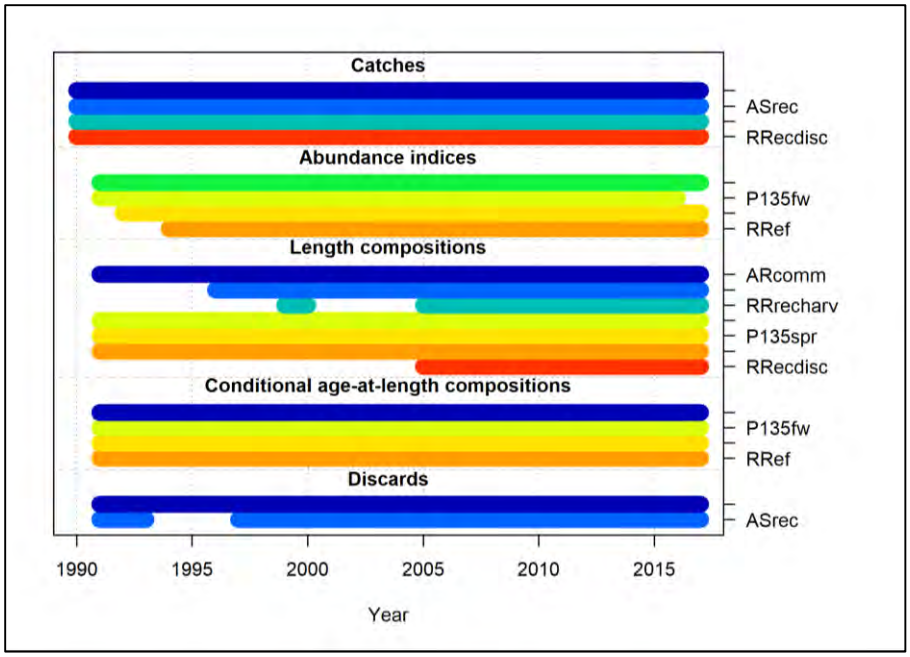

Figure 3.4. Summary of the data sources and types used in the stock assessment model for striped bass.

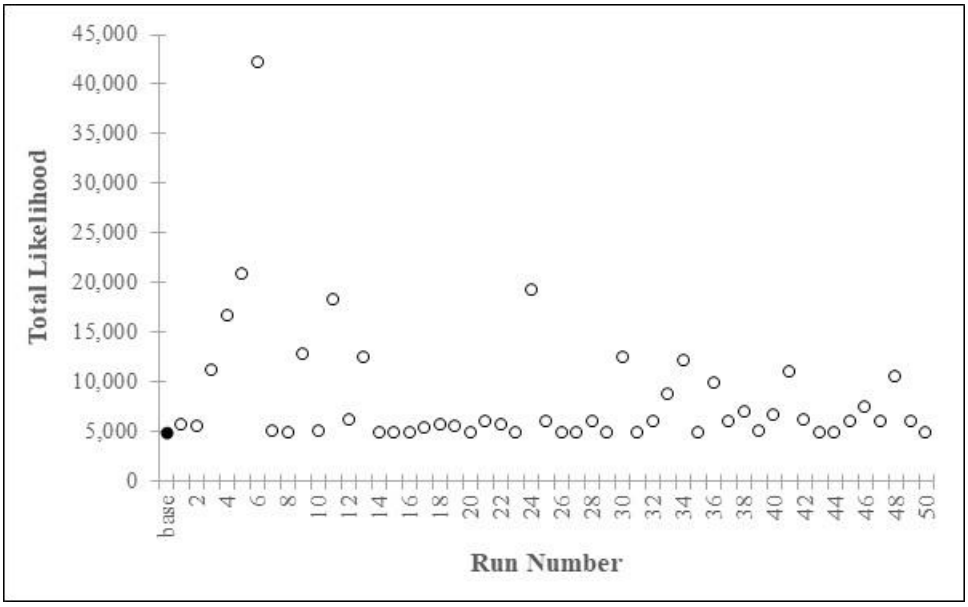

Figure 3.5. Negative log-likelihood values produced from the 50 jitter trials in which initial parameter values were jittered by 10%. The solid black circle is the value from the base run.

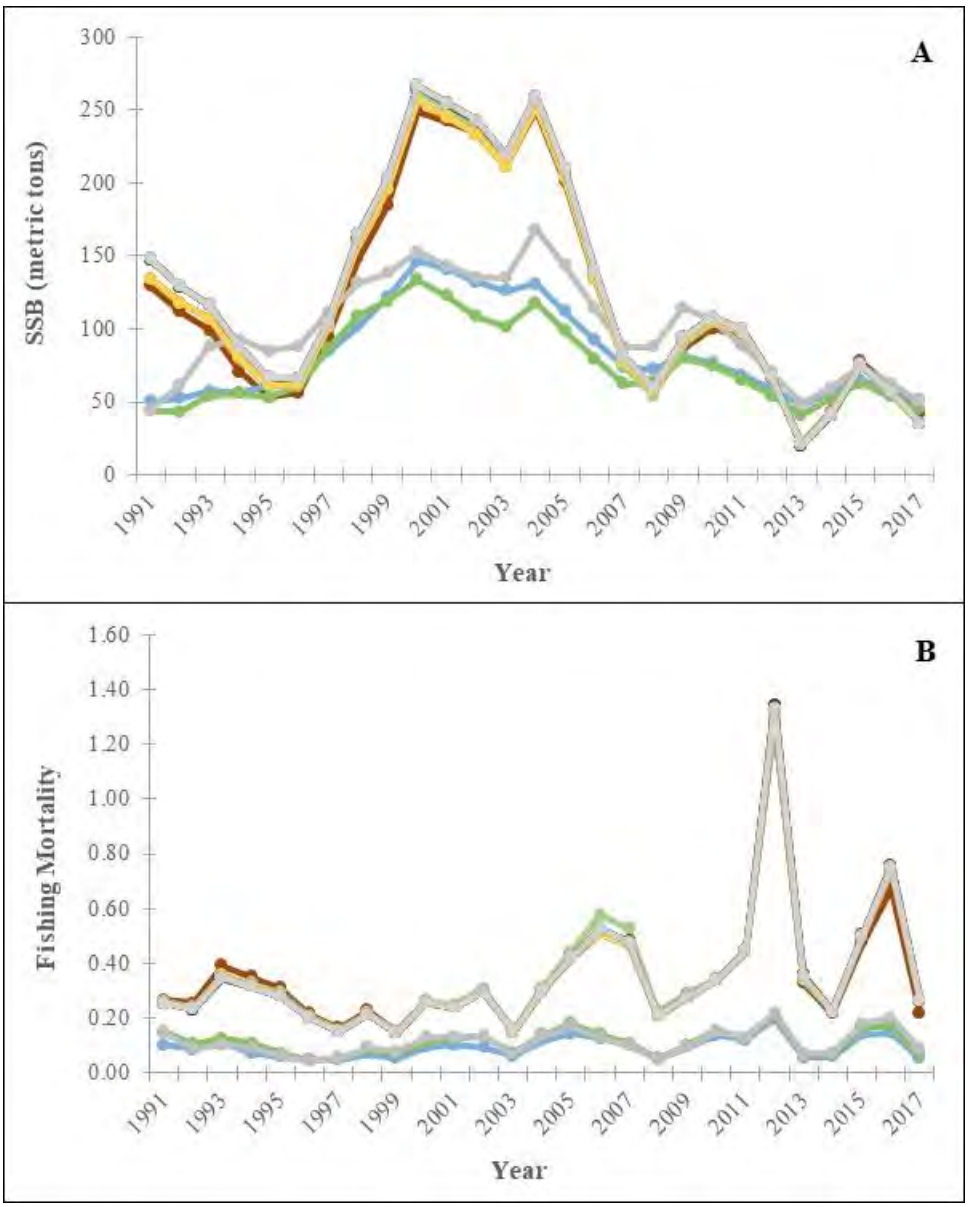

Figure 3.6. Predicted (A) female SSB and (B) *F* (numbers-weighted, ages 3–5) from the converged jitter trials (run 46 removed) in which initial parameter values were jittered by 10%, 1991–2017.

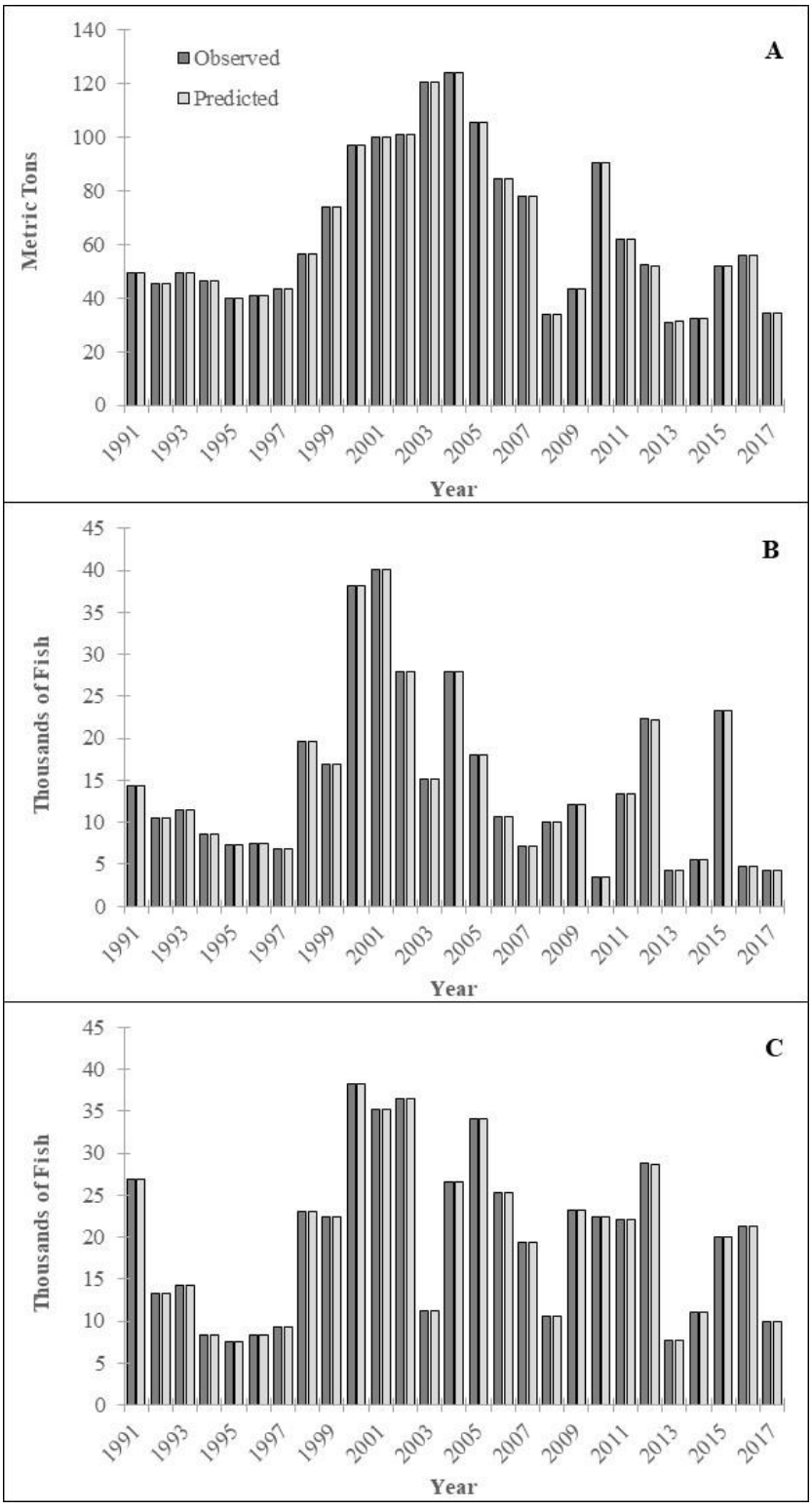

Figure 3.7. Observed and predicted (A) ARcomm landings, (B) ASrec harvest, and (C) RRrec harvest from the base run of the stock assessment model, 1991–2017.

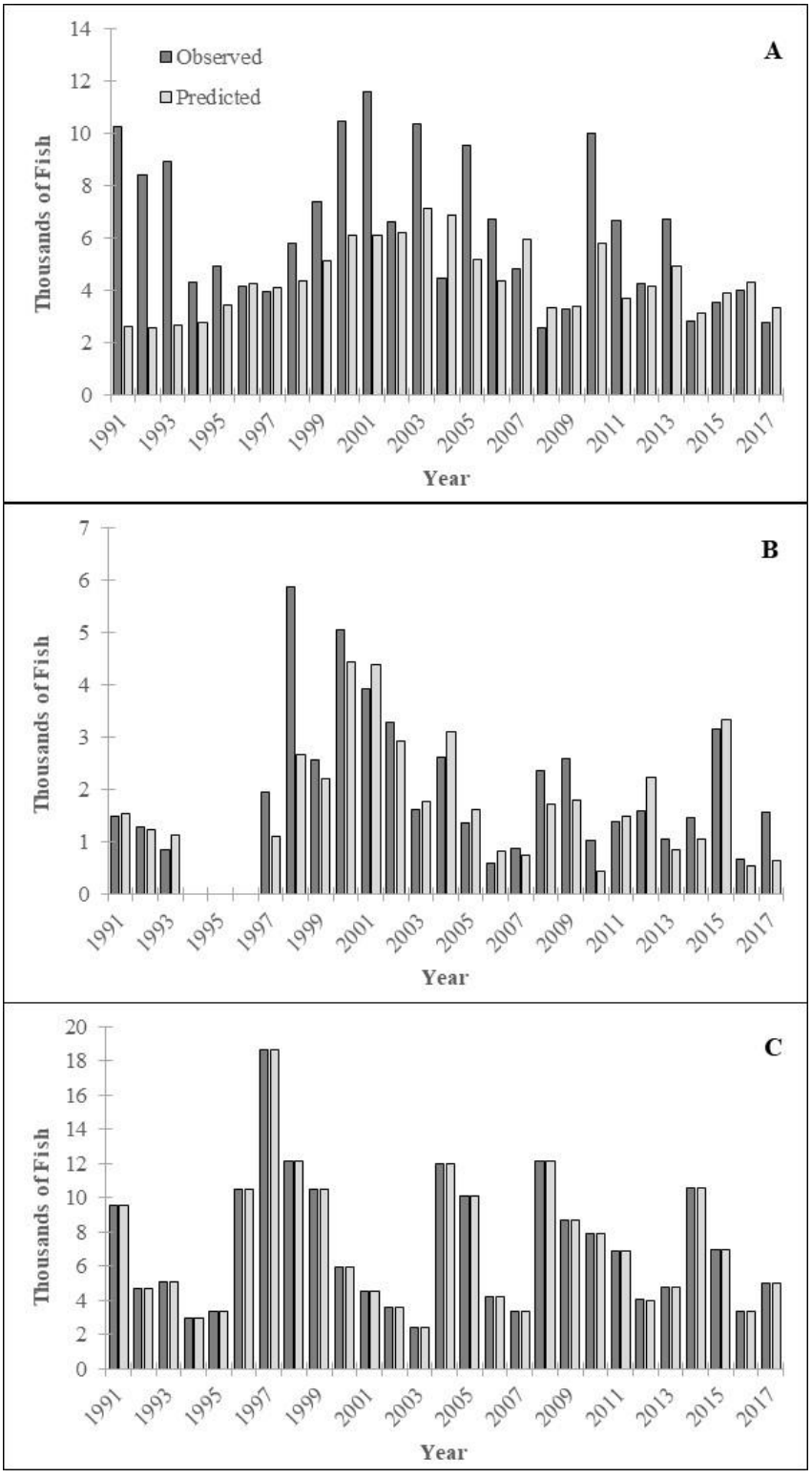

Figure 3.8. Observed and predicted (A) ARcomm, (B) ASrec, and (C) RRrec dead discards from the base run of the stock assessment model, 1991–2017.

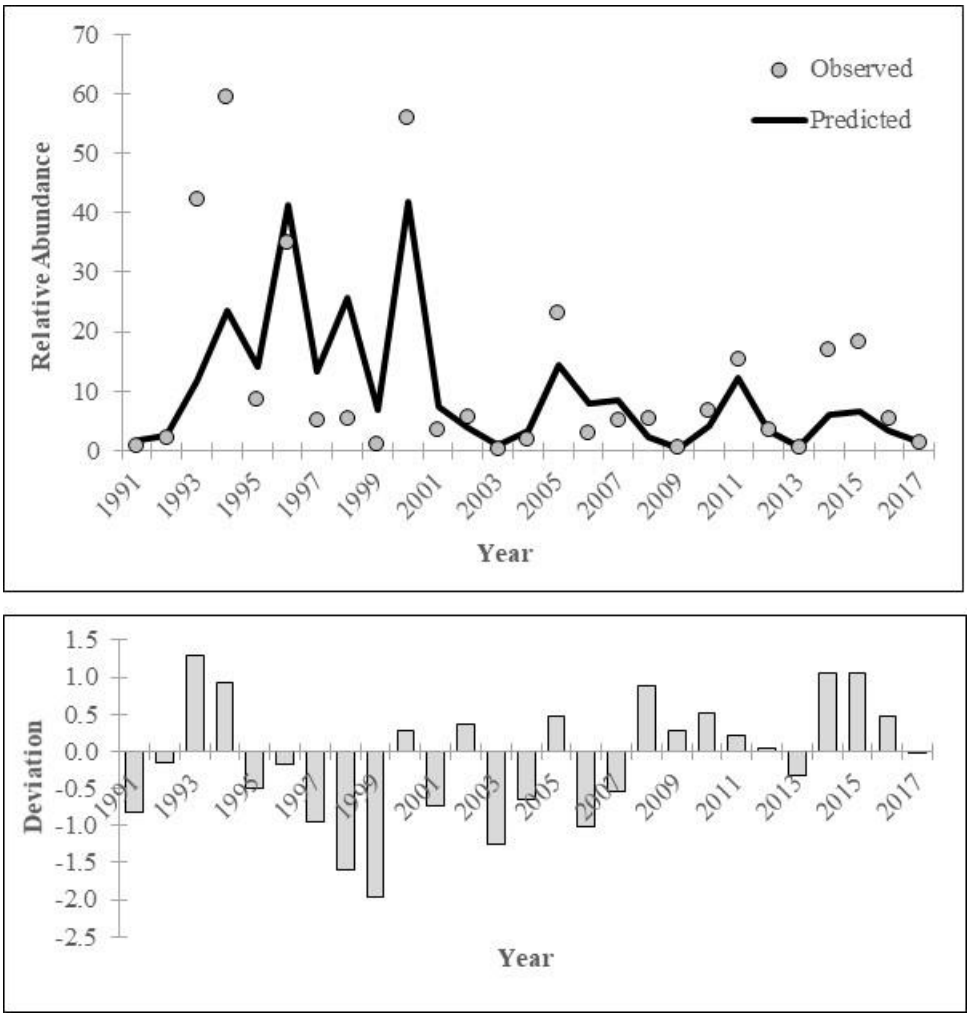

Figure 3.9. Observed and predicted relative abundance (top graph) and standardized residuals (bottom graph) for the P100juv survey from the base run of the stock assessment model, 1991–2017.

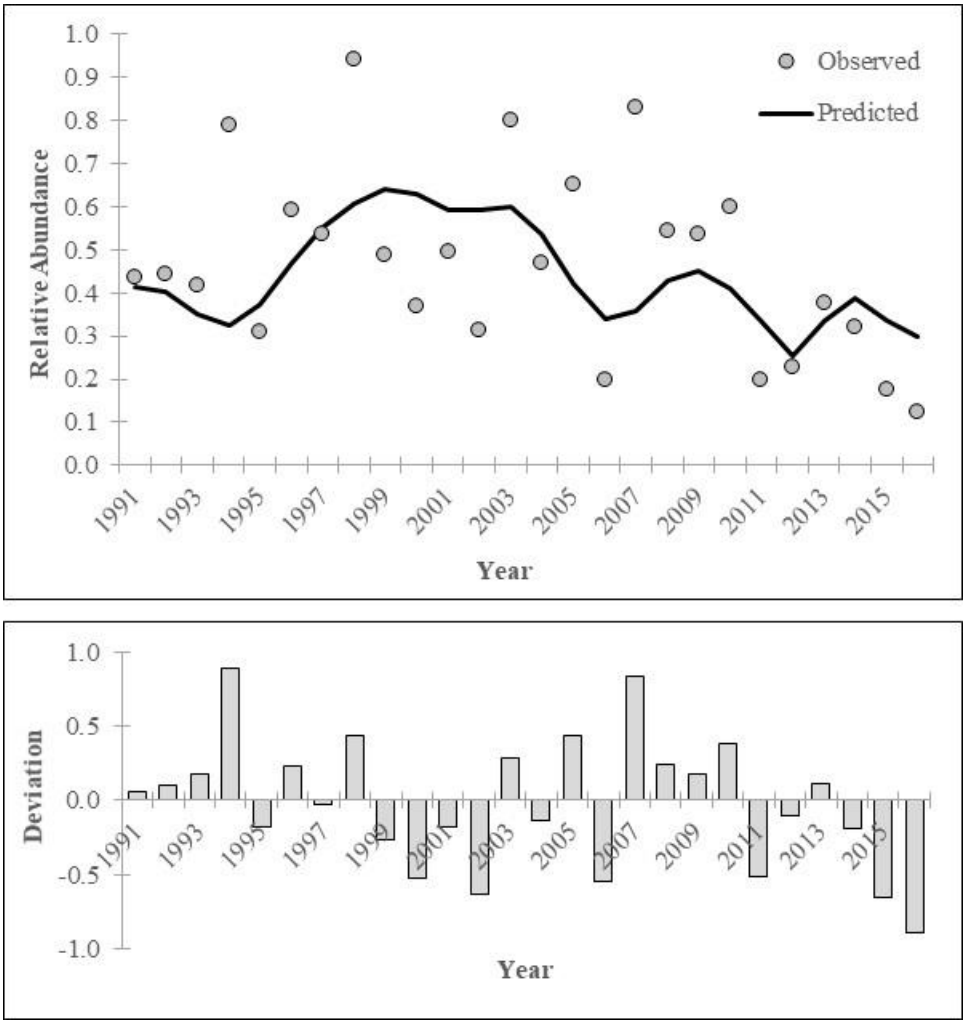

Figure 3.10. Observed and predicted relative abundance (top graph) and standardized residuals (bottom graph) for the P135fw survey from the base run of the stock assessment model, 1991–2017.

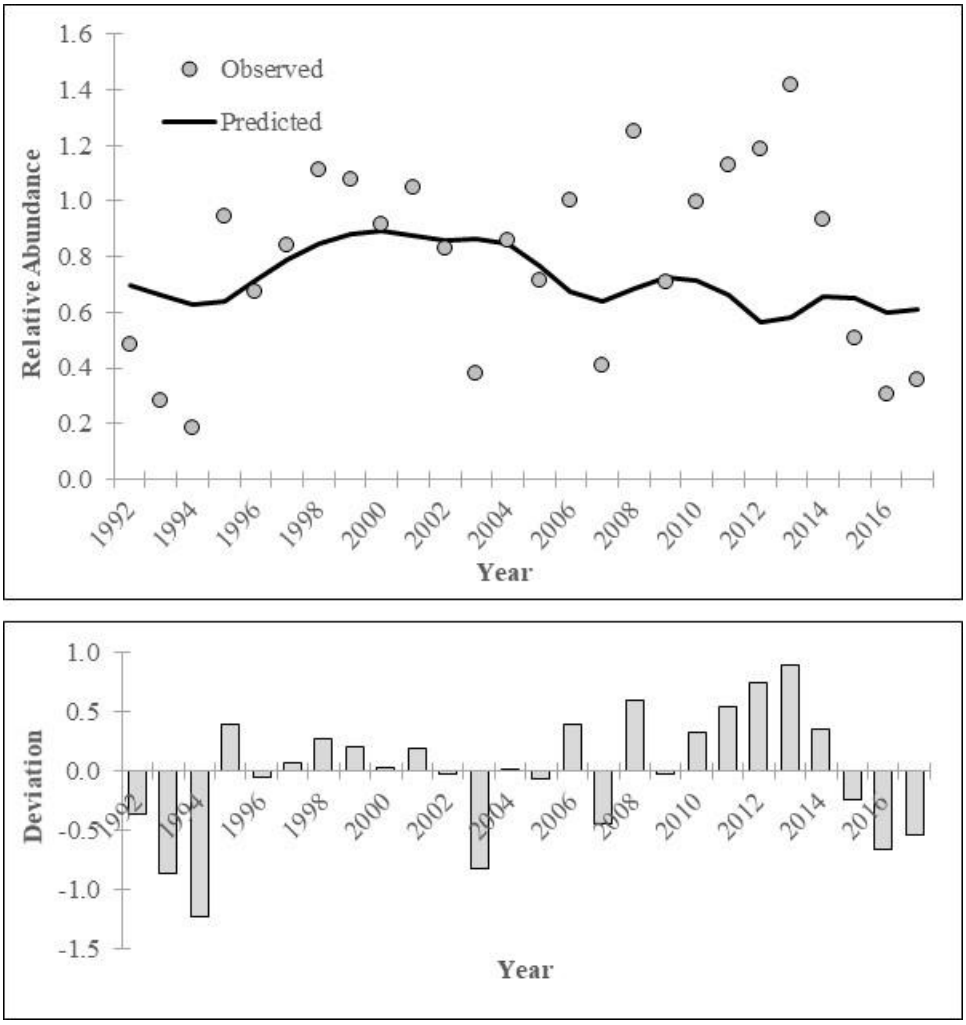

Figure 3.11. Observed and predicted relative abundance (top graph) and standardized residuals (bottom graph) for the P135spr survey from the base run of the stock assessment model, 1992–2017.

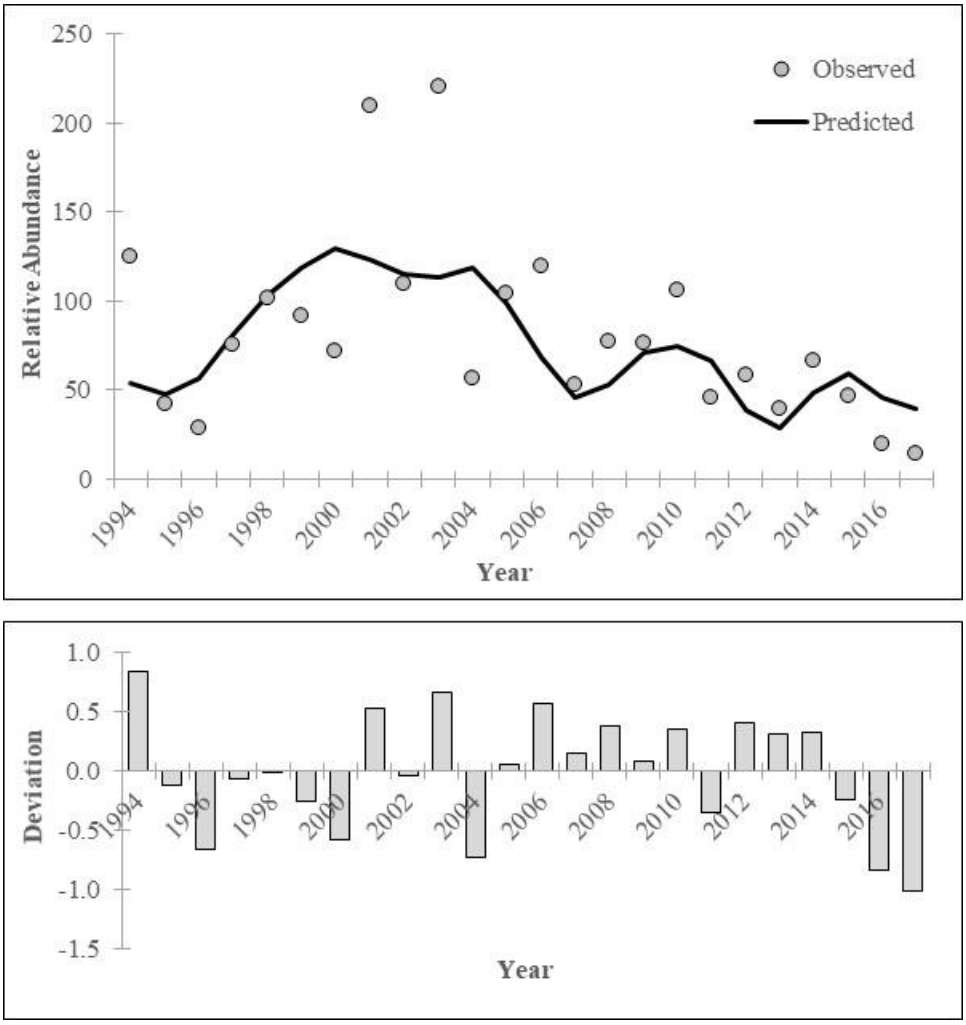

Figure 3.12. Observed and predicted relative abundance (top graph) and standardized residuals (bottom graph) for the RRef survey from the base run of the stock assessment model, 1994–2017.

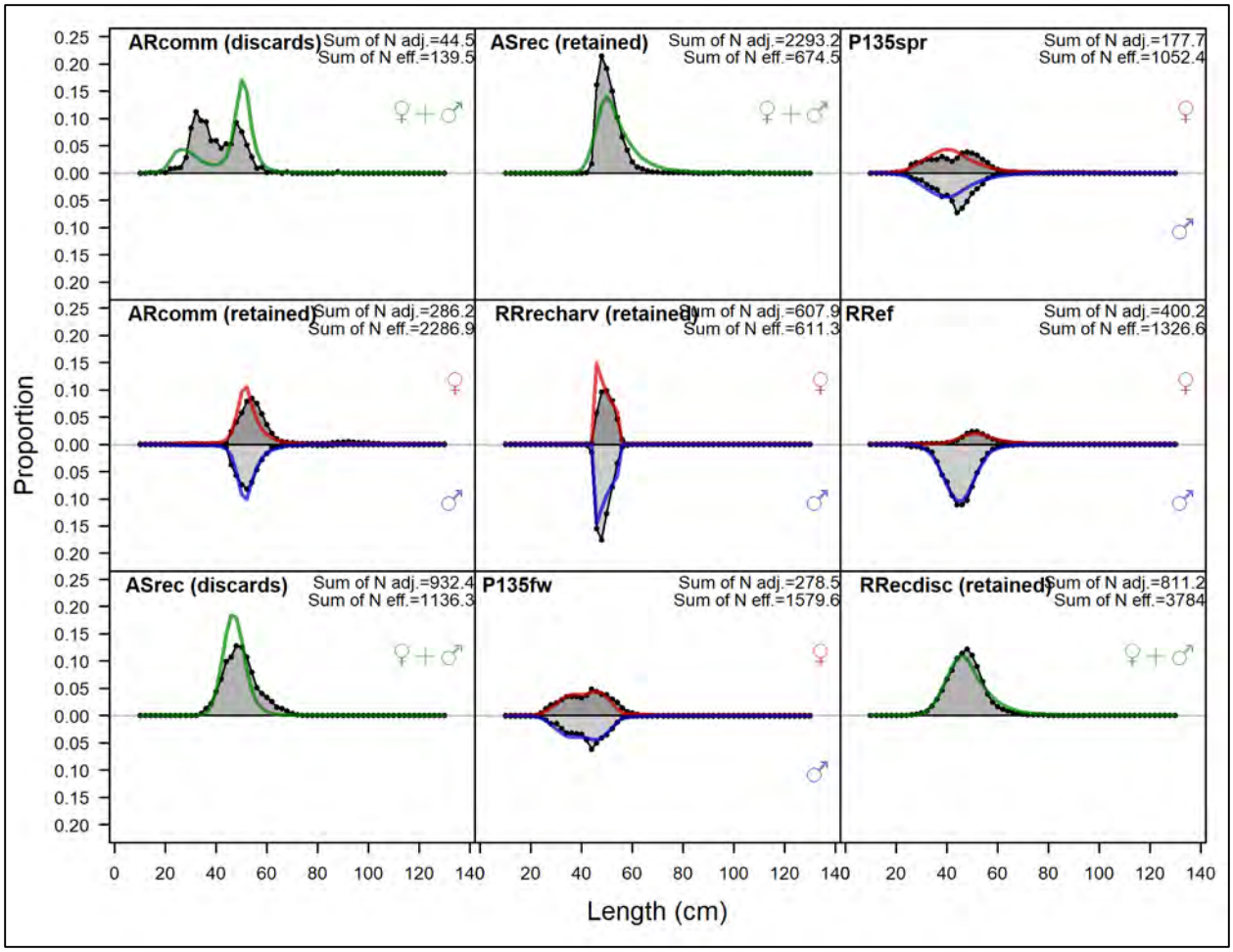

Figure 3.13. Observed and predicted length compositions for each data source from the base run of the stock assessment model aggregated across time. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

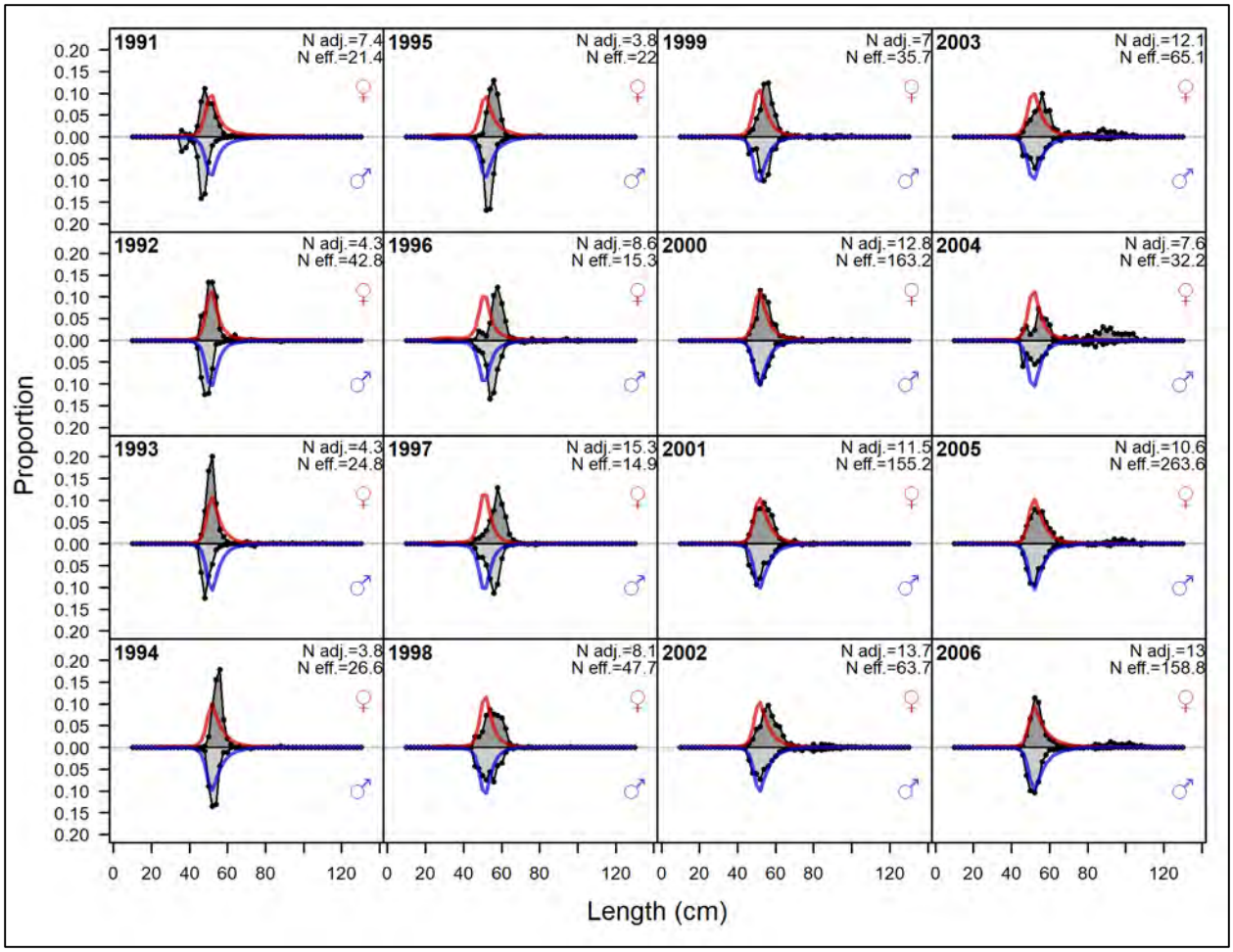

Figure 3.14. Observed and predicted length compositions for the ARcomm landings from the base run of the stock assessment model, 1991–2006. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

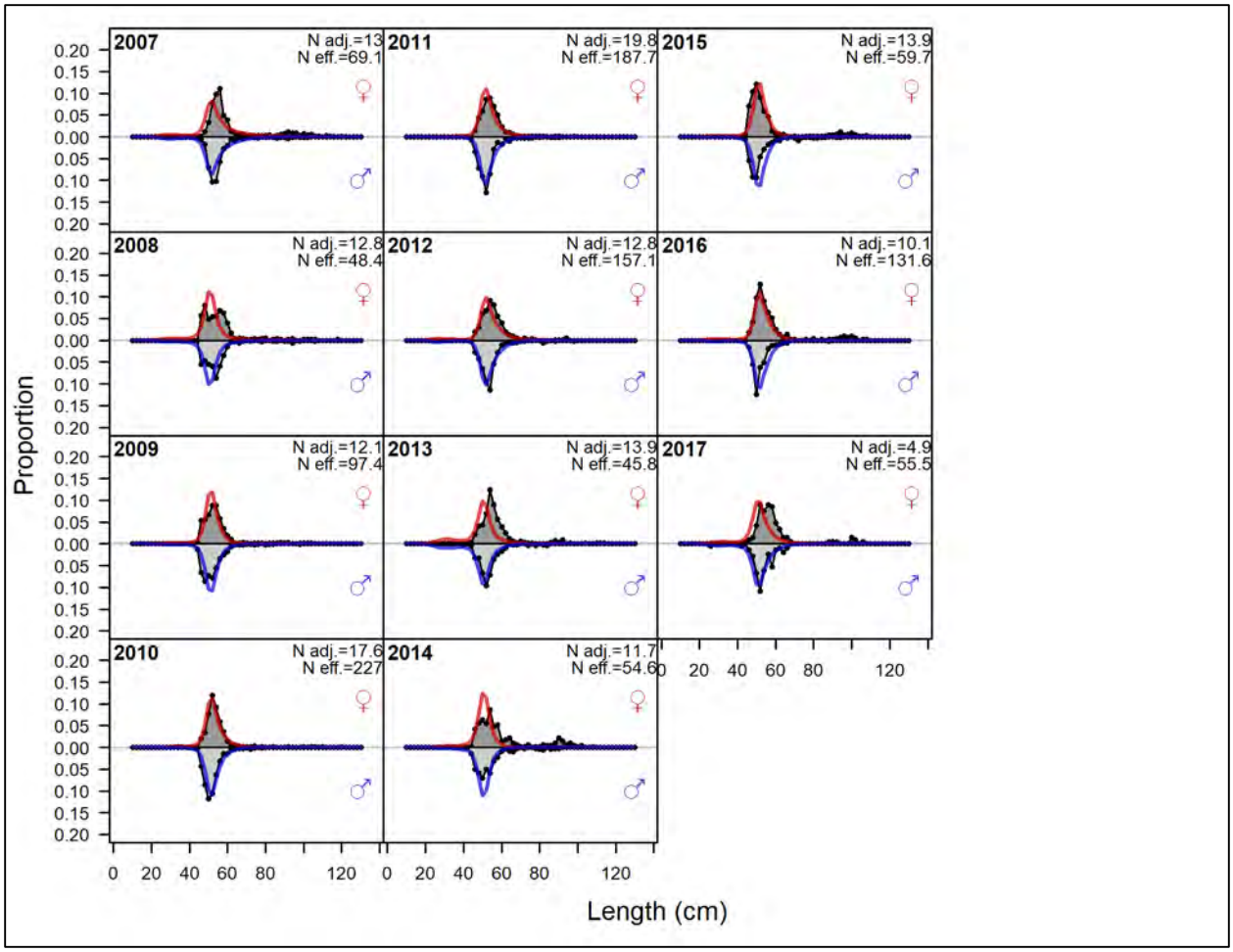

Figure 3.15. Observed and predicted length compositions for the ARcomm landings from the base run of the stock assessment model, 2007–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

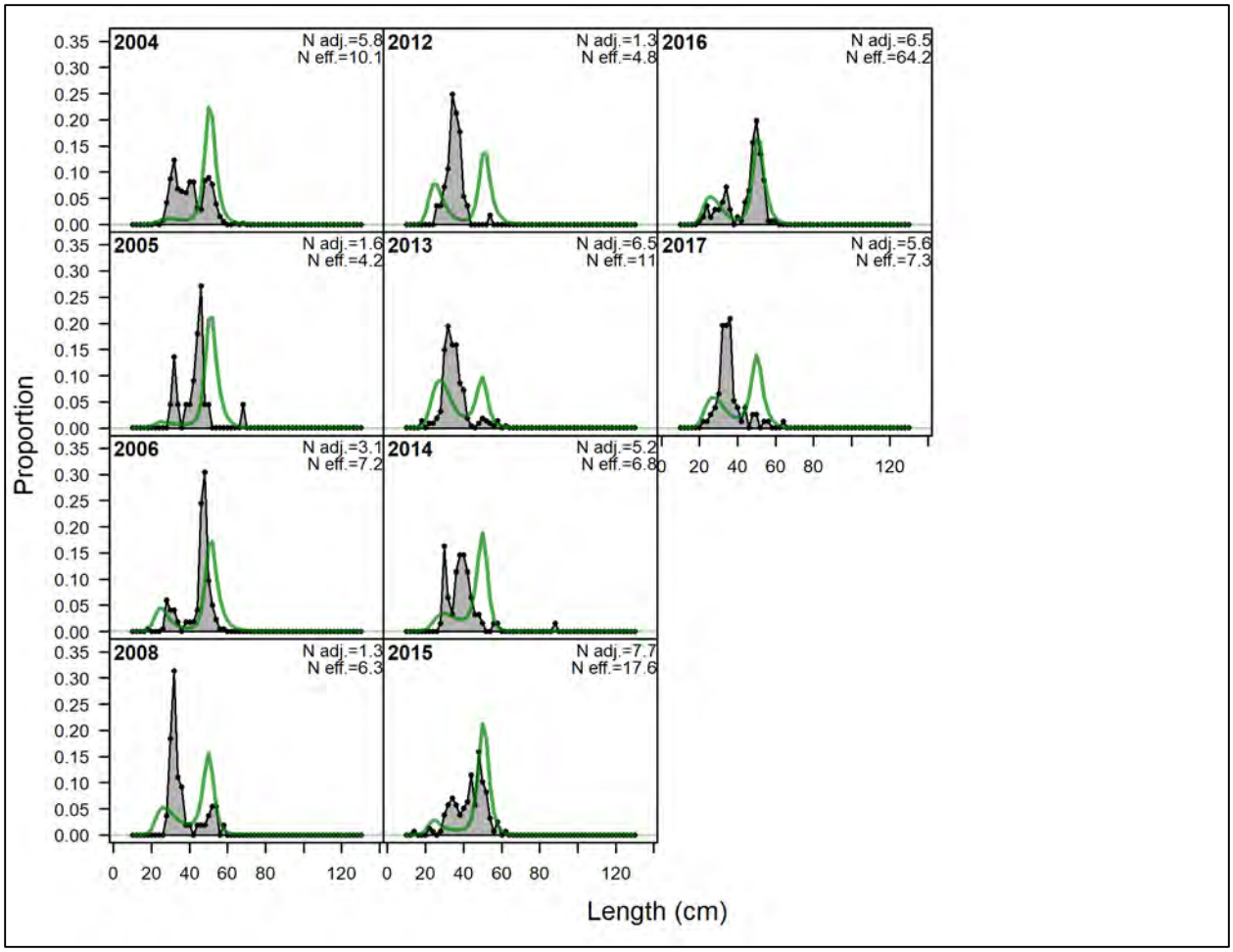

Figure 3.16. Observed and predicted length compositions for the ARcomm discards from the base run of the stock assessment model, 2004–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

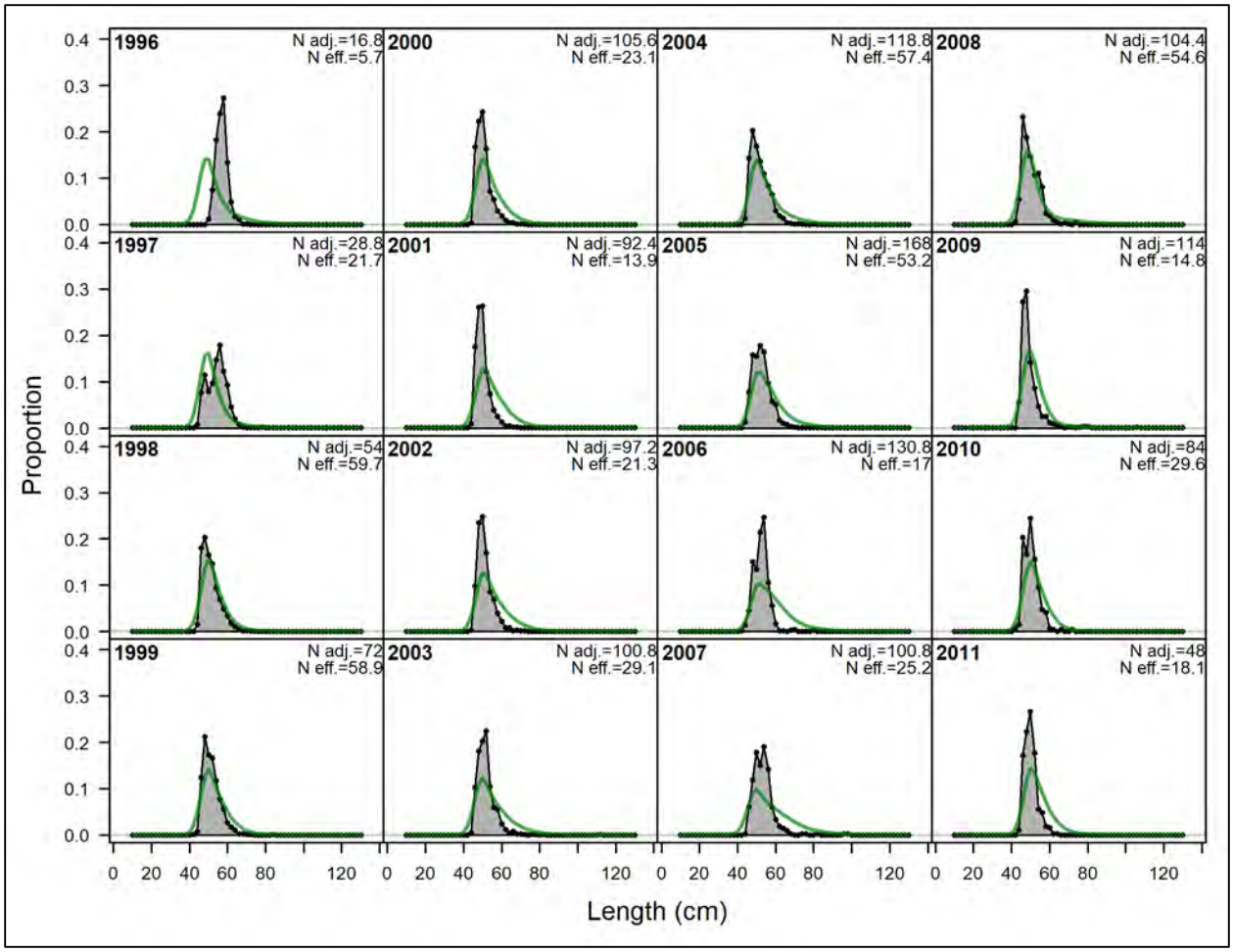

Figure 3.17. Observed and predicted length compositions for the ASrec harvest from the base run of the stock assessment model, 1996–2011. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

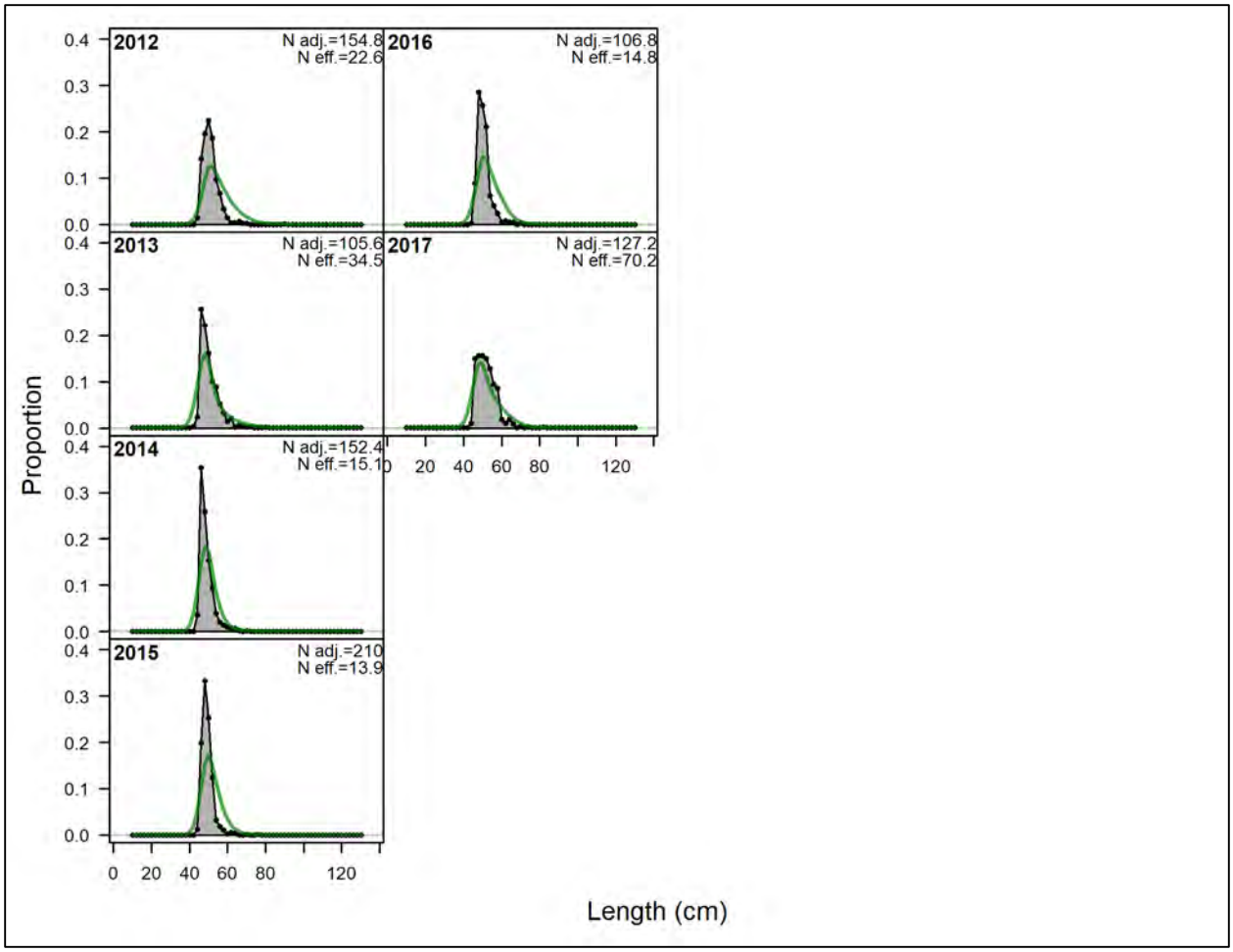

Figure 3.18. Observed and predicted length compositions for the ASrec harvest from the base run of the stock assessment model, 2012–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

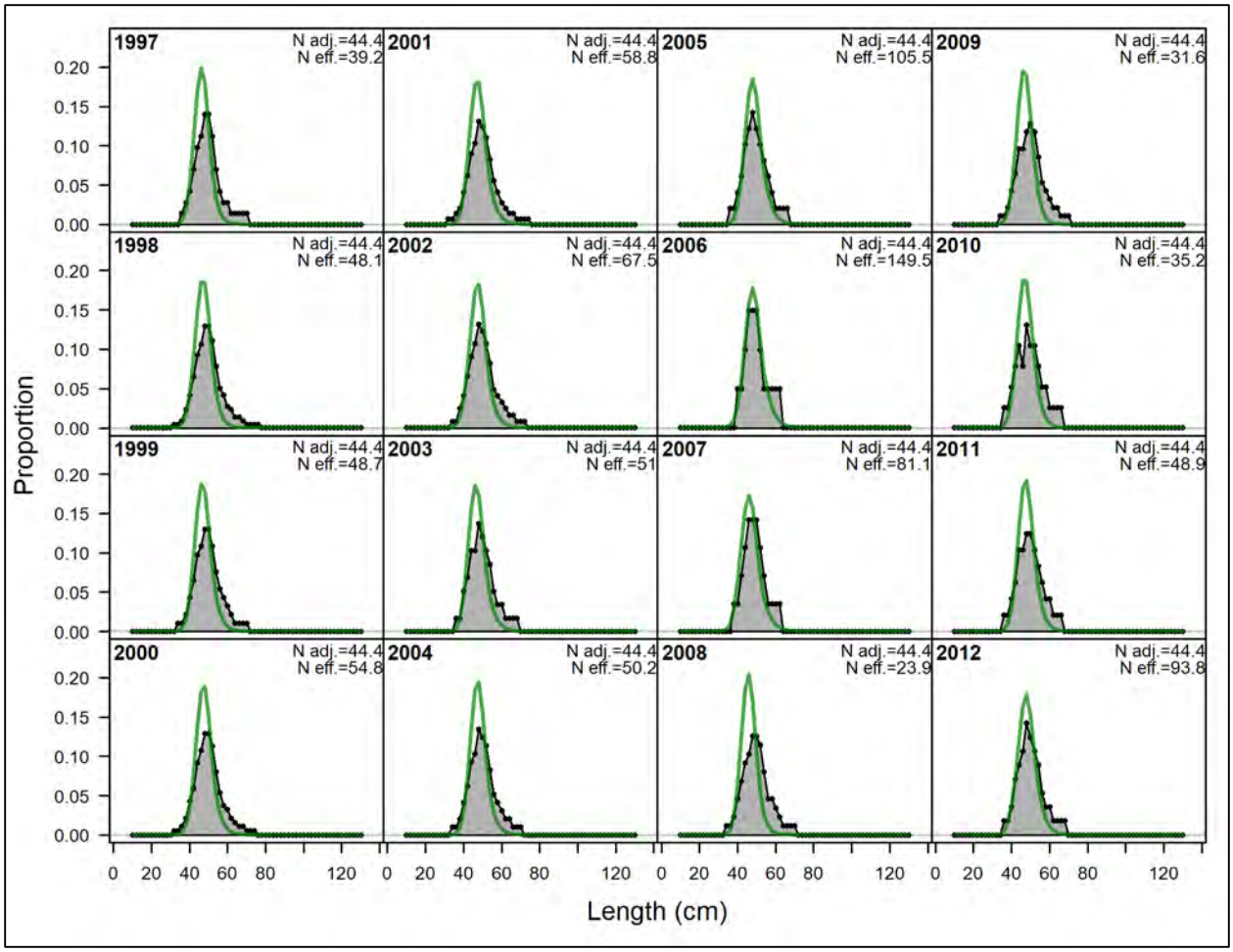

Figure 3.19. Observed and predicted length compositions for the ASrec discards from the base run of the stock assessment model, 1997–2012. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

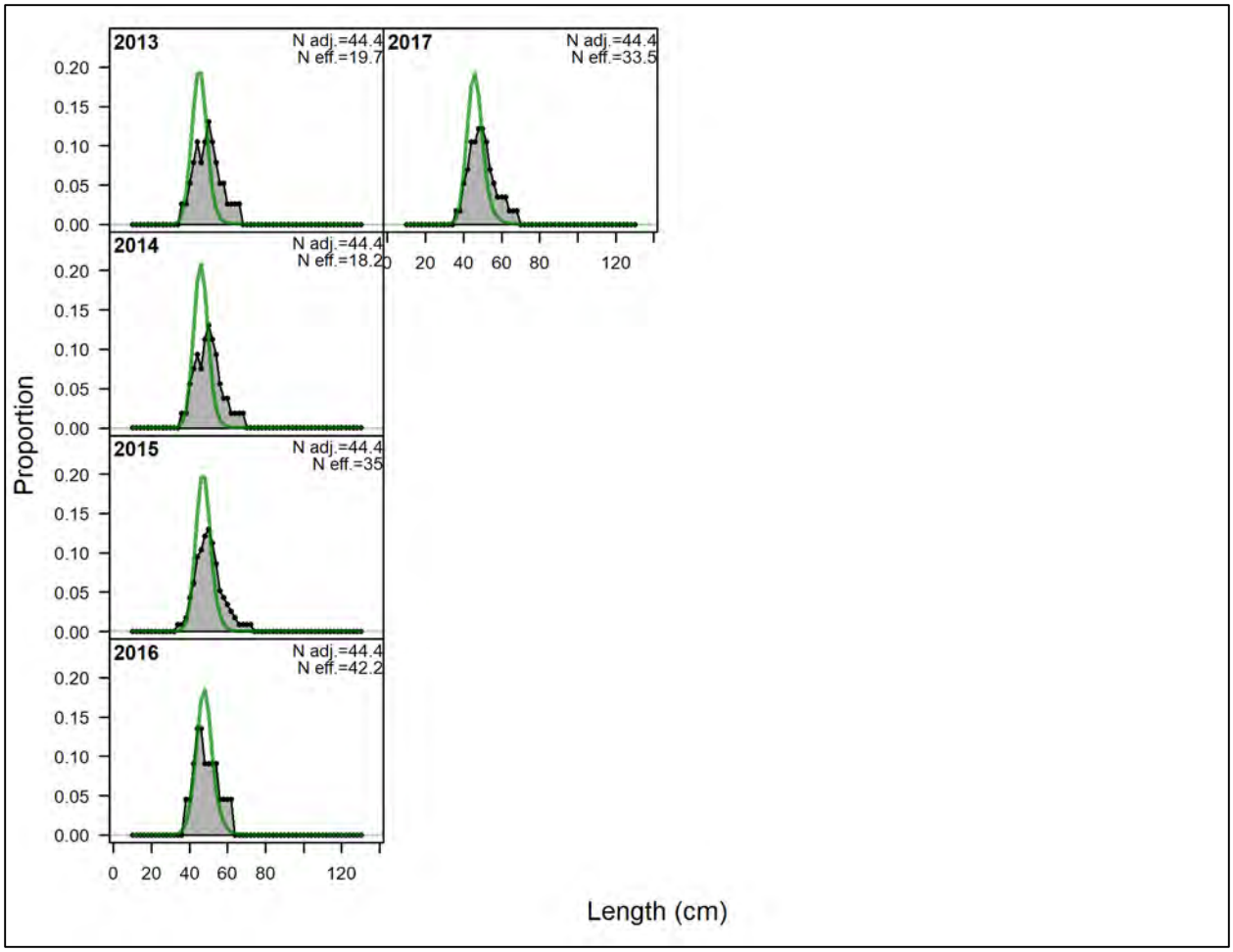

Figure 3.20. Observed and predicted length compositions for the ASrec discards from the base run of the stock assessment model, 2013–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

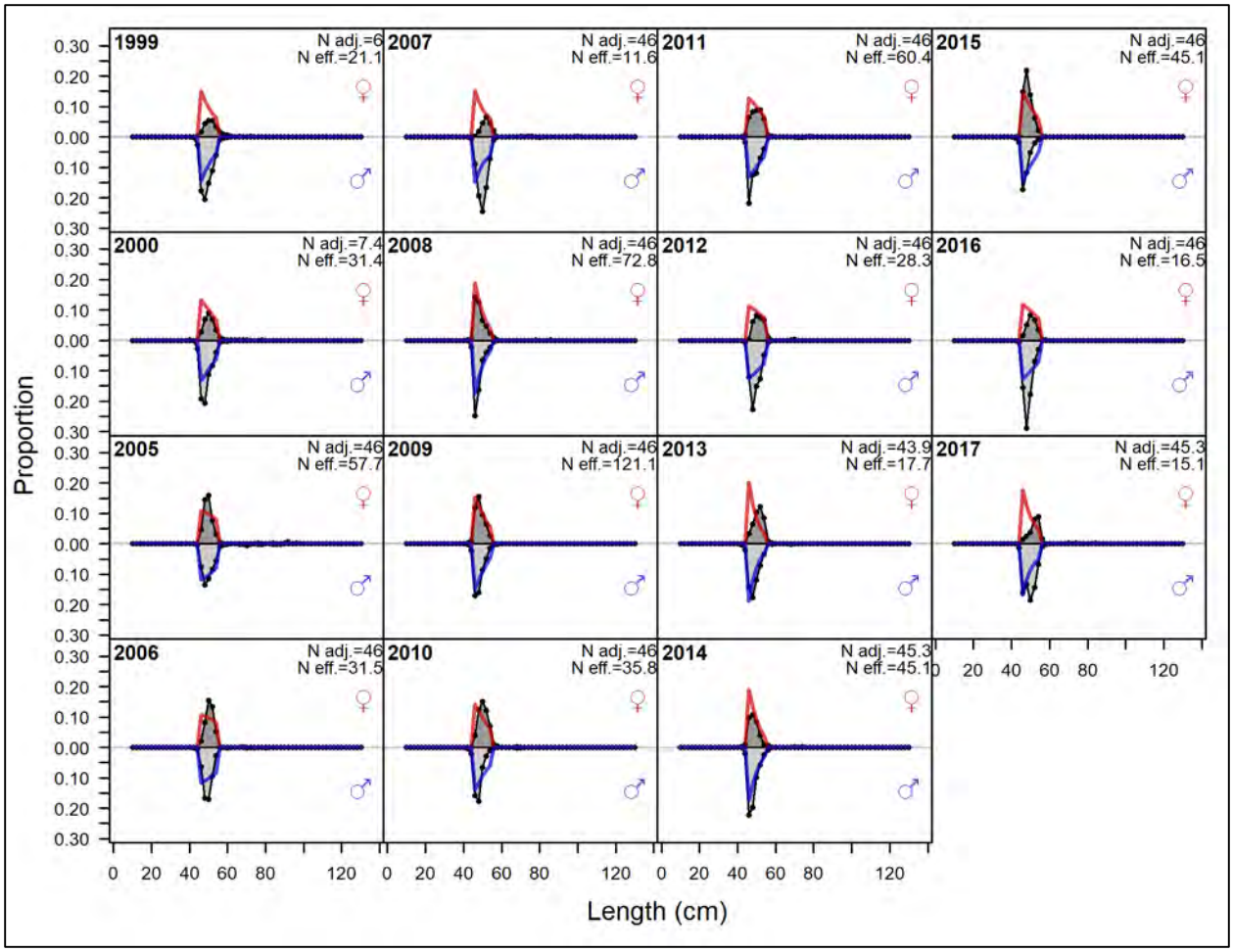

Figure 3.21. Observed and predicted length compositions for the RRrec harvest from the base run of the stock assessment model, 1999–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

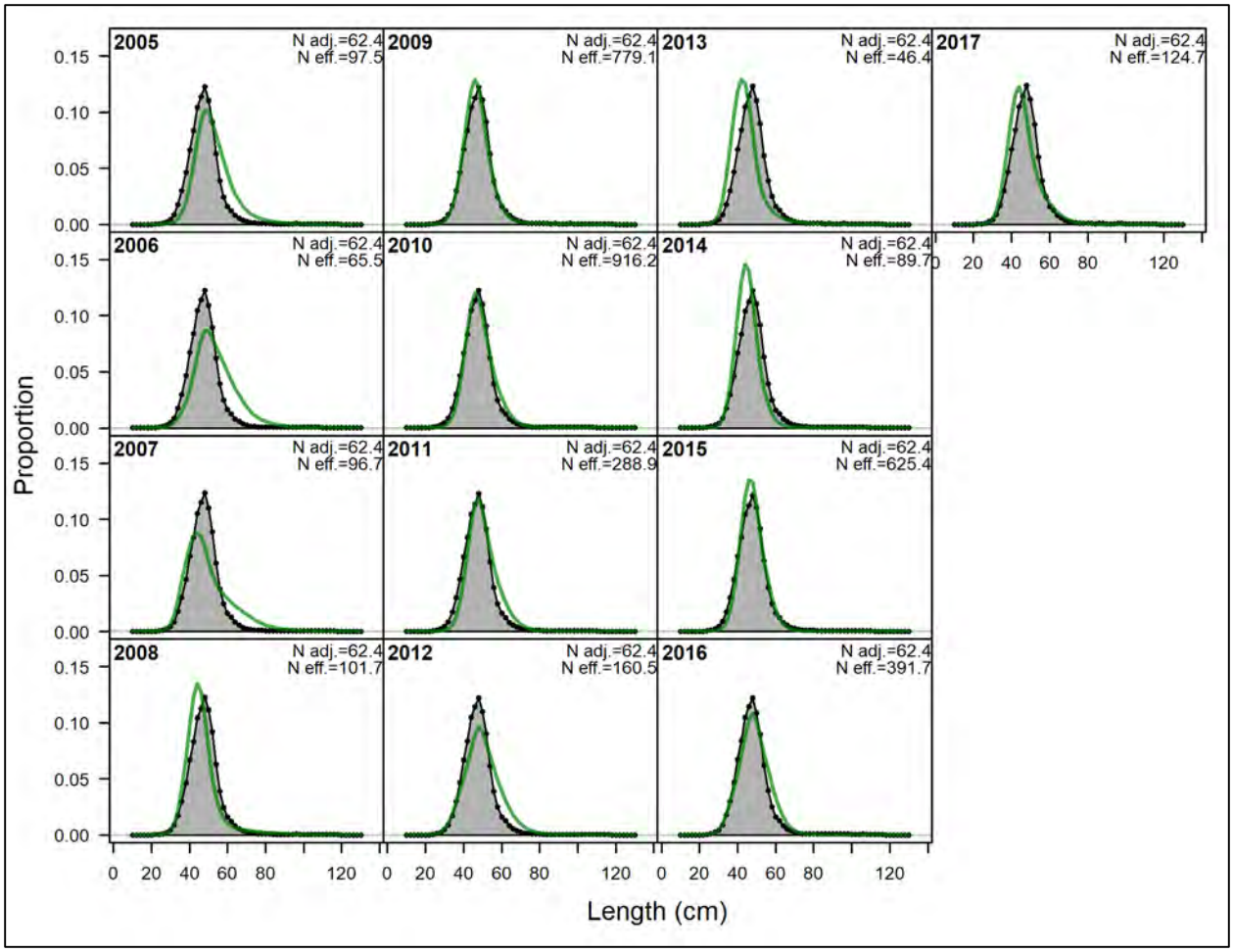

Figure 3.22. Observed and predicted length compositions for the RRrec discards from the base run of the stock assessment model, 2005–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

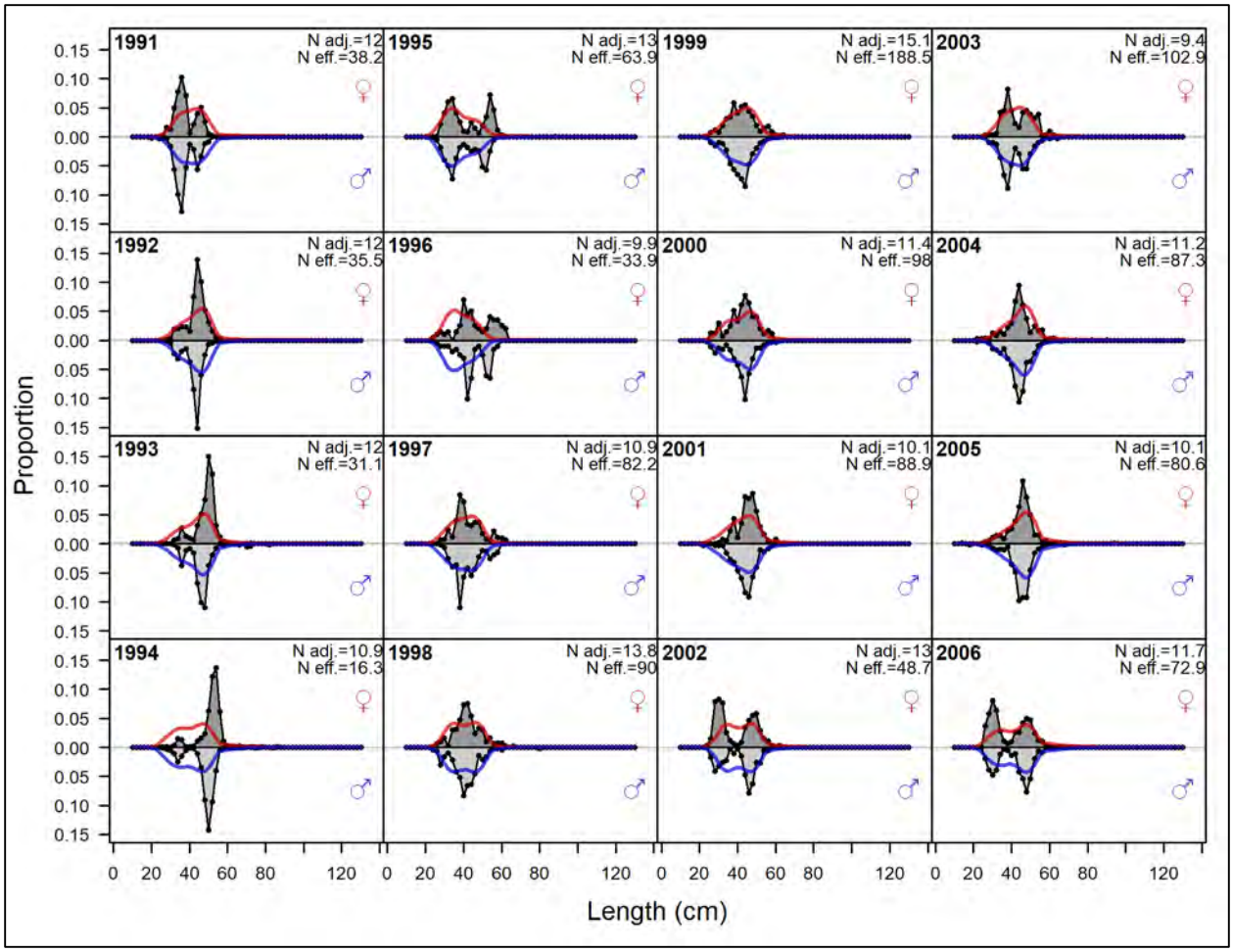

Figure 3.23. Observed and predicted length compositions for the P135fw survey from the base run of the stock assessment model, 1991–2006. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

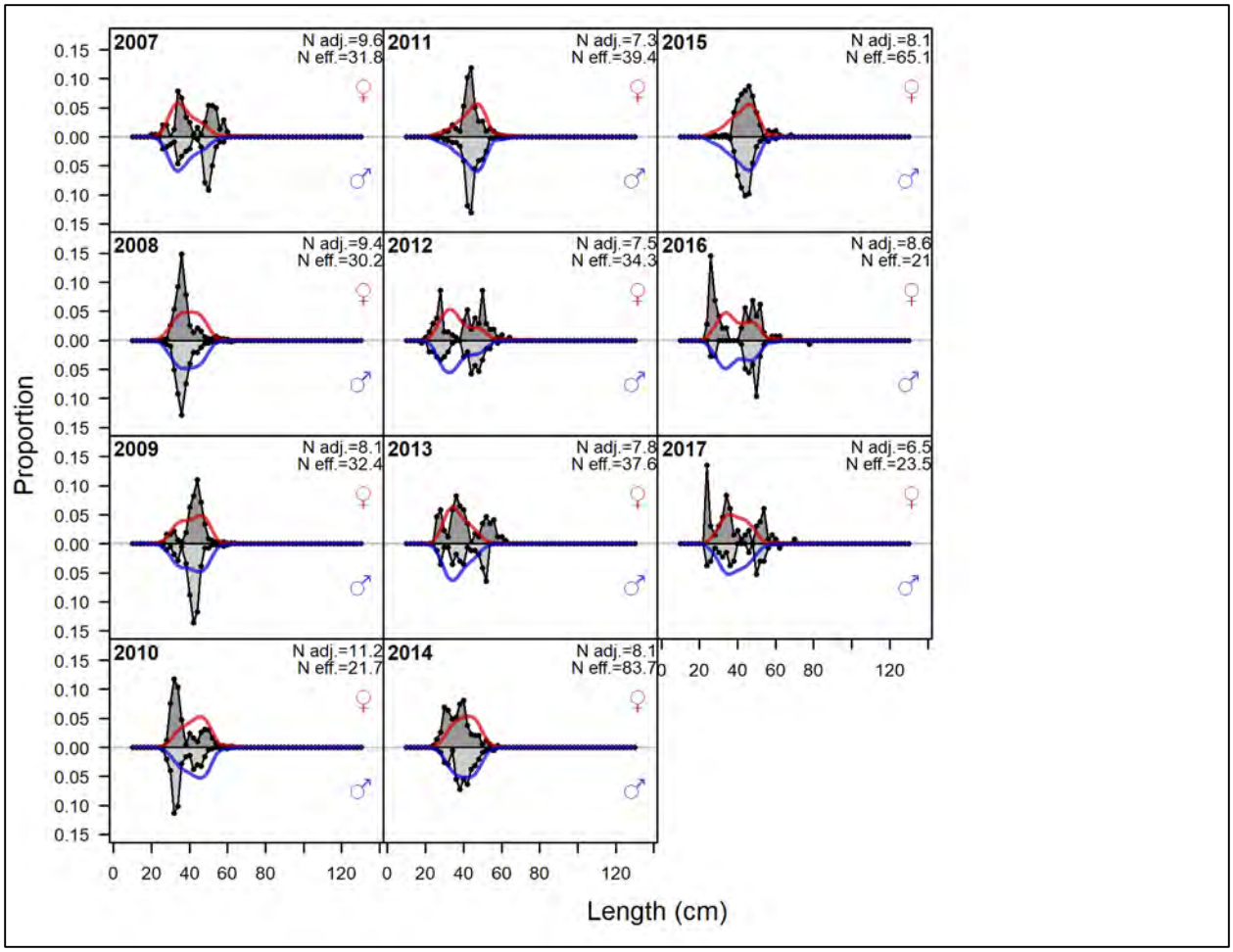

Figure 3.24. Observed and predicted length compositions for the P135fw survey from the base run of the stock assessment model, 2007–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

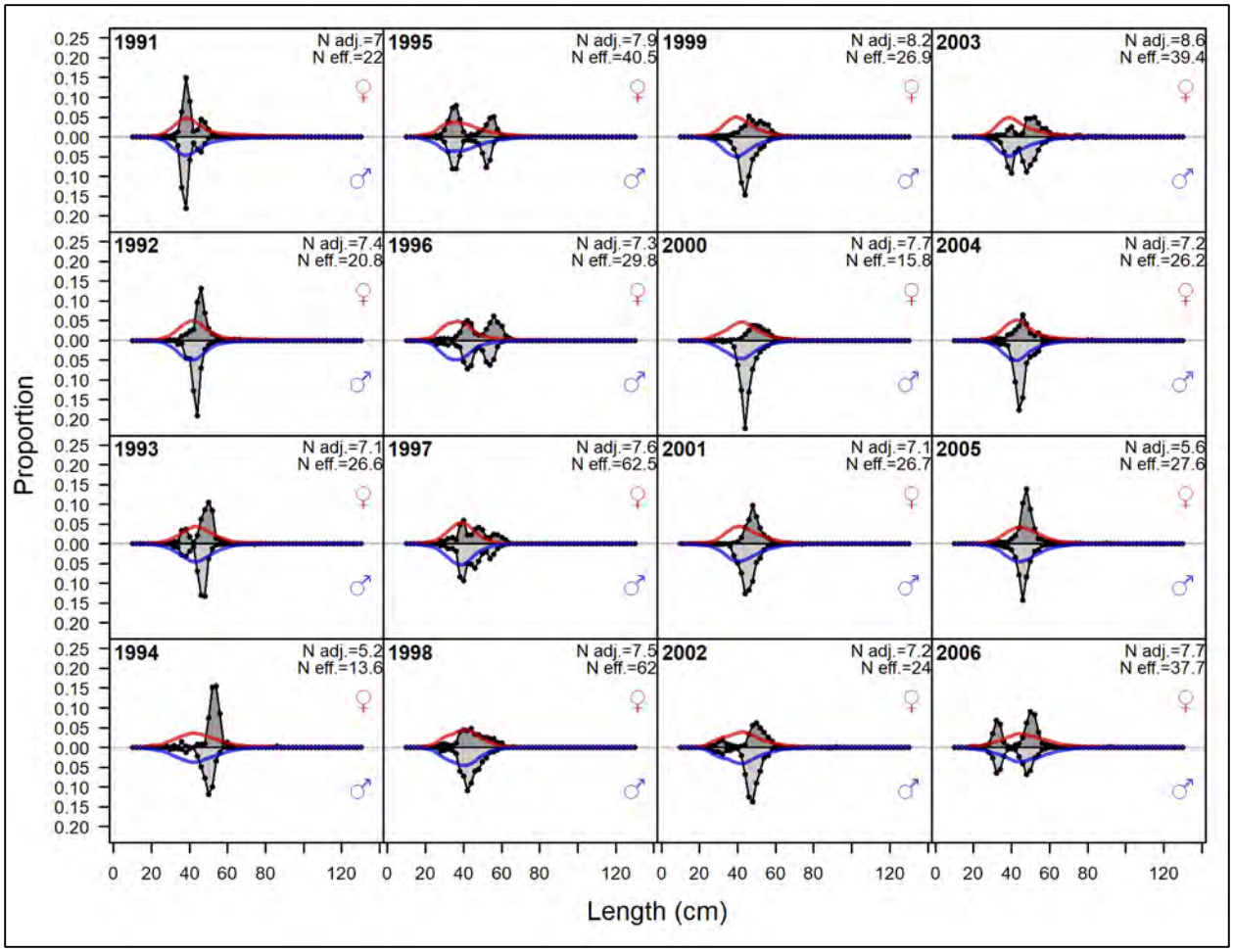

Figure 3.25. Observed and predicted length compositions for the P135spr survey from the base run of the stock assessment model, 1991–2006. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

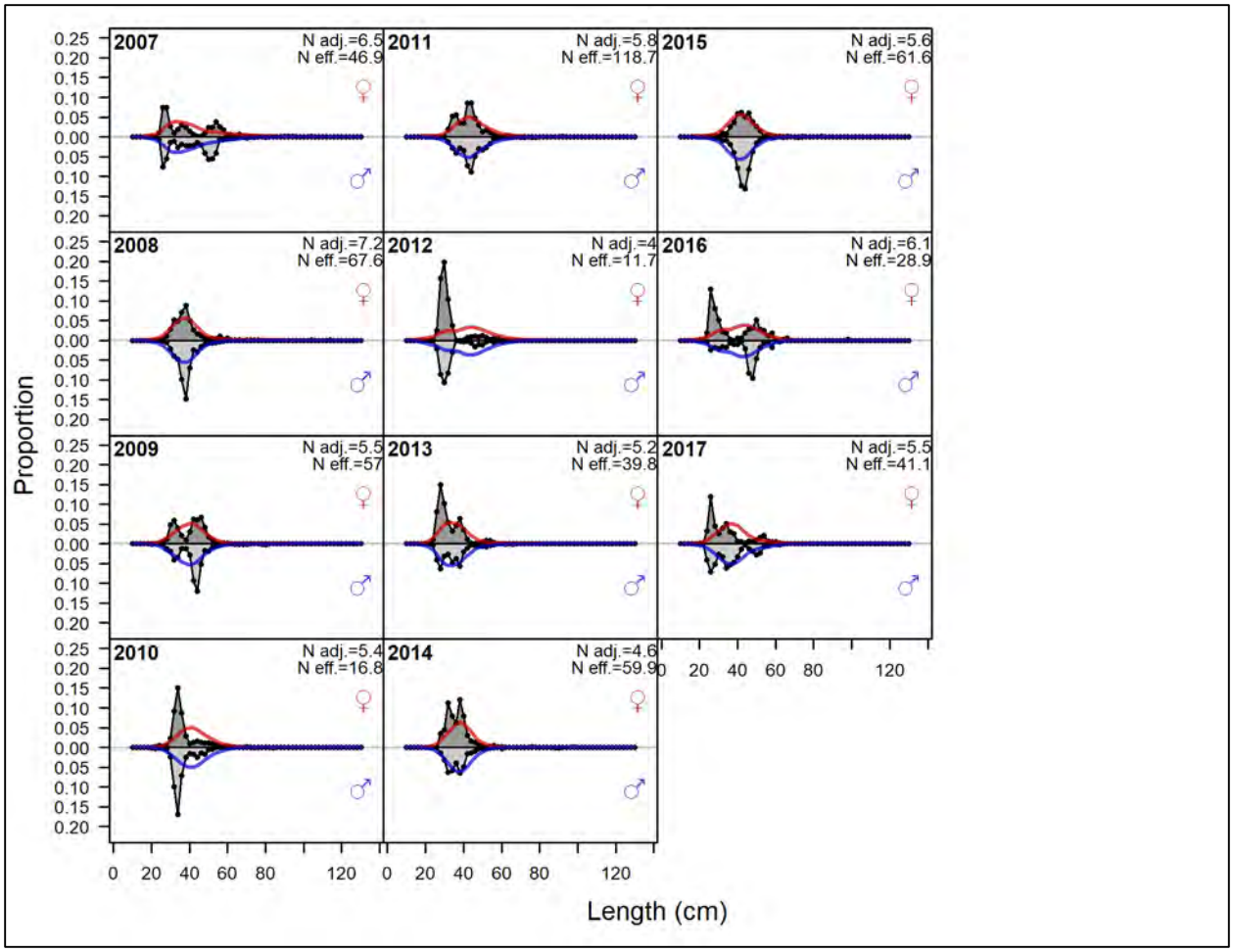

Figure 3.26. Observed and predicted length compositions for the P135spr survey from the base run of the stock assessment model, 2007–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

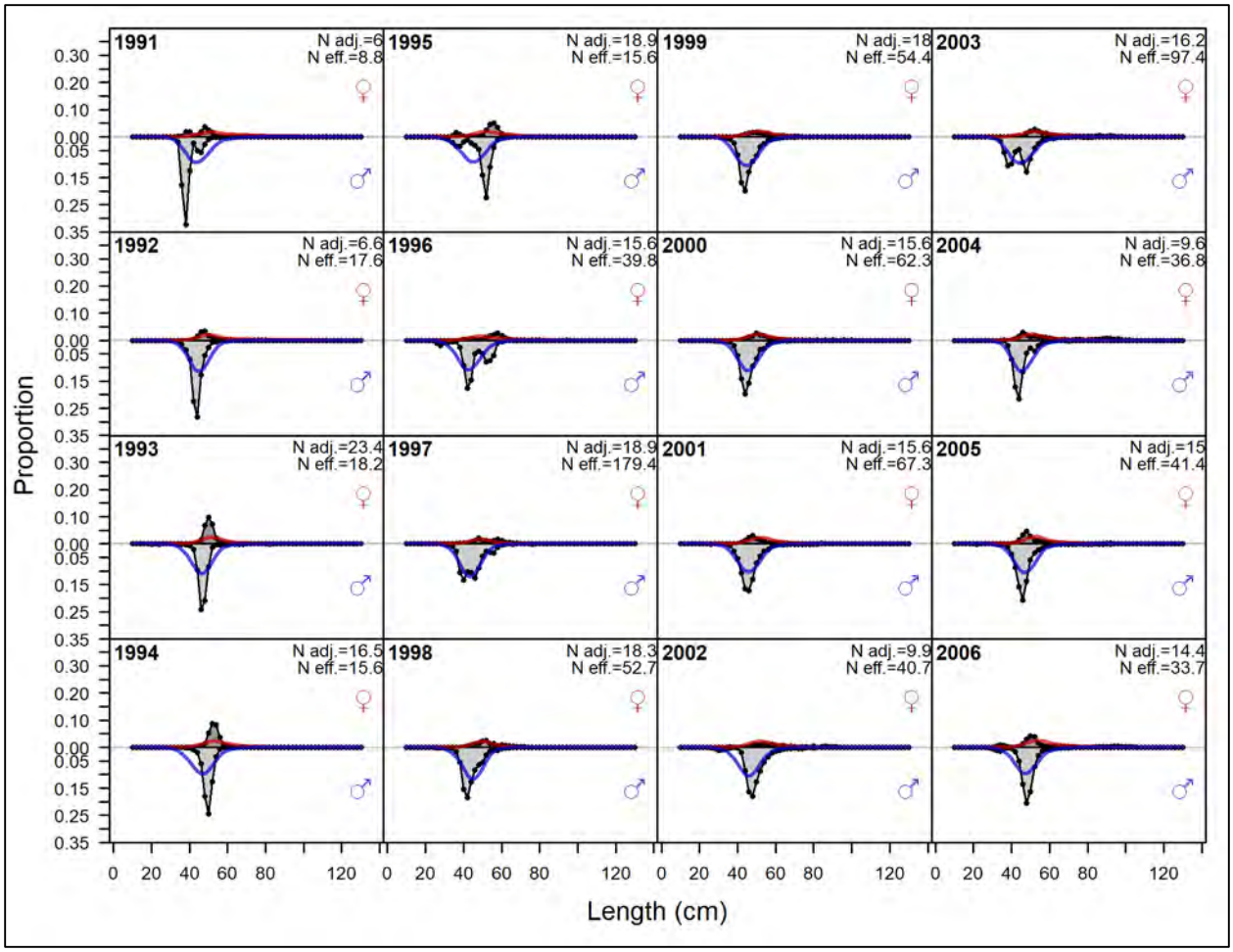

Figure 3.27. Observed and predicted length compositions for the RRef survey from the base run of the stock assessment model, 1991–2006. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

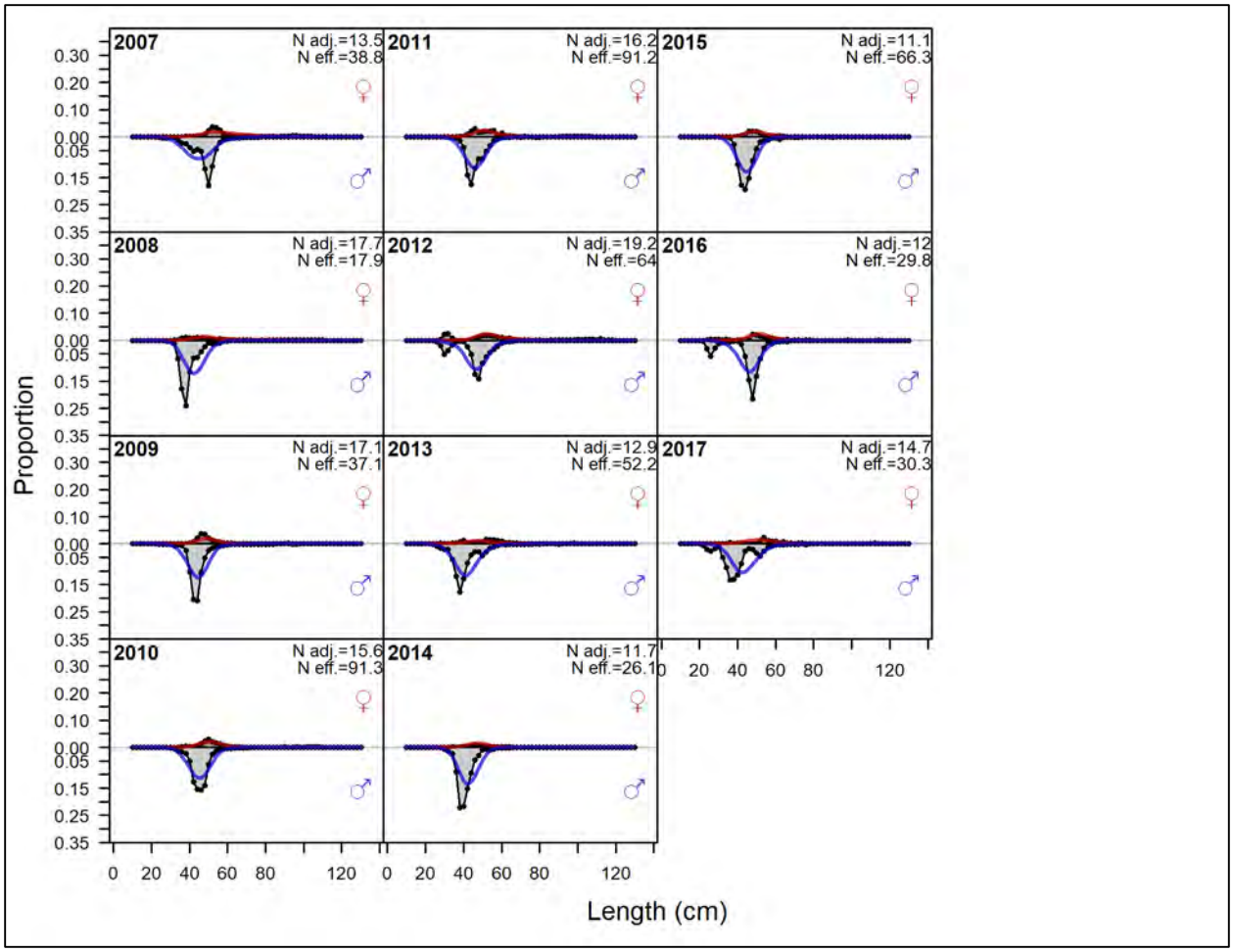

Figure 3.28. Observed and predicted length compositions for the RRef survey from the base run of the stock assessment model, 2007–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

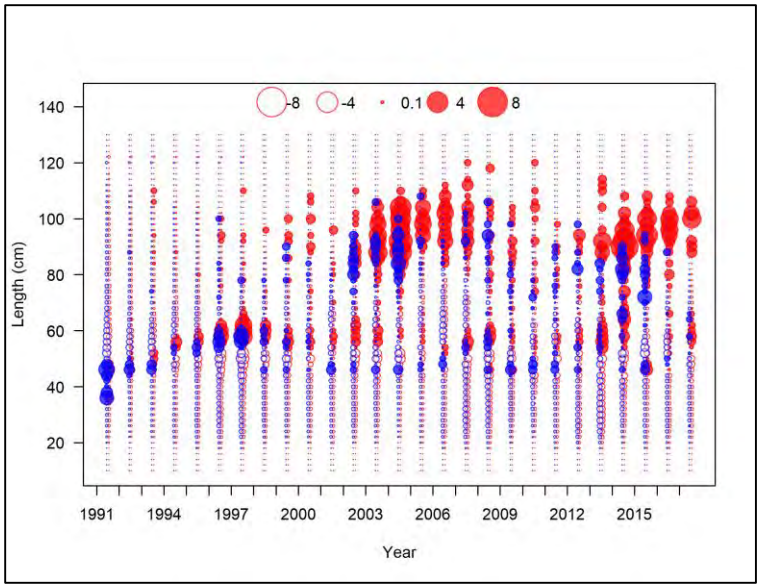

Figure 3.29. Pearson residuals (red: female; blue: male) from the fit of the base model run to the ARcomm landings length composition data, 1991–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

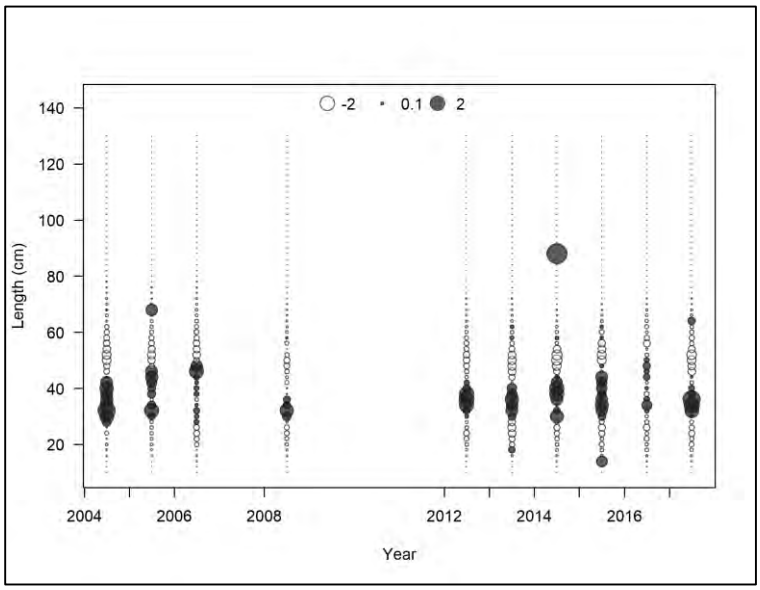

Figure 3.30. Pearson residuals from the fit of the base model run to the ARcomm discards length composition data, 1991–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

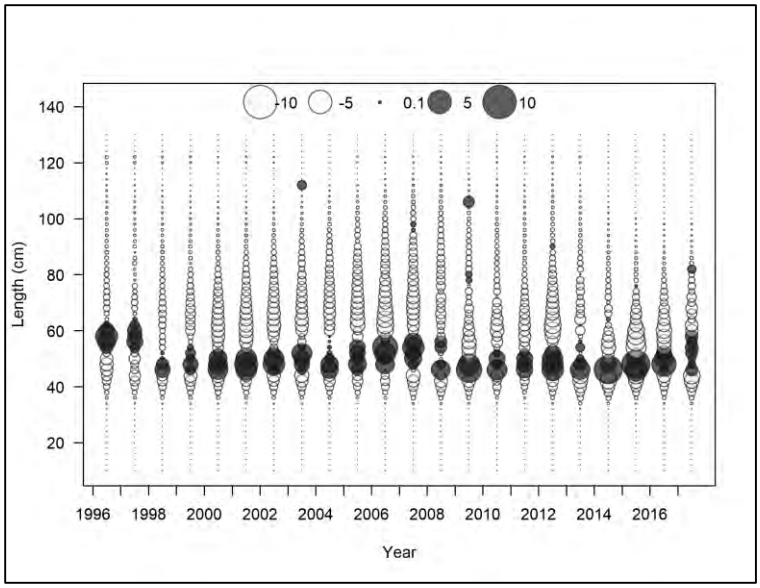

Figure 3.31. Pearson residuals from the fit of the base model run to the ASrec harvest length composition data, 1996–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

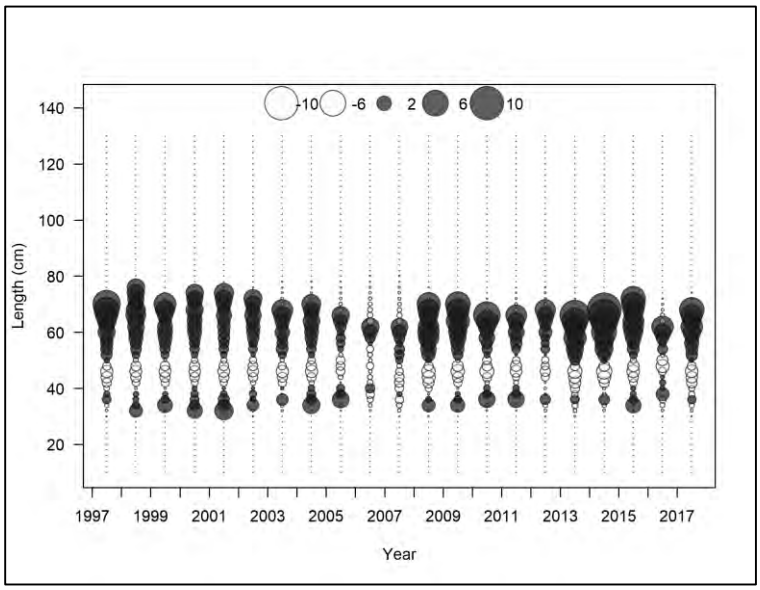

Figure 3.32. Pearson residuals from the fit of the base model run to the ASrec discard length composition data, 1997–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

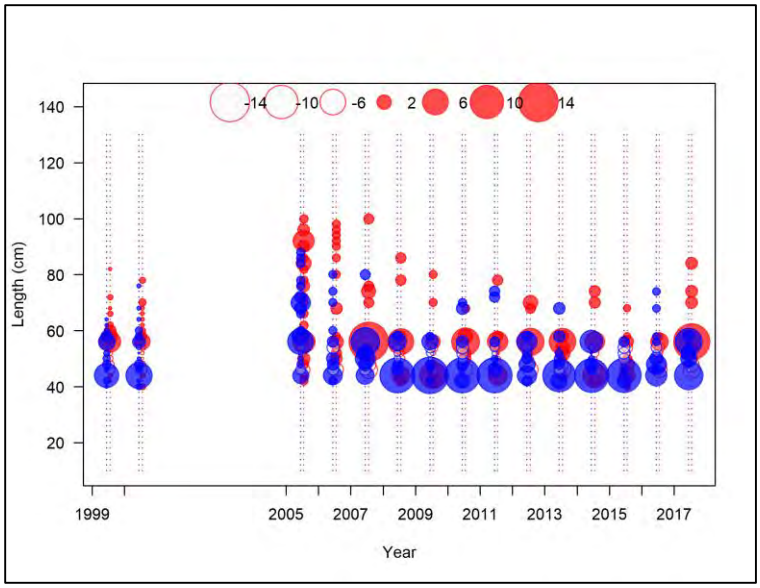

Figure 3.33. Pearson residuals (red: female; blue: male) from the fit of the base model run to the RRrec harvest length composition data, 1999–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

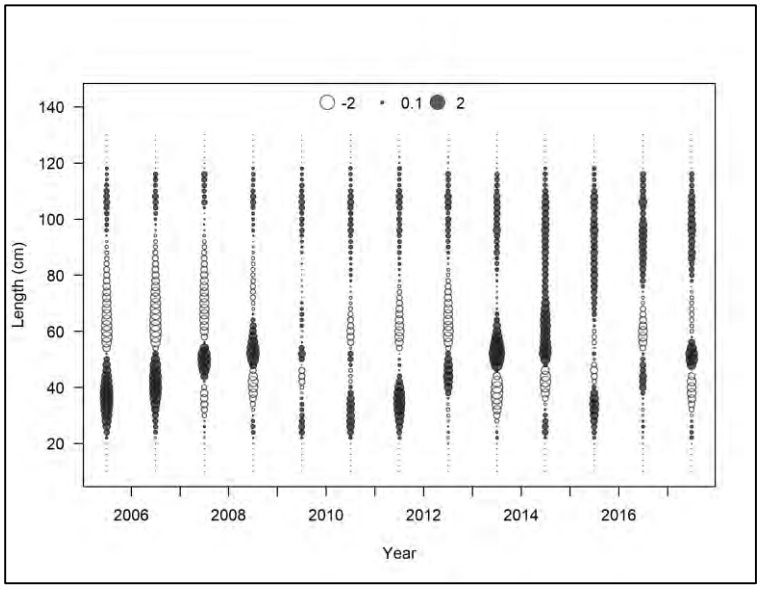

Figure 3.34. Pearson residuals from the fit of the base model run to the RRrec discard length composition data, 2005–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

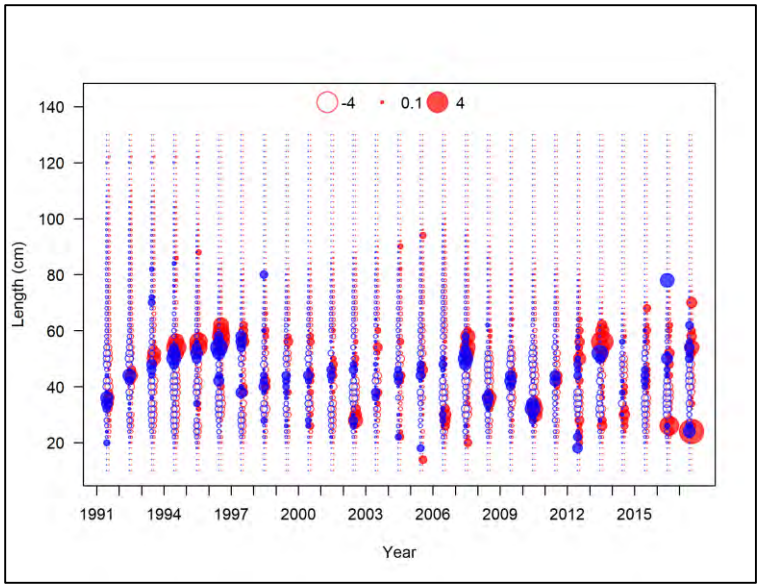

Figure 3.35. Pearson residuals (red: female; blue: male) from the fit of the base model run to the P135fw survey length composition data, 1991–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

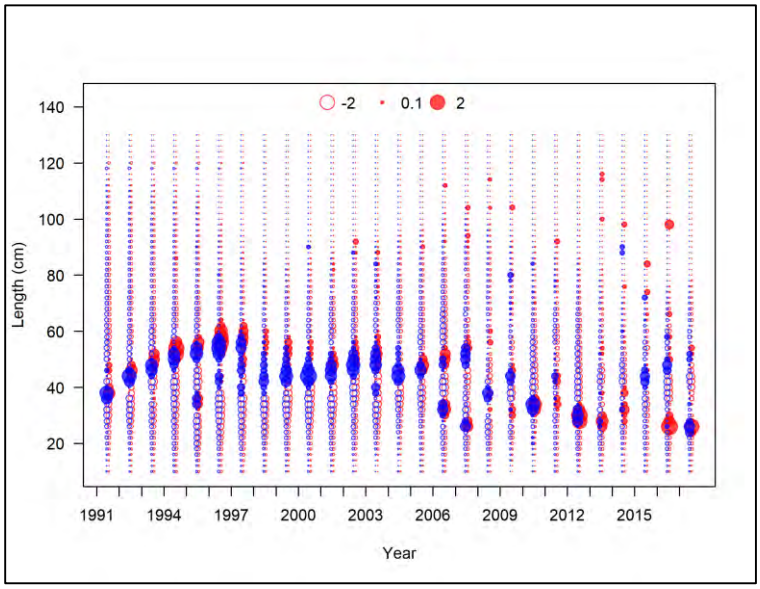

Figure 3.36. Pearson residuals (red: female; blue: male) from the fit of the base model run to the P135spr survey length composition data, 1991–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

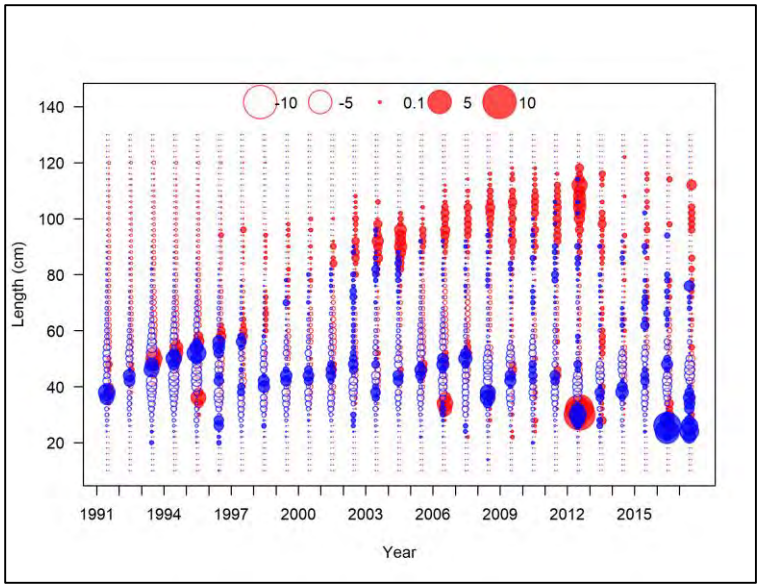

Figure 3.37. Pearson residuals (red: female; blue: male) from the fit of the base model run to the RRef survey length composition data, 1991–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

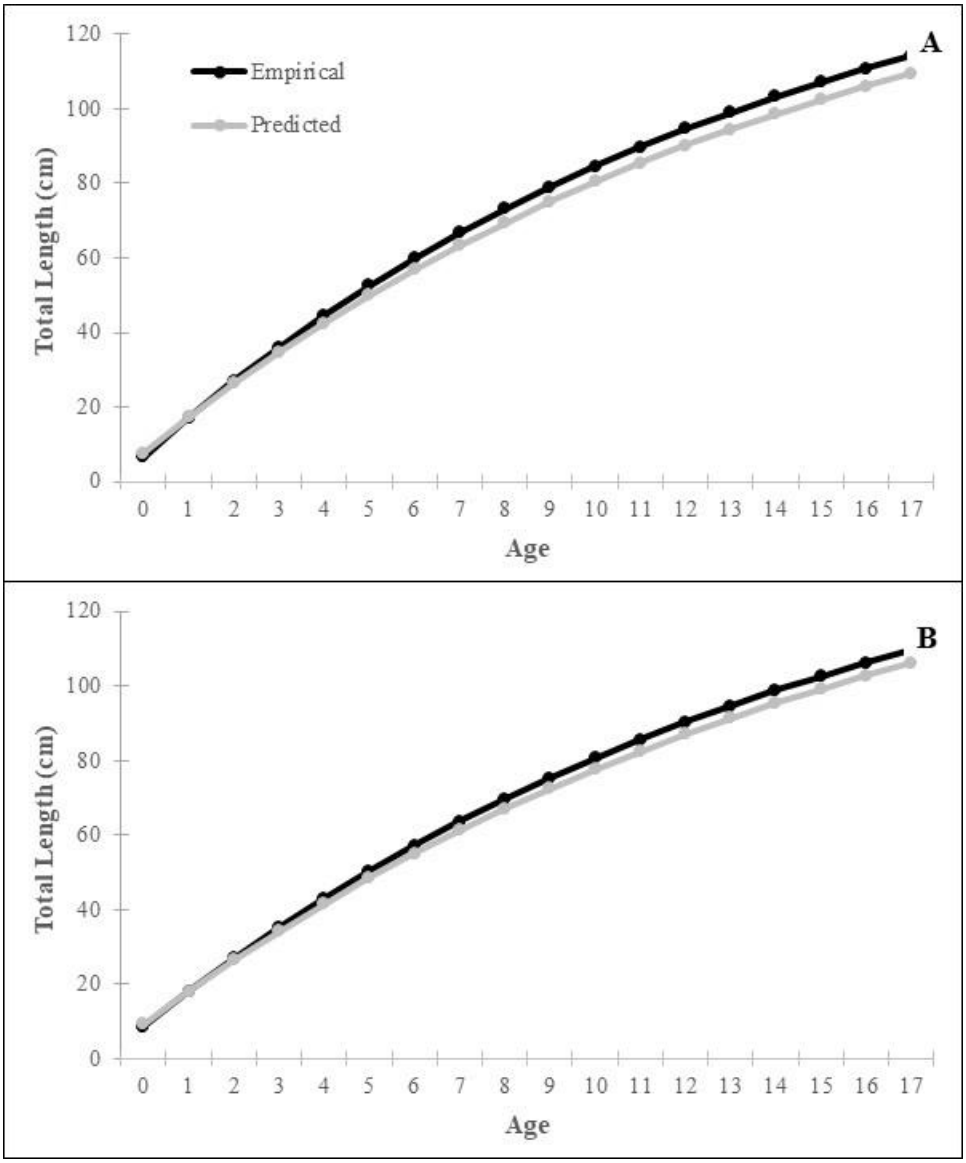

Figure 3.38. Comparison of empirical and model-predicted age-length growth curves for (A) female and (B) male striped bass from the base run of the stock assessment model.

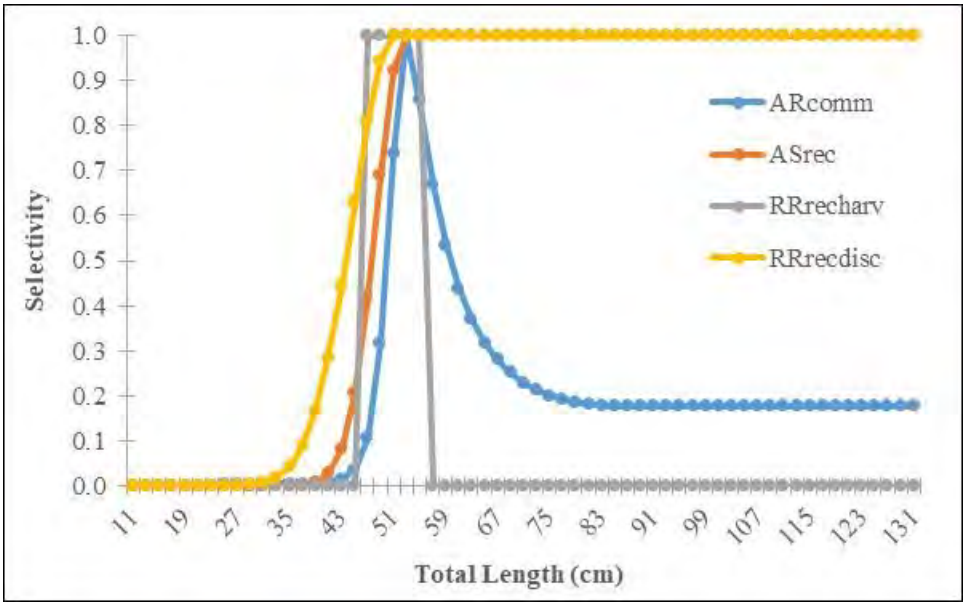

Figure 3.39. Predicted length-based selectivity for the fleets from the base run of the stock assessment model.

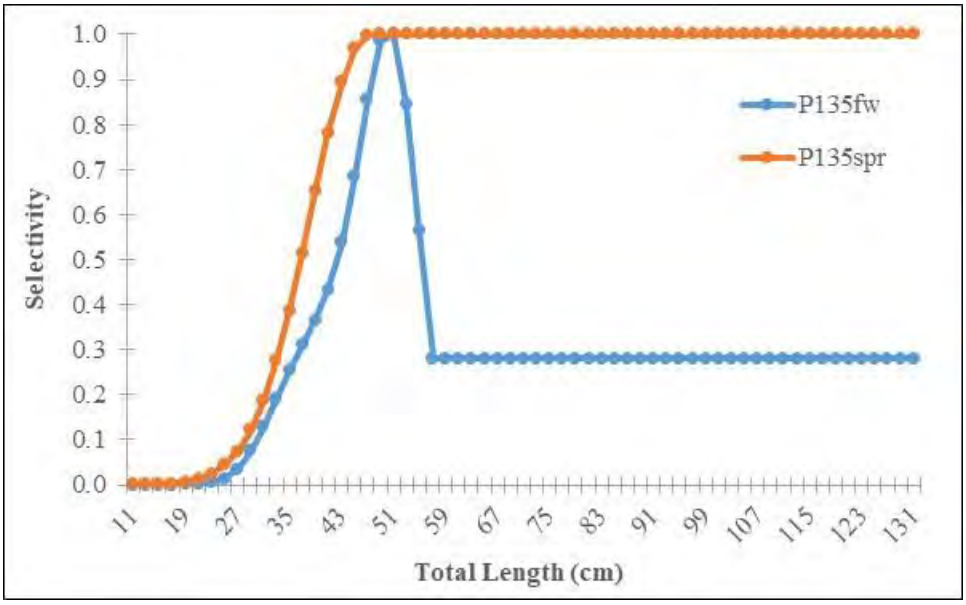

Figure 3.40. Predicted length-based selectivity for the P135fw and P135spr surveys from the base run of the stock assessment model.

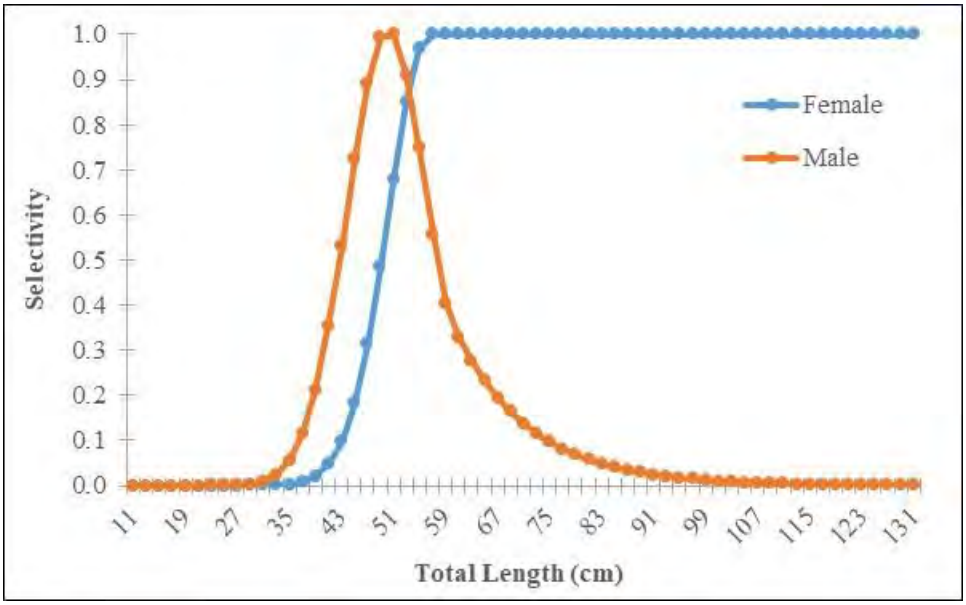

Figure 3.41. Predicted length-based selectivity for the RRef survey from the base run of the stock assessment model.

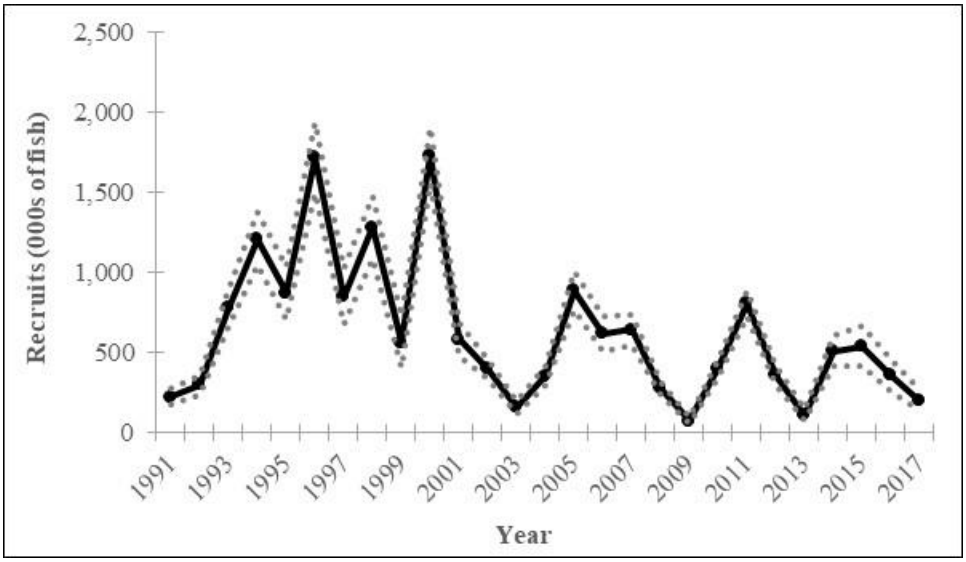

Figure 3.42. Predicted recruitment of age-0 fish from the base run of the stock assessment model, 1991–2017. Dotted lines represent ± 2 standard deviations of the predicted values.

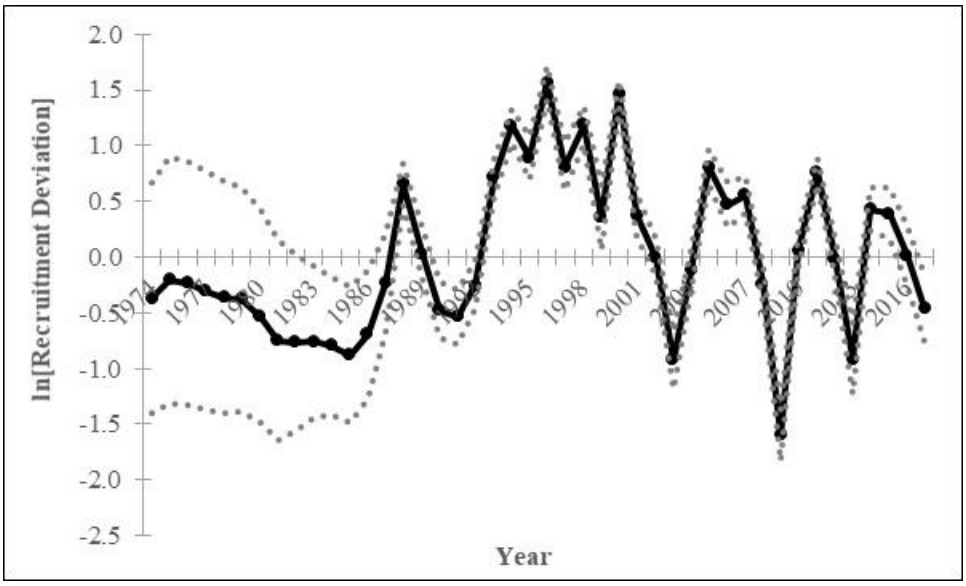

Figure 3.43. Predicted recruitment deviations from the base run of the stock assessment model, 1991–2017. Dotted lines represent ± 2 standard deviations of the predicted values.

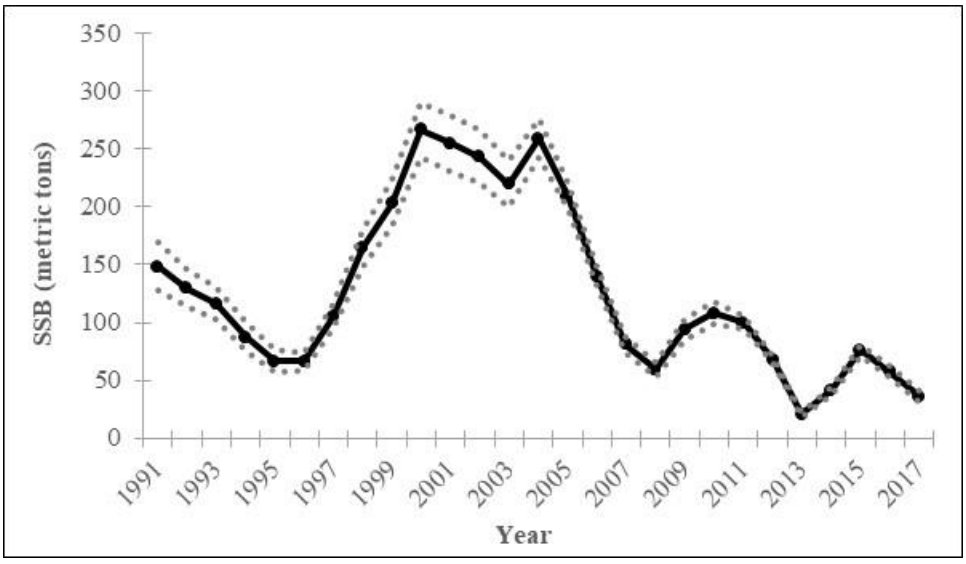

Figure 3.44. Predicted female spawning stock biomass from the base run of the stock assessment model, 1991–2017. Dotted lines represent ± 2 standard deviations of the predicted values.

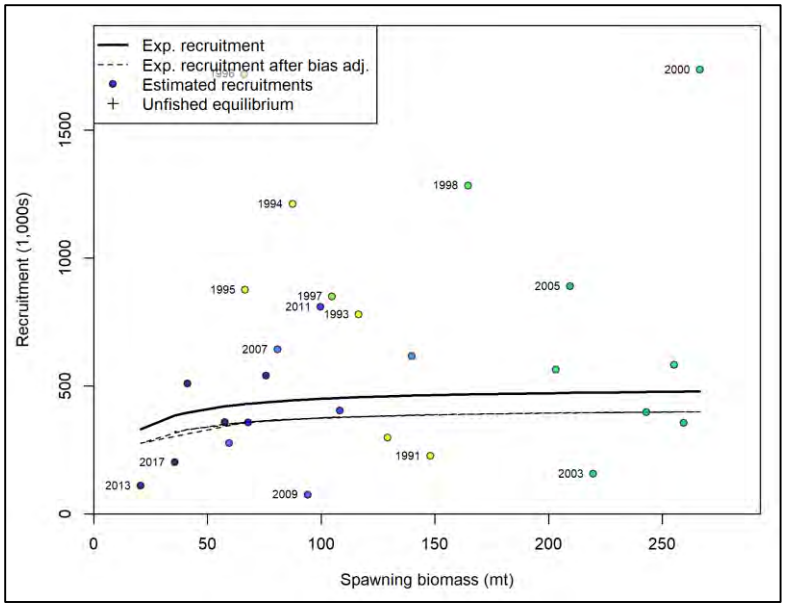

Figure 3.45. Predicted Beverton-Holt stock-recruitment relationship from the base run of the stock assessment model with labels on first (1991), last (2017), and years with (log) deviations > 0.5.

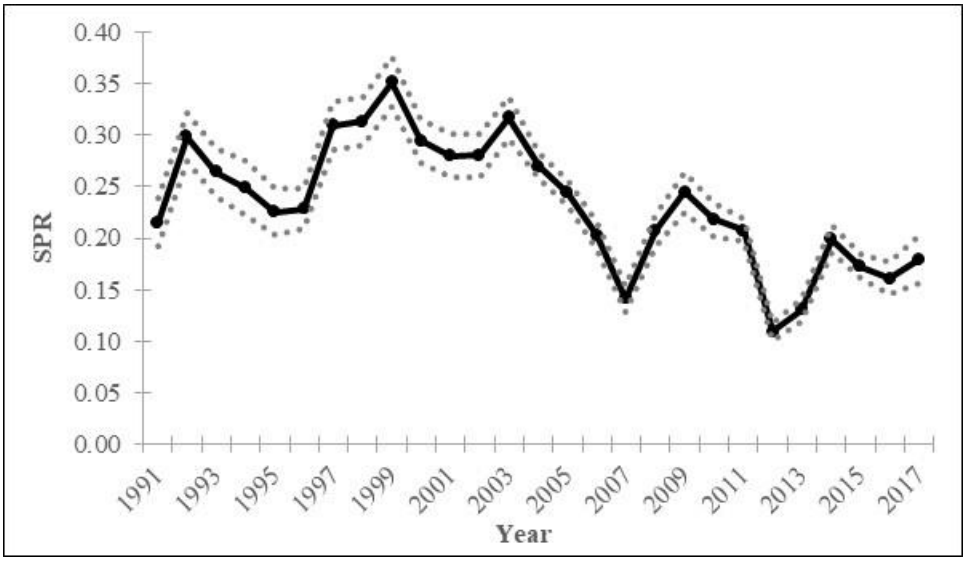

Figure 3.46. Predicted spawner potential ratio (SPR) from the base run of the stock assessment model, 1991–2017. Dotted lines represent ± 2 standard deviations of the predicted values.

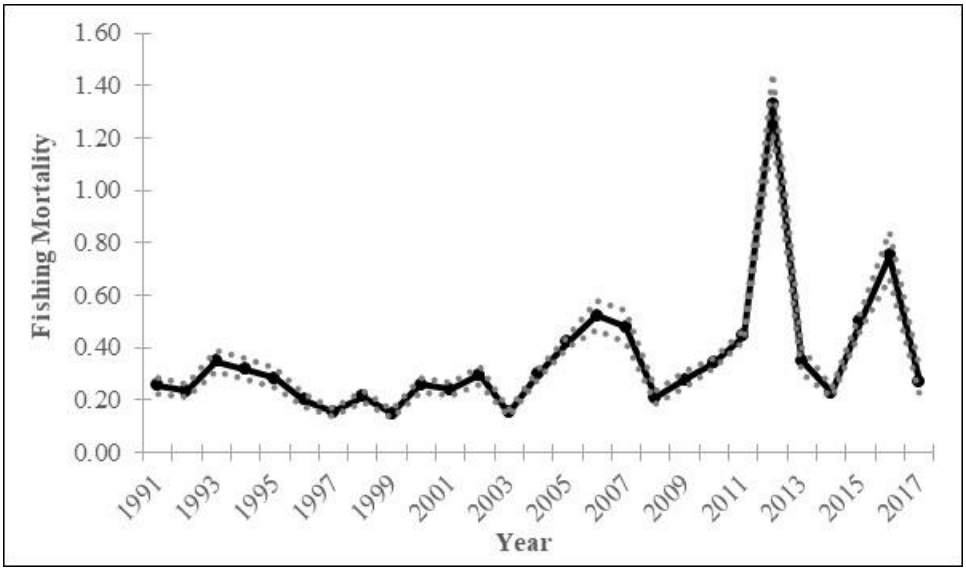

Figure 3.47. Predicted fishing mortality (numbers-weighted, ages 3–5) from the base run of the stock assessment model, 1991–2017. Dotted lines represent ± 2 standard deviations of the predicted values.

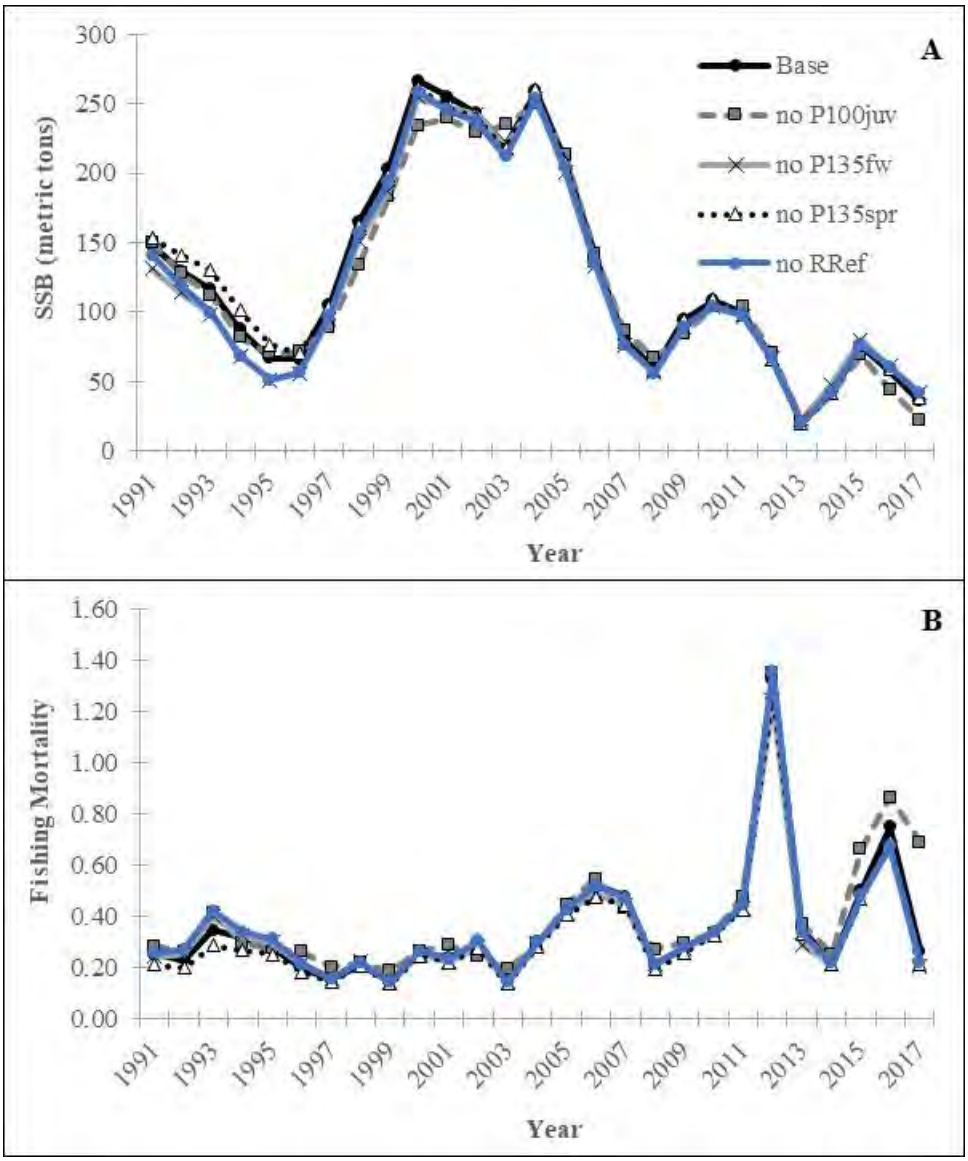

Figure 3.48. Sensitivity of model-predicted (A) female spawning stock biomass (SSB) and (B) fishing mortality rates (numbers-weighted, ages 3–5) to removal of different fisheries-independent survey indices from the base run of the stock assessment model, 1991–2017.

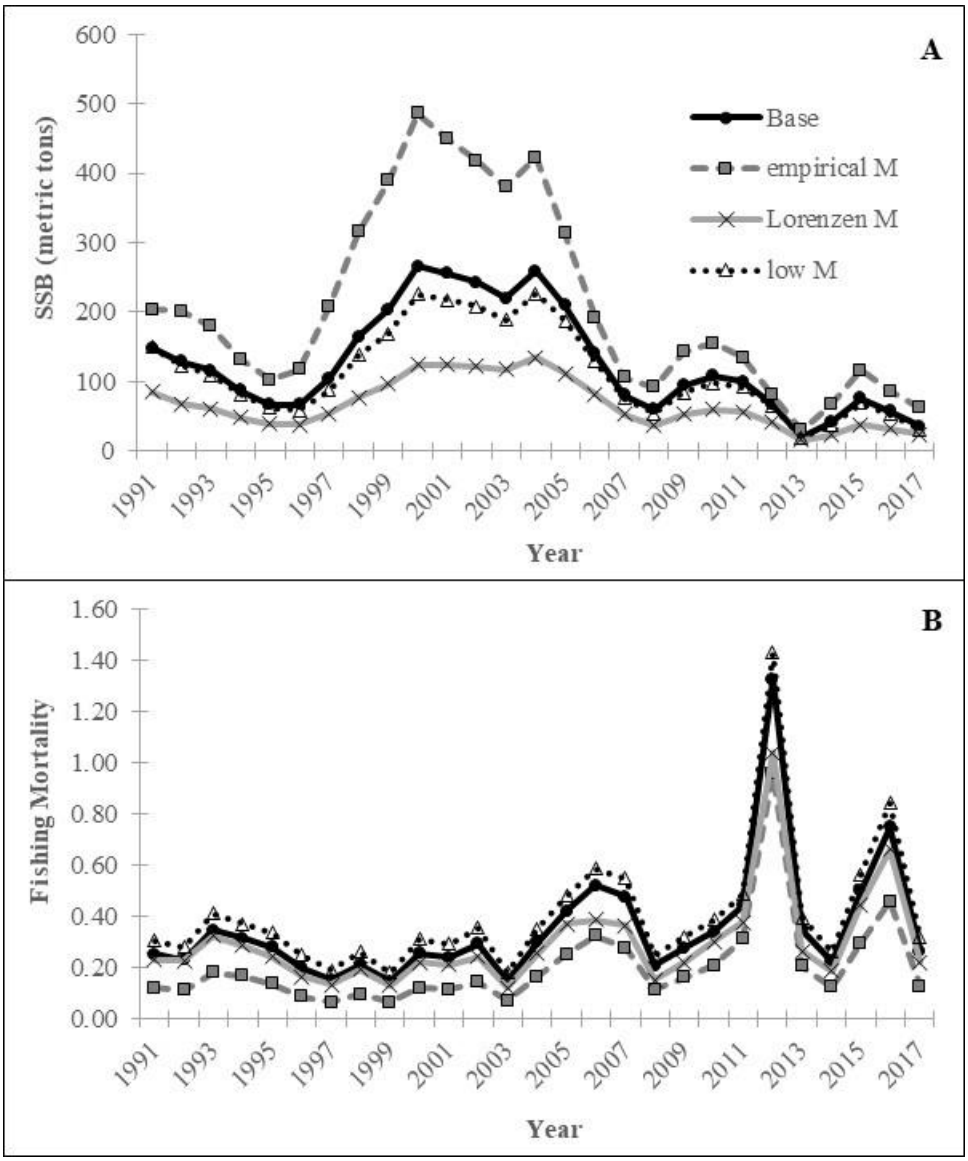

Figure 3.49. Sensitivity of model-predicted (A) female spawning stock biomass (SSB) and (B) fishing mortality rates (numbers-weighted, ages 3–5) to the assumption about natural mortality, 1991–2017.

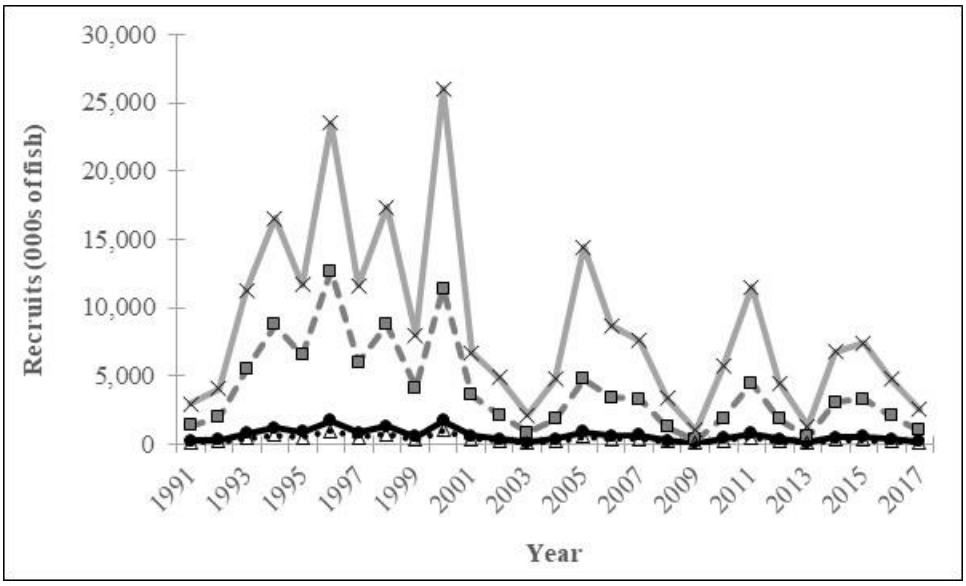

Figure 3.50. Predicted recruitment from the sensitivity runs in which the assumption about natural mortality was changed, 1991–2017.

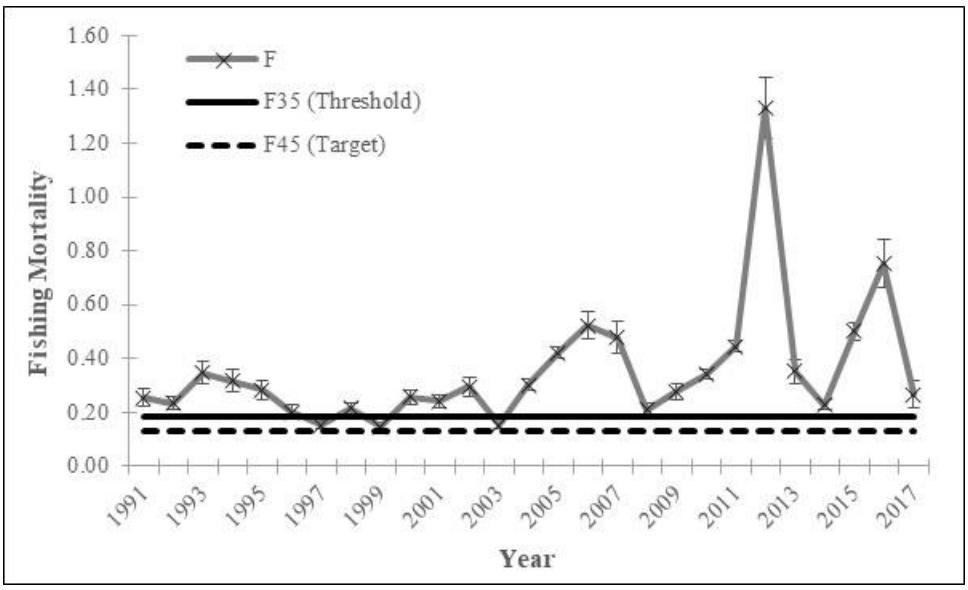

Figure 4.1. Estimated fishing mortality (numbers-weighted, ages 3–5) compared to fishing mortality target ($F_{45\%}$=0.13) and threshold ($F_{35\%}$=0.18). Error bars represent ± two standard errors.

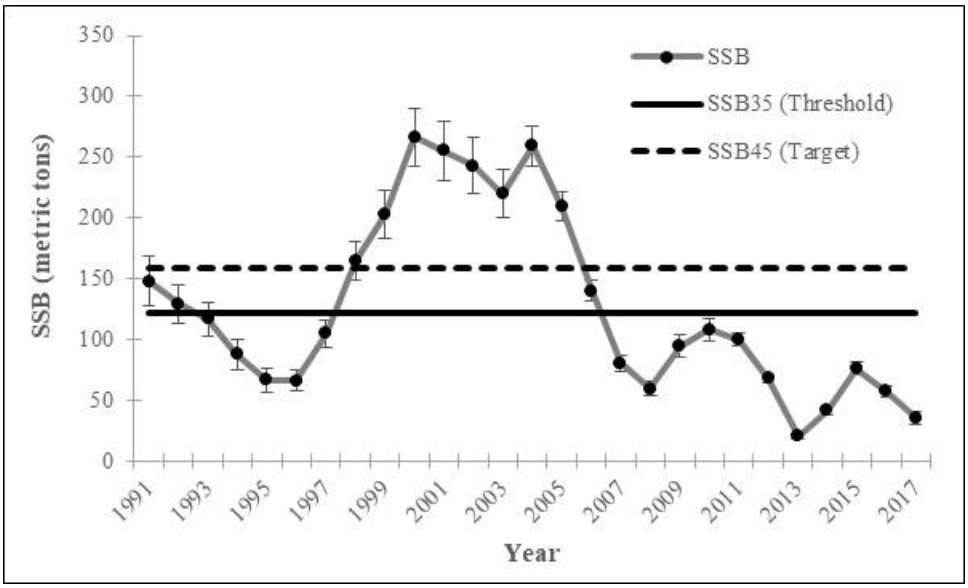

Figure 4.2. Estimated female spawning stock biomass compared to spawning stock biomass target ($SSB_{45\%}$=159 mt) and threshold ($SSB_{35\%}$=121 mt). Error bars represent ± two standard errors.

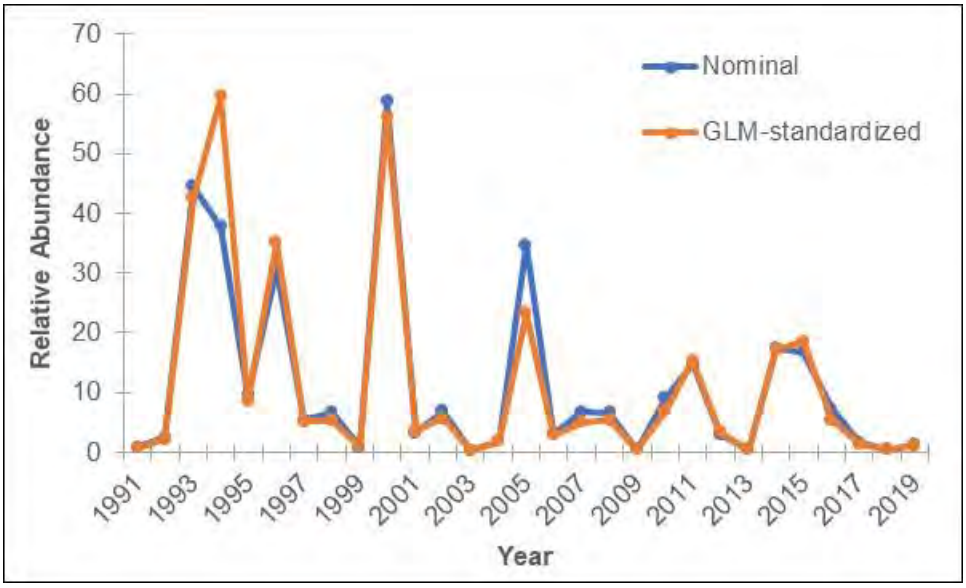

Figure 5.1. Update of the nominal and GLM-standardized indices of relative age-0 abundance derived from the Juvenile Abundance Survey (P100), 1991–2019.

10 APPENDIX

Addendum to the External Peer Review Report for the 2019 Stock Assessment of the Albemarle Sound-Roanoke River Striped Bass in North Carolina

The SAT was able to satisfactorily resolve several of the RP's concerns in the original base model reviewed during the December 2019 workshop. The growth functions fit to observed length-at-age data external to the assessment model to generate starting values for the assessment model (i.e., empirical growth estimates) showed improved fits to the data and the growth functions predicted by the revised assessment model were more consistent with the empirical growth estimates, particularly for males. Residual patterning from fits to the length composition data in the revised assessment model are still present indicating some model misspecification, but were generally reduced. The corrected P135 indices were more consistent with the decline in recent years observed during the RRef survey, reducing some conflict the original base model was forced to reconcile. It's important to note that the revised model overestimated the index values for both P135 indices and the RRef index during the last three years of the time series, indicating the abundance estimates may still be biased high in these recent years. However, the consistent overfished status determination estimated across the revised model and natural mortality sensitivity runs (see below) lessen this concern.

The revised base model specified an age- and sex-constant natural mortality of 0.72 based on Harris and Hightower (2017). The RP still believes the empirical natural mortality estimates from Harris and Hightower (2017) are higher than reality and suggested sensitivity runs exploring the effects of lower natural mortality rates. The RP was less concerned with variation in natural mortality-at-age, as this can be less influential on parameter bias (Deroba and Schueller 2013) and because model insensitivity to age-specific natural mortality was demonstrated by the SAT in the revised report, and more interested in effects of lower natural mortality for all ages. Therefore, various age-constant life history-based natural mortality estimators were applied to the striped bass data. Ultimately, the Alverson and Carney (1975), Hoenig (1983), and Cubillios et al. (1999) estimators were included in sensitivity runs because they estimated high (relative to the other life history-based estimators, but lower than Harris and Hightower 2017 estimates), moderate, and low natural mortality rates, respectively. Additionally, an average across the estimators, which was slightly lower than the Hoenig (1983) rate, was included in the sensitivity analysis. The SAT conducted a thorough sensitivity analysis of natural mortality with model configurations that included sex-specific and sex-aggregate natural mortality rates with growth fixed or estimated. The sensitivity runs that converged on a solution produced some differences in the scale of estimates, but similar stock trajectories, particularly since the decline in SSB in the mid-2000s (Figures 1-3). The various natural mortality rates had the greatest effect on age-0 recruitment as the model needs to estimate higher recruitment under high mortality scenarios to match the data on subsequent ages that are vulnerable to the fisheries. All sensitivity runs indicated the stock was overfished and experiencing overfishing in the terminal year (Table 1).

The SAT recommended the model with a high, sex-aggregate natural mortality (M=0.40) as the most appropriate to acknowledge estimates from established life history-based methods, but also the higher empirical rates estimated directly from the striped bass population by Harris and Hightower (2017). A sex-aggregate natural mortality rate is consistent with the similar growth

estimated between sexes from the available data. Further, a subsequent sensitivity run requested by the RP showed this model configuration is not sensitive to excluding the RRef survey data, as was a primary concern with the original base model. The RP agrees with the SAT's recommendation and recommends this model be used for management advice. The population trajectory and overfished and overfishing stock status estimates from this model are consistent with the available data sets that show poor recruitment in recent years, declining abundance to historically low levels, and a truncated age structure.

Needs for Future Assessments

The RP along with the SAT were collectively concerned about declining recruitment in the time series. One key uncertainty identified in this review is to incorporate the effects of changes in river flow on recruitment. It appears that substantial data exists, but they have not yet been incorporated into the stock assessment. Future assessments should consider key environmental drivers of recruitment such as river flow, because declining recruitment in the time series does not appear to result solely from reduced abundance due to harvest. The RP suggests that future assessments should incorporate flow-recruitment relationships into the stock assessment formally to understand how spring flow conditions influence recruitment and ultimately stock abundance. Another potential influence on the striped bass stock is the prevalence of non-native catfishes, primarily blue catfish *Ictalurus furcatus* and flathead catfish *Pylodictis olivaris.* Both species occur in North Carolina river systems and it seems the blue catfish population is expanding in the Roanoke River and Albemarle Sound areas. Predation by catfishes could potentially impact recruitment of striped bass directly, or could influence food resources for striped bass through competition for prey (e.g., Pine et al. 2005). The degree to which this occurs is not known, but future assessments should consider this as a factor that may influence abundance and is not tied to striped bass harvest.

Moderate and evident differences in growth (Figures 1.2 and 1.3, main report) are not resolved within the model. The effect on estimation of sex-specific M are not readily quantifiable at present. Factors potentially contributing to the poor resolution of male and female growth trajectories, as estimated by the von Bertalanffy growth function, include under-representation of older age classes and lack of sex-specific length data for Ages 0 to 2^{+} year old fish. The RP accordingly encourages collection of sex-specific length-at-age data from juveniles (ages 0–2) and as well from older fish to better inform growth estimates.

References

Alverson, D.L., and M.J. Carney. 1975. A graphic review of the growth and decay of population cohorts. *Journal du Conseil international pour l'Exploration de la Mer* 36(2):133–143.

Cubillos, L.A., R. Alarocan, and A. Brante. 1999. Empirical estimates of natural mortality for Chilean hake (*Merluccius gayi*): evaluation of precision. Fisheries Research 42:147–153.

Deroba, J.J., and A.M. Schueller. 2013. Performance of stock assessments with misspecified age- and time-varying natural mortality. Fisheries Research 46:27–40.

Hoenig, J. 1983. Empirical use of longevity data to estimate mortality rates. Fishery Bulletin 81(4): 898–903.

Pine, W.E., T.J. Kwak, D.S. Waters, and J.A. Rice. 2005. Diet selectivity of introduced Flathead catfish in coastal rivers. Transactions of the American Fisheries Society 134:901–909.

Tables

Table 1. Specified natural mortality, terminal year and threshold model estimates, and stock status across the revised base model (Baseline) and natural mortality sensitivity runs. The RP recommends the "highMsamesex (est growth)" run be used for a management advice.

Scenario	M (yr^{-1})	Current year (2017)		Threshold		Overfished	Overfishing	Reference
		SSB (mt)	F (yr^{-1})	$SSB_{35\%}$ (mt)	$F_{35\%}$ (yr^{-1})			
Baseline	0.72	62	0.13	89	0.43	Y	N	Harris and Hightower, 2017
avgM (est growth)	0.23F, 0.25M	30.80	0.35	283.88	0.12	Y	Y	
avgM (fix growth)	0.23F, 0.25M	47.46	0.28	153.20	0.13	Y	Y	
midM (fix growth)	0.25F, 0.28M	42.79	0.29	114.46	0.14	Y	Y	Hoenig 1983
highM (fix growth)	0.37F, 0.44M	40.22	0.31	182.06	0.19	Y	Y	Alverson and Camey 1975
highMsamesex (est growth)	0.40	35.64	0.27	121.29	0.18	Y	Y	Alverson and Camey 1975
avgMsamesex (est growth)	0.24	32.91	0.28	150.77	0.11	Y	Y	

Figures

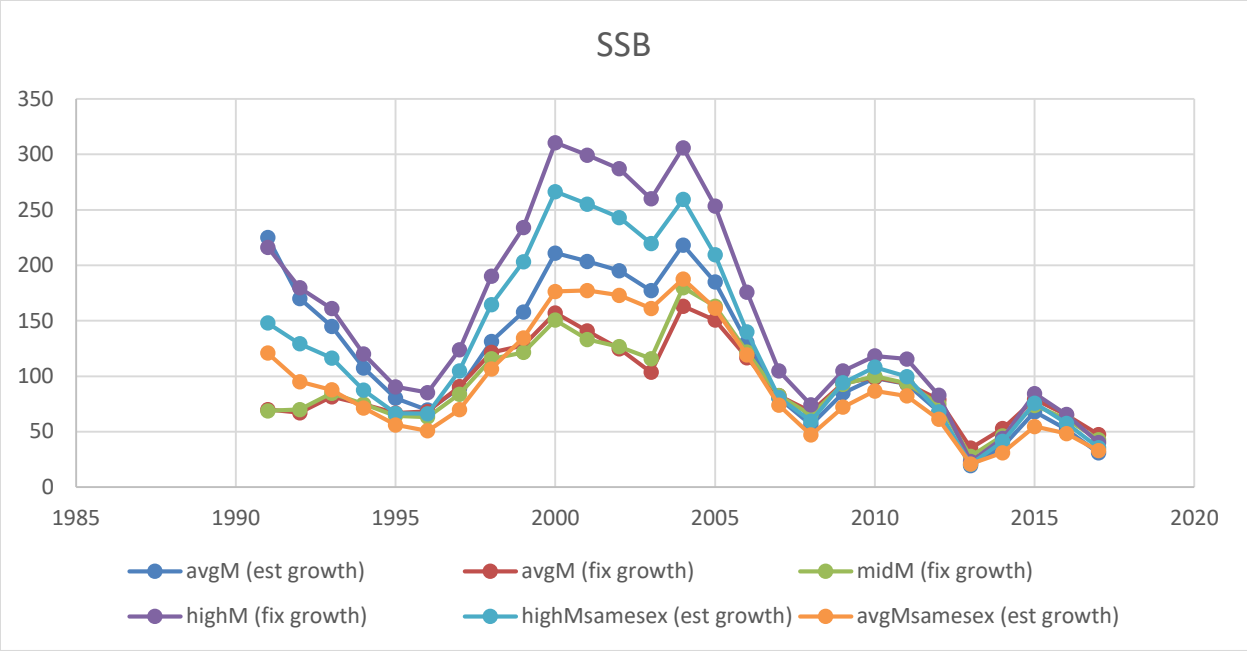

Figure 1. Female spawning stock biomass estimates (metric tons) across natural mortality sensitivity runs.

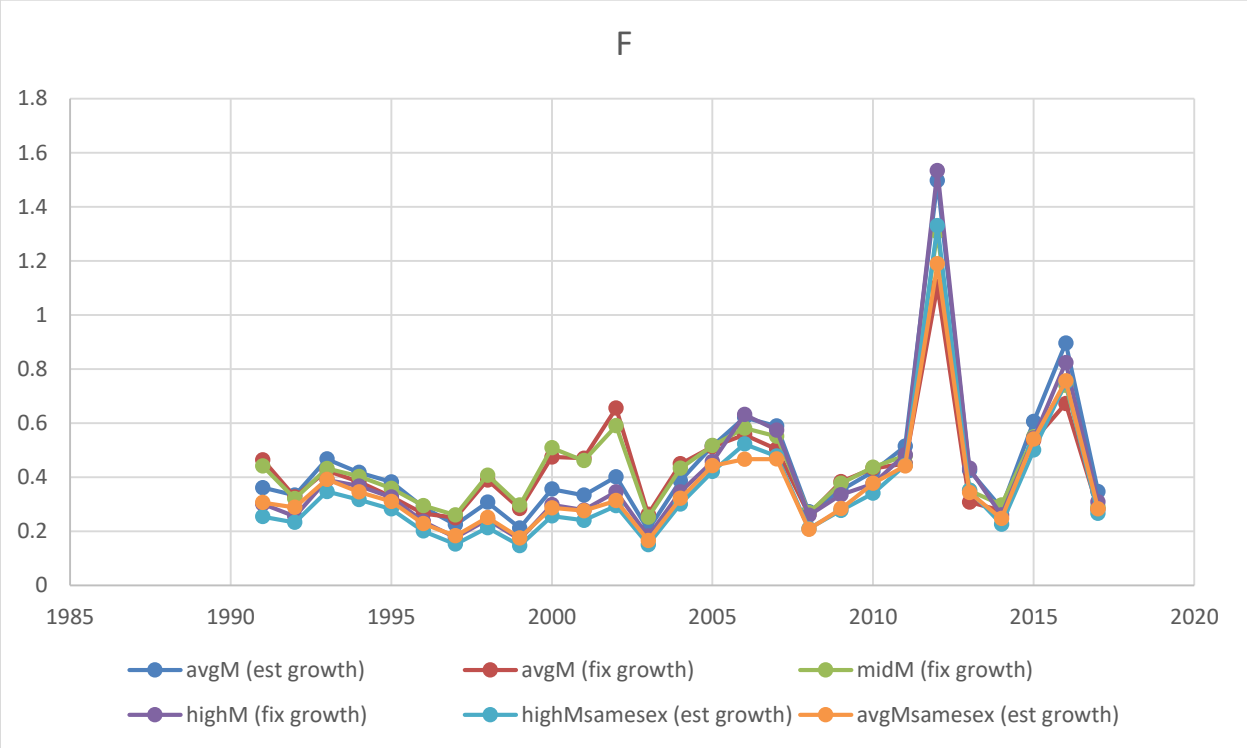

Figure 2. Numbers-weighted ages 3-5 average fishing mortality estimates across natural mortality sensitivity runs.

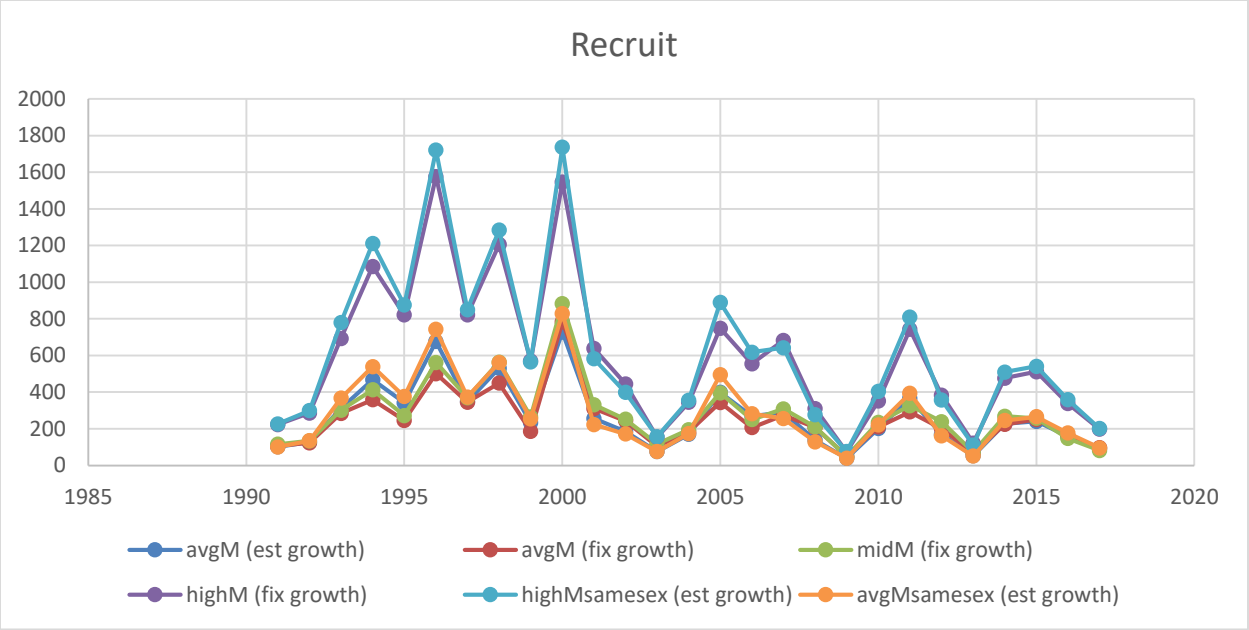

Figure 3. Age-0 recruitment estimates (thousands) across natural mortality sensitivity runs.

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **Atlantic Striped Bass Management Board**

FROM: **Atlantic Striped Bass Technical Committee**

DATE: **April 6, 2021**

SUBJECT: **2020 Albemarle Sound-Roanoke River Striped Bass Stock Assessment**

The Striped Bass Technical Committee (TC) met via webinar on March 9, 2021 to review the 2020 Albemarle Sound-Roanoke River (A-R) striped bass stock assessment (Lee et al. 2020). Under Addendum IV to Amendment 6 to the Atlantic Striped Bass Interstate Fishery Management Plan, the A-R stock is managed by the State of North Carolina using reference points from the latest A-R stock assessment accepted by the TC and approved for management use by the Striped Bass Management Board (Board).

Staff from the North Carolina Division of Marine Fisheries (NCDMF) provided a detailed overview of the stock assessment model set-up, model results, stock status, management response, and peer review process. An independent, external peer review panel has approved the assessment for management use for at least the next five years. TC members discussed the assessment model and results and provided recommendations for NCDMF staff to consider in future assessments.

The TC recommends the Board approve the 2020 Albemarle Sound-Roanoke River striped bass stock assessment for management use. The TC identified the following recommendations for NCDMF to consider in future A-R stock assessments:

- Continue discussions on the natural mortality estimate (0.4) used in the assessment model and consider alternative methods to develop that estimate. NCDMF noted there was some concern about whether the natural mortality estimate used in the assessment was too high.
- Continue exploring factors contributing to peaks in fishing mortality (e.g. 2012) and the overall high variability of the stock. NCDMF noted that low estimates of age 3-5 fish associated with poor year classes in prior years contribute peaks in fishing mortality. NCDMF also noted the potential impacts of environmental conditions like flow and predation on recruitment variability.
- Consider impacts of immigration/emigration of fish into and out of the management area and how that is reflected in fishing mortality.
- Explore alternative targets and thresholds that are less conservative than the current reference points for female spawning stock biomass. If recruitment variability is largely

driven by environmental factors and there is not a strong stock-recruit relationship, the current reference points for female spawning stock biomass may be overly conservative.

- Continue exploring factors that impact recruitment, including the observed patterns of 2-3 consecutive years of poor recruitment followed by 1-2 years of higher recruitment. NCDMF discussed ongoing analysis comparing flow rates during peak spawning time to the juvenile abundance indices.
- Consider developing interim projections to estimate stock parameters for the period between stock assessments (2018-2022) and take into account the low levels of recruitment observed in recent years.
- Consider using tagging data to help with validating the growth curve.
- Continue reviewing historical data on the fishery for insight into periods of population highs and lows and what might be considered normal for this stock.

Albemarle Sound-Roanoke River Stock Status Overview

The 2020 A-R assessment (Lee et al. 2020) uses a forward-projecting fully-integrated, age-structured statistical model to estimate population parameters and reference points for the A-R striped bass stock for 1991-2017. The A-R stock is managed using reference points for female spawning stock biomass (SSB) and fishing mortality (*F*) with threshold values based on 35% spawning potential ratio and target values based on 45% spawning potential ratio. The assessment estimated female SSB in 2017 (terminal year) was 35.6 metric tons, which is below the SSB threshold of 121 metric tons. The assessment estimated *F* in 2017 was 0.27, which is above the *F* threshold of 0.18. These results show that the stock is overfished and overfishing is occurring.

References

Lee, L.M., T.D. Teears, Y. Li, S. Darsee, and C. Godwin (editors). 2020. Assessment of the Albemarle Sound-Roanoke River striped bass (*Morone saxatilis*) in North Carolina, 1991-2017. North Carolina Division of Marine Fisheries, NCDMF SAP-SAR-2020-01, Morehead City, North Carolina. 171 p. Available at http://portal.ncdenr.org/c/document_library/get_file?uuid=3c11cbb9-2a84-425c-9694-eb788ed718de&groupId=38337

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MEMORANDUM

TO: **Atlantic Striped Bass Management Board**

FROM: **Emilie Franke, FMP Coordinator**

DATE: **April 19, 2021**

SUBJECT: **Amendment 7 Public Information Document (PID) Public Hearing Summaries**

Eleven public hearings for the Striped Bass Amendment 7 PID were conducted via webinar from March 8 – March 25, 2021 for the following states: Maine, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Delaware, Maryland, Potomac River Fisheries Commission, and Virginia. 491 individuals (not including state staff, ASMFC staff, or Commissioners/Proxies) attended the hearings and some of these individuals attended multiple hearings.

Each public hearing is summarized in the following pages and are ordered from north to south. 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 during the hearing. Not all participants provided comments and the summary only reflects the comments provided during the hearing. Attendance lists for each hearing are provided following the hearing summaries.

Maine Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 9, 2021
65 Public Participants (see attached attendee list)

Hearing Officer: Megan Ware (ME Dept. of Marine Resources)
ASMFC Staff: Toni Kerns, Emilie Franke, Katie Drew, Maya Drzewicki

ME Commissioners/Proxies in attendance: Pat Keliher, Megan Ware

20 people provided comments including comments on behalf of the Maine Association of Charterboat Captains (MACC), Plum Island Surfcasters (PIS), and American Saltwater Guides Association (ASGA)

Commenters from:	
ME	16
NH	2
CT	1
DC	1

Issue 1: Goals and Objectives

- 12 people (including MACC and ASGA) support maintaining Amendment 6 goal and objectives and noted that the goals are fine but the Board has been adhering to them.
- 1 person specifically recommends editing the goal statement state support of a self-sustaining spawning stock first before stating support of fisheries.
- 1 person commented the first priority goal should be maintaining SSB at the target and the second priority is maintaining a broad age structure; all other goals are secondary.
- 4 people commented in support of managing for abundance and 2 people commented the Commission should consider the fish first and the fishery second.
- MACC commented that management stability is easily achieved with a fully rebuilt fishery and flexibility without accountability is irresponsible.
- 1 person commented management stability is not a goal but rather a side effect.

Issue 2: Biological Reference Points

- 17 people (including MACC, PIS, ASGA) support maintaining the current reference points based on the 1995 estimate of SSB for the following reasons:
    - Current reference points are based on sound science.
    - Consistency with management is the only way to rebuild the stock.
    - BRPs should not be changed before the stock is rebuilt.

Issues 3-4: Management Triggers and Rebuilding Schedule

- 2 people support all the existing management triggers.
- 12 people (including MACC, ASGA) support maintaining the current SSB and F management triggers and recommend revising the recruitment-based trigger. MACC suggests making use of the forecasting provided by the recruitment trigger.

- 16 people (including MACC, ASGA, PIS) support maintaining the 10-year rebuilding timeline and noted that a rebuilding plan should be put in place as specified in Amendment 6 since it has already been two years since the stock was declared overfished.
- 1 person supports a shorter rebuilding timeline if possible.
- PIS supports taking bigger steps to rebuild the stock instead of small steps to keep people happy.

Issue 5: Regional Management

- 16 people (including MACC, ASGA) do not support a regional management approach for the following reasons:
    - Best available science does not support regional management or a two-stock assessment model.
    - Regional management is a failure and every state is affected by decisions made in Delaware and the Chesapeake region.
    - Need consistent management coastwide to effectively managing one stock.
    - There is not enough information about the origin of catch and the stocks comingle.
    - States rely on fish migrating up the coast from spawning areas.

Issue 6: Conservation Equivalency (CE)

- 10 people (including MACC, ASGA) commented CE should not be used if overfishing is occurring and/or the stock is overfished and accountability measures must be in place to keep states accountable to their CE plans.
- MACC noted concern that restricting the use of CE may limit states from implementing measures that are more conservative than coastwide measures.
- 6 people commented CE should be eliminated from the FMP because consistent standards across all states is important and CE undermines management.

Issue 7: Recreational Release Mortality

- 12 people (including MACC, ASGA) support increasing angler education and outreach on how to safely handle striped bass and support the MA DMF release mortality study.
- 1 person commented noted there should also be increased outreach on regulations to explain why there are changes in management.
- 1 person supports the use of circle hooks, only having one hook per lure, and supports a 1 fish bag limit with length limits in every state.

Issue 8: Recreational Accountability

- 11 people (including MACC, PIS) do not support using an RHL at this time because there is not enough data available.

- ASGA noted this general issue should be removed from consideration.

Issue 9: Coastal Commercial Quota Allocation

- 8 people (including ASGA) recommend the Board revisit commercial allocation to better reflect the characteristics of the commercial striped bass fishery.
- PIS commented there should be a better way to track commercial quota as it is caught.
- 1 person commented that all commercially-caught fish should be tagged when they are caught so all fish are counted toward the quota; Massachusetts only requires fish to be tagged when they are sold and should be required when they are caught.

Issue 10: Other Issues

Harvest Control

- 2 people support a moratorium if it is needed to rebuild the stock.
- 1 person commented there should be a limit on commercial fishing.
- 1 person supports designating striped bass as a game fish in all states.

Spawning Protection

- 1 person commented the Chesapeake Bay and Hudson regions need to comply with all of the other states for length limits and should prohibit fishing in spawning grounds.

Enforcement

- 1 person noted concerns about law enforcement capacity in Connecticut and high incidence of poaching reports and commented in support of additional funding for law enforcement.

Others

- ASGA and 7 people recommend conducting human dimensions research and identifying a pathway for applying that research to management. It was noted that this research could help forecast future changes in fishing effort and angler behavior and research should include non-market valuation of the fishery and the value of catch and release vs. the value of catch and harvest.
- 1 person commented striped bass should be regulated at the federal level.
- 1 person commented the 2015 year class needs to be protected as they enter the slot.

General Comments:

- Abundance provides the opportunity to have access to fish and they want a management body that will honor the majority of participants in this fishery.
- There seems to be support a conservation-minded fishery.
- There is a large disparity between recreational and commercial removals with a lot more removals on the recreational side.
- The Commission needs manage using the best available science and be accountable as they are legally bound to rebuild the stock.

- The Board should wait until Addendum VI has been implemented for some time before changing management and one person noted concern about starting a new amendment without a plan to rebuild the stock.
- The Board should focus on rebuilding the stock and not reacting each year.

New Hampshire Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 8, 2021
39 Public Participants (see attached attendee list)

Hearing Officer: Cheri Patterson (NH Fish and Game)
ASMFC Staff: Toni Kerns, Emilie Franke

NH Commissioners/Proxies in attendance: Cheri Patterson, Ritchie White, Dennis Abbott

10 people provided comments including comments on behalf of Coastal Conservation Association New Hampshire Chapter (CCANH) and American Saltwater Guides Association (ASGA)

Commenters from:	
NH	7
ME	1
MA	1
MD	1

Issue 1: Goals and Objectives

- 3 people (including ASGA) support maintaining Amendment 6 goal and objectives. ASGA noted the goals are not the problem, rather the issue is the Board not adhering to them.
- 1 person noted the importance of management stability and 2 people noted the importance of coastwide regulatory consistency.
- 5 people (including CCANH) commented in support of managing for an abundant stock with fish across all age classes.
- 1 person noted the goal should be the long-term sustainability of the fishery.

Issue 2: Biological Reference Points

- 5 people (including ASGA) support maintaining the current reference points based on the 1995 estimate of SSB for the following reasons:
    - Current approach seems supported by data and science.
    - 1995 is the year the stock was recovered and achieved a broad age structure.

Issue 3-4: Management Triggers and Rebuilding Schedule

- ASGA supports maintaining the current SSB and F management triggers and recommended revisiting the recruitment-based trigger.
- 3 people (including ASGA) support maintaining the 10-year rebuilding timeline and ASGA noted that a rebuilding plan should be in place for striped bass.
- 1 person supports a faster rebuilding timeline of 3-5 years.
- 1 person commented it is better to rebuild sooner rather than later.

Issue 5: Regional Management

- 6 people (including ASGA) do not support a regional management approach for the following reasons:

  - Striped bass are migratory so management should remain coastwide.
  - Coastwide consistency on management measures is important.
  - Regional management would not promote cooperation long the coast.
  - There is not enough science to support regional management.

Issue 6: Conservation Equivalency

- 3 people (including ASGA) commented CE should not be used if overfishing is occurring and/or the stock is overfished. ASGA also commented accountability measures should be in place.
- 1 person commented CE should be eliminated from striped bass management.
- 1 person commented that there needs to be a better definition of CE and there should be more rules around when states can use CE.

Issue 7: Recreational Release Mortality

- 2 people (including CCANH) support gear restrictions to protect striped bass.
- 2 people (including CCANH) commented there should be more science and better data on gear restrictions and 1 person noted concern about the number of treble hooks on lures.
- 2 people commented on circle hooks:
  - 1 person supports the tube and worm rig study proposed by Maine and Massachusetts and would like to see the study move forward.
  - 1 person noted circle hooks are not always effective, particularly for new anglers.
- 2 people (including CCANH) do not favor seasonal restrictions/closures.
- ASGA supports increasing angler education and outreach support the release mortality work being conducted by MA DMF.

Issue 8: Recreational Accountability

- 1 person would support using an RHL if the fishery was in a healthy state with a broad range of size classes, but an RHL should not be the focus right now.
- 2 people support a volunteer angler program for recreational fisherman to submit data (e.g. catch counts, bait, etc.) to help increase available information. 1 person commented on the importance of educational resources for anglers.
- ASGA commented this issue should be removed from consideration since recreational accountability is a broader issue than just striped bass.

Issue 9: Coastal Commercial Quota Allocation

- 2 people (including ASGA) recommend the Board work with the TC to update commercial quota allocations.
- 1 person commented commercial quota should be reduced.

Issue 10: Other Issues

- ASGA recommends including guidance for expanding human dimensions research and how it would be applied to future management discussions.

General Comments:

- Importance of better science to support better management.
- General concern and observations of stock decline.
- Board decisions have led to missing year classes in the population.

Massachusetts Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 18, 2021
140 Public Participants (see attached attendee list)

Hearing Officer: Mike Armstrong (MA Division of Marine Fisheries)
ASMFC Staff: Toni Kerns, Emilie Franke

MA Commissioners/Proxies in attendance: Dan McKiernan, Mike Armstrong, Ray Kane

Commenters from:	
MA	30
ME	2
NH	1
NY	1
PA	1
MD	1
DC	1

37 people provided comments including comments on behalf of Stripers Forever (SF), Cape Cod Salties Sportfishing Club (CCS), and the American Saltwater Guides Association (ASGA)

Issue 1: Goals and Objectives

- 2 people (including ASGA) support maintaining Amendment 6 goal and objectives and this issue should be removed from consideration in the amendment.
- 9 people commented in support of managing for abundance and/or putting the interest of the fish first.
- 3 people commented the focus should be reducing mortality.
- 3 people (including CCS) commented in support of overall regulatory consistency among the states and sectors.
- 2 people commented on the overall importance of accountability.

Issue 2: Biological Reference Points

- 5 people (including ASGA) support maintaining the current reference points based on the 1995 estimate of SSB.
- 1 person supports reexamining the 1995 reference year to determine if it is appropriate given changing environmental factors such as shark and seal predation, stock shifts, and changing water temperatures.

Issues 3-4: Management Triggers and Rebuilding Schedule

- 2 people (including ASGA) support maintaining the current SSB and F management triggers and recommend revising the recruitment-based trigger.
- 2 people (including ASGA) support maintaining the 10-year rebuilding timeline and noted that a rebuilding plan should be put in place as specified in Amendment 6.
- 2 people support a faster rebuilding timeline if possible and 10 years should be the maximum timeline.

- 1 person commented there should be more aggressive targets to reduce mortality and see improvement in the stock.

Issue 5: Regional Management

- 4 people (including ASGA) do not support a regional management approach. ASGA commented there is not enough science to support this and genetic research should be prioritized.

Issue 6: Conservation Equivalency

- 2 people (including ASGA) commented CE should not be used if overfishing is occurring and/or the stock is overfished and CE must have accountability measures in place.
- 5 people commented CE should be eliminated from the FMP because it allows states to manage for their own interests with little accountability.

Issue 7: Recreational Release Mortality

- 4 people (including ASGA and CCS) support increasing angler education and outreach on how to safely handle striped bass, including more training and potentially a test for anglers on sage handling practices. ASGA also noted support for the catch and release study being conducted by MA DMF.
- 2 people support the use of circle hooks and noted they are good for consistency.
- 6 people commented that the use of treble hooks needs to be addressed to reduce release mortality and only single hooks should be used; 1 person also commented barbs should potentially be banned.

Issue 8: Recreational Accountability

- 2 people (including ASGA) commented this issue should be removed from consideration and considered at a later time.
- 1 person supports putting a tag system in place to help determine the overall harvest and help with enforcement and also suggests aligning the tags with the existing recreational saltwater license system.

Issue 9: Coastal Commercial Quota Allocation

- 2 people (including ASGA) commented the Board should update the commercial allocation.
- 6 people commented there should be a decrease in the number of commercial fishing days or the commercial quota and 2 people commented there should not be an increase in commercial fishing days or commercial quota.

Issue 10: Other Issues

Harvest Control

- 17 people (including SF) support a 10-year moratorium to allow the stock to rebuild; they noted a moratorium has proven effective in the past and the moratorium would be a chance to collect more data and reorganize. 1 person commented in support of a moratorium longer than 10 years if needed to rebuild the stock.
- 5 people support a catch and release only fishery and noted there is already enough recreational mortality with just catch and release alone given the high number of people fishing.
- 1 person commented that the commercial fishery should be closed until the stock is recovered.
- 1 person commented striped bass should be designated as a gamefish and commercial harvest should be eliminated.

Spawning Protections

- 1 person commented on the importance of the largest spawning fish and there should be a sharp cutoff at a specific length to protect these fish and all fishermen in all sectors must adhere to that length limit; this would also make enforcement more straightforward.
- 1 person commented in support of harvest restrictions after spawning.

Enforcement

- 15 people support increased license fees and using the increased revenue to support enforcement and/or other uses related to conservation such as data collection for the fishery.

Others

- 4 people commented the 2015 year class coming into the 28-inch slot limit needs to be protected.
- 2 people (including ASGA) recommend conducting research on human dimensions to understand angler effort and behavior changes and genetics work on stock distinction.
- 1 person commented there should be a metric for commercial discard mortality.
- 1 person commented there should be a way to notify managers if there is a problem in certain area (e.g. aggregating fish disappear) and managers should act quickly to close that area to fishing for a period of time.
- 1 person commented the Commission should work to limit beach pumping as beach pumping and replenishment are having negative impacts on fish and their distribution.
- 1 person commented that surf fisherman should not be in the same category as recreational fishermen with advanced technology to locate fish.

- 1 person commented that the definition of recruitment is not the same as young-of-the-year, recruitment is based on the size of the fish being recruited to the fishery and we need healthy females to recruit to the stock.
- 1 person commented on the issue of seal predation on striped bass.

General Comments:

- Concern about the current status and decline of the stock.
- This is not the right time to change the regulatory framework with a new amendment given the status of the stock and multiple uncertainties, including uncertainty around MRIP data and effort during the COVID-19 pandemic, uncertainty on how well the current slot limit is doing to reduce mortality, and uncertainty around loss of habitat;
- The Commission should hold themselves to the existing standards and not lower the goalposts.
- Lower abundance limits the areas where people can fish, especially shore-based anglers.

Striped Bass Amendment 7 PID Public Hearings
Webinar Hearing
March 17, 2021
62 Public Participants (see attached attendee list)

Hearing Officer: Jason McNamee (RI Dept. of Environmental Management)
ASMFC Staff: Toni Kerns, Emilie Franke

RI Commissioners/Proxies in attendance: Jason McNamee, David Borden

Commenters from:	
RI	13
MA	1
CT	1
NY	1

16 attendees provided comments including comments on behalf of the Rhode Island Saltwater Anglers Association (RISAA) and American Saltwater Guides Association (ASGA)

Issue 1: Goals and Objectives

- 5 people (including RISAA, ASGA) support maintaining Amendment 6 goal and objectives. ASGA noted the problem is the Board not meeting the established goals.
- 2 people commented the objective should include managing for the diverse stakeholders that fish for striped bass, including those that fish for consumption of striped bass, and not to favor one group over another.
- 4 people commented in support of managing for abundance and 1 person also commented on managing for a diversity of ages.
- 1 person commented in support of the regulatory consistency theme.

Issue 2: Biological Reference Points

- 8 people (including RISAA, ASGA) support maintaining the current reference points based on the 1995 estimate of SSB for the following reasons:
    - 1995 had a broad age structure/healthy stock and a good fishing year.
    - Lowering the BRPs would cause problems for the fishery.
    - Existing levels are appropriate and should not be compromised.
- 2 people commented the BRPs should be re-analyzed to consider the new MRIP estimates to determine if they are appropriate based on high level of harvest and mortality on the species now.

Issues 3-4: Management Triggers and Rebuilding Schedule

- 1 person supports maintaining all the current triggers and adhering to them.
- 2 people (including ASGA) support maintaining the current SSB and F management triggers and recommend revising the recruitment-based trigger.
- 2 people commented the F-based trigger should be based on a 3-year average due to the variability of the recreational catch.

- 2 people (including ASGA) support maintaining the 10-year rebuilding timeline and noted that a rebuilding plan should be put in place to address the overfished status as specified in Amendment 6; the Board has ignored the triggers and needs to adhere to the current framework.
- 1 person supports a more aggressive rebuilding timeline.

Issue 5: Regional Management

- 3 people (including ASGA) do not support a regional management approach for the following reasons:
    - Multiple fisheries cannot be managed at the same time and hard and fast rules are needed across the board, such as temperature thresholds for the recreational fishery and closed spawning areas across all states.
    - Science does not support regional management.

Issue 6: Conservation Equivalency

- 2 people support maintaining CE because it gives states the opportunity to adjust measures to address nuances in their state.
- 2 people (including ASGA) commented CE should not be used if overfishing is occurring and/or the stock is overfished and accountability measures must be in place to keep states accountable to their CE plans.
- 4 people commented CE should be eliminated because states have not been held accountable, CE does not benefit the fish, and all states must be held to the same standard.
- 2 people (including RISAA) commented there are too many CE plans and there is a lack of enforcement and accountability when states are overfishing and exceeding triggers.
- 1 person noted CE should be reconsidered due to a lack of accountability and inability to evaluate effectiveness.

Issue 7: Recreational Release Mortality

- 8 people (including RISAA, ASGA) support increasing angler education and outreach to reduce recreational mortality.
    - 3 people support the idea of a striper stamp, which could cost $25, which anglers would get after watching a video on proper handling and release techniques and passing a quiz on that video. RISAA noted the similar process required for getting a shark license.
- 2 people commented that management should take into account the high recreational rates and try to reduce the mortality to the extent practicable.
- 1 person supports exploring seasonal closures, including in the winter, to reduce recreational release mortality.
- There were several comments on changes in tackle and gear restrictions:

  - 2 people noted that more time/research is needed for tackle changes and 1 person noted tackle shops should be involved in angler education and outreach.
  - 2 people commented on additional gear restrictions including single hooks only, crushed barbs, and not allowing treble hooks.
  - 1 person commented circle hooks should not be required for eel skins and plugs.
  - 1 person commented circle hooks should not be required for rigged eels.
- 2 people (including RISAA) support new studies on release mortality to better understand what is causing mortality and ASGA supports the MA DMF study on recreational release mortality.

Issue 8: Recreational Accountability

- 2 people (including ASGA) commented this issue is bigger than just striped bass and should not be considered for this amendment.
- 1 person commented that a website is needed where recreational fishermen can provide data.

Issue 9: Coastal Commercial Quota Allocation

- 2 people (including ASGA) commented the allocation base period should be updated.

Issue 10: Other Issues

- 1 person commented the fishery should only be recreational and only catch and release.
- 1 person commented there should be more resources for enforcement.
- ASGA and 1 person recommend conducting research to quantify the value of the catch and release fishery and angler well-being as well as other social science research to understand the dynamics of the fishery.
- 3 people (including ASGA) support research on spawning areas to determine where fish are spawning.
- 1 person commented that the impact of seal predation on striped bass and the impacts of climate change should be considered.
- 1 person commented that the 28-inch fish moving into the slot limit need to be protected now and recommends potentially raising the slot limit up to 32 or 36 inches.
- 2 people commented that impacts of an abundant striped bass population on other species should be considered (e.g. striped bass as predators).

General Comments:

- Some commenters noted they are open to any restrictions, size limits, bag limits, etc. needed to rebuild the stock.
- Importance of the best available science.
- The reason for the current decline is because the management has yielded to political pressures instead of protecting the fish stock.

Connecticut Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 24, 2021
54 Public Participants (see attached attendee list)

Hearing Officer: Justin Davis (CT Dept. of Energy & Environmental Protection)
ASMFC Staff: Toni Kerns, Emilie Franke

CT Commissioners/Proxies in attendance: Justin Davis, Matthew Gates, Robert LaFrance

22 people provided comments including comments on behalf of Stripers Forever (SF) and American Saltwater Guides Association (ASGA)

Commenters from:	
CT	20
MA	1
NY	1

Issue 1: Goals and Objectives

- 9 people (including ASGA) support maintaining Amendment 6 goal and objectives and commented the problem is not the goals and objectives themselves but rather the Board not adhering to them; remove from amendment.
- 1 person commented that an objective should be to establish an F target that maximizes abundance of spawning striped bass with a focus on age 7 and up.
- 10 people commented in support of managing for abundance and 4 people support managing for a broad age structure.
- 1 person commented the focus should be reducing F to the target level to rebuild to the SSB target and keep it there for a number of years.

Issue 2: Biological Reference Points

- 13 people(including ASGA) support maintaining the current reference points based on the 1995 estimate of SSB (and so removing it from consideration) for the following reasons:
    - Failing to maintain a sustainable stock is not a reason to lower the bar.
    - Should strive for a robust population.
    - Do not consider a change to BRPs until the stock is rebuilt.

Issues 3-4: Management Triggers and Rebuilding Schedule

- 2 people support maintaining all the current triggers and adhering to them.
- 3 people (including ASGA) support maintaining the current SSB and F management triggers and recommend revising the recruitment-based trigger.
- 8 people (including ASGA) support maintaining the 10-year rebuilding timeline and noted that a rebuilding plan should be put in place to address the overfished status as specified in Amendment 6.

- 2 people support a more aggressive rebuilding timeline as quickly as possible.

Issue 5: Regional Management

- 8 people (including ASGA) do not support a regional management approach for the following reasons:
    - Not enough science to support regional management at this time, particularly need better genetic analyses.
    - The stock should be managed as one coastwide unit.
    - Stick to current methods especially while the stock is overfished.

Issue 6: Conservation Equivalency

- 8 people (including ASGA) commented CE should not be used if overfishing is occurring and/or the stock is overfished and accountability measures must be in place to keep states accountable to their CE plans; CE creates uncertainty.
- 5 people commented CE should be eliminated because the stock should be managed as one body of fish on a coastwide basis.

Issue 7: Recreational Release Mortality

- 11 people (including ASGA) support increasing angler education and outreach on safe handling and release.
- 3 people (including ASGA) support the MA DMF study on recreational release mortality.
- 1 person commented that the release mortality rate used in the assessment is not accurate and may not be the best data to use.
- 1 person commented that more research is needed to understand the impact of the circle hook requirement on mortality.
- 3 people support the circle hook requirement and 1 person commented that enforcement will be difficult.
- 1 person spoke against the circle hook requirement and suggests additional research be conducted on circle hooks and recreational release mortality in general.
- 1 person supports barbless hooks.
- 1 person encourages tackle companies to alter lure designs to include inline hooks.
- 7 people support closing the winter fishery for holdover bass in the Housatonic River due to concern about release mortality in cold waters when fish are lethargic and wet gills are exposed to cold air as well as concerns about poaching.

Issue 8: Recreational Accountability

- 1 person supports an RHL if it is supported by science.
- 6 people (including ASGA) commented this issue applies to multiple species and is too complex to address in this amendment; remove from amendment.

- 1 person commented that more research is needed overall to understand the impact of recreational anglers.

Issue 9: Coastal Commercial Quota Allocation

- 5 people (including ASGA) commented the commercial allocations should be updated to reflect today's commercial fishery.
- 1 person commented that charter boats should be included in the commercial quota and not the recreational quota.
- 1 person supports bycatch reduction improvements to reduce waste by the commercial industry.

Issue 10: Other Issues

Harvest Control

- 6 people supports making striped bass a catch and release only fishery[1], similar to tarpon in Florida, and noted the higher economic value of striped bass in the water supporting local economies vs. the lower value of striped bass on a dinner plate.
- 2 people commented there is economic value of harvesting striped bass and this issue should be considered objectively from both sides.
- 1 person commented that a 1 fish bag limit is sufficient.
- 1 person (SF) supports a 10-year moratorium on harvest as the only approach to allow the stock to rebuild; during that time additional data can be collected to inform the management plan.

Spawning Protections

- 1 person supports additional controls during the spawning season.

Enforcement

- 2 people also support more enforcement and increased funding for enforcement. Specific recommendations include stronger fines on the spot for illegal possession and increased patrol on the Housatonic River during the winter to address poaching.

Others

- 3 people (including ASGA) recommend conducting human dimensions research and research on spawning areas to determine where fish are spawning.
- 4 people commented on the importance of prioritizing protection of good year classes like the 2015 year class; also consider what environmental factors contribute to good year classes.
    - 2 people support changing the slot limit (e.g., widening the slot limit to 28-40 inches) so the focus is not just on one year class.

[1] Participants at this hearing used the term "gamefish status" to refer to a catch and release only fishery, similar to tarpon in Florida. In other hearings, "gamefish status" was used to describe a fishery that is recreational only but does allow recreational harvest.

- 1 person noted the 2018 assessment was biased and did not look for fish more than 3 miles from shore.
- 1 person suggests moving the minimum size limit to 32-36 inches to help manage for abundance.
- 2 people commented on the importance of menhaden as forage for striped bass and the need to monitor Omega Protein's menhaden harvest; maintain a good predator to prey ratio.

General Comments:

- More research is needed to understand the fishery, specifically the impact of the recreational sector, and conduct more frequent stock assessments.
- This amendment process is ill-timed and the focus should be on the rebuilding plan.
- Some support for generally conservative measures until the fishery is rebuilt and more information is available.
- Environmental impacts are important but they are not an excuse for changing regulations.
- Concern that Amendment 7 is moving forward without a new stock assessment and without data on how the new slot limits have performed.
- Concern about the accuracy of MRIP data.

New York Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 23, 2021
77 Public Participants (see attached attendee list)

Hearing Officer: Maureen Davidson (NY Dept. of Environmental Conservation)
ASMFC Staff: Toni Kerns, Emilie Franke, Maya Drzewicki

NY Commissioners/Proxies in attendance: Maureen Davidson, Emerson Hasbrouck, John McMurray

20 people provided comments including comments on behalf of New York Coalition for Recreational Fishing (NYCRF), Stripers Forever (SF), Tightlined Conservation Coalition (TCC), Menhaden Project (MP), and Southern Maryland Recreational Fishing Organization (SMRFO)

Commenters from:	
NY	16
MD	2
CT	1
CA	1

Issue 1: Goals and Objectives

- 6 people (including TCC) support maintaining Amendment 6 goal and objectives and adhering to them.
- NYCRF recommends changing the goal to focus on a striped bass stock characterized by a broad age structure, self-sustaining spawning stock, and provide for restoration of essential habitat.
- 6 people (including TCC) commented in support of managing for abundance.
- 4 people are not in favor of flexibility and 3 are also not in favor of management stability; these management themes should not work against the overall goal of maintaining a healthy stock and a stable stock is more important than stable regulations.
- 2 people support managing the toward a fishery that is as good or better than in 2003 when there were an abundance of fish, including big fish, a good age structure, and fish available for all sectors. Another person supports managing for a broad age structure.
- 2 person commented the Commission should be working for the fish first.

Issue 2: Biological Reference Points

- 11 people (including NYCRF, TCC) support maintaining the current reference points based on the 1995 estimate of SSB for the following reasons:
    - It is possible to hit the target again if the fishing mortality target is achieved.
    - 1995 was selected for valid reasons.
    - The goal post should not be changed.
    - The current BRPs would keep an abundance of spawning females to buffer the stock.

- 1 person commented that the questions about population dynamics (e.g., how big should the population be?) are questions for the TC and not for the public.

Issues 3-4: Management Triggers and Rebuilding Schedule

- 3 people support maintaining all existing management triggers and adhering to them.
- 2 people (NYCRF, TCC) support maintaining the current SSB and F management triggers and recommend revising the recruitment-based trigger. NYCRF suggests a 3-year rolling average or 3 out of 5 years for the recruitment trigger and requiring immediate discretionary action.
- 2 people commented on the importance of protecting incoming year classes and 1 person commented that there needs to be a quicker reaction to the triggers and when there is low spawning success and action should be taken to reduce harvest as fish come into the fishery to protect year classes.
- 5 people (including NYCRF, TCC) support maintaining the 10-year rebuilding timeline and commented the Board needs to stick to this timeline to rebuild the stock.
- 2 people supports rebuilding as quickly as possible with a more aggressive timeline.

Issue 5: Regional Management

- 9 people do not support a regional management approach for the following reasons:
    - Everyone should be at the same harvest level.
    - Coastwide measures are sufficient to implement regulations such as coastwide spawning area closures.
    - There is currently not enough science available to support regional management.
    - Migratory fish should be managed as a whole.
- 2 people (including SF) support regional management, specifically seasonal closures of spawning areas like the NY Bight to protect spawning females.

Issue 6: Conservation Equivalency

- 12 people commented CE should be eliminated from the FMP for the following reasons:
    - All states should fish at the same fishing mortality rate.
    - Nearly impossible to quantify the results of the CE regulations.
    - Allows states to take more fish without any consequences and get away with having less restrictions than the coastwide measures.
    - Allows for special interests, loopholes, and too many exceptions.
    - The regulations should be the same for a migratory fish.
- NYCRF supports CE only if CE plans are actively managed to meet their goals and accountability measures are in place to hold states to their harvest reductions. Maryland's CE plan under Addendum IV was part of the reason the 2011 year class was not protected.

Issue 7: Recreational Release Mortality

- 9 people (including TCC, SF, NYCRF) support increasing angler education and outreach on safe handling.
    - Suggestions include a video on safe handling/release techniques and a striper stamp that could also fund additional science.
    - NYCRF recommends the Commission provide grants for education on the importance of an abundant fishery, use circle hooks, responsible harvestings, and safe handling as well as consider making education a requirement as part of the Recreational Marine Fishing Registry System.
- TCC supports the ongoing MA DMF study on catch and release mortality rates.
- 4 people (including SF) support gear restrictions, including limiting treble hooks to one per artificial lure, requiring flattened barbs and no gaffing.
- 2 people support temperature thresholds when the water is too warm.
- 1 person commented that a fish that recreational release mortality is no worse than mortality from retaining a fish and fish that are caught and released provide more economic benefit and opportunity; this economic benefit is closely tied to abundance.
- 3 people commented that recreational release mortality is just part of the recreational fishery and more focus should be on reducing harvest and rebuilding than on recreational release mortality; it can be viewed as 91% of fish do survive.

Issue 8: Recreational Accountability

- 2 people (including NYCRF) people do not support using an RHL at this time because there is not enough data available.
- 3 people support using a tag system to control harvest.
- 2 person commented that the recreational sector is willing to do what it takes, including collecting and providing data.
- 1 person suggests assigning days when people can fish with some on odd days and some on even days to address the growing recreational effort.
    - 1 person is not in favor of assigning even/odd fishing days.
- TCC commented this issue should be removed from consideration because it is too big of an issue for this amendment.
- 1 person commented there should be annual catch limits tied to biomass conditions and there should be collective accountability at the coastwide level, except if a state uses CE there should be accountability at the state level. If managers don't want to change measures every year, they could set regulations 10% below levels that produce the F target so if that specified level is exceeded, the regulations do not have to change; this would maintain stability while having a harvest limit.
- 1 person commented that this issue is misleading and recreational anglers abide by regulations and are therefore accountable; this section should be referred to as achieving recreational harvest targets.

Issue 9: Coastal Commercial Quota Allocation

- 2 people support updating commercial quota allocation from the 1970s timeframe, including reevaluating allocation to states that do not have a commercial fishery.
- NYCRF does not support making any changes to the commercial quota allocation.

Issue 10: Other Issues

Harvest Controls

- 4 people (including SF) support a 10-year moratorium on harvest for both sectors. The moratorium would provide time to conduct additional science like a new catch and release mortality study, reevaluate the assessment, and inform an effective management plan.
- 2 people commented against a moratorium.
- 1 person commented that a healthy fishery there can be both harvest and release.

Spawning Protection

- 5 people (including SF) support spawning closures to protect spawning success.

Enforcement

- 4 people (including SF) support stronger penalties for enforcement violations to better serve a deterrent.

Others

- NYCRF commented on the budgetary pressures for enforcement and actions should be considered to improve enforcement.
- NYCRF commented that as a consequences of failing to take action under management trigger 4, the TC should conduct a retrospective analysis to determine how changes to Amendment 6 would have impacted the fishery and anything that does not align with the FMP should be excluded from Amendment 7.
- NYCRF commented on the TC's failure to account for the 2011 year class in their analysis of Maryland Addendum IV proposals and recommends institutional and operational changes to make sure this does not happen again.
- NYCRF commented that using a 50% confidence level for managing fishery is not sufficient and should be increased for any proposed management action.
- 2 people (SMRFO, MP) commented on the importance of menhaden for striped bass survival and they support including menhaden mortality rates and required menhaden thresholds in the striped bass management document. They ask that NY Commissioners take action to support moving the menhaden reduction fishery out of the Chesapeake Bay and into the offshore area outside of three miles from shore; this would benefit striped bass along the entire coast.
- 2 people support increased education on the effects of climate change, environmental factors, health concerns around consuming striped bass, the importance of prey in the ecosystem, and the responsibility to self-enforce regulations.

General Comments:

- Importance of using the best available science.
- The Board should not give in to industry pressure and should do what is best for a sustainable stock.
- The recreational sector has lost confidence in the Board after its failure to act quickly to rebuild the stock after seeing the warning signs and after the stock was declared overfished; there has been a general lack of accountability.
- There are important cultural values and mental health benefits attached to striped bass.
- Desire for transparency and accountability.
- Concern about observed stock declines and impacts to local economies; important to recognize the high economic value of the recreational fishery.

New Jersey Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 25, 2021
67 public participants (see attached participant list)

Hearing Officer: Joe Cimino (NJ Fish and Wildlife)
ASMFC Staff: Toni Kerns, Emilie Franke

NJ Commissioners/Proxies in attendance: Joe Cimino, Heather Corbett, Tom Fote, Adam Nowalsky

Commenters from:	
NJ	14
NY	2
CT	1
PA	1
NH	1

19 people provided comments including comments on behalf of Stripers Forever (SF) and Menhaden Defenders (MD)

Issue 1: Goals and Objectives

- 1 person supports maintaining Amendment 6 goal and objectives.
- 5 people commented in support of managing for abundance.
- 1 person commented there should not be all these extremes of managing from down periods to up periods and back down again.

Issue 2: Biological Reference Points

- 8 people support maintaining the current reference points based on the 1995 estimate of SSB for the following reasons:
    - 1995 was a healthy mix of age classes and was full restored.
    - Lowering the benchmark would make it easier for people to harvest more fish.
    - Striped bass are already in a bad state with the current BRPs, should not lower and make it worse.
    - Having to many moving targets is detrimental to the fishery.
    - Lowering the BRPs would have an effect on menhaden ERPs; need to hold the line on BRPs so Omega Protein cannot increase their harvest.
- 1 person commented the SSB threshold should be slightly lower than the 1995 peak.

Issues 3-4: Management Triggers and Rebuilding Schedule

- 4 people support maintaining the 10-year rebuilding timeline and noted that a rebuilding plan should be put in place to address the overfished status as specified in Amendment 6; there needs to be accountability for rebuilding within the 10-year time.
- 1 person commented on the need to rely more on trending data when management regulations are established; need to fine-tune management response to these triggers.

Issue 5: Regional Management

- 3 people (including SF) support regional management for the following reasons:
    - Nurseries need different management, including seasonal closures for spawning locations, including the Hudson River, to allow striped bass to spawn and produce strong year classes.
    - Regional data are available to protect spawning stocks and need to focus on stock distinctions in the spring and genetics research.
- 1 person does not support a regional management approach and supports standardized regulations across the states.
- 1 person voiced concerns for regional depletions, like in the Delaware Bay where the stock was depleted and quota is allocated in the spring during spawning season.

Issue 6: Conservation Equivalency

- 1 person commented CE should not be used if overfishing is occurring and/or the stock is overfished and accountability measures must be in place to keep states accountable to their CE plans.
- 2 people commented CE should only be used if there are accountability measures in place to payback overages; concern about overages in NJ and MD.
- 5 people commented CE should be eliminated because the results cannot be quantified, there are too many loopholes and uncertainty, it should not be used for a migratory fish, and states do not have accountability and can make up their own rules.

Issue 7: Recreational Release Mortality

- 5 people (including SF) support increasing angler education and outreach including on safe handling practices and circle hook requirements; this could include a required video with a test and permit similar to sharks.
- 1 person commented that the impact of the circle hook requirement should be evaluated and quantified and 1 person supports the requirement that striped bass must be released if caught incidentally with a non-circle hook when fishing with bait.
- 4 people (including SF) support additional gear restrictions including banning treble hooks, pinching barbs/barbless hooks, and/or limiting one treble hook per artificial lure.
- 1 person supports considering ways to reduce effort such as not fishing 1 day per week.
- 2 people (including SF) support updating catch and release mortality studies to reflect changes to current gear awareness and environmental conditions.

Issue 8: Recreational Accountability

- No comments were given.

Issue 9: Coastal Commercial Quota Allocation

- No comments were given.

Issue 10: Other Issues

Harvest Controls

- 2 people (including SF) support a 10-year moratorium on harvest for the recreational and commercial sectors. During that time, science can be conducted and management can be reevaluated.
    - 1 person asked what a moratorium would look like for catch and release anglers and if directed fishing for striped bass would be allowed.
    - NJ Commissioners noted several factors that would dictate what a moratorium would look like and the impact it would have, including the level of effort and availability of fish and input from law enforcement.
    - SF commented that any fish that is kept has a 100% mortality rate and a moratorium on harvest would reduce that mortality rate to the 9% mortality rate of catch and release fishing.
    - 2 people commented that a moratorium is too extreme and a Commissioner from another state commented the situation is not dire enough for a moratorium at this point.
- 1 person supports banning commercial harvest for 5 or more years.
- 1 person supports catch and release only for 5 years to get the stock to a better place.
- There should be a balance between access and conservation; harvest should be allowed in some form.

Enforcement

- 4 people (including SF) support stronger fines for poaching and/or increased enforcement.

Others

- 2 people support increased outreach around health concerns about consumption of striped bass and bioaccumulation in fish.
- 3 people (including MD) support an ecosystem-based approach considering the availability and abundance of prey for striped bass; baitfish need to be protected to support the striped bass fishery. MD commented on the importance of protecting the forage base in Chesapeake Bay and the continued menhaden reduction fishery impacts striped bass coastwide.
- 2 people commented on the importance of protecting year classes and concern for the 2015 year class reaching the slot limit; concerned about a hole in fishery with the current slot limit and the unbalanced stock age structure.
- 2 person commented on habitat protection, particularly for nursery areas and rivers and considering the impacts of sand mining that may limit inshore habitat availability.
- 1 person commented the NJ striped bass bonus program should have a fee associated with tags to raise money for states.

- 1 person supports eliminating the NJ striped bass bonus program, especially with the current stock status and threat to the 2015 year class, and the program does not align with rebuilding the stock.
- 1 person supports a mechanism to assess commercial bycatch.

General Comments:

- Importance of using the best available science.
- The Commission did not take action quickly enough to prevent overfishing and respond to the management triggers and the Commission has been catering to a small part of the community and those economic beneficiaries. The complexity of the management plans and the inability to quantify science has been detrimental and the Commission needs to move quickly to prevent stock failure.
- Observation that if the stock is not abundant, then fish tend to stay out in deep water.
- General concern about the observed decline of the stock and resulting negative impacts to local economies.
- Focus on the long-term health of the fishery and rebound of the stock.

Delaware Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 16, 2021
14 Public Participants (see attached attendee list)

Hearing Officer: John Clark (DE Division of Fish and Wildlife)
ASMFC Staff: Toni Kerns, Emilie Franke, Maya Drzewicki

DE Commissioners/Proxies in attendance: John Clark, Roy Miller

Commenters from:	
DE	2

2 people provided comments including comments on behalf of the American Saltwater Guides Association

Issue 1: Goals and Objectives

- 1 person (ASGA) commented this issue should be removed from consideration. They support Amendment 6 goal and objectives and noted the goals are not the issue, but the problem is the Board does not adhere to those goals.

Issue 2: Biological Reference Points

- 1 person (ASGA) supports maintaining the current reference points based on the 1995 estimate of SSB and removing this issue from consideration.
- 1 person commented the target is set too high and that is why it has not been achieved. They commented the Board needs to take into account the negative feedbacks that occur at high population densities and intraspecific competition that can cause population declines. They also commented the overfishing threshold is also too high and is above what is typically used (e.g. half of MSY biomass would be used for the overfishing threshold). They commented the Board should have a scientific basis for the reference points and also consider the impacts of building up the striped bass population and their effect as predators of other species like shad and weakfish. They also commented that the age data used in the assessment is biased and tends to under-age fish which underestimates SSB and biases the F estimates too high. Further, they commented the Board should not ignore the results from the tagging model included in the assessment.

Issues 3-4: Management Triggers and Rebuilding Schedule

- 1 person (ASGA) supports maintaining the current SSB and F management triggers and recommend revising the recruitment-based trigger.
- 1 person (ASGA) supports maintaining the 10-year rebuilding timeline and noted that a rebuilding plan should be put in place.

Issue 5: Regional Management

- 1 person (ASGA) commented this should be removed from consideration and does not support regional management.

Issue 6: Conservation Equivalency

- 1 person (ASGA) commented CE should not be used if overfishing is occurring and/or the stock is overfished.

Issue 7: Recreational Release Mortality

- 1 person (ASGA) commented that addressing this issue is premature given the ongoing study by MA DMF. ASGA commented continuing angler education should be the focus.

Issue 8: Recreational Accountability

- 1 person (ASGA) commented this issue should be removed from consideration because it is too complex for this amendment.

Issue 9: Coastal Commercial Quota Allocation

- 1 person (ASGA) recommends the Board revisit commercial allocation to better reflect the characteristics of today's commercial fishery.
- 1 person commented using the 1970s as a basis for commercial allocation is unfair because there was no DE river spawning stock at that time and so no landings in Delaware during that time period. The person commented on the importance of the DE Bay and DE River as a producer area and the current quota allocation does not reflect that.

Issue 10: Other Issues

- 1 person (ASGA) recommends expanding human dimensions research and research to better understand the impacts of person spawning stock, including the DE Bay and DE Rive stock, to the whole population.

Maryland Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 22, 2021
82 Public Participants

Hearing Officer: Mike Luisi (MD Dept. of Natural Resources)
ASMFC Staff: Toni Kerns, Emilie Franke

MD Commissioners/Proxies in attendance: Mike Luisi, David Sikorski

14 people provided comments including comments on behalf of the Southern Maryland Recreational Fishing Organization (SMRFO) and Chesapeake Bay Foundation (CBF)

Commenters from:	
MD	13
ME	1

Issue 1: Goals and Objectives

- 1 person commented that the focus needs to be on reducing removals.
- 1 person commented that the primary goal should be to meet the SSB target.
- 1 person does not support the flexibility theme.
- 1 person (SMRFO) commented the goal and objective should be a healthy recreational fishery, whatever it takes.

Issue 2: Biological Reference Points

- 5 people (including CBF) support maintaining the current reference points based on the 1995 estimate of SSB and commented the BRPs should not be changed just because the target has not been achieved.

Issues 3-4: Management Triggers and Rebuilding Schedule

- 1 person supports maintaining the triggers and evaluating the triggers each year with consequences if a trigger is exceeded.
- 1 person commented that a higher recruitment threshold should be considered to fuel a healthier stock.
- 1 person supports a more rapid rebuilding timeline of 5 years.
- 1 person supports rebuilding the stock as quickly as possible by whatever means necessary.

Issue 5: Regional Management

- 1 person supports exploring a regional management program for the Chesapeake Bay, given its unique ecosystem and environmental factors, and the need to collect information to determine what a separate management for the Chesapeake Bay would look like.

- 1 person does not support considering regional management until the coastwide stock is rebuilt.
- 1 person commented on the importance of regional data in the assessment model.

Issue 6: Conservation Equivalency

- 4 people (including CBF) commented CE should not be used if overfishing is occurring and/or the stock is overfished and accountability measures must be in place to keep states accountable to their CE plans if reductions are not reached and need to show quantifiable results.
- 1 person commented CE should be limited and states must be held accountable to monitor effectiveness.
- CBF noted concern about MRIP data in state proposals and commented states should submit supplemental data collection plans to monitor proposals.

Issue 7: Recreational Release Mortality

- 2 people (including CBF) support increasing angler education to reduce recreational mortality and better communicate the impact of regulations to anglers. CBF also noted the importance of consistent communication.
- 3 people commented that one study and one recreational release mortality rate (9%) should not be applied to all recreational anglers and the mortality rate needs to distinguish among time of year, gear, fishing method etc.
- 1 person supports the ongoing work by MA DMF on release mortality.
- 1 person commented there needs to be a companion study done in MD to inform management of the stock in warmer waters.
- 1 person commented the Commission should take a leadership role in release mortality studies and could potentially make it a condition for states to conduct research if they choose to pursue CE related to this.
- CBF supports consideration of gear and time or area closures.
- 1 person commented that Maryland should close the Chesapeake Bay for both sectors when water gets over 80 degrees.

Issue 8: Recreational Accountability

- 2 people support using a tag system for recreational harvest and giving fishermen a seasonal limit.
- 1 person commented there should be a program where recreational anglers can register and log information from their catches and many recreational anglers would be willing to participate.
- 1 person commented that CPUE data is critical and effort needs to be accounted for in Maryland in this intercept fishery.

- 1 person commented that whatever direction managers decide to go for this issue, it should increase the population, especially for the spawning fish.

Issue 9: Coastal Commercial Quota Allocation

- 1 person commented commercial quotas should be tightened.

Issue 10: Other Issues

Harvest Control

- 2 people support a moratorium if needed.

Spawning Protection

- 3 people commented that a slot limit should be implemented to protect spawning females (over 32 inches or over 30 inches) and that protecting the female breeders is the only way to increase the stock.

Enforcement

- 1 person commented that effective enforcement programs should be incentivized, especially for CE, and states need to show they have effective enforcement programs.

Others

- 1 person commented that regulations should recognize and take into account the important nursery area in the Chesapeake Bay.
- 2 people (including CBF) commented concern about the impacts of climate change on striped bass vital rates, recruitment, mortality, and distribution. CBF commented it should be incorporated into management using a predictive model of F and recruitment under difference scenarios.
- SMRFO commented the recent study on ecological reference points should be a focus of Amendment 7 which should account for the menhaden mortality rate and its impact on striped bass. CBF also supports considering the forage base in the management of striped bass.
- CBF commented states should be required to develop habitat conservation plan that should include measures to address pollution and other environmental variables.
- 1 person commented the definition of recruitment is how many fish get old enough to be caught and using young-of-the-year as the definition is not a good measure of success; at a minimum standard recruitment is 18 inches and this is an issue because females become vulnerable to overfishing at 18 inches in the Chesapeake Bay.
- 1 person specifically commented there needs to be frequent stock assessments and more local assessment data.

General Comments:

- Need to fund more science and better data to inform the models in order to gain public trust, address the complexity of the fishery, and have more accountability.

- The Commission should not be focused on a new amendment at this time and should be focused on the rebuilding plan; Amendment 6 is still useful and appropriate that could be applied if it could be enforced.
- The Commission needs to take conservation action and there needs to be real way to quantify the mortality reductions; the model should include conservatism, for example by taking SSB and recruitment estimates and scaling with a factor less than 1 to create a savings of the resource that never goes into the biomass for harvest.
- The PID should more clearly reflect the state of the fishery and the lows in harvest and population, particularly in the Chesapeake Bay.

Potomac River Fisheries Commission Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 15, 2021
47 Public Participants (see attached attendee list)

Hearing Officer: Marty Gary (PRFC)
ASMFC Staff: Toni Kerns, Emilie Franke, Maya Drzewicki

PRFC Commissioner in attendance: Marty Gary

Commenters from:	
MD	7
VA	4

11 attendees provided comments including comments on behalf of Maryland Waterman's Association (MWA), American Saltwater Guides Association (ASGA), Chesapeake Bay Foundation (CBF), and Virginia Saltwater Sportfishing Association (VSSA).

Issue 1: Goals and Objectives

- ASGA commented in support of maintaining Amendment 6 goal and objectives and noted that the goals are not the problem and the problem is the Board not adhering to those goals.
- 2 people support stability and sustainability to protect and keep high levels of SSB and to protect a broad age structure; also support flexibility through CE.
- CBF commented management stability and flexibility should not the focus while the stock is in a depressed state.

Issue 2: Biological Reference Points

- 2 people (ASGA, CBF) support maintaining the current reference points based on the 1995 estimate of SSB for the following reasons:
    - The goalpost should not be moved and the Board needs to manage properly to the current BRPs to rebuild the stock.
    - The BRPs are the most important issue in the PID and there is no scientific reason to change them.
- 3 people commented the Board should continue to discuss the BRPs and it was suggested the Board consider if the 1995 level of abundance is achievable with current fishing and consider that the population is not the same now as it was in 1995, which was 5 years after the moratorium.

Issues 3-4: Management Triggers and Rebuilding Schedule

- VSSA supports maintaining the current SSB and F management triggers and recommend modifying the recruitment trigger to reflect a 3-year rolling average instead of 3 consecutive years.

- 2 people commented that the F-based triggers requiring action within 1 year is too extreme and a 2-3 year timeframe would be easier for management implementation and for the public to understand why the action is being put in place.
- ASGA supports maintaining the 10-year rebuilding timeline and noted that a rebuilding plan should be put in place since the stock has been declared overfished for a few years already.

Issue 5: Regional Management

- 2 people support a regional management approach and a 2-stock model and note the Chesapeake Bay needs its own data.
- ASGA does not support a regional management approach and commented it is already hard to manage as one stock and splitting into two stocks would be harder.

Issue 6: Conservation Equivalency

- 2 people support maintaining CE to allow each area to regulate for their region and nuances while keeping F where it needs to be.
- ASGA commented CE should not be used if overfishing is occurring and/or the stock is overfished and MRIP data are not reliable; Maryland is using bad data with their CE plans to create extra fishing and extra harvest.

Issue 7: Recreational Release Mortality

- 2 people (including ASGA) support angler outreach and education and strategies like keeping fish in the water and changing barbs on hooks. ASGA also commented the release mortality numbers are not right and the MA DMF study should be used.
- 3 people (including MWA) support considering restrictions for catch and release during periods of extreme heat; restrictions could be during a time period in the middle of the day when temperatures are high or based on temperature thresholds or heat index levels.

Issue 8: Recreational Accountability

- 1 person supports using a quota for the recreational sector and 2 people support using a tag system to limit how many fish the recreational sector can take.
- 3 people (including MWA) commented there needs to be more accountability in the recreational sector; MRIP is not reliable and there needs to be a reporting system that is more reliable.

Issue 9: Coastal Commercial Quota Allocation

- ASGA commented the Board should work with the Technical Committee to updated allocations to better reflect today's commercial striped bass fishery.

Issue 10: Other Issues

- 1 person commented on the importance of recruiting fish to the SSB to become breeders and commented the Commission should not be using YOY as a proxy for recruitment and there is no scientific precedent for this. They referenced a 2004 Commission publication that defines recruitment as 18 in for the Chesapeake Bay and 28 inches for the ocean and commented the Commission should be using this scientific definition and not YOY.
- 3 people (including MWA) noted concern about predation on striped bass including by cormorants and blue catfish.
- CBF commented that climate change should be factored in when managing the population in the future; striped bass rely on cool wet springs for spawning activity and there may less of those in the future.

General Comments:

- Concern about the lack of management that has let the fishery collapse; managers should draw from management of other anadromous species.

Virginia Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 10, 2021
29 Public Participants (see attached attendee list)

Hearing Officer: Pat Geer (VMRC)
ASMFC Staff: Toni Kerns, Emilie Franke

VA Commissioners/Proxies in attendance: Pat Geer

Commenters from:	
VA	6

6 people provided comments including comments on behalf of the Virginia Waterman's Association (VWA—represented by Thompson McMullan), Twin Rivers Waterman's Association (TRWA—represented by Thompson McMullan), Virginia Saltwater Sportfishing Association (VSSA), American Saltwater Guides Association (ASGA), Virginia Anglers Club (VAC), and Chesapeake Bay Foundation (CBF)

Issue 1: Goals and Objectives

- 3 people (VSSA, CBF, VAC) commented in support of maintaining the Amendment 6 goal and objectives.
- 3 people (including VWA, TWRA) noted the guiding themes are not goals and they should not override the goal of achieving a sustainable striped bass population and to support commercial recreational fishing communities. They also commented the striped bass fishery is not a unitary fishery and management should not be limited by consistency; flexibility should be provided to achieve the goals.
- 2 people (VSSA, VAC) commented there is too much emphasis on stability and the Board is not making changes or taking action fast enough.
- CBF commented that management stability and flexibility should not be the focus until the stock is healthier.
- 2 people (VSSA, VAC) commented the Board needs to rebuild biomass and to cut back on mortality; also want to see a broad age distribution.

Issue 2: Biological Reference Points

- 3 people (VSSA, CBF, VAC) support maintaining the current reference points based on the 1995 estimate of SSB for the following reasons:
    - There is no science to justify changing the BRPs.
    - The existing targets and thresholds are easy to understand for a complex fishery.
    - Any increase in F would be a lot of pressure on the stock.
- 3 people (including VWA, TWRA) support moving forward as quickly as possible with the two-stock assessment model to address differences in the Bay and ocean fisheries.

Issues 3-4: Management Triggers and Rebuilding Schedule

- 3 people (VSSA, CBF, VAC) support maintaining the current SSB and F management triggers and recommend revising the recruitment-based trigger. CBF noted concern about the Board failing to take action on these triggers in the past.
- 2 people (VSSA, VAC) recommend changing the rebuilding timeline to 5-7 years maximum.

Issue 5: Regional Management

- 6 people (including VWA, TWRA, VSSA, CBF, VAC) support a regional management approach for the following reasons:
    - One-size-fits-all management has not been working and the Board should use the tools available to them and not be weighed down by inflexibility.
    - The Chesapeake Bay is a producer area.
    - The Chesapeake Bay has different harvesting strategies and managers need the ability to manage their unique fisheries.
- 2 people (VSSA, VAC) commented that any regional management for the Hudson or Delaware Bay should not be included in this amendment.

Issue 6: Conservation Equivalency

- 3 people (including VWA, TWRA) support the current use of CE to provide flexibility recognizing the differences among regions, sectors, and fisheries.
- 3 people (VSSA, CBF, VAC) commented CE should not be used if overfishing is occurring and/or the stock is overfished and accountability measures must be in place in order for a proposal to be approved. VSSA recommends limiting it to one proposal per state.

Issue 7: Recreational Release Mortality

- 3 people (CBF, VAC, ASGA) support of continuing angler education and gear restrictions.
- VSSA commented this issue generally needs to be addressed.
- 2 people (CBF, VAC) commented that seasonal closures (when water and air temps are high) should be considered.
- ASGA is not in favor of seasonal closures that would reduce access for anglers.
- 3 people (including VWA, TWRA) spoke against a one-size-fits-all management for both the commercial and recreational sectors to address issues like dead discards.
- ASGA commented that dead discards in the recreational fishery are not a total loss and they still have intrinsic economic value.

Issue 8: Recreational Accountability

- 3 people (including VWA, TWRA) support an RHL for the recreational sector.
- 2 people (VSSA, VAC) commented this issue generally needs to be addressed.

Issue 9: Coastal Commercial Quota Allocation

- 3 people (including VWA, TWRA) commented the Chesapeake Bay needs to be recognized as a producer area and treated differently.
- 2 people (VSSA, VAC) do not support including this issue in Amendment 7 at this time.

Issue 10: Other Issues

- 2 people (CBF, VAC) identified the following issues of concern for striped bass: climate change, loss of prey availability, reduced spawning capacity, and increasing stressors from climate change and that the Board should more strongly take climate change into account.
- VSSA commented the menhaden ERPs will be affected if striped bass BRPs are changed, so the striped bass BRPs should be maintained.

General Comments:

- Supports a precautionary approach and using the best available science.
- Amendment 7 should be strengthened with greater accountability measures.
- Favor a proactive management process.

Maine Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 9, 2021
Attendee List

Last Name	First Name	State
Abbott	Dennis	New Hampshire
Audet	Jerry	Massachusetts
Baggitt	Shaun	Maine
Barnes	Duncan	Maine
Batter	Victoria	Maine
Beckman	Brian	Maine
Berry	Howard	Maine
Bickford	Matt	Maine
Blanchette	Larry	Maine
Bloom	Charlotte	Maine
Brown	Chase	Maine
Brown	Clarisse	Maine
Bryand	Michael	Maine
Cieri	Matthew	Maine
Cloutier	Germain	Maine
Conceicao	Ryan	New Hampshire
Curley	Brendan	Massachusetts
Dameron	John	Virginia
Desisto	Stephen	Massachusetts
DiMento	Brian	Maine
Dooley	Mike	Maine
Fallon	Peter	Maine
Faulkingham	Mike	Maine
Friedrich	Tony	Maryland
Fuda	Tom	Connecticut
Gary	Martin	Virginia
Geer	Pat	Virginia
Gerrish	Parker	Maine
Gibson	Barry	Maine
Gillespie	Chris	Maine
Goldsmith	Willy	District of Columbia
Hildreth	Carle	Maine

Hoffer	Scott	Maine
Humphrey	Bob	Maine
Jenner	Blaise	Maine
Johnson	Tom	Maine
Jowett	Doug	Maine
Kaler	Benjamin	Maine
Karwacky	Kurt	Maine
Keliher	Pat	Maine
Kleiner	Don	Maine
Lambert	Sam	Maine
Landry	Aaron	Maine
Leary	Peter	New York
Lepine	Bruce	New Hampshire
Liberty	Robert	Maine
Lorello	Michael	Maine
McDaniel	John	Virginia
Mohlin	Peter	Maine
Myers	Evan	Maine
Oliver	Zane	Virginia
Owens	Wallace	Virginia
Pecci	David	Maine
Piatek	Chris	Maine
Polakowski	Mick	Maine
Pschirrer	Rich	Maine
Rosa	Bryan	Maine
Reardon	Jeffrey	Maine
Riley	Libby	Maine
Roberts	Courtney	Maine
Rudman	Patrick	Maine
Sands	Cody	Maine
Sarcona	Tony	Maine
Sawyer	Ian	Maine
Schaefer	Kyle	Maine
Tirado	Luis	Maine
Toole	Michael	New Hampshire
Wallace	Eric	Maine
Ware	Megan	Maine

Whelan	Peter	Maine
Whitener	Zachary	Maine
Wippelhauser	Gail	Maine
Wolotsky	Dan	Maine
Zlokovitz	ERIK	Maryland

ASMFC Staff: Toni Kerns, Katie Drew, Emilie Franke, Maya Drzewicki

New Hampshire Striped Bass Amendment 7 PID Public Hearing

Webinar Hearing

March 8, 2021

Attendee List

Last Name	First Name	State
Abbott	Dennis	New Hampshire
Audet	Gerald	Massachusetts
Baker	Mike	Maine
Barnes	Duncan	Maine
Bedard	Alan	Maine
Catalano	Vincent	New York
Cloutier	Germain	Maine
Couture	Jeff	New Hampshire
Cummings	Derek	New Hampshire
Dameron	John	Virginia
Fanney	Brian	New Hampshire
Fallon	Peter	Maine
Friedrich	Tony	Maryland
Gardrel	Ron	Rhode Island
Gary	Martin	Virginia
Griffith	Chris	New Hampshire
Hoffer	Janine	New Hampshire
Hutson	Ray	Maryland
Jewkes	James	Massachusetts
Karwacky	Kurt	Maine
Lacey	Mike	Massachusetts
Leary	Peter	New York
Legere	Paul	New Hampshire
Lynch	Michael	New Hampshire
Milne	Grant	New Hampshire
Mize	James	New Hampshire
Niven	Shane	Mass?
Oliver	Zane	Virginia
Patterson	Cheri	New Hampshire
Piatek	Chris	Maine
Pike	Dale	New Hampshire
Ramp	Ken	Maryland

Roach	Eric	New Hampshire
Robinson	Zakary	New Hampshire
Sands	Cody	Maine
Schaefer	Kyle	Maine
Sullivan	Kevin	New Hampshire
Upton	Andy	New Hampshire
Waine	Mike	North Carolina
Weedon	Craig	Maryland
White	Ritchie	New Hampshire
Whittaker	Randy	Virginia
Willette	Nick	Connecticut
Wood	Jared	New Hampshire
Young	Robert	New Hampshire
Zobel	Renee	New Hampshire

ASMFC Staff: Toni Kerns, Emilie Franke

Massachusetts Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 18, 2021
Attendee List

Last Name	First Name	State
Amaral	Alfred	Rhode Island
Abbott	Dennis	New Hampshire
Allia	Joe	Massachusetts
Amberson	Jeff	Massachusetts
Andresino	Mike	Massachusetts
Appelman	Max	Maryland
Aprea	Matthew	Massachusetts
Armstrong	Mike	Massachusetts
Audet	Gerald	Massachusetts
Aversa	Charles	Massachusetts
Battista	Vince	Massachusetts
Bessett	Joshua	Massachusetts
Boghdan	Kalil	Massachusetts
Brandt	Sam	Massachusetts
Buttaro	Sergio	Massachusetts
Cannistraro	Dave	Massachusetts
Carotta	Michael	Massachusetts
Caruso	Paul	Massachusetts
Casella	Ben	New Jersey
Cassidy	Patrick	Massachusetts
Catalano	Vincent	New York
Cloutier	Germain	Maine
Coelho	Rui	Massachusetts
Cole	Gary	Massachusetts
Conceicao	Ryan	New Hampshire
Conway	LeeAnne	Massachusetts
Coombs	Brian	Massachusetts
Cordeiro	Gregory	Massachusetts
Cordeiro	Joe	Massachusetts
Creighton	Jack	Massachusetts
Cullen	James	Massachusetts
Curtin	Brad	Massachusetts

Dalton	Bob	Massachusetts
Dameron	John	Virginia
Denno	Patrick	Massachusetts
Desisto	Stephen	Massachusetts
Devanski	Jason	Massachusetts
DiRocco	Carl	Massachusetts
Dinoia	Todd	Massachusetts
Downing	Kevin	Massachusetts
Dudus	Roman	Massachusetts
Fallon	Peter	Maine
Fay	Christopher	Massachusetts
Fleming	Dennis	Maryland
Foley	Jonathan	Massachusetts
Ford	Alexander	Massachusetts
Friedrich	Tony	Maryland
Gonsalves	Justin	Maine
Galatie	Joe	Massachusetts
Gammill	Corey	Massachusetts
Gary	00Martin	Virginia
Geer	Pat	Virginia
Gilmartin	Joseph	Massachusetts
Golden	Rick	Massachusetts
Goldsmith	Willy	District of Columbia
Gonyer	Chris	Massachusetts
Gordon	Jesse	New York
Goros	Klark	New York
Gottschall	Kurt	Connecticut
Graf	Scott	Massachusetts
Haffey	Kane	Massachusetts
Hardy	Jake	New York
Harkness	Cynthia	Massachusetts
Hayes	Brian	New York
Holbeche	Joseph	Massachusetts
Iacovelli	Stephen	Massachusetts
Ingraham	Taylor	Connecticut
Jackson	Ashanti	Massachusetts
Jewkes	Ken	Massachusetts
Jewkes	James	Massachusetts

Johnston	Jon	Massachusetts
Jowett	DOUG	Maine
Kane	Raymond	Massachusetts
Karwacky	Kurt	Maine
Kathmann	Nicholas	Massachusetts
Klane	Geoffrey	Massachusetts
Lake	Stephen	Massachusetts
Landry	Mark	Massachusetts
Lapinski	Toby	Connecticut
Leary	Peter	New York
Lebel	Robert	Massachusetts
Lesser	Kevin	Virginia
MacKeil	Louis	Massachusetts
Machado	Dean	Massachusetts
Madden	Stephen	Massachusetts
Maio	Steven	Massachusetts
Malitsky	Gray	Massachusetts
Maranian	Aram	Massachusetts
Martin	Christian	Massachusetts
Mascari	Luciano	Massachusetts
Mauck	Capt. Parker	Massachusetts
Mckiernan	Daniel	Massachusetts
Meserve	John	Massachusetts
Meserve	Nichola	Massachusetts
Messing	Rex	Massachusetts
Milone	Luigi	Massachusetts
Milton	Sarah	Massachusetts
Mitchell	Billy	Massachusetts
Mobley	Matt	Maryland
Morris	Jonathan	Massachusetts
Murphy	Matthew	Massachusetts
Nelson	Gary	Massachusetts
Nethercott	Thomas	New Hampshire
Nicholson	Nick	Massachusetts
O'Connor	Jonathan	Massachusetts
O'Keefe	Paul	Massachusetts
Oliver	Zane	Virginia
Oteri	John	Massachusetts

Ouch	David	Massachusetts
P	will	Maryland
Pajecki	Mariusz	Massachusetts
Paquette	Patrick	Massachusetts
Peros	Dave	Massachusetts
Perrone	John	Massachusetts
Piatek	Chris	Maine
Pierdinock	Michael	Massachusetts
Potvin	Brian	Massachusetts
Powers	Ron	Massachusetts
Prodouz	William	Massachusetts
Prouty	Brad	Massachusetts
Pschirrer	Rich	Maine
Robinson	Kermit	Massachusetts
Rubner	Cody	Massachusetts
Rudman	Patrick	Maine
Saldutti	Tony	Pennsylvania
Santuccio	Sam	Massachusetts
Schaefer	Kyle	Maine
Shukis	Alex	Massachusetts
Siek	John	Massachusetts
Simeone	Vincent	Massachusetts
Sladen	Barry	Massachusetts
Spinney	Michael	Massachusetts
Stebbins	Russell	Massachusetts
Stephens	Graham	Massachusetts
Summers	Eric	Massachusetts
Sylvestre	George	Massachusetts
Sypek	Joseph	Massachusetts
Thompson	Nat	Maine
Toole	Michael	New Hampshire
Treanor	Jeremiah	Massachusetts
Turowski	Carson	Massachusetts
Vavra	Taylor	New York
Walsh	Matthew	Massachusetts
West	Ray	Massachusetts
Whalley	Ben	Maine
Whitbeck	Nick	Massachusetts

White	Jonathan	Massachusetts
Whiting	Ken	Massachusetts
Wirth	Jeremy	Massachusetts
Yemma	John	Massachusetts
Yenkinson	Harvey	Pennsylvania
Zlokovitz	Erik	Maryland

ASMFC Staff: Toni Kerns, Emilie Franke, Maya Drzewicki

Rhode Island Striped Bass Amendment 7 PID Public Hearing

Webinar Hearing

March 17, 2021

Attendee List

Last Name	First Name	State
Abbott	Dennis	New Hampshire
Aguilar	Gilberto	Rhode Island
Audino	Lawrence	Rhode Island
Barrioa	Kevin	Rhode Island
Batsavage	Chris	North Carolina
Bellavance	Rick	Rhode Island
Berger	Alan	New York
Bilodeau	Keith	Connecticut
Borden	David	Rhode Island
Bravo	Peter	Rhode Island
Chiles	Benson	New Jersey
Cloutier	Germain	Maine
Connelly	Harrison	Rhode Island
Cournoyer	Jeff	Rhode Island
Creighton	Jack	Massachusetts
Dameron	John	Virginia
Dangelo	Andy	Rhode Island
Dee	Dominic	Rhode Island
Dudus	Roman	Connecticut
Estabrook	Susan	Rhode Island
Fallon	Peter	Maine
Freiman	Chase	Rhode Island
Friedrich	Tony	Maryland
Funches	John	Rhode Island
Gardrel	Ron	Rhode Island
Gary	Martin	Virginia
Gilmartin	Joseph	Massachusetts
Gingras	D	Rhode Island
Gocka	Ruthie	Connecticut
Griswold	David	Massachusetts
Hagen	Michael	Rhode Island
Hittinger	Rich	Rhode Island

Horan	Ryan	Rhode Island
Jarvis	Jason	Rhode Island
Jenkins	Peter	Rhode Island
Karwacky	Kurt	Maine
Kearney	Ed	Rhode Island
King	Daniel	Rhode Island
Lake	Stephen	Massachusetts
Lapinski	Toby	Connecticut
Leary	Peter	New York
Lee	Robert	Connecticut
Lengyel Costa	Nicole	Rhode Island
Lesser	Kevin	Virginia
Lord	Nick	Rhode Island
Lundberg	Scott	Massachusetts
Macari	Joe	Rhode Island
Maietta	Robert	Rhode Island
McNamee	Jason	Rhode Island
Medeiros	Stephen	Rhode Island
Mendez	Kenneth	Rhode Island
Miller	Steve	Massachusetts
Monteforte	Michael	Rhode Island
Monti	David	Rhode Island
O'Malley	Shane	Rhode Island
OConnor	Clement	Rhode Island
Perrone	John	Massachusetts
Plaia	Michael	Rhode Island
Rudman	Patrick	Maine
Schipritt	Michael	Rhode Island
Seward	Robert (Mike)	Rhode Island
Simas	Daniel	Rhode Island
Spier	Greg	Massachusetts
St. Jean	Douglas	Rhode Island
Thompson	Ian	New Jersey
Vespe	Greg	Rhode Island
Voutes	George	Rhode Island
Wagner	William	New Jersey
Woods	Michael	Rhode Island
Zlokovitz	Erik	Maryland

ASMFC Staff: Toni Kerns, Emilie Franke

Connecticut Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 24, 2021
Attendee List

Last Name	First Name	State
Aarrestad	Pete	Connecticut
Abbott	Dennis	New Hampshire
Adams	Mike	Connecticut
Amorello	Jeff	Connecticut
Baldwin	George	Connecticut
Berger	Alan	New York
Burdacki	Ted	Connecticut
Carey	Tim	Connecticut
Catalano	Vincent	New York
Cloutier	Germain	Maine
Conroy	Peter	Connecticut
Coyle	Carson	Connecticut
Dameron	John	Virginia
Davis	Justin	Connecticut
DePersenaire	John	New Jersey
Dondero	Mark	Connecticut
Dudus	Roman	Connecticut
Forrest	Todd	Connecticut
Freiman	Chase	Connecticut
Friedrich	Tony	Maryland
Fuda	Tom	Connecticut
Gary	Martin	Virginia
Gates	Matthew	Connecticut
Giulietti	Arthur	Connecticut
Goeben	William	Connecticut
Goldsmith	Willy	District of Columbia
Gombos	William	Connecticut
Gottschall	Kurt	Connecticut
Hughes	Sean	Connecticut
Ingraham	Taylor	Connecticut
Karbowski	TJ	Connecticut
King	Don	Connecticut
LaFrance	Robert	Connecticut

Lapinski	Toby	Connecticut
Leary	Peter	New York
Lee	Robert	Connecticut
Lesser	Kevin	Virginia
Losty	Kevin	Connecticut
Loughran	Tom	Connecticut
McMurray	John	New York
Messing	Rex	Connecticut
Molnar	David	Connecticut
Morgan	Jerry	Connecticut
Pirri	Michael	Connecticut
Pesce	Matthew	Connecticut
Phillips	Mark	Connecticut
Plaia	Mike	Connecticut
Platt	Michael	Connecticut
Roy	Michael	Connecticut
Rubner	Cody	Massachusetts
Smedick	Nick	Connecticut
Smith	Gary	Connecticut
Smith	Brandon	Connecticut
Spinney	Michael	Massachusetts
Wallace	Jack	Connecticut
Willette	Nick	Connecticut
Williams	Cory	Connecticut
Williams	Logan	Connecticut
Zadrovicz	Michael	Connecticut
Zenel	Arek	Connecticut
Zlokovitz	Erik	Maryland

ASMFC Staff: Toni Kerns, Emilie Franke

New York Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 23, 2021
Attendee List

Last Name	First Name	State
Abbott	Dennis	New Hampshire
Albano	Albert	New York
Audet	Jerry	Massachusetts
Berger	Alan	New York
Best	Jessica	New York
Bravo	Peter	Connecticut
Broderick	Matt	New York
Carson	Jeff	New York
Caruso	Michael	New York
Catalano	Vincent	New York
Chiles	Benson	New Jersey
Christy	Nicholas	New York
Cloutier	Germain	Maine
Cooperstock	Adam	New York
Cosentino	Ferdinand	New York
Craig	Caitlin	New York
Dougherty	Frazer	New York
Dameron	John	Virginia
Danielson	Bob	New York
Davi	John	New York
Davidson	Maureen	New York
DeFlumeri	Dominic	New York
Delgado	Johnny	New York
Dougherty-Johnson	Bran	New York
Dudus	Roman	Connecticut
Falco	Tom	New York
Flanagan	David	New York
Frank	Julien	New York
Freiberger	Joshua	New York
Frets	Johnny	New York
Friedrich	Tony	Maryland

Fuda	Tom	Connecticut
Gary	00Martin	Virginia
Gordon	Jesse	New York
Goros	Klark	New York
Gottschall	Kurt	Connecticut
Hagen	Paul	New York
Hardy	Jake	New York
Hasbrouck	00Emerson	New York
Hill	Ben	New York
Carol	Hoffman	New York
Hornstein	Jesse	New York
Ingraham	Taylor	Connecticut
Jack	Dan	New York
Jowett	Doug	Maine
Karwacky	Kurt	Maine
Louie	Michael	New York
Lapinski	Toby	Connecticut
Leary	Peter	New York
Lee	Robert	Connecticut
Lesser	Kevin	Virginia
Lilly	Tom	Maryland
LoBue	Carl	New York
M	Milo	New York
Magun	Ethan	New York
Malone	Eric	New York
Maniscalco	John	New York
McMurray	John	New York
Miciotta	Salvatore	New York
Miller	Nathaniel	New York
Oconnor	Kevin	New York
Papciak	John	New York
Pierrepont	Rs	New York
Pierrepont	Stuyve	New York
Platt	Michael	Connecticut
Poston	Will	Maryland
Power	Robert	Vermont
R	Sam	New York
Regan	Tim	New York

Reilly	Sean	New York
Rudman	Patrick	Maine
Schmidlapp	Carl	New York
Skolnick	David	New York
Skolnick	Stewart	New York
Skorupski	Ed	New York
Solomon	Lee	New York
Solomon	Lee	New York
Squire	Ross	New York
Summers	Eric	New York
Sussman	Howard	New York
Tomici	John	New York
Turvey	John	New Jersey
Vavra	Taylor	New York
Witthuhn	Steven	New York
Werkema	Andrew	New York
Witek	Charles	New York
Wolfstaetter	John	New York
Wong	Steve	New York
Zalesak	Phil	Maryland
Zenel	Arek	New York
Zlokovitz	Erik	Maryland

ASMFC Staff: Toni Kerns, Emilie Franke, Maya Drzewicki

New Jersey Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 25, 2021
Attendee List

Last Name	First Name	State
Abbott	Dennis	New Hampshire
Audet	Gerald	Massachusetts
Auriemma	Michael	New Jersey
Azzinaro	John	New Jersey
Bentivegna	Lou	New Jersey
Barbato	Carmine	New Jersey
Beato	Frank	New Jersey
Berger	Alan	New York
Bolen	Keith	New Jersey
Browne	George	New Jersey
Brust	Jeffrey	New Jersey
Caesar	Pedro	New Jersey
Casale	Frank	New Jersey
Celestino	Michael	New Jersey
Chiles	Benson	New Jersey
Cimino	00Joe	New Jersey
Cloutier	Germain	Maine
Corbett	Heather	New Jersey
Cudnik	Greg	New Jersey
Curry	Brian	Massachusetts
Dameron	John	Virginia
Deinocenzio	Marcelo	New Jersey
Devine	Thomas	New Jersey
DiBonaventura	Justin	New Jersey
Eidman	Capt. Paul	New Jersey
Fallon	Peter	Maine
Fote	00Thomas	New Jersey
Friedrich	Tony	Maryland
Gallinoto	Joe	New Jersey
Gary	Martin	Virginia
Geer	Pat	Virginia
Haertel	Paul	New Jersey

Hamilton	Ray	Connecticut
Harrison	Brendan	New Jersey
Hassall	Andrew	New Jersey
Hutchinson	Jim	New Jersey
Ingraham	Taylor	Connecticut
Jensen	Ronald	New Jersey
Jack	Dan	New York
Jaworski	Mark	New Jersey
Jewkes	James	Massachusetts
Junkerman	David	New Jersey
Karwacky	Kurt	Maine
Kosinski	Thomas	New Jersey
Leary	Peter	New York
Lesser	Kevin	Virginia
Luniewski	John	New York
MaxLife	Reel	New Jersey
McKenna	John	New Jersey
McMurray	John	New York
Mckenna	Joe	New Jersey
Mickus	Gary	New Jersey
Monske	Tom	New Jersey
Mountainland	David	New Jersey
Neilan	Brian	New Jersey
Nowalsky	Adam	New Jersey
Panza	Robert	New Jersey
Parisien	Richard	New Jersey
Perrotto	Patrick	New Jersey
Phillips	Mark	New Jersey
Poston	Will	Maryland
Quenzer	Marcus	Pennsylvania
Rivas	Thomas	New Jersey
Shillingford	Bill	New Jersey
Sabatino	Tony	New Jersey
Scheule	Randall	New Jersey
Schivell	David	New Jersey
Shanahan	Caitlin	New Hampshire
Thompson	Ian	New Jersey
Toth	John	New Jersey

Turvey	John	New Jersey
Villalba	Juan Andres	New Jersey
Vavra	Taylor	New York
Visek	Patrick	New Jersey
Whalley	Ben	Maine
Williams	Capt. Brian	New Jersey
Wilson	Sean	New Jersey
Yenkinson	Harvey	Pennsylvania
Zemeckis	Douglas	New Jersey
Zenel	Arek	Connecticut
Zlokovitz	Erik	Maryland

ASMFC Staff: Toni Kerns, Emilie Franke

Delaware Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 16, 2021
Attendee List

Last Name	First Name	State
Audet	Jerry	Massachusetts
Boucher	Jason	Delaware
Clark	John	Delaware
Dameron	John	Virginia
Eustis	Mark	Delaware
Friedrich	Tony	Maryland
Fuda	Tom	Connecticut
Gary	Martin	Virginia
Geer	Pat	Virginia
Goros	Klark	New York
Hense	Zina	Delaware
Kahn	Desmond	Delaware
Leary	Peter	New York
Lesser	Kevin	Virginia
Miller	Nicholas	Pennsylvania
Marker	Casey	Delaware
Miller	Roy	Connecticut
O'Neill	Tyler	Delaware
Park	Ian	Delaware
Reed	Justin	Delaware
Stormer	David	Delaware
Taylor	Jason	Pennsylvania
Tippett	Lee	Maryland
Zlokovitz	Erik	Maryland

ASMFC Staff: Toni Kerns, Emilie Franke, Maya Drzewicki

Maryland Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 22, 2021
Attendee List

Last Name	First Name	State
Abbott	Dennis	New Hampshire
Appelman	Max	Maryland
Audet	Jerry	Massachusetts
Aus	Andrew	Maryland
Batsavage	00Chris	North Carolina
Brupbacher	Michael	Maryland
Carski	Ted	Maryland
Catalano	Vincent	New York
Chacos	John	Maryland
Chiles	Benson	New Jersey
Cloutier	Germain	Maine
Colden	Allison	Maryland
Corbin	Jeff	Maryland
Cvach	Sarah	Maryland
Dameron	John	Virginia
Danford	James	Maryland
DeAnzeris	Mike	New York
Dean	Rachel	Maryland
Depperschmidt	Perry	Maryland
Desisto	Stephen	Massachusetts
Dintaman	Evan	Maryland
Dollar	C	Maryland
Eustis	Mark	Maryland
Evans	Joe	Maryland
Eversmier	Michael	Maryland
Fallon	Peter	Maine
Fegley	Lynn	Maryland
Frey	Toby	Maryland
Friedrich	Tony	Maryland
Fuda	Tom	Connecticut
Gaff	Jerry	Maryland
Geer	Pat	Virginia
Geho	Tracy	Maryland

Giuliano	Angela	Maryland
Gloss	John	Maryland
Gorham	William	North Carolina
Gottschall	Kurt	Connecticut
Grande	Mary Kate	Maryland
Grosko	Andrew	Maryland
Hardman	Brian	Maryland
Hardy	Jake	New York
Herrick	Dan	Maryland
Hollenshade	Thomas	Maryland
Holmes	Ricky	Maryland
Hornick	Harry	Maryland
Hutson	Ray	Maryland
Ingraham	Taylor	Connecticut
Ingraham	Taylor	Connecticut
Jewkes	James	Massachusetts
Kennedy	Carrie	Maryland
King	Jesse	Maryland
Kirkendall	Dale	Maryland
Kuhlman	Richard	Maryland
Leary	Peter	New York
Lesser	Kevin	Virginia
Lewis	Kenneth	Maryland
Lilly	Tom	Maryland
Lombardi	Robert	Maryland
Luisi	Michael	Maryland
Machado	Dean	Massachusetts
Malec	Brandon	Maryland
Marceron	Matt	Maryland
Martell	David	Maryland
McClair	Genine	Maryland
McMenamin	Kevin	Maryland
Mendez	Kenneth	Maryland
Messing	Rex	Maryland
Mobley	Matt	Maryland
Mohan	John	Maine
Munro	Bob	Maryland
Nassif	Erin	Maryland

Oliver	Zane	Virginia
Packard	Eric	Maryland
Phillips	Mark	Maryland
Pieper	Larry	Maryland
Poston	Will	Maryland
Rather	DJ	New York
Rudman	Patrick	Maine
Rudow	Lenny	Maryland
Schaefer	Kyle	Maryland
Sharov	Alexei	Maryland
Shute	Greg	Maryland
Shute	Sandy	Maryland
Sikorski	David	Maryland
Smolek	Michael	Maryland
Summers	Eric	Maryland
Taylor	Mark	New Jersey
Tippett	Lee	Maryland
Turvey	John	New Jersey
Verdin	Michael	Maryland
Versak	Beth	Maryland
Wingate	Brandon	Maryland
Waine	Mike	North Carolina
Ware	Megan	Maine
Weaver	Tom	Maryland
Weyl	Chris	Maryland
Williams	John Page	Virginia
Williams	Wally	Maryland
Zajano	David	Maryland
Zalesak	Phil	Maryland
Zenel	Arek	Connecticut
Zlokovitz	Erik	Maryland

ASMFC Staff: Toni Kerns, Emilie Franke

Potomac River Fisheries Commission Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 15, 2021
Attendee List

Last Name	First Name	State
Abbott	Dennis	New Hampshire
Alsop	Michael	Virginia
Bello	John	Virginia
Bowling	James	Maryland
Brown	Robert	Maryland
Carr	Carol	Virginia
Chiles	Benson	New Jersey
Cloutier	Germain	Maine
Colden	Allison	Maryland
Dameron	John	Virginia
Eldreth	Gerald	Maryland
Eversmier	Michael	Maryland
Farneth	Linda	Virginia
Fleming	Dennis	Maryland
Friedrich	Tony	Maryland
Fuda	Tom	Connecticut
Gary	00Martin	Virginia
Geer	Pat	Virginia
Griffiths	Michael	Maryland
Hughes	Tom	Maryland
Johnson	Porter	Maryland
Jones	Wes	Virginia
Kellam	Paul	Maryland
King	Jesse	Maryland
Kirk	Jesse	Virginia
Koenig	Chad	Maryland
Lampson	Robert	Virginia
Leary	Peter	New York
Maconochie	Bob	Connecticut
McCabe	Dan	Maryland
McCormack	Bobby	Maryland
McMenamin	Kevin	Maryland

Meserve	Nichola	Massachusetts
Mobley	Matt	Maryland
Moore	Chris	Virginia
Morel	David	Massachusetts
Oliver	Zane	Virginia
Osakowicz	Marty	Maryland
Owens	Wallace	Virginia
Pharis	Jeff	Maryland
Ravago	Rebekah	South Carolina
Rudman	Patrick	Maine
Shifflett	Tim	Virginia
Shute	Greg	Maryland
Sikorski	David	Maryland
Tippett	Lee	Maryland
Verdin	Michael	Maryland
Williams	John Page	Virginia
Zlokovitz	Erik	Maryland

ASMFC Staff: Toni Kerns, Emilie Franke, Maya Drzewicki

Virginia Striped Bass Amendment 7 PID Public Hearing
Webinar Hearing
March 10, 2021
Attendee List

Last Name	First Name	State
Allen	Robert	Virginia
Atkinson	Stephen	Virginia
Bello	John	Virginia
Berry	Todd	Virginia
Bolen	Ellen	Virginia
Bowling	James	Maryland
Cloutier	Germain	Maine
Dameron	John	Virginia
Denno	Patrick	Massachusetts
Dollar	Chris	Maryland
Ford	John	Virginia
Friedrich	Tony	Maryland
Gary	00Martin	Virginia
Geer	Pat	Virginia
Gorham	William	North Carolina
Hudgins	James	Virginia
J	J	Virginia
Janeski	Todd	Virginia
Kenyon	Adam	Virginia
Knott	Daniel	Virginia
Leary	Peter	New York
Madsen	Shanna	Virginia
Meserve	Nichola	Massachusetts
Miller	Jeff	Connecticut
Mobley	Matt	Maryland
Moore	Chris	Virginia
Musick	Susanna	Virginia
Newsome	Chris	Virginia
Oliver	Zane	Virginia
Phillips	Olivia	Virginia
Quinan	Michael	Virginia
Ramsey	Jill	Virginia

Sandefur	James	Virginia
Sarfan	Edward	Virginia
Smith	Kevin	Virginia
Toole	Michael	New Hampshire
Wilke	Kate	Virginia
Williams	John Page	Virginia
Zlokovitz	Erik	Maryland

ASMFC Staff: Toni Kerns, Emilie Franke

Atlantic States Marine Fisheries Commission

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703.842.0740 • 703.842.0741 (fax) • www.asmfc.org

MEMORANDUM

TO: **Atlantic Striped Bass Management Board**

FROM: **Atlantic Striped Bass Advisory Panel**

DATE: **April 19, 2021**

SUBJECT: **Advisory Panel Recommendations on Issues for Consideration in Draft Amendment 7**

AP Members in Attendance: Louis Bassano (Chair, NJ – recreational), Dave Pecci (ME – for-hire/recreational), Bob Humphrey (ME – comm. rod and reel/for-hire), Peter Whelan (NH – recreational), Patrick Paquette (MA – rec/for-hire/comm), Andy Dangelo (RI – for-hire), Michael Plaia (RI – comm/rec/for-hire), Bob Danielson (NY – recreational), Nathaniel Miller (NY – commercial), Kelly Place (VA – commercial), Dennis Fleming (PRFC – fishing guide/seafood processer/dealer), Jon Worthington (NC nominee – recreational)

ASMFC Staff: Emilie Franke, Toni Kerns

The Atlantic Striped Bass Advisory Panel (AP) met via webinar on April 13, 2021 to discuss AP recommendations on which issues from the Amendment 7 Public Information Document (PID) to include in Draft Amendment 7. Staff presented an overview of each issue and a general summary of comments heard during the eleven public hearings conducted on the PID. The following is a summary of the AP recommendations and discussion for each issue.

Issue 1: Fishery Goals and Objectives

- **The AP recommends Issue 1 be included in Draft Amendment 7** for the following reasons:
    - The managers and the public should have the opportunity to evaluate and reconsider the objectives if necessary through the Amendment 7 process.
    - A stricter objective to address declining stock trends could be considered since the stock has been declining to its current state under the existing objectives.
    - The existing objective that addresses state flexibility may need to be modified or addressed in some way given the public's concerns about conservation equivalency.
- One AP member noted that when considering changes to the objectives, the language should be general enough so it does not prevent management from pursuing new or different management measures in the future.

Issue 2: Biological Reference Points

- **The AP recommends Issue 2 be removed from consideration for Draft Amendment 7** for the following reasons:
    - The comments from the public hearings were very clear in support of maintaining the current reference points based on the 1995 estimate of spawning stock biomass (SSB).
- The AP noted the importance of communicating to the public the recognition that the SSB target may be difficult to attain but it is target we want to strive for in rebuilding the stock.

Issue 3-4: Management Triggers and Stock Rebuilding Target and Schedule

- **The AP recommends the female SSB and fishing mortality (*F*) triggers and rebuilding schedules be removed from consideration for Draft Amendment 7 and recommends the recruitment-based trigger using the juvenile abundance indices be included in Draft Amendment 7** for the following reasons:
    - Commenters at the public hearings expressed support for the current SSB and *F* triggers and rebuilding timelines and called for a stricter adherence to those.
    - The fact that the current recruitment trigger has not been tripped given the recent periods of low recruitment is concerning.
    - Recruitment is an important factor contributing to stock abundance and this importance needs to be more apparent in the management triggers.
    - Young-the-year (YOY) may not be the best or only proxy for a recruitment trigger; environmental conditions (e.g., instream flow) affect survivability of YOY fish and the potential contribution to the stock. There could be consideration for how account for environmental conditions and survivability in conjunction with the YOY indices.
- The AP recognized commenters at public hearings expressed concerns that the Board did not respond quickly enough to the management triggers that initiate a rebuilding plan; the AP recommends better communication from the Board about their response to management triggers and the process of taking action when a trigger is tripped.

Issue 5: Regional Management

- **The AP recommends Issue 5 be removed from consideration for Draft Amendment 7** for the following reasons:
    - There is enough flexibility in current management to implement different measures (e.g., size limits, gear restrictions, effort control) in different states.
    - The two-stock assessment model is not yet ready for management use.

Issue 6: Conservation Equivalency (CE)

- **The AP recommends Issue 6 be included in Draft Amendment 7** for the following reasons:
    - Concerns about the reliability of MRIP data and its application to CE should be addressed, particularly when MRIP PSE is above 50%.

- Stronger accountability measures for CE need to be put in place.
- There should be discussion about required data/ data standards to implement CE accountability measures; CE plans in states with more available data tend to be better than those without data supporting them.
- Comments heard at the public hearings expressed clear concern about the current use of CE.
- CE can be an effective tool but concerns about it being a loophole need to be addressed.

Issue 7: Recreational Release Mortality

- **The AP recommends Issue 7 be included in Draft Amendment 7** for the following reasons:
  - A wide variety of options to address release mortality should be considered including options for effort control measures (e.g. seasonal closures) and gear restrictions. One AP member commented that a moratorium should be included in the analysis as one of a range of effort control options.
  - The most effective measures to address release mortality may differ among states and the unique conditions in certain regions (e.g. warm water temperatures) should be recognized in analysis of this issue.
  - Comments heard at the public hearings expressed support for continuing to pursue this issue.
- The AP noted the importance of continued angler outreach and education on this issue.
- One AP member noted that as a predominantly recreational fishery, recreational release mortality needs to be accepted as part of the fishery.

Issue 8: Recreational Accountability

- **The AP could not come to consensus on whether or not Issue 8 should be included in Draft Amendment 7.**
- AP members who support including Issue 8 in Draft Amendment 7 made the following comments:
  - There is a successful accountability system in place for the commercial sector and there needs to be discussion about what accountability could look like for the recreational sector, especially since the majority of striped bass removals are from the recreational sector.
  - There needs to be an opportunity to explore options for recreational accountability.
  - Recreational accountability at a sector level is in place for other recreational fisheries.
- AP members who support removing Issue 8 from consideration for Draft Amendment 7 made the following comments:
  - There is already recreational accountability through existing measures like effort control, size limits, and gear restrictions.

- Accountability measures used for commercial fisheries, such as quotas, are not as applicable to the predominantly recreational striped bass fishery.
- It may be appropriate to consider sector-wide recreational accountability in the future but not in Amendment 7.
- This issue could be discussed by the ISFMP Policy Board as a Commission-wide policy for recreational fisheries, not in Amendment 7.
- There is concern about how this issue is presented and there has been some confusion about what recreational accountability if referring to.

Issue 9: Coastal Commercial Quota Allocation

- **The majority of the AP recommend Issue 9 be removed from consideration for Draft Amendment 7 with one objection.**
- AP members who support removing Issue 9 from consideration for Draft Amendment 7 made the following comments:
  - There are not better data available to use for commercial allocation because this allocation system based on the 1972-1979 period has been in place since 1995.
  - Concern that changing the allocation may penalize states who have implemented conservative risk-averse measures for the commercial fishery; some states may not be achieving their quota due to stringent regulations and not because they couldn't catch their quota.
  - Have not heard the commercial sector asking for the quota allocation to be updated.
  - This could be addressed in the future but should not be addressed in Amendment 7.
- One AP member[1] supports including Issue 9 in Draft Amendment 7 for the following reason:
  - States that currently receive a commercial allocation but do not have a commercial fishery should be able to transfer unused quota to other states.
- There was some AP discussion about states that currently receive a commercial allocation but do not have a commercial fishery.
  - One AP member noted concern that some states use their commercial quota to support recreational bonus program. Two AP members commented that states have the authority to decide how they use their commercial quotas.
  - One AP member commented they would be opposed to states being able to transfer unused quota to other states. Another AP member commented in support of states being able to transfer unused quota to other states, as noted above.

Issue 10: Other Issues

- **AP members identified the following other issues as relatively high priority for potential inclusion in Draft Amendment 7**:

[1] AP member had to step away from the meeting before this issue was discussed and provided this comment to staff after the meeting.

- Measures to protect the 2015 year class: This is critically important to rebuild the stock. The 2015 year class is coming into the slot and the slot needs to be changed or move to a minimum size limit to protect this year class. There should be discussion about measures to protect this year class. Regarding slot limits, one AP member noted there needs to be discussion about potential increased discard mortality associated with using a slot limit to protect a year class.
- Protect spawning and pre-spawn fish: Size limits and area closures should be considered to protect spawning and pre-spawn staging fish. One example was presented related to pre-spawn staging areas in Raritan Bay/NY Bight. Pre-spawn fish are caught in this area before they move up the Hudson River to spawn. States should coordinate to consider potential closed areas or other measures to protect spawn and pre-spawn fish. Although these may be state or region-specific issues, this topic should still be part of the Amendment 7 discussion.
- Increased and stronger enforcement: Support for increased enforcement. Staff noted that the Commission does not have control over the amount of funding allocated for enforcement but the Commission could potentially address fines in a management document.
- Predation and Shifting Stock Distribution[2]: The impacts of predation (e.g., seal predation) and the shifting distribution of the stock should be considered.

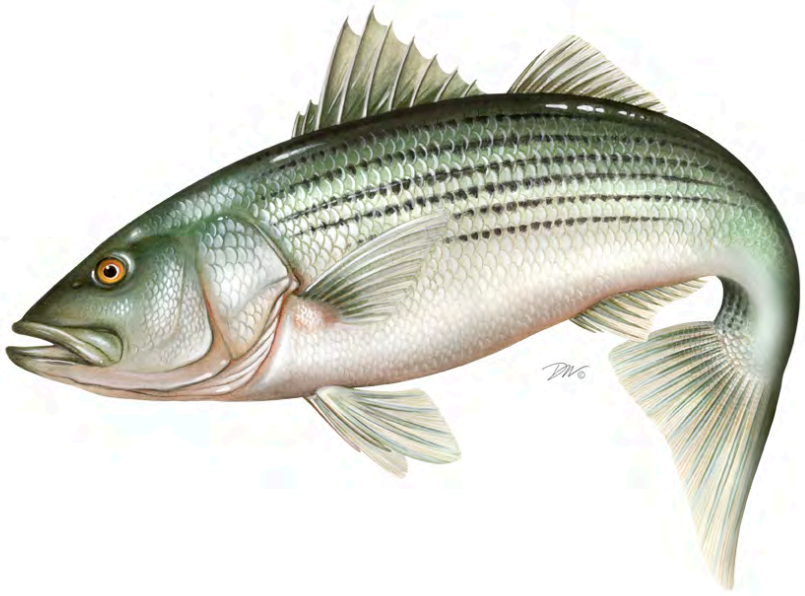
[2] AP member had to step away from the meeting before this issue was discussed and provided this comment to staff after the meeting.

Atlantic States Marine Fisheries Commission

PUBLIC INFORMATION DOCUMENT

For Amendment 7 to the Interstate Fishery Management Plan For

ATLANTIC STRIPED BASS



February 2021

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

The Atlantic States Marine Fisheries Commission seeks your input on the initiation of 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 **5:00 PM (EST) on April 9, 2021.** 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 when developing the first draft of Amendment 7.

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, its likely most hearings will occur via webinar.
2. Refer comments to your state's members on the Atlantic Striped Bass Board or Atlantic Striped Bass Advisory Panel, if applicable.
3. Mail, fax, or email written comments to the following address:

Emilie Franke
Fishery Management Plan Coordinator
Atlantic States Marine Fisheries Commission
1050 North Highland Street, Suite 200A-N
Arlington, Virginia 22201
Fax: 703.842.0741
comments@asmfc.org (subject line: Striped Bass PID)

If you have any questions please call Emilie Franke at 703.842.0740.

YOUR COMMENTS ARE INVITED

The Atlantic States Marine Fisheries Commission (Commission) is developing an amendment to revise the Interstate Fishery Management Plan (FMP) for Atlantic Striped Bass. The Commission is responsible for developing FMPs which are based on the best available science and promote the conservation of the stock throughout its range. The states and jurisdictions of Maine through North Carolina, including Pennsylvania, the District of Columbia, and the Potomac River Fisheries Commission, participate in the management of this species as part of the Commission's Atlantic Striped Bass Management Board (Board).

This is your opportunity to inform the Commission about changes observed in the fishery, actions you feel should or should not be taken in terms of management, regulation, enforcement, and research, and any other concerns you have about the resource or the fishery, as well as the reasons for your concerns.

WHY IS THE ASMFC PROPOSING THIS ACTION?

The last time a new plan amendment to the FMP was adopted was in 2003 (Amendment 6). Since then, the status and understanding of the striped bass stock and fishery has changed considerably which raises concern that the current management program no longer reflects current fishery needs and priorities. The results of the 2018 Benchmark Stock Assessment in particular led the Board to discuss a number of significant issues facing striped bass management. Consequently, in August 2020, the Board passed the following motion:

"Move to initiate an Amendment to the Atlantic Striped Bass Fishery Management Plan focused on the following management topics: (1) fishery goals and objectives; (2) stock rebuilding/timeframe; (3) management triggers; (4) biological reference points; (5) regional management (recreational measures, coastal and producer areas, regional reference points); (6) recreational discard mortality; (7) conservation equivalency; (8) recreational accountability; and (9) coastal commercial quota allocation.

Each of these topics will be presented in a Public Information Document in order to solicit stakeholder comment focused on prioritizing the importance of each topic for continued development and inclusion in the Amendment."

WHAT IS THE PROCESS FOR DEVELOPING AN AMENDMENT?

The publication of this document is the first step of the Commission's formal amendment process. Following this initial phase of information gathering and public comment, the Board will select the range of issues to be addressed through this Amendment, and identify potential management options. Other issues not addressed here can be addressed through a subsequent management document. The Commission will then develop Draft Amendment

7, incorporating the identified management options, for public review. Following that review and public comment, the Commission will specify the management measures to be included in Amendment 7, as well as a timeline for implementation. In addition to issues identified in this Public Information Document (PID), Draft Amendment 7 may include issues identified during the public comment period of the PID.

The timeline for completion of Amendment 7 is as follows. Please note that the timeline is subject to change per the direction of the Board:

February 2021	Board reviews Draft PID and considers approving for public comment
February - April 2021	Public comment on PID ***Current Step***
May 2021	Board reviews public comment; directs Plan Development Team to develop Draft Amendment
May - September 2021	Preparation of Draft Amendment with input from Technical Committee and Advisory Panel
October 2021	Board reviews Draft Amendment and considers approving for public comment
November 2021-January 2022	Public comment on Draft Amendment
February 2022	Board reviews public comment and selects final measures for the Amendment; Policy Board and Commission approve the Amendment

WHAT IS THE PURPOSE OF THIS DOCUMENT?

The purpose of this document is to inform the public of the Commission's intent to gather information concerning Atlantic striped bass and to provide an opportunity for the public to identify major issues and alternatives relative to the management of this species. Input received at the start of the amendment process can have a major influence in the final outcome of the amendment. This document is intended to solicit observations and suggestions from commercial and recreational anglers, the public, and other interested parties, as well as any supporting documentation and additional data sources.

To facilitate public input, this document provides a broad overview of the issues already identified for consideration in the amendment; background information on the Atlantic striped bass population, fisheries, and management; and a series of questions for the public to consider about the management of the species. In general, the primary question on which the Commission is seeking

public comment is: **"How would you like management of the Atlantic striped bass fishery to look in the future?"**

WHAT ISSUES WILL BE ADDRESSED?

The primary issues considered in the PID are:

1. Fishery Goals and Objectives
2. Biological Reference Points
3. Management Triggers
4. Stock Rebuilding Targets and Schedule
5. Regional Management
6. Management Program Equivalency (Conservation Equivalency)
7. Recreational Release Mortality
8. Recreational Accountability
9. Coastal Commercial Allocation
10. Any other issues concerning the management of Atlantic striped bass

ISSUE 1: Fishery Goals and Objectives

Background: The current goal and objectives of the Atlantic Striped Bass FMP were established in 2003 in Amendment 6. They are:

GOAL

"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."

OBJECTIVES

- 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.
- Manage fishing mortality to maintain an age structure that provides adequate spawning potential to sustain long-term abundance of striped bass populations.
- 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.
- Foster quality and economically viable recreational, for-hire, and commercial fisheries.
- Maximize cost effectiveness of current information gathering and prioritize state obligations in order to minimize costs of monitoring and management.

- Adopt a long-term management regime that minimizes or eliminates the need to make annual changes or modifications to management measures.
- 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.

Statement of the Problem: The status and understanding of the striped bass stock and fishery has changed considerably since implementation of Amendment 6 in 2003. As a result, both managers and stakeholders have expressed concern that the existing goals and objectives of this management program may be outdated, and no longer fully reflect current fishery needs and priorities. Some of the objectives may need to be refined, while other priorities may be missing entirely. The Board identified management stability, flexibility, and regulatory consistency as guiding themes for future striped bass management, and discussed the desire to balance these principles to the extent practical.

Public Comment Questions: Are the existing goal and objectives of Amendment 6 still in line with current fishery needs and priorities? Which specific priorities (if any) are missing from the existing goal or objectives? Which of the existing objectives (if any) should be removed or refined? Do the existing objectives balance the need for management stability, flexibility, and regulatory consistency? Which of these three themes do you value most?

ISSUE 2: Biological Reference Points

Background: Biological reference points (BRPs) are used in fisheries management to measure stock status and evaluate management plan effectiveness. The current BRPs for striped bass are coastwide in nature and based on historical stock performance, and given in terms of threshold and target levels of female spawning stock biomass (SSB) and fishing mortality. Specifically, the 1995 estimate of female SSB is used as the SSB threshold, with the SSB target set at 125% of the threshold. When female SSB is below the threshold level, the stock is declared overfished. The fishing mortality target and threshold are the values of fishing mortality estimated to achieve the respective SSB target and threshold over the long-term. When fishing mortality is above the threshold, the stock is experiencing overfishing. The current SSB and fishing mortality target and threshold values are based on results of the 2018 Benchmark Stock Assessment, which represents the best available science on the coastwide stock (NEFSC 2018a and 2018b; Table 1). The FMP manages towards the target levels, providing an additional buffer to help achieve the management plan's objectives.

Table 1. Current female spawning stock biomass (SSB) and fishing mortality (F) target and threshold reference points for Atlantic striped bass based on results of the 2018 benchmark assessment.

	Female SSB	***F***
Threshold	SSB_{1995} = 91,436 mt (202 million lbs)	0.24
Target	$SSB_{threshold}$ x 1.25 = 114,295 mt (252 million lbs)	0.20

The female SSB threshold and target were first implemented through Amendment 6 in 2003. Model-based reference points, such as the biomass needed to achieve maximum sustainable yield (MSY), were uncertain, resulting in reliance on empirical-based reference points. The SSB in 1995 was selected as the threshold because that was the year the Commission declared the stock recovered from its depleted status in the 1980s, and many desirable stock characteristics were achieved, such as an expanded age structure. The additional 25% buffer for the target was an ad hoc decision to account for uncertainty in the SSB estimates, and also produced a target value comparable to those observed prior to the stock's collapse in the 1970's. The current fishing mortality reference points were implemented in 2014 through Addendum IV to Amendment 6 and are linked to the SSB reference points. The previous fishing mortality reference points were calculated independently of the SSB reference points and were based on MSY. The 2013 Benchmark Stock Assessment moved away from that approach primarily due to uncertainty in the F_{MSY} estimates because of difficulty fitting a stock-recruit relationship and the inconsistency between the F_{MSY} reference point and the empirical SSB reference points.

While the definitions for the SSB threshold and target have remained unchanged since 2003, the estimated female SSB time series (values and trajectories) has changed with each new stock assessment. Those changes are often more pronounced in a benchmark assessment as new or improved data and advancements in population modeling are incorporated. As a result, the female SSB reference point values, and the Commission's understanding of stock performance has changed over time.

Figure 1 shows results of the last four benchmark stock assessments for striped bass (2002, 2007, 2013, and 2018 benchmarks) which demonstrate how the Commission's understanding of stock condition in 1995 has changed over time. Note that in 2003, when the SSB reference points were established, the most recent assessment information indicated the stock was above the SSB target. Also, while the general pattern of SSB is consistent across the assessments, the magnitude of the estimates and trajectories have changed. For example, the 2007 and 2013 benchmark assessments indicated female SSB was above the

SSB target for a period of time during the early 2000s. This fits our understanding of striped bass population dynamics, as the population was considered to be at a historically high level during that time period, but the 2018 benchmark shows the SSB target has not been reached at any point during the 1982-2017 time series. It is worth noting, however, the 2018 benchmark also indicates fishing mortality has consistently exceeded the fishing mortality associated with achieving the SSB target since 1996 (Figure 2). Given the 2018 benchmark assessment found overfishing was occurring and the SSB was below the target even during those years that the striped bass population was at a historically high level, the current reference points may be unattainable given current objectives for fishery performance.

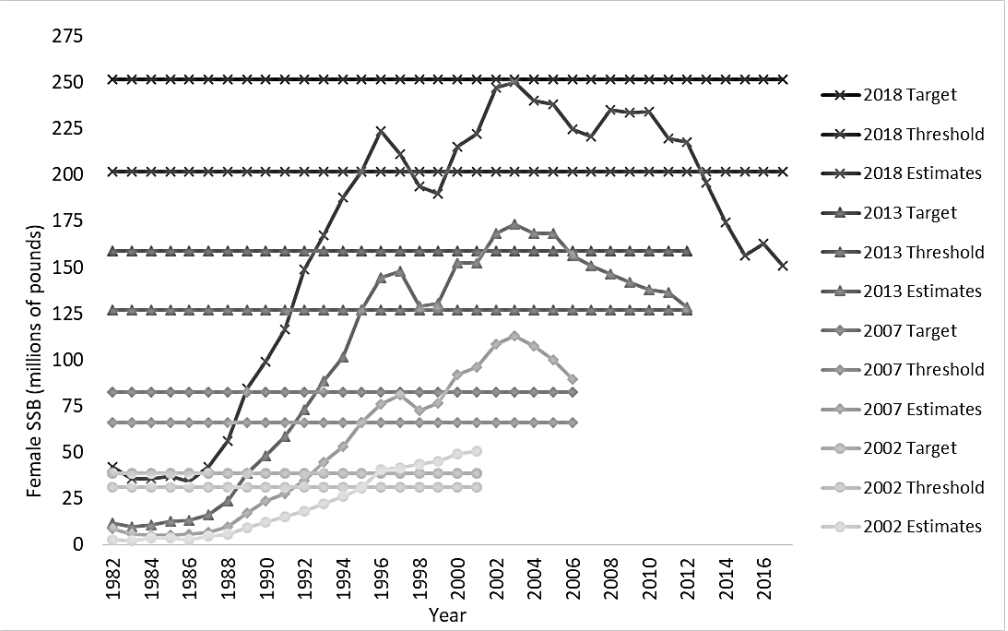


Figure 1. Historical perspective of Atlantic striped bass female spawning stock biomass (SSB) estimates and resulting SSB target and threshold since implementation of Amendment 6 in 2003. The SSB threshold and target are based on the estimate of female SSB in 1995 which has changed over time with improved data and modeling techniques. Source: ASMFC.

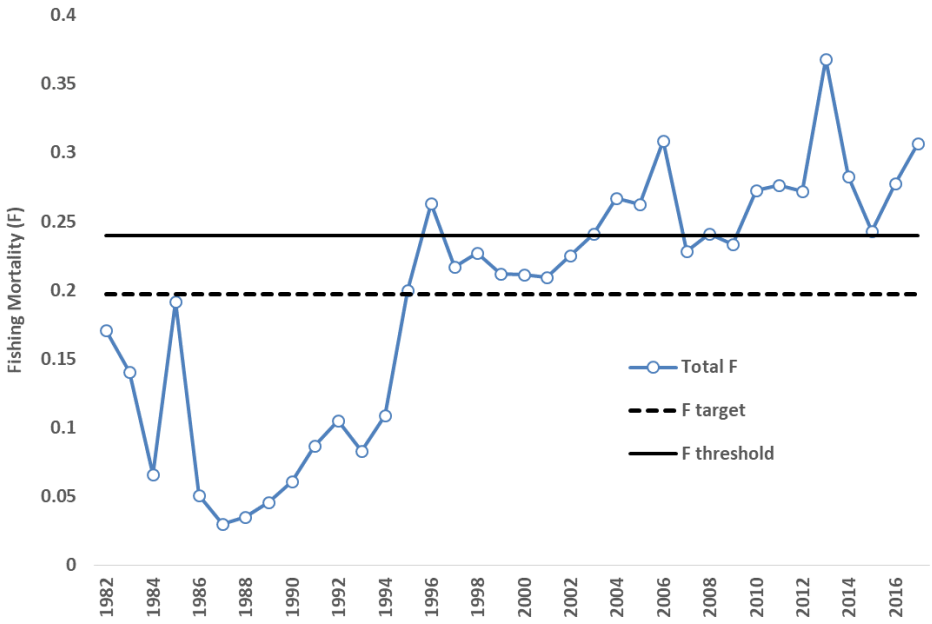


Figure 2. Current estimates of fishing mortality (F) relative to the F target and threshold, 1982-2017. Source: NEFSC 2018a.

Potential alternatives to the current reference points are restricted by data and modeling limitations. Unfortunately, the statistical-catch-at-age (SCAA) model currently used in striped bass stock assessment is unable to produce reasonable estimates for model-based reference points, such as MSY or SPR (spawning potential ratio). The Technical Committee (TC) has made considerable progress on a two-stock SCAA model which may be able to produce reasonable SPR-based reference points in the future, but the model needs more work and is not available for management use at this time. However, other empirical-based reference points could be considered, such as the estimate of SSB in a year other than 1995 as the SSB threshold, or a percentage other than 125% for the SSB target. For example, the TC discussed 1993 as a possible alternative proxy year because SSB was lower than in 1995 but still produced a strong year-class (Figure 3).

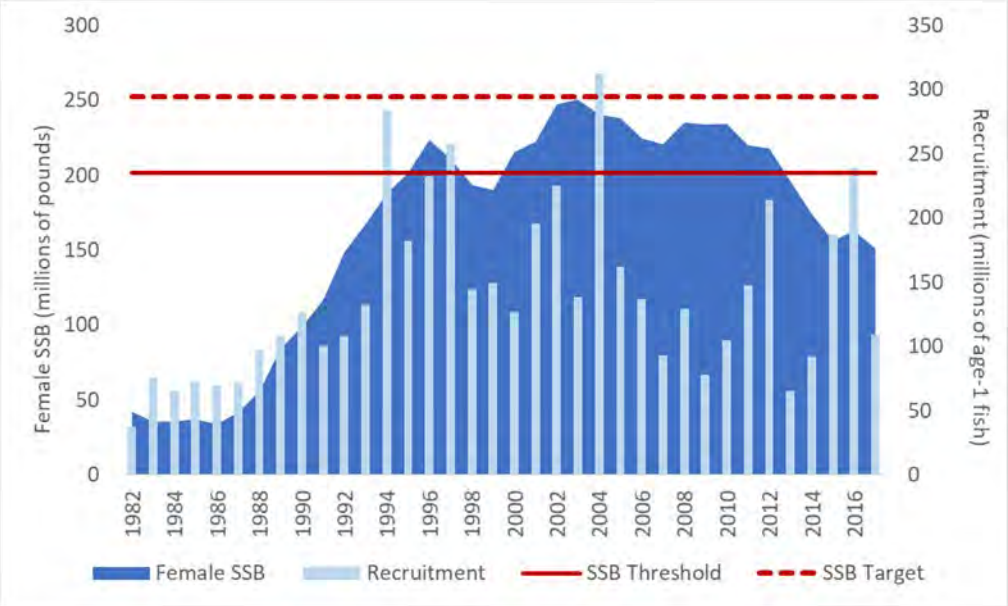


Figure 3. Current estimates of female spawning stock biomass (SSB) relative to the SSB target and threshold, and recruitment (age-1 fish), 1982-2017. The 1994 recruitment estimate, which represents the 1993 year-class, was the first large recruitment event in the time series. Source: NEFSC 2018a.

The Atlantic Striped Bass FMP has also managed specific areas of the fishery with different F rates (i.e., the Chesapeake Bay, and the Albemarle Sound/Roanoke River (A/R) management area in North Carolina), although these F rates were not used to determine overall stock status and are not considered BRPs in the context of this section. The Board has expressed interest in establishing separate reference points for the primary stocks that contribute to the coastwide migratory population, but the current SCAA model does not allow for this. The two-stock SCAA model that is under development has the potential to produce a set of reference points for the Chesapeake Bay stock and for the ocean region (which includes the Delaware Bay/Hudson River stock complex), but this remains a long-term objective. However, the current SCAA model does separate fishery removals into two fleets or regions, and these fleet components could be used to explore regional management programs which is discussed in Issue 5: Regional Management (page 13).

Statement of the Problem: It's approaching two decades since the 1995 estimate of female SSB was selected as the basis for BRPs for striped bass. However, improved data and advancements in assessment modeling have changed our understanding of historical stock performance since the stock was declared restored. This is an appropriate time to revisit the BRPs to ensure they are reliable indicators of stock performance and are properly aligned with the FMP's goal and objectives.

Public Comment Questions: Is the 1995 estimate of female SSB still an appropriate benchmark for determining stock status? Is there a better empirical reference year or other empirical approach that should be considered? Is a 25% buffer appropriate for the SSB target? Should the Board prioritize development of model-based reference points and/or stock-specific reference points for the Chesapeake Bay and other stock components? What stock characteristics (abundance of large fish available to anglers, diverse age structure, etc.) should the BRPs attempt to achieve to balance the needs of diverse striped bass fisheries and the state of the resource?

ISSUE 3: **Management Triggers**

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ISSUE 4: Stock Rebuilding Target and Schedule

Background: Amendment 6 includes a series of management triggers to prevent overfishing the striped bass resource. The triggers are based on the BRPs and juvenile recruitment indices, and are paraphrased below. Management measures implemented by the Board are to be held in place for at least three years, unless a trigger or threshold is violated (although CE has allowed for exceptions to this 3-year timeframe; see Issue 6 on page 15). Upon reaching any (or all) of these triggers, the Board is required to modify the management program to ensure the goal and objectives of Amendment 6 are achieved.

Management triggers established in Amendment 6 are:

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.

The BRP-based management triggers require action on different timelines. When the fishing mortality-based triggers are met, corrective action is required quickly, as management action can reduce fishing mortality immediately by reducing total removals. When the SSB-based triggers are met, changes to the management program can occur gradually over a long period of time (up to 10-years); this is in recognition of the fact that striped bass are slow to mature, with 100% of females reaching maturity by age 9, and as a result, the impact of management action on SSB will not be fully realized until the protected age classes are mature. This also provides stability for the fishery while rebuilding the stock. The latest science also indicates that the SSB target has never been reached which raises questions that it may be an unreasonably high management target given current objects for fishery performance and changing or altered ecosystem conditions (e.g., climate change, and changes in other predator and prey population abundance). Meanwhile, the recruitment-based trigger is evaluated on a 3-year cycle and has not been triggered since it was established, even though the stock experienced a period of variable, but below average recruitment from about 2005-2014 which contributed to stock declines in recent years.

Of note, the BRP-based management triggers are based on the most recent estimate of fishing mortality and/or SSB. While significant changes in SSB tend to occur slowly over time due to the biology of the species (i.e., long lived and late to mature), fishing mortality is a measure of fishing pressure which is variable from year-to-year. As a result, the Board is sometimes criticized for having 'knee-jerk' reactions when responding to a single point estimate of fishing mortality. Additionally, development of both short- and long-term rebuilding programs are informed by simulations of stock performance in the future based on assumptions of fishing mortality, recruitment, and other variables. As a result, these stock projections are inherently uncertain, particularly the further out they project.

Statement of the Problem: 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 SSB is below the target level, the variable nature of fishing mortality can result in a continued need to 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 introduces an inherent level of uncertainty in decision making. 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.

Public Comment Questions: Which management triggers (if any) should be revisited? What is an appropriate timeframe to respond to overfishing or overfished determinations? Should the fishing mortality-based triggers account for annual variability in fishing mortality? What is more important, rebuilding the stock quickly, or mitigating impacts to fisheries? In other words, do you prefer significant changes to rebuild the stock quickly, or smaller incremental changes over time to gradually rebuild the stock?

***ISSUE 5:* Regional Management**

Background: The Atlantic striped bass population is assessed and managed on a coastwide basis. However, the population is actually comprised of several stocks each with unique contributions to the coastwide population. Striped bass fisheries are conducted very differently throughout the species range due to the size and availability of fish in those areas (and other cultural differences), although there are some regional similarities.

To address this, previous striped bass management programs have managed specific regions of the fishery differently. Under Amendment 5 (1995), fisheries in the Chesapeake Bay and A/R were managed under a lower F rate than the rest of the coast which allowed these regions to implement different harvest strategies including size limits, bag limits, and catch quotas. Fisheries included in the ocean region, like in the Delaware Bay and River, and the Hudson River, were also able to implement lower size limits during certain seasons, although this was accomplished through management program equivalency (see Issue 6 on page 15). This regional management approach for the Chesapeake Bay and the A/R was maintained in Amendment 6. However, with implementation of Addendum IV to Amendment 6 in 2015, the entire striped bass population is once again managed under the same F rate (i.e., the coastwide fishing mortality reference points). Addendum IV also formally defers management of the A/R stock to the state of North Carolina (under the auspices of the Commission) based on evidence that the stock contributes minimally to the coastwide population.

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 SCAA model was modified into a competing two-stock SCAA 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 is not ready for management at this time.

There are stock assessment tools available now that the Board could use to pursue a different management program for the Chesapeake Bay region. The current single-stock SCAA model separates fishery removals into an ocean fleet and a Chesapeake Bay fleet, and these fleet components can be used to explore different management programs for the two regions. This approach would be unique in the Commission framework and would raise a number of questions about implementation. In this scenario, the fishing mortality target and threshold would be set for the entire coastwide stock complex, and the Chesapeake Bay region and the ocean region would be allocated a proportion of the overall F to manage towards. With further model development, additional regions could be added. The Board would decide how to allocate total F to each region, which could be based on historical performance of each fishery or other management objectives. The Board would also have to decide how to implement accountability for each region. Currently, if total removals have to be reduced to bring the overall coastwide fishing mortality down to the fishing mortality target, both regions take an equal percent cut. With a regional fishing mortality management program, the reduction could be based on whether a region has exceeded its allocation of fishing mortality and by how much. The Board would also have to consider whether a region would have to reduce harvest if it exceeds its regional F allocation, but the overall fishing mortality for the stock was no exceeded.

Statement of the Problem: An ongoing objective of the Atlantic Striped Bass FMP is to provide regional flexibility while maintaining coastwide regulatory consistency to the extent practical. Previous striped bass management regimes have allowed specific regions to manage their fisheries independently (under a different F rate than the rest of the coast) to balance these competing priorities. While the development of stock-specific reference points has been identified as a research priority, there are tools available now that the Board could use to pursue different management programs for the Chesapeake Bay and ocean regions. However, the appropriate allocation of fishing mortality between these two regions is ultimately a policy decision, and must be considered carefully along with other management implications.

Public Comment Questions: Should separate regional management programs be pursued for the Chesapeake Bay and the ocean region, which includes the Delaware Bay/Hudson River stock complex? If so, how should the Board determine the appropriate allocation of fishing mortality between the two regions? Should the Board consider any other areas (e.g. Delaware River or Hudson River) for separate regional management programs? If so, what level of data should support additional regional separation? Should development of

similar assessment tools be prioritized to support regional management programs for other areas of the coast?

ISSUE 6 Management Program Equivalency (Conservation Equivalency)

Background: Management program equivalency (hereafter referred to as 'conservation equivalency' or CE) has been an explicit component of the striped bass management program since the stock was declared rebuilt in 1995. The Atlantic Striped Bass FMP (and Commission's ISFMP Charter) employs CE to provide states and jurisdictions (hereafter states) flexibility to develop alternative regulations that achieve the same quantified level of conservation for the resource as the FMP standards. Allowing states to tailor their management programs in this way avoids the unequal impacts that result from implementing one set of management measures for all states.

The striped bass population is managed on a coastwide basis, although the fisheries are executed very differently due to size and availability of fish and a wide range of fishing cultures and priorities. This makes it difficult to develop a 'one-size-fits-all' regulation for the entire fishery. Early striped bass CE programs addressed areas where only a portion of the stock was available, e.g. areas were approved to have smaller size limits because large fish were not available during the summer. The primary motivation for more recent CE programs has been for states to propose alternative measures to ameliorate social and economic impacts of actions to reduce harvest. States typically pursue CE to adjust commercial size limits and quotas, or to implement different recreational bag limits, size limits, and seasons.

The process and application of CE is detailed in the Commission's Conservation Equivalency Policy and Technical Guidance Document. To implement CE, states must develop a CE proposal demonstrating, through quantitative analysis, how the proposed regulations are equivalent to the FMP standards. Guidance regarding data use and methods that states should follow when developing CE proposals are typically provided by the TC, while the Board determines what constitutes equivalency on an ad hoc basis (e.g., the level of harvest (or reduction) that proposed measures must achieve). All CE proposals are subject to technical review and Board approval before the state can implement a CE program, as well as a post-implementation review of effectiveness. However, it is challenging to evaluate the effectiveness or success of CE programs once implemented because of the difficulty in separating the effects of the CE program from other factors like angler behavior and availability of fish that determine the amount of catch and release (see Issue 7 and Issue 8 on page 16 and 19, respectively) that occurs. As a result, CE programs, once implemented, typically become the new baseline for future regulatory changes for that state and fishery. Furthermore, CE proposals for the recreational fishery generally rely on state-level catch and effort data estimated by the Marine Recreational

Information Program (MRIP) which are less precise then regional or coast-wide estimates.

The fundamental conflict between allowing flexibility through CE and achieving regulatory consistency among states escalated recently with the implementation of Addendum VI. For the recreational fishery, the Addendum implemented a 1-fish bag limit and a 28 inch to less than 35 inch slot limit for the ocean region and a 1-fish bag limit and an 18 inch minimum size limit for the Chesapeake Bay in order 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) due to varying contributions of each states fishery to the total, and state's needed to only demonstrate an 18% reduction at the state-level in CE proposals, which could result in falling short of overall target reductions. Also, majority of states pursued CE and submitted a very large number of options for TC review, which raised questions for additional guidelines regarding the submission of CE proposals.

Statement of the Problem: There is an essential tension between managing the striped bass fishery on a coastwide basis while allowing states to deviate from the coastwide standard, and thus creating regulatory inconsistency among states and within shared waterbodies. However, there is perceived value in allowing states to implement alternative regulations tailored to the needs of their fisheries, even though it is difficult to evaluate the effectiveness of CE programs once implemented. Both CE programs and coastwide measures have variable levels of effectiveness. A CE program may provide a higher level of conservation than the coastwide measure in a state. However, it is difficult to determine if a coastwide measure or a CE program has performed better or worse due to the challenge of separating the performance of the measure and outside variables, particularly on a state level when more than one state implements a CE program. There is 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.

Public Comment Questions: Should CE be part of the Striped Bass FMP? Should the Board restrict the use of CE based on stock status, data restrictions, differences from neighboring state, and/or any other potential issues? Should the Board provide a strict definition for 'equivalency' (e.g., equal to the level of harvest the fishery would have achieved under the standard measure)? Should more quantitatively rigorous and clearly defined data requirements be required as a pre-requisite for CE proposals to be considered? Should there be limitations to how many CE proposals a state can submit? Should CE be limited to time and areas with unique ecological characteristics (e.g., presence of smaller striped bass)? Given state-level MRIP estimates are often less precise than regional or coastwide estimates, are these data used appropriately to

develop CE proposals? Given the variability in recreational catch and harvest from year-to-year, how do you evaluate effectiveness of CE programs following implementation?

ISSUE 7 Recreational Release Mortality

Background: 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 harvested recreationally, as well as those caught and released alive, are estimated by MRIP. 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 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% discard mortality rate accounts for the variation in conditions and factors that attribute to release mortality coastwide. Applying this hooking mortality rate to the estimated number of striped bass caught and released from 2015 to 2019 results in an annual average of 2.8 million dead releases per year.

Since 1990, roughly 90% of all striped bass caught recreationally were released alive (Figure 4) 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).

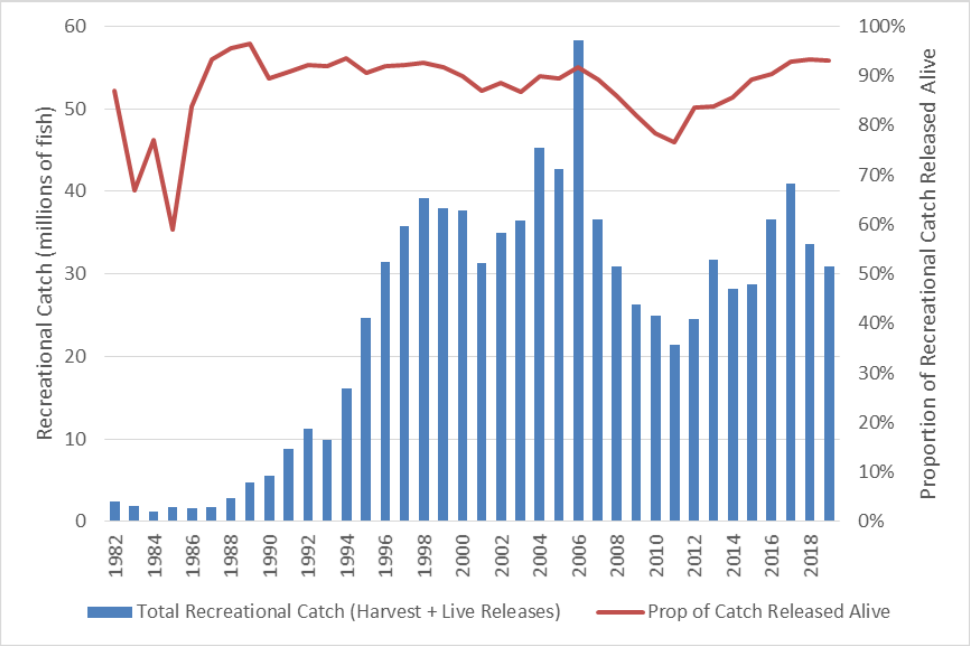

Figure 4. Total recreational catch (harvest + live releases) and the proportion of catch released alive, 1982-2019. Source: MRIP; excludes inshore estimates from A/R in North Carolina.

In 2019, more fish were estimated to have died from catch and release fishing than were harvested by the recreational fishery (2.59 million fish and 2.15 million fish, respectively; Figure 5). Because 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 (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 including environmental conditions (e.g., salinity, air and water temperatures), angler experience, and angler behavior (e.g., how fish are handled). Addendum VI also encourages 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 will have to consider the impacts those actions will have on the fishery. For example, management measures focusing on reducing discards could discourage participation from anglers that value food fish and negatively impacts the industry which caters to those anglers.

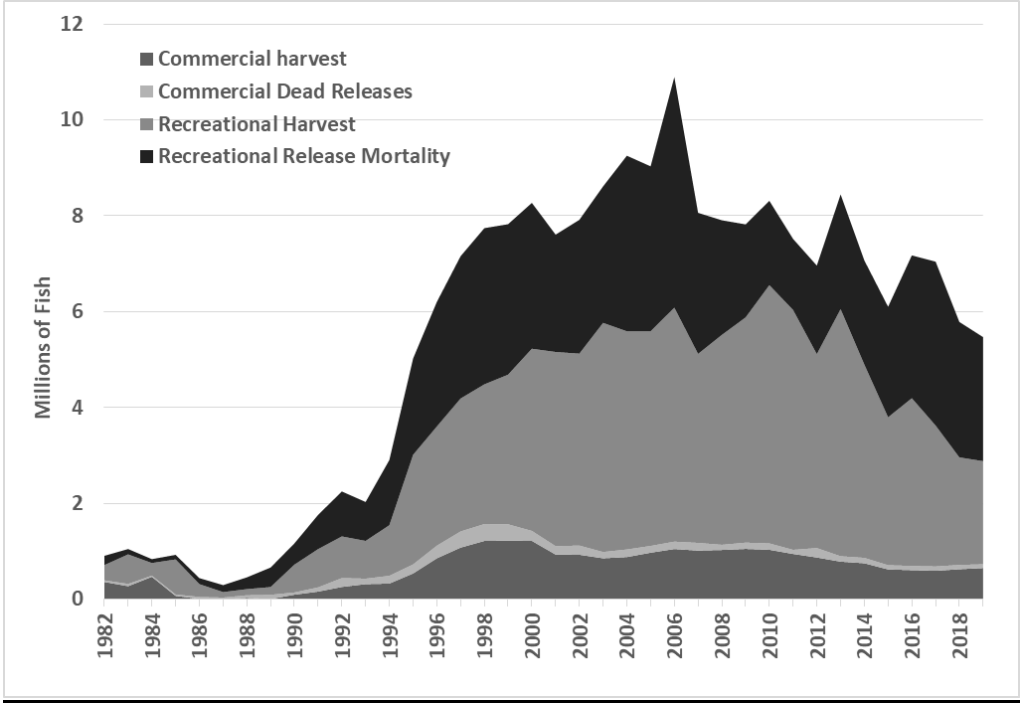

Figure 5. Total striped bass removals by sector in numbers of fish, 1982-2019. Note: Harvest is from ACCSP/MRIP, commercial discards and recreational release mortality is from ASMFC. Estimates exclude inshore harvest from A/R in North Carolina.

Statement of the Problem: Recreational release mortality constitutes such a large component of annual fishing mortality because the striped bass fishery is predominantly recreational and an overwhelming majority of the catch is released alive. The source of mortality does not matter to the health of the stock, as long as the overall fishing mortality is below the threshold. The current management program, which primarily uses bag limits and size limits to control harvest, 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.

Public Comment Questions: Should management focus on reducing the rate at which fish die after being released alive through additional gear restrictions similar to recent actions regarding the use of circle hooks (e.g., banning gaffing or the use

of treble hooks)? Should management focus on reducing effort in the fishery in order to reduce the total number of striped bass caught and released? Should management consider seasonal closures when environmental conditions are unfavorable to striped bass survival when released? What are some ways to improve awareness and stewardship of the resource?

ISSUE 8: Recreational Accountability

Background: The striped bass resource currently supports commercial fisheries in eight jurisdictions and recreational fisheries in 14 jurisdictions along the Atlantic coast. The commercial fishery is regulated through Addendum VI with state-by-state commercial quota allocations and size limits (see Issue 9 on page 20 for more information about the striped bass commercial quota). Many jurisdictions have imposed additional management measures, including time and area closures, and gear restrictions, which are designed to control effort and the size of fish in the catch. Quotas are allocated to the states on an annual basis. If a state exceeds its quota in a given year, the state's quota is reduced by the amount of the overage the following year on a pound-for-pound basis. States are able to monitor the commercial quota closely throughout the year via landings and dealer reports which are typically required on a daily or weekly basis depending on the state. The state closes the fishery when its quota (or a percentage of the quota) is projected to be landed.

Unlike the commercial sector, the recreational striped bass fishery is not managed by a quota system; instead, the fishery is managed with size limits and bag limits (and with seasons in some states). As a result, recreational removals (combined harvest and release mortality) fluctuate from year-to-year with changes in angler effort and changes in the size, age structure, and distribution of the population throughout its range. Additionally, recreational catch and effort data are estimated in two-month intervals, called 'waves', via angler intercept and mail-based surveys administered by MRIP. These estimates are generally available six weeks after the end of a wave, which limits manager's ability to monitor the fishery during the season.

Some recreational fisheries, such as summer flounder and black sea bass, are managed by an annual recreational harvest limit (RHL) due to federal mandates. In the federal process, stock projections, estimates of release mortality, and management uncertainty are considered when setting the RHL for a species. Management measures (e.g., bag limits, size limits, and seasons) are implemented at the state, regional, or coastwide level, to collectively achieve the RHL. If the RHL is projected to be exceeded in a given year, the states may be required to adjust measures prior to that season to address potential for overharvest. Conversely, if recreational removals are projected to be less than the RHL, the states may be allowed to liberalize measures to fully utilize the RHL. While this approach allows for recreational accountability, it can also lead to frequent annual regulatory changes.

Statement of the Problem: The Atlantic Striped Bass FMP does not use an RHL or quota to manage the recreational fishery, which makes it difficult to evaluate whether removals from the sector are too high and to implement accountability measures. The use of RHLs is an effective way to implement accountability, however, recreational removals are inherently variable from year-to-year and MRIP data can have high levels of uncertainty (particularly at the state-level). Furthermore, a quota-based management approach conflicts with the stated objective of management stability for the fishery.

Public Comment Questions: Should the Board consider implementing an RHL for recreational striped bass management? How should an RHL overage or underage be addressed? Should stock status be considered when handling an RHL overage or underage? Are there additional accountability measures the Board should consider for managing the recreational striped bass fishery?

ISSUE 9: Coastal Commercial Quota Allocation

Background: Some species management boards (e.g. the Summer Flounder, Scup, and Black Sea Bass Board) are emphasizing the need to update commercial allocations to reflect recent catch and population distribution data. The Atlantic Striped Bass FMP uses a quota system to manage the commercial fishery. Each state from Maine to North Carolina is allocated a commercial quota in pounds of fish for harvest in the ocean region. A separate Chesapeake Bay commercial quota is allocated to Maryland, Virginia, and the Potomac River Fisheries Commission per the state/jurisdiction's mutual agreement. Quota overages are paid back the following season on a pound-for-pound basis, while the transfer of quota between states and rollover of unused quota from one year to the next is not permitted. Commercial harvest in the A/R is managed separately by the state of North Carolina with Commission oversight.

In general, the coastal commercial quota allocation is based on average landings during 1972-1979 and assuming a 28" minimum size limit. This historical base period was first used for management in 1989 when Amendment 4 required closed seasons in order to reduce commercial harvest to 20% of the base period. State-specific quotas were first implemented under Amendment 5 (1995) when the Commission declared the stock fully rebuilt; states were allocated 70% of their average landings during the 1972-1979 base period. Addendum III to Amendment 5 also granted producer-area status to the Delaware River and Bay, which allowed its commercial quota to be managed under a harvest-control model similar to that used in the Chesapeake Bay. Under Amendment 6 (2003), the quotas were increased to 100% of the base period, with some exceptions (see page 57 of *Amendment 6, Appendix 3* for details) and producer-areas were no longer used as a management tool. Of note, Delaware's quota was held at its last producer-area level under Amendment 6.The Amendment 6 quota allocations have since been reduced by 25% in 2015 (Addendum IV) and by an additional 18% in 2020

(Addendum VI) in response to declining stock status (Table 2). Throughout quota management, states have used CE to implement different commercial size limits resulting in changes to respective quota amounts.

Table 2. Changes in base quotas for Atlantic striped bass commercial fisheries by state and region since implementation of Amendment 6 in 2003. All quota amounts are in pounds.

State	Reference Period	Amendment 6		
	1972-1979 Average	Amend 6 † (2003)	Adden IV º (2015)	Adden VI ^ (2020)
Maine	250	250	188	154
New Hampshire	5,750	5,750	4,313	3,537
Massachusetts	1,159,750	1,159,750	869,813	713,247
Rhode Island	243,625	243,625	182,719	148,889
Connecticut	23,750	23,750	17,813	14,607
New York	1,059,875	1,061,060	795,795	652,552
New Jersey	321,750	321,750	241,313	197,877
Delaware *	169,125	193,447	145,085	118,970
Maryland	131,560	131,560	98,670	74,396
Virginia	184,853	184,853	138,640	113,685
North Carolina	480,480	480,480	360,360	295,495
Maryland (Chesapeake Bay)		Set annually based on fishing mortality rate of F=0.27	3,120,247	2,588,603
PRFC (Chesapeake Bay)				
Virginia (Chesapeake Bay)				

*Quota combined for Delaware Bay and ocean region

†Beginning in 2003, quota reduced through CE for NY (892,293) and MD (126,396). Beginning in 2007, quota reduced through CE for RI (239,963)

ºAddendum IV quota changed through CE for MD (90,727), RI (181,572), NJ (215,912)

^Addendum VI quota changed through CE MA (735,240), NY (640,718), NJ (215,912), DE (142,474), MD (ocean: 89,094; bay: 1,445,394), PRFC (572,861), VA (ocean: 125,034; bay: 983,393)

Under Amendment 5, the Chesapeake Bay quota was also based on average landings during the 1972-1979 base period, and split among the three jurisdictions based on their percent contribution to the 1994 harvest: Maryland = 52.359%, PRFC = 15.226%, and Virginia = 32.414%. Under Amendment 6, management in the Chesapeake Bay transitioned to a harvest control model where the commercial quota changed annually with exploitable biomass (Table 2). However, under Addendum IV the Chesapeake Bay quota was made static again and reduced to its 2012 harvest level minus 20.5%. Addendum VI further reduced the Chesapeake Bay commercial quota by 18%, although states pursued CE to lessen the impact of further cuts to the quota.

Unlike the commercial fishery in Chesapeake Bay, the ocean region regularly underutilizes the quota. The ocean quota underage is mainly attributed to designated game fish status in several states including Maine, New Hampshire, Connecticut, and New Jersey which collectively share about 10% of the commercial quota in the ocean region. 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.

Statement of the Problem: For decades, 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. Additionally, the coastal commercial quota is not set annually based on changes in available biomass, but rather state-specific quotas are fixed in terms of pounds of fish until an assessment indicates removals need to be adjusted. Furthermore, within Chesapeake Bay there is an increasing disconnect from the 1970s base period over the years with the continued use of CE and other management actions that have occurred there.

Public Comment Questions: Should this Amendment address commercial allocation or be considered in a future management action? Is the 1972-1979 landings period still an appropriate baseline for the coastal commercial allocation? Should other allocation approaches be considered? Should the coastwide quota be explicitly set on an annual basis, or following an updated stock assessment or benchmark? Should regions with the necessary data be able to use a harvest control rule where commercial quotas are set annually based on exploitable biomass?

ISSUE 10: Other Issues

Background: The intent of this document is to solicit feedback on a broad range of issues for consideration in the next amendment for Atlantic striped bass. Stakeholder feedback should generally focus on **"How would you like management of the Atlantic striped bass fishery to look in the future?"**

After reading the above issues, are there any other topics that should be addressed in Amendment 7? Some examples may include:

- Impacts due to climate change, including possible loss of prey due to changing environmental conditions;
- Habitat degradation;
- Limited resources for law enforcement; and

- Research priorities

When providing comment on other management issues, it's important to indicate how the issue can be addressed through Board action.

BACKGROUND INFORMATION ON THE MGMT & STOCK STATUS OF ATLANTIC STRIPED BASS

Summary of Fishery 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 NOAA Fisheries. The first Interstate FMP for the species was approved in 1981 in response to declining juvenile recruitment and depressed landings throughout 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 until recruitment improved. 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 fishery is currently managed through Amendment 6 to the FMP, which was implemented in 2003. Amendment 6 modified the BRPs, and established a list of management triggers based on the BRPs and juvenile recruitment. The coastal commercial quotas were restored to 100% of the states' average landings during the 1972-1979 historical base period at a 28" minimum size, with few exceptions (see Issue 9 on page 20). In the recreational fisheries, all states were required to implement a two-fish bag limit with a minimum size limit of 28 inches except for states with approved CE programs (see Issue 6 on page 15). The Chesapeake Bay and A/R regulatory programs were managed by a lower fishing mortality target than the ocean region, which allowed these jurisdictions to implement separate seasons, harvest caps, and size and bag limits as long as they remain under that fishing mortality target. No minimum size limit can be less than 18 inches under Amendment 6.

Five addenda to Amendment 6 have been implemented. Addendum I, approved in 2007, recommended research and angler education programs to address bycatch and release mortality. Addendum II, approved in 2010, modified the definition of recruitment failure so that each juvenile abundance index would have a fixed threshold for determining recruitment failure. Addendum III, approved in 2012,

requires all states with a commercial striped bass fishery to implement a uniform commercial harvest tagging program to improve compliance and enforcement.

Addendum IV, approved in 2014, established new coastwide fishing mortality reference points as recommended by the 2013 benchmark, eliminated the separate F rates used to manage the Chesapeake Bay and A/R regions, and changed commercial and recreational measures to reduce F to the new F target. To achieve this, the Addendum implemented a 25% reduction to coastal commercial quotas, a 1-fish bag limit and 28" minimum size limit in recreational ocean fisheries (equivalent to a 25% reduction in removals), and 20.5% reductions in the Chesapeake Bay commercial and recreational fisheries. Addendum VI, approved in 2019 in response to the 2018 benchmark assessment, implemented additional 18% reductions to fishery removals to end overfishing and again try to reduce F to the target. This required an 18% reduction to all commercial quotas (ocean and Chesapeake Bay), a 1-fish bag limit and 28" to less than 35" slot limit for ocean recreational fisheries, and a 1-fish bag limit and 18" minimum size limit for Chesapeake Bay recreational fisheries beginning in 2020. For 2021, the addendum also requires mandatory use of circle hooks while recreationally fishing with bait. CE was employed by some states to implement alternative recreational or commercial measures from the Addendum IV and Addendum VI standards described above. There is no Addendum V; an action was initiated under this title in 2017 to consider liberalizing regulations, but the action was postponed and ultimately replaced by the development of Addendum VI.

The EEZ 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. In addition, an Executive Order issued in 2017 prohibits the sale of striped bass from the EEZ. In 2018, the Consolidated Appropriations Act directed NOAA Fisheries (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 movement by NOAA on this directive as of late.

Summary of Stock Status

The 2018 Benchmark Stock Assessment is the latest and best information available on the 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. 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 female SSB, F, and recruitment. Notably, 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.

The reference points currently used for management are based on stock conditions in 1995, the year the stock was declared rebuilt (see Issue 2 on page 6). The biomass threshold is the level of 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 have been updated after each benchmark stock assessment based on the time series of SSB estimates.

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 SSB threshold of 91,436 metric tons (202 million pounds) (Figure 3). Female SSB peaked in 2003 and has been declining since then; SSB has been below the threshold level since 2013. Total F in 2017 was estimated at 0.31, which is above the fishing mortality threshold of 0.24 (Figure 2). Total fishing mortality has been at or above the threshold in 13 of the last 15 years of the assessment (2003-2017). Striped bass experienced a period of lower recruitment from 2005-2011 (Figure 3) which contributed to the steep decline in SSB that the stock has experienced since 2010. Recruitment 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 average in 2013, 2014, and 2017.

Ecological Reference Points

In August 2020, the Atlantic Menhaden Management Board approved the use of ecological reference points (ERP) for menhaden management. The ERP assessment uses the Northwest Atlantic Coastal Shelf Model of Intermediate Complexity for Ecosystems (NWACS-MICE) to develop Atlantic menhaden ERPs that account for Atlantic menhaden's role as a forage fish. NWACS-MICE is an ecosystem model that focuses on four key predator species (striped bass, bluefish, weakfish, and spiny dogfish) and three key prey species (Atlantic menhaden, Atlantic herring, and bay anchovy). These species were chosen because diet data indicate they are top predators of Atlantic menhaden or are key alternate prey species for those predators. The tool allows managers to evaluate the tradeoffs between Atlantic menhaden harvest and predator abundance to set reference points that take into account menhaden's role as a forage fish. 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.

Atlantic striped bass is the focal species for the ERP definitions because it is 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.

Summary of the Fishery
The Atlantic striped bass fishery is predominantly recreational with the sector accounting for 88% of total harvest by weight since 2005 and 82% in terms of numbers of fish (Table 3 and Table 4). In 2019, total removals (commercial and recreational combined, including harvest and dead releases) was estimated at 5.47 million fish; the recreational sector accounted for 87% of total removals by number.

Commercial Fishery
The commercial fishery is managed via a quota system resulting in relatively stable landings since implementation of Amendment 6 in 2003 (see Issue 9 on page X). From 2004 to 2014, coastwide commercial harvest averaged 6.8 million pounds (1 million fish) annually (Table 3 and Table 4). From 2015-2019, commercial landings decreased to an average of 4.7 million pounds (619,279 fish) due to implementation of Addendum IV and a reduction in the commercial quota. Commercial discards are estimated to account for <2% of total removals per year since 2004 (Table 3 and Table 4).

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. Although the regional 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 is 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 designated game fish status in some states (Maine, New Hampshire, Connecticut and New Jersey).

Recreational Fishery

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. From 2004-2014, recreational harvest averaged 54.8 million pounds (4.6 million fish) annually (Table 3 and Table 4). From 2015-2019, recreational harvest averaged 33.6 million pounds (2.8 million fish) in part due to declining biomass and implementation of Addendum IV.

The vast majority of recreational striped bass catch is released alive either due to angler preference or regulation; roughly 90% annually since 1990. 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 catch and release fishing contributes a significant source of mortality to the stock each year. In 2019, recreational anglers caught and released an estimated 28.8 million fish, of which 2.60 million are assumed to have died which represents 47% of total striped bass removals in 2019 (Table 3).

A large proportion of recreational harvest comes from Chesapeake Bay. From 2004-2014, 33% of recreational harvest in numbers of fish came from Chesapeake Bay. From 2015-2018, that percentage increased to 45%, 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.

References

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Northeast Fisheries Science Center (NEFSC). 2018a. 66th Northeast Regional Stock Assessment Workshop (66th SAW) Assessment Report. US Dept Commer. Northeast Fish Sci Cent Ref Doc. 19-08; 719 p.

Northeast Fisheries Science Center (NEFSC). 2018b. 66th Northeast Regional Stock Assessment Workshop (66th SAW) Assessment Summary Report. US Dept Commer. Northeast Fish Sci Cent Ref Doc. 19-01; 45 p.

Tables

Table 3. Total striped bass removals (harvest plus release mortality) by sector in numbers of fish, 1990-2019. Note: Harvest is from ACCSP/MRIP, release mortality is from ASMFC. Estimates exclude inshore harvest from North Carolina.

Year	Commercial		Recreational		Total Removals
	Harvest	Release Mortality	Harvest	Release Mortality	
1990	93,888	46,912	578,897	442,811	1,162,508
1991	158,491	88,486	798,260	715,478	1,760,714
1992	256,476	184,638	869,779	937,611	2,248,505
1993	314,483	113,410	789,037	812,404	2,029,333
1994	325,401	162,970	1,055,523	1,360,872	2,904,765
1995	537,412	189,819	2,287,578	2,010,689	5,025,498
1996	854,094	263,510	2,487,422	2,600,526	6,205,552
1997	1,076,460	337,085	2,774,981	2,969,781	7,158,307
1998	1,215,219	353,224	2,915,390	3,259,133	7,742,966
1999	1,223,572	339,103	3,123,496	3,140,905	7,827,075
2000	1,216,812	208,415	3,802,477	3,044,203	8,271,906
2001	931,412	175,656	4,052,474	2,449,599	7,609,141
2002	928,085	191,561	4,005,084	2,792,200	7,916,931
2003	854,326	130,646	4,781,402	2,848,445	8,614,819
2004	879,768	158,311	4,553,027	3,665,234	9,256,339
2005	970,403	141,415	4,480,802	3,441,928	9,034,549
2006	1,047,648	153,276	4,883,961	4,812,332	10,897,218
2007	1,015,226	159,830	3,944,679	2,944,253	8,063,988
2008	1,027,837	107,778	4,381,186	2,391,200	7,908,000
2009	1,049,959	130,819	4,700,222	1,942,061	7,823,061
2010	1,031,430	133,970	5,388,440	1,760,759	8,314,599
2011	944,777	85,848	5,006,358	1,482,029	7,519,013
2012	870,606	197,412	4,046,299	1,847,880	6,962,196
2013	784,379	111,580	5,157,760	2,393,425	8,447,144
2014	750,263	113,080	4,033,746	2,172,342	7,069,431
2015	621,952	88,497	3,085,725	2,307,133	6,103,307
2016	606,087	87,827	3,500,434	2,981,430	7,175,777
2017	592,670	91,338	2,939,777	3,420,645	7,044,430
2018	625,177	90,092	2,244,766	2,826,667	5,786,702
2019	650,511	78,990	2,150,935	2,589,045	5,469,481

Table 4. Total recreational and commercial striped bass harvest by sector in pounds and numbers of fish, 1990-2019. Note: Harvest is from ACCSP/MRIP. 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	314,483	789,037	1,103,520	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	854,094	2,487,422	3,341,516	4,822,874	28,625,685	33,448,559
1997	1,076,460	2,774,981	3,851,441	6,077,751	30,616,093	36,693,844
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	1,015,226	3,944,679	4,959,905	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	1,049,959	4,700,222	5,750,181	7,216,792	54,411,389	61,628,181
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	870,606	4,046,299	4,916,905	6,516,868	53,256,619	59,773,487
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	606,087	3,500,434	4,106,521	4,831,442	43,671,532	48,502,974
2017	592,670	2,939,777	3,532,447	4,816,395	37,961,037	42,777,432
2018	625,177	2,244,766	2,869,943	4,770,463	23,069,028	27,839,491
2019	650,511	2,150,935	2,801,446	4,199,502	23,556,287	27,755,789

Atlantic States Marine Fisheries Commission

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MEMORANDUM

April 20, 2021

To: **Atlantic Striped Bass Management Board**

From: **Tina Berger, Director of Communications**

RE: **Advisory Panel Nomination**

Please find attached one new nomination to the Atlantic Striped Bass Advisory Panel – Jon Worthington, a recreational angler from North Carolina. 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

Bolded names await approval by the Atlantic Striped Bass Management Board April 20, 2021

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Appt. Confirmed 5/23/02
Appt Reconfirmed 5/06 and 5/10

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Appt. Confirmed 5/13/14

North Carolina
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Phone: (252) 312-8457
Appt. Confirmed 11/10/04
Appt Reconfirmed 11/08; 8/18

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Camden, NC 27921
Phone: (252) 562-2914
ncpierrat@gmail.com

District of Columbia
Joe Fletcher (rec)
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McLean, VA 22101
Phone: (703) 356-9106
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)
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Newburg, MD 20664
Phone: 240.538.1260
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 ___ Bill Gorham_____ State: _NC____
(your name)

Name of Nominee: ____ Jon Worthington_____

Address: _____ 405 Japonica Drive_____

City, State, Zip:_____ Camden, NC 27921_____

Please provide the appropriate numbers where the nominee can be reached:

Phone (day): _____ 252-562-2914_____ Phone (evening): _____

FAX: _____ Email: _____ ncpierrat@gmail.com _____

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

If “yes,” please list them below by name.

Outer Banks Anglers Club(Past President) __ Nags Head Surf Fishing Club_____

Cape Hatteras Anglers Club_____ _ NCBBA_____

_____ _____

4. What kinds (species) of fish and/or shellfish has the nominee fished for during the past year?

Red Drum_____ Cobia_____

Rockfish_____ Tuna & Wahoo_____

Speckled Trout_____ Dolphin_____

5. What kinds (species) of fish and/or shellfish has the nominee fished for in the past?

Same as above_____ _____

_____ _____

_____ _____

FOR COMMERCIAL FISHERMEN:

1. How many years has the nominee been the commercial fishing business?
2. Is the nominee employed only in commercial fishing? ☐yes ☐no
3. What is the predominant gear type used by the nominee? _____

FOR CHARTER/HEADBOAT CAPTAINS:

1. How long has the nominee been employed in the charter/headboat business? _____
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? __50_ 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.

Nominee Signature: _____ Date: 03162021

Name: Jonathan F. Worthington_____
(please print)

COMMISSIONERS SIGN-OFF (not required for non-traditional stakeholders)

_____ _____
State Director State Legislator

_____
Governor's Appointee

Atlantic States Marine Fisheries Commission

ISFMP Policy Board

May 6, 2021
9:00 a.m. -12:00 p.m.
Webinar

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 *(P. Keliher)* 9:00 a.m.

2. Board Consent *(P. Keliher)* 9:00 a.m.
   - Approval of Agenda
   - Approval of Proceedings from February 2021

3. Public Comment 9:05 a.m.

4. Executive Committee Report (*P. Keliher*) 9:15 a.m.

5. Review and Consider New York Appeal of Addendum XXXIII to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (*P. Keliher*) 9:25 a.m.
   Final Action

6. Discuss *De Minimis* within Commission Fishery Management Plans (*T. Kerns*) 10:35 a.m.

7. Discuss East Coast Climate Change Scenario Planning Initiative (*T. Kerns*) 10:50 a.m.
   - Review Strategy for Scenario Planning Process

8. Discuss the Board Process of Approving Fishery Management Plan Reviews and Recommendations from Plan Review Teams (*T. Kerns*) 11:10 a.m.

9. Update on the Mid-Atlantic Fishery Management Council's Research Steering Committee to Evaluate Restarting the Research Set-Aside Program (*R. Beal*) 11:25 a.m.

10. SEAMAP Report (*S. Murray*) 11:35 a.m.

11. Review Noncompliance Findings (If Necessary) **Action** 11:45 a.m.

12. Other Business/Adjourn 11:50 a.m.

This meeting will be held via webinar, click here for details.
Sustainable and Cooperative Management of Atlantic Coastal Fisheries

MEETING OVERVIEW

ISFMP Policy Board
Thursday May 6, 2021
10:45 -11:45 a.m.
Webinar

Chair: Pat Keliher (ME) Assumed Chairmanship: 10/19	Vice Chair: Spud Woodward (GA)	Previous Board Meetings: February 1 and 4, 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 February 1 and 4, 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. Executive Committee Report (9:15-9:25 a.m.)

Background

- The Executive Committee will meet on May 5, 2021

Presentations

- P. Keliher will provide an update of the committees work

Board action for consideration at this meeting

- none

5. Review and Consider New York Appeal of Addendum XXXIII to the Summer Flounder, Scup, and Black Sea Bass FMP (9:25-10:35 a.m.) Final Action

Background

- Addendum XXXIII to the Summer Flounder, Scup and Black Sea Bass FMP was approved in February 2021 (**briefing materials**). The Addendum established a new state-by-state commercial black sea bass allocation.
- New York is appealing the approval of the addendum (**briefing materials**).
- Following the Appeal Process (**briefing materials**), Commission leadership reviewed the appeal and determined the appeal should be considered by the ISFMP Policy Board under criterion 1 (**briefing materials**).

Presentations

- T. Kerns will present a 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.
- New York will present rationale for appealing the decision under criterion 1 and provide a suggested solution.

Board action for consideration at this meeting

- Consider the Appeal of Addendum XXXIII to the Summer Flounder, Scup, and Black Sea Bass FMP

6. Discuss *De Minimis* within Commission Fishery Management Plans (10:35-10:50 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.

Presentations

- T. Kerns will present an overview of *de minimis* within Commission FMPs (**Briefing Materials**).

Board action for consideration at this meeting

- None

7. Discuss East Coast Climate Change Scenario Planning Initiative (10:50-11:10 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.
- This initiative is in the early stages of development, with the NRCC serving as the primary decision-making body with the addition of South Atlantic representatives. A newly formed core team of technical staff from participating organizations held an initial meeting earlier this month to discuss planning for this process.

Presentations

- T. Kerns will present an update on the East Coast Climate Change Scenario Planning Initiative and process (**Briefing Materials**).

Board action for consideration at this meeting

- None

8. Discuss the Board Process of Approving FMP Reviews and Recommendations from Plan Review Teams (11:10-11:25 a.m.)

Background

- Each year management boards review FMP Reviews and state compliance reports for approval. Plan Review Teams draft a recommendations section of the document. Unless a board specifically takes action to address a recommendation, it is not addressed by the approval of the FMP Review.

Presentations

- T. Kerns will present an overview of current process to approve FMP Reviews

Board action for consideration at this meeting

- None

9. Update on the Mid-Atlantic Fishery Management Council's Research Steering Committee to Evaluate Restarting the Research Set-Aside Program (11:25-11:35 a.m.)

Background

- The Research Steering Committee (RSC) met via webinar on March 18, 2021 to discuss redevelopment of the Research Set-Aside (RSA) program

Presentations

- R. Beal will present an update on the Council's Research Steering Committee

Board action for consideration at this meeting

- none

10. SEAMAP Report (11:35-11:45 a.m.)

Background

- The SEAMAP South Atlantic, Gulf of Mexico, and Caribbean components developed a 2021-2025 SEAMAP Management Plan and a 2021-2025 SEAMAP Strategic Plan (**Briefing Materials**).

Presentations

- S. Murray will provide an update on SEAMAP-South Atlantic activities and an overview of the joint SEAMAP five-year plans.

Board action for consideration at this meeting

- None

11. Review Non-Compliance Findings, if Necessary Action

12. Other Business

13. Adjourn

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ISFMP POLICY BOARD

Webinar
February 1 and
February 4, 2021

These minutes are draft and subject to approval by the ISFMP Policy Board .
The Board will review the minutes during its next meeting.

Draft Proceedings of the ISFMP Policy Board
February 2021

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Draft Proceedings of the ISFMP Policy Board
February 2021

ATTENDANCE

Board Members

Pat Keliher, ME (AA)
Sen. David Miramant, ME (LA)
Cheri Patterson, NH (AA)
Ritchie White, NH (GA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Dan McKiernan, MA (AA)
Raymond Kane, MA (GA)
Rep. Sarah Peake, MA (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)
Jim Gilmore, NY (AA)
Emerson Hasbrouck, NY (GA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Joe Cimino, NJ (AA)
Tom Fote, NJ (GA)
Adam Nowalsky, NJ, proxy for Asm. Houghtaling (LA)
Kris Kuhn, PA, proxy for T. Schaeffer (AA)
Warren Elliott, PA (LA)
John Clark, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Bill Anderson, MD (AA)
Russell Dize, MD (GA)
David Sikorski, MD, proxy for Del. Stein (LA)
Steve Bowman, VA (AA)
Shanna Madsen, VA, proxy for Sen. Mason (LA)
Chris Batsavage, NC, proxy for J. Batherson (AA)
Jerry Mannen, NJ (GA)
Bill Gorham, NC, proxy for Rep. Steinberg (LA)
Mel Bell, SC, proxy for P. Maier (AA)
Malcolm Rhodes, SC (GA)
Chris McDonough, SC, proxy for Sen. Cromer (LA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Erika Burgess, FL, proxy for J. McCawley (AA)
Marty Gary, PRFC
Karen Abrams, NOAA
Mike Millard, USFWS, proxy for S. White

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

Staff

Robert Beal
Toni Kerns
Maya Drzewicki
Kristen Anstead
Pat Campfield
Alex DiJohnson
Emilie Franke
Lisa Havel
Sarah Hylton
Chris Jacobs
Jeff Kipp
Laura Leach
Dustin Colson Leaning
Savannah Lewis
Kirby Rootes-Murdy
Sarah Murray
Julie Defilippi Simpson
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Fred Akers
John Almeida, NOAA
Max Appelman, NOAA
Mike Armstrong, MA DMF
Pat Augustine, Coram, NY
Russ Babb, NJ DEP
Chris Balouskus, RI DRM
Julia Beaty, MAFMC
Bonnie Brady
Delayne Brown, NH F&G
Jeff Brust, NC DENR
Andrew Cathey, NC DENR
Mike Celestino, NJ DEP
Yong Chen, Univ ME
Richard Cody, NOAA
Allison Colden, CBF
Alan Bianchi, NC DENR
Ellen Bolen, VMRC
Rob Bourdon, MD DNR
Heather Corbett, NJ DEP
Nicole Costa, RI DEM
David Behringer, NC DENR
Rick Bellavance
Karson Coutre, MAFMC

Guests (continued)

Derek Cox, FL FWS
Rip Cunningham
Jessica Daher, NJ DEP
Kiley Dancy, MAFMC
Lorena De la Garza, NC DENR
Jeff Deem
Peter deFur
John DePersenaire, RFA
Greg DiDomenico
Anthony DiLernia
Sandra Dumas, NYS DEC
Michelle Duval, MAFMC
Julie Evans
Lynn Fegley, MD DNR
Marianne Ferguson, NOAA
Cynthia Ferrio, NOAA
Kimberly Fine
Dawn Franco
Tony Friedrich, SGA
Tom Fuda
Jack Fullmer
Alexa Galvan
Matt Gates, CT DEEP
Lewis Gillingham, VMRC
Angela Giuliano, MD DMR
Willy Goldsmith, SGA
Melanie Griffin, MA DMF
Sonny Gwin
Jon Hare, NOAA
Bridget Harner, NOAA
Amalia Harrington, U Maine
Brendan Harrison, NJ DEP
Hannah Hart, FL FWC
Dewey Hemilright
Jay Hermsen, NOAA
Helen Heumacher, US FWS
Rich Hittinger
Carol Hoffman, NYS DEC
Asm. Eric Houghtaling, NJ (LA)
Rachel Howland, NC DENR
Peter Hughes, Atlantic Capes
Bob Humphrey
Miluska Hyde, USGS
Jimmy Johnson, NC DENR
Jeff Kaelin, Lund's Fisheries
Emily Keiley, NOAA
Moira Kelly, NOAA
Adam Kenyon, VMRC
Craig King, ME DMF
Kathy Knowlton, GA DNR
Rob LaFrance, Quinnipiac
Wilson Laney
Edward Leonard, GA DNR
Tom Little, Ofc Asm. Houghtaling
Chip Lynch, NOAA
Genine McClair, MD DNR
Ashleigh McCord, NOAA
Conor McManus, RI DEM
Nichola Meserve, MA DMF
Chris Moore, MAFMC
Patrick Moran, MA DMF
Jerry Morgan
Brandon Muffley, MAFMC
Trish Murphey, NC DENR
Allison Murphy, CBF
Brian Neilan, NJ DEP
Ken Neill
Derek Orner, NOAA
Mike Pentony, NOAA
Kelly Place
Mike Plaia
Nicholas Popoff, FL FWS
Paul Rago
Paul Risi, KCC NY
Jessica Ruggieri, Univ RI
Scott Sakowski, NOAA
Sara Saunders, UFL
CJ Schlick, NC DENR
John Schoenig
Matt Seeley, MAFMC
McLean Seward, NC DENR
Andrew Sinchuk, NYS DEC
Tom Sminkey, NOAA
Melissa Smith, ME DMF
Somers Smott, VMRC
David Stormer, DE DFW
Mark Taylor
Mark Terceiro, NOAA
John Toth
Wes Townsend
Joseph Tripptree
Corinne Truesdale, RI DEM
Mike Waine, ASA
Philip Welsh
Meredith Whitten
Kate Wilke, TNC
Chris Wright, NOAA
Sarah York, NOAA
Erik Zlokovitz, MD DNR
Renee Zobel, NH F&G

The ISFMP Policy Board of the Atlantic States Marine Fisheries Commission convened via webinar; Monday, February 1, 2021, and was called to order at 10:45 a.m. by Chair Patrick C. Keliher.

CALL TO ORDER

CHAIR PATRICK C. KELIHER: Welcome everybody to the ISFMP Policy Board. It is February 1st. This is the first part of our Policy Board meeting. We will be reconvening on Thursday afternoon. We have scheduled today this portion of the Policy Board to continue until 11:45.

I would like to try to make sure that we conclude all of our business, so people have time to take a break before Summer Flounder, Scup and Black Sea Bass resumes again at 12:45.

APPROVAL OF AGENDA

CHAIR KELIHER: I'm going to jump right into the second agenda item, which is Board Consent for Approval of the Agenda. Does anybody have any issues with the agenda? Is there any new business to be brought before the Policy Board?

MS. TONI KERNS: There are no hands raised, Pat.

CHAIR KELIHER: Great, we have consensus on the agenda.

APPROVAL OF PROCEEDINGS

CHAIR KELIHER: Then, Approval of the Proceedings from October, 2020. Does anybody have any questions or comments on those notes from those proceedings? Seeing no hands and hearing nobody's objections, the approval of the proceedings, we will say they have been approved by consensus, thank you.

PUBLIC COMMENT

CHAIR KELIHER: Item three on the agenda is Public Comment. Is there any member of the public that would have a comment? Has anybody signed up, or is there anybody that would like to raise your hand from the public?

MS. KERNS: I see no hands, Pat.

CHAIR KELIHER: Great, we're going to move it right along then.

REVIEW STATE MEMBERSHIP ON SPECIES MANAGEMENT BOARDS

CHAIR KELIHER: Agenda Item Number 4 is Review State Membership on Species Management Boards. I'm going to turn that right over to you, Toni.

MS. KERNS: Maya, if you could pull up the presentation for State Declared Interest that would be great. While Maya is pulling that presentation up, I'll just give a little background. Each year the states have an opportunity to declare interest in or out of species. If you declare an interest into the species, then you are saying that your state has landings in their state waters.

You have historical landings, you are a part of the FMP, and the management unit of that FMP, and you want to start taking an active role in the fishery on species management boards. Whether that is through, as species start to move north sometimes that is through de minimis measures, then the other times that is the real active directed fisheries in those states. We had a significant number of changes this year. We hadn't had very many changes in the species declared interest in quite some time. This year, the U.S. Fish and Wildlife Service withdrew from several species managed declared interest, and that includes black sea bass, summer flounder, scup, bluefish, Spanish mackerel, tautaug, weakfish, winter flounder, cobia, black drum, red drum, spot, spotted sea trout, and Atlantic croaker.

These were Boards that the Fish and Wildlife Service were not active on previously, and wanted to devote their time and resources to those species that there

are more interactions with the Agency, and the Agency's science goals and objectives. The state of Massachusetts has pulled out of the Weakfish Board, due to the lack of the species in their state waters.

They will go ahead and hold onto the current regulations in the recreational fishery and the commercial fishery as they are for now. Then there are several states that want to declare interest into some species. As everybody knows, this year the South Atlantic State and Federal Species Management Board was split into two management boards this year.

We now have the Pelagics Board, which is cobia and Spanish mackerel, and we have the Sciaenid's, which includes spot, spotted sea trout, red drum, black drum, and Atlantic croaker. With that split we had a couple of states wanting to declare into either Spanish mackerel and/or cobia.

Then Delaware has started to see an increase in spotted sea trout in both their commercial and recreational landings, so therefore they felt as though they need to start participating into this fishery. Their recreational landings in the last five years have ranged anywhere from 0-11,000 pounds, and they also have some commercial landings, but I believe they are confidential, so I'm not going to say those out loud.

New York has declared into Spanish mackerel. They are starting to see commercial landings in their state for Spanish mackerel in the last couple years. They range from 800 to 5,000 pounds. Rhode Island is declaring into Spanish mackerel and cobia. They are starting to see both Spanish mackerel and cobia commercial landings in their state waters, which are in the commercial fishery, but these are confidential landings.

New Hampshire has asked to declare into the black sea bass fishery. New Hampshire is already in the management unit within the FMP for black sea bass. They receive an allocation, and they are also required to keep regulations in place in the recreational fishery. They have been on this Board before, withdrawn, and are asking to come back onto the management board. That is my presentation and I am happy to take any questions on any of these changes, or go to the state or agency that has asked for changes, Mr. Chairman.

CHAIR KELIHER: Thanks, Toni, are there any questions for Toni?

MS. KERNS: I have Joe Cimino.

CHAIR KELIHER: Go ahead, Joe.

MR. JOE CIMINO: Toni, if I missed it, New Jersey's connection with spotted sea trout. I had mentioned sending in speckled trout compliance reports already, but I didn't know if that was all right.

MS. KERNS: I apologize, Joe. New Jersey is also declaring into the spotted sea trout as well. I somehow missed that. It should have been next to the Delaware.

CHAIR KELIHER: Any other hands, Toni?

MS. KERNS: Emerson Hasbrouck, Mr. Chair.

CHAIR KELIHER: Go ahead, Emerson.

EMERSON C. HASBROUCK: I'm wondering, when are these changes effective? When do they become effective? Is that going to start today, for instance, so will New Hampshire this afternoon be sitting in on the black sea bass discussion?

MS. KERNS: If the Policy Board approves these changes, then they would be effective immediately.

CHAIR KELIHER: Anybody else, Toni? Toni, I don't know why. Is there any way you can make the change so I can actually see the hands when they go up on my screen?

MS. KERNS: Yes, sure can, Pat.

CHAIR KELIHER: That would be great.

MS. KERNS: All right, Pat, you should be able to see hands.

CHAIR KELIHER: Perfect, great, thank you. I don't see any other hands up at this time. Toni, do you think we can do this by consensus, or do you want a motion?

MS. KERNS: I think it would be good just to have a motion for the record, and thank you Maya for adding that for New Jersey. It can be a general motion for declaring into the Board meeting today. You can see if there is no objection, but just having a typed-out motion for the record would be great.

CHAIR KELIHER: Would somebody like to make a motion on the declared interest?

MS. KERNS: Pat, don't forget you have to click on that little hand, the black outlined hand, in order to get all of the hands raised, and you had Tom Fote with his hand up, and Ellen Bolen also had her hand up.

CHAIR KELIHER: All right, I'll go to Tom and then Ellen.

MR. THOMAS P. FOTE: I'll make the motion.

CHAIR KELIHER: Motion by Mr. Fote, do I have a second?

MS. KERNS: Malcolm Rhodes, and Tom, if you could read that motion.

MR. FOTE: Move to approve the changes to the species declared interest.

CHAIR KELIHER: Thank you, Tom, we have a motion by Mr. Fote and a second by Malcolm Rhodes, is there any discussion on the motion?

MS. KERNS: Do you see Cheri's hand, Pat?

CHAIR KELIHER: For some reason I'm not seeing those, but Cheri, go ahead.

MS. CHERI PATTERSON: No, I was just going to second the motion.

CHAIR KELIHER: Okay. The motion has been seconded. **Is there any further discussion on the motion? Hearing no discussion, is there any objections? Seeing no hands, hearing no objections, the motion passes by consensus.**

DISCUSS RECREATIONAL MANAGEMENT REFORM INITIATIVES WITH MID-ATLANTIC FISHERIES MANAGEMENT COUNCIL

CHAIR KELIHER: Great, thank you very much, we will move to the next item on the agenda, which is to Discuss Recreational Management Reform Initiatives, and I believe Julia Beaty is going to present on this one, am I correct, Toni?

MS. KERNS: That is correct.

MS. JULIA BEATY: Hi everybody, yes, I'm here ready to go. Toni, Council staff we're checking the attendance list, and when you last did audio checks, I think there are a few Council members still missing, so I don't know if any have joined, and if you'll go onto an audio check with any of them before I get started.

MS. KERNS: Yes, I'm happy to do that. If there are any Council members that have joined since we've gotten started. If you could raise your hand that will be the fastest way for me to find you. Just to note, Pat, that we would be as I get here, this portion of the meeting will now be convened jointly with the Mid-Atlantic Council, and Mike Luisi is the Chair of the Mid-Atlantic Council. I'll start with you, Sara Winslow on your audio.

MS. SARA WINSLOW: Can you hear me?

MS. KERNS: I sure can, Sara. Chris Moore.

MR. CHRIS MOORE: Hi, Toni.

MS. KERNS: Hi, Kate Wilke, you put your hand up again, and Tony DiLernia, you had put your hand up again.

MR. ANTHONY DiLERNIA: Yes. Toni, should my name be listed with a double zero in front of it?

MS. KERNS: It's okay, it's more for the beginning of the meeting that that is helpful. At this point, explaining how to change it is a little difficult, and we can't change it for you, unfortunately, so you're fine. Any time you want to speak just raise your hand.

MR. DiLERNIA: Well, you'll know I'm here. Thank you, Toni.

MS. KERNS: Okay, just one last check, has anybody not been able to do an audio check? If you raise your hand by clicking on the little hand button, Scott Lenox, go ahead.

MR. SCOTT LENOX: Yes, good morning.

MS. KERNS: Good morning, Scott. All right, so we will not convene the joint portion of this Policy Board to go over the Recreational Reform Initiative, if that is good with you, Mr. Chairman.

CHAIR KELIHER: Yes, absolutely. Thanks for reminding me that we're now in a joint session. I will turn it over to Julia for her presentation.

MS. BEATY: Great, thank you, Mr. Chair, and good morning everybody. I have a fairly brief presentation. This is the outline of the presentation. First, I'm going to briefly summarize the timeline of how we go where we are today with the Recreational Reform Initiative. I'll remind you of the goals of the Recreational Reform Initiative. I'll briefly touch on the prioritized topics, and then we'll have a discussion of next steps.

In terms of how we got to where we are today. The Recreational Reform Initiative evolved out of conversations that had been happening for several years, mostly focused on black sea bass, and challenges with recreational management of that species. But the conversations really gained momentum after the Summer Flounder, Scup, Black Sea Bass Management Board Chair and Vice-Chair at the time, put forward a document titled A Strategic Plan for Reforming Recreational Black Sea Bass Management, in the spring of 2018.

That document had a lot of suggestions for how to reform the management system, again with a focus on black sea bass, and this stimulated a lot of discussion among the Council and the Management Board, and ultimately as a result of those conversations, the Council and the Management Board agreed to form a joint Steering Committee to further develop some of those topics, and to kind of open it up to consider all four jointly managed recreational species, not just black sea bass.

Now it's Summer Flounder, Scup, Black Sea Bass and Bluefish, and the intent is to focus on improvements to the recreational management system that could apply to all four species, although some of the considerations might be slightly different, depending on the species and stock status, and things like that.

The Steering Committee consisted of staff and leadership from the Councils, the Commission and GARFO, and the Steering Committee over a little bit more than a year, developed a Goal Statement for the Recreational Reform Initiative, and an outline of suggested priority topics. In October of last year, the Council and the Policy Board considered all of those topics that the Steering Committee put forward, as well as some other topics that had been discussed through some other ongoing actions. Ultimately the Council and Board initiated a joint framework and addendum, and an amendment, to address several prioritized topics, as part of the Recreational Reform Initiative.

On a later slide I will summarize what those topics are, but first I wanted to remind you of the overarching goal of the Recreational Reform Initiative. This statement was developed by the Steering Committee, and approved by the Council and the Policy Board. The overarching goal is to have more stability in the recreational management measures, so the bag size and season limits for the four jointly managed recreational species. To have more flexibility in the

management process, and to have accessibility that is aligned with availability in stock status.

There is a little asterisk, because the Steering Committee wanted to make it very clear that the intent is not to circumvent the requirement to constrain catch to the annual catch limit, nor is the intent to change the current method for deriving catch and landings, when it's as defined in the fishery management plan. But rather how can we work within the requirement to achieve these objectives of having more stability, flexibility, and accessibility for these fisheries.

This table lists all the topics that the Council and Board prioritized in October of last year, when they initiated a joint framework and addendum and an amendment to address all of the topics shown on the screen here. As you can see, there are many different topics. This table actually reflects a staff recommendation that some of the topics which were identified for inclusion in the framework and addendum be addressed through a Technical Guidance Document. That is what is showing in that first column there.

Specifically, this would include developing a process for identifying and smoothing outlier MRIP estimates, evaluating the pros and cons of using preliminary current year MRIP data, and developing guidelines for maintaining status quo management measures. If we can develop these topics through a Technical Guidance Document that would allow us to get this all done in a more efficient manner than if all of those things were also part of the framework and addendum.

We think this is possible, because depending on the specific details considered, we think these topics are not going to require a change to the fishery management plan. We think they could be done through a technical document, rather than a framework and addendum. That would leave four topics in the framework and addendum, including a harvest control rule, which I will describe in more detail on the next slide.

Another topic, which we're calling the envelope of uncertainty approach, where we would explicitly consider variability in the projected harvest estimate, compared to the next years recreational harvest limit, when determining if measures should change. Another topic, which is developing a process for setting management measures that apply for two years at a time.

That is what we're calling multi-year measures here. There would be a commitment to making no changes in the interim year. Then the last topic is considering making recommendations for federal waters measures earlier in the year than December of the prior year, which is our current practice. I should say, in the briefing materials there is a lot more detail on what all of these mean. I'm just briefly touching on all of them here, just to remind you of what is part of all of these actions.

That leaves the last column here, which is the Recreational Reform Amendment, and that Amendment would consider recreational sector separation, which means managing the for-hire sector separately from the rest of the recreational sector, and there is a number of different ways you could do that, as well as actions related to recreational catch accounting.

This could include things such as private angler reporting, changes to the VTR requirements, and other topics. Again, these are all the topics that the Council and the Policy Board prioritized back in October, and this is a suggestion of how to put them in three different bins, to help get everything done in the most efficient manner possible.

I wanted to note that this binning, especially of those first two bins, isn't necessarily set-in stone. Some things might have to get shifted around between those first two columns, depending on future considerations related to the specific changes that are desired. It might be determined that something might need a change to the accountability measures, so if we put it in a framework and addendum category, or if something is more just guidelines related to how we

use the data, then it could go to the Technical Guidance Document category.

But this is what we're thinking right now for how we think it should bin it, but I just wanted to give you the understanding that it might shift around a little bit. But everything that is listed under the amendment definitely requires an amendment, so that wouldn't change. Anyway, the intent to get all this done would be to first focus on the highest priority topics within this list.

That could be something to talk about today. What are the highest priority topics? For example, based on past discussions, we think the two items listed under the amendment, our understanding is that those are a lower priority for the immediate near term, compared to some of these other items.

As of now, we're not intending to make much progress on the amendment until later in 2021, but we could focus on some of these other topics first. Within those other two columns, some of them might be a higher priority than others. Some of them will be more straightforward to get done than others. We might focus on some of those first.

Related to the discussion of priorities, I wanted to provide a little bit more detail on the Harvest Control Rule that was listed in that framework and addendum column, that middle column. There has been some indication from GARFO and some Council and Board members, some discussion of previous meetings, suggesting that this topic might be one of the highest priorities for the Recreational Reform Initiative.

I wanted to provide more background on what this means to help inform the discussion today. I've summarized at the previous meetings, it's all in the briefing book, but just to kind of give you a refresher. This Harvest Control Rule was a proposal that was initially put forward by six recreational organizations, and the conceptual idea behind it is that you would have a range of predefined management measures that are referred to as steps, and there is a figure on the screen here that is an illustration of how it would work. You have Step A, B, C and D. It doesn't have to be four steps; this is just an example.

Step A is associated with the highest biomass compared to the target level, so the best stock status, and it's associated with the most level of access. Step A is the most liberal management measure, and then as you move down and to the left, Step B is the most restrictive set of management measures, the least amount of access associated with the smallest biomass, the poorest stock status.

The idea behind this proposal is that each step has predefined management measures associated with it. Under the proposal that was put forward, it was noted that states could have different management measures from each other, and from federal waters, but everything would be predefined.

Step A, you have this set of management measures in federal waters, and then it also lists the management measures in each state that would be associated with that. The same thing for all of the other steps. You would determine which step you're at in a given year, just based on biomass. How does biomass compare to the target?

This is intending to address some concerns related to stakeholder perception that our current management measures don't feel like they are related to availability in biomass, because in some cases we have more restrictive management measures under higher availability than we did in the past, under lower availability.

This would explicitly tie the measures to stock status, and there is some level of predictability, in that you know what the measures are with each step. You might not know which step you're at in a given year, in a future year. But you know what your options are, because it will fall within one of these steps.

Then another important aspect to this proposal is that, as it's described in the proposal is that the upper and lower bounds, so Step A and Step B, are informed

by stakeholder input. The idea is that Step A is the most liberal set of management measures that you would have, at the most high biomass, highest availability.

Stakeholders would inform that by saying, you know for this species this is the most liberal set of management measures that I could possibly need. I don't need a higher bag limit than however amount of fish. I don't need a smaller minimum size than X inches, for example, and that would inform Step A.

On the other hand, Step B, the most restrictive set of management measures would also be informed by stakeholder input, and stakeholders would provide advice such as, if you go any more restrictive than this set of management measures, then we're going to have major economic impacts, major loss of businesses. The proposal also suggests that maybe there is not even a conservation benefit of going more restrictive than a certain level. This is all conceptual at this point. We haven't analyzed this to see if this would really work the way it is spelled out. But there has been some interest expressed in going through the analysis to see if this could work. Discussions among staff and the Steering Committee, we think that we could come up with these steps, but it would have to be clear that these are just the starting point for consideration.

They would have to be regularly reevaluated. We wouldn't be able to, for example say we're never going to go more restrictive than whatever we put at Step D. There would have to be some flexibility within this. But again, the idea is to have these predetermined management measures, so that you have that predictability.

Also, just to emphasize that this would represent a big change from how we currently do things, because you would be choosing your management measures say on stock status, and you wouldn't be, for example, trying to predict next year's harvest, compare it to the RHL. The measures would not be based on performance of the recreational fishery, compared to an RHL as explicitly as it has been in the past. It would be more explicitly based on biomass.

Again, this is something that is largely conceptual. We've heard a lot of interest in this proposal, and we could further evaluate this, to see if it could even meet the requirements of Magnuson, where we have to have an annual catch limit, and prevent overfishing by trying to control overall catch that we have to measure in pounds or numbers in fish.

How can we make this proposal work within those constraints? We think that's something that needs a little bit more evaluation, which brings me to the next slide, which is next steps for the Recreational Reform Initiative overall. Again, there is a lot of topics that are part of this initiative, and we have a lot of other pretty important, high priority, ongoing and anticipated actions for these four species over the next year or so.

The briefing book does include an example timeline, but I wasn't planning to touch on that in detail, because it's just an example, and it's highly dependent on prioritization, both within the Recreational Reform Initiative, compared to other ongoing actions, in terms of what do you want us to work on first, and things like that.

One suggestion for the immediate next step is for the Council and Commission and GARFO staff, to work with a few additional NMFS staff who have expertise in things like the Magnuson Act requirements, and maybe MRIP expertise, depending on the topics that we want to focus on first for the immediate next step. For example, if the Harvest Control Rule is a very high priority for the Council and Board to focus on in the immediate future, we think it would be helpful to first answer questions about how can we make the Harvest Control Rule so it will work within the confines of the Magnuson Act requirements.

That could help us determine the next step, figure out should this be a high priority, how do some of those other topics fit within that, and we think that would help us moving forward. That is the staff recommendations, again for the immediate next step

is to focus on that, if that is what the Council and Board would like to do. That is basically all I had for my presentation, and next the intent was just to open it up for discussion of next steps. We can talk about that recommendation for Council, Commission, and GARFO staff working with additional NMFS staff, to focus on the Harvest Control Rule if that is what the Council and Board want to do. We don't necessarily need an explicit action today, or a motion to be moved forward.

We'll move forward with these next steps as presented, unless a different path forward is approved during the discussion today. With that I'm happy to answer any questions, and I can provide more detail on anything that I glossed over, if needed. Thank you.

CHAIR KELIHER: Thanks, Julia, I appreciate the presentation. It seems to me with that intercept with Magnuson, that working group would be a good first step. But let's open it up for questions before we determine what the path will be. Does anybody have any questions of Julia?

MS. KERNS: Pat, I don't know if you see the hands raised. I hope you get to see the hands raised. At the very top of your attendees pop out list, there should be an outline of a hand that is in black. If you click on that little black outlined hand, you should be able to see them.

CHAIR KELIHER: Yes, I've got them, thanks. The first three on the list are Jason McNamee, John Clark, and Mike Luisi.

DR. JASON McNAMEE: I thought I heard my name first. Thanks for the report, Julia. I am definitely interested in that Harvest Control Rule idea, and I think the suggestion here is a really good one. I would offer two other quick thoughts. You know on the slide it said, the steps would be kind of set based on stakeholder input.
I just think there needs to be, I think that is an important part, and it needs to be balanced with some sort of regulatory setup that won't put the stock in jeopardy, as well. I'm guessing that balance is where you would end up anyways with this group. One other quick thought is, there is actually, I've been thinking about this a bit.

I'm aware of some work going on at the Science Center with yellowtail flounder, and the development of kind of an interesting tool by some scientists at the Science Center for yellowtail flounder. I just kind of put that bug in your ear, as I think there is application for what they are working on with yellowtail flounder in this situation as well. I would be happy to provide less cryptic information afterwards, if folks are interested.

CHAIR KELIHER: Great, thanks, Jason. Julia, did you need to follow up with any of that?

MS. BEATY: No, I don't think so.

CHAIR KELIHER: I've got John Clark then Mike Luisi, Martin Gary and Rick Bellavance.

MR. JOHN CLARK: Just to clarify. This definitely gives you a knowledge of what the regulations have changed to, based on the steps. But in terms of stability, you could still end up changing fairly often, depending on the stock status, or does this smooth that out somewhat also?

MS. BEATY: Yes, that is a good question. I guess it depends on how many steps there are. But yes, as you get new stock status information, there is a potential to change the step that you're at every time stock status is updated. It could still change frequently, but there is still some level of predictability, provided that you know ahead of time what measures are associated with each step.

CHAIR KELIHER: Mike Luisi.

MR. MICHAEL LUISI: Thanks for your presentation, Julia. I guess where I am right now with questions is, I'm trying to figure out. You know we've been talking about Rec reform for a number of years now, and I'm trying to get a sense both from a Council perspective, and from the state of Maryland, as to when. Nothing has been initiated.

I mean we've supported the Policy Board and the Council has supported the continued development of the Rec Reform Initiative for the last couple years. But at what point do you think, Julia, that we need to initiate an amendment or addenda frameworks? Are we not there yet? Does staff need to continue to develop concepts, before we start something up officially?

Correct me if I'm wrong, but I just want to make sure that as far as process goes, that we've got a plan. I know that it's on the Mid-Atlantic Council's priorities list for 2021, as far as developing this initiative even further. But I don't know if you can give us some perspective from the staff level, as to when you would need decisions to put forth a formal document. I hope that question made some sense.

MS. BEATY: Great question. Maya, can you go back to Slide 5. In October, the Council and the Policy Board had a joint meeting, and did initiate a framework and addendum, and an amendment. This table lists all the topics that were part of the motion that the Council and the Policy Board already passed and approved for getting all of these things done.

The only thing that is different is that staff are recommending doing some of them through a Technical Guidance Document, rather than a framework and addendum. But an action already has been initiated by both the Council and the Policy Board. Staff do feel like we do already have the direction that we need, that we should move forward with all these, and these are all priorities.

Just the intent behind kind of having this discussion and talking about next steps, there is a lot on this list, and there is a lot of other things happening with these species. We just wanted to provide an update of what we think is the best path forward for getting all of this one, because there are some concerns about staff workload, between the Council, the Commission, and GARFO to get all this done.

We're operating as if, you know, these are already all priorities. The framework and addendum have already been initiated, so just how can we work within that to kind of get these all done? We're not going to work on everything all at once, initially just focus on what we think are the highest priorities, and/or the most straightforward, most helpful things. There is again the suggestion for how to do that in more details in the briefing book. But I just wanted to make it clear that we don't need to initiate any sort of actions today, because that already happened back in October.

CHAIR KELIHER: Toni, do you want to follow up on that as well?

MS. KERNS: I think actually Julia covered everything that I was going to say, Pat. Thank you.

MR. LUISI: Mr. Chairman, if I could just a quick follow up, Mr. Chairman that would be great.

CHAIR KELIHER: Go ahead, Mike.

MR. LUISI: Thanks, Julia. It's amazing what you forget, and yes, thanks for the reminder that we have approved the continued development of these options moving forward. I guess where I am, I am trying to figure out where do we start? There are a lot of things here. We have a lot of other activities going on with summer flounder, scup, black sea bass and bluefish. I guess that's what we need to think about, as far as prioritizing these different measures going forward. Thanks, Julia, I appreciate the reminder on the initiation of these actions, thank you.

CHAIR KELIHER: Next on my list is Marty Gary.

MR. MARTIN GARY: Thanks, Julia for your presentation. I appreciate all the hard work that has gone in to this, and I'm supportive of the concept going forward. My question is just out of curiosity, Julia. It was probably in the briefing materials, but you mentioned that six recreational groups supported this, and I'm just curious as to who those groups are. Given the diversity of our recreational stakeholder community, and all the different species they interact with, I'm curious who they are and how they might

represent our coastal recreational community, if you have that available.

MS. BEATY: Yes, just give me a second, I'm pulling up the initial document. They initially put it forward as part of a different action in the, okay let' see. American Sport Fishing Association, Center for Sportfishing Policies, Coastal Conservation Association, Congressional Sportsmen's Foundation, National Marine Manufacturers Association, and the Recreational Fishing Alliance.

MR. GARY: Okay, thank you very much, Julia.

CHAIR KELIHER: Thanks, Marty. I've got Rick Bellavance, then Chris Batsavage and Roy Miller. Go ahead, Rick.

MR. RICK BELLAVANCE: Just a quick question. I was wondering if Julia could explain to me, what if any role the New England Council might have in the working group participation, just to get an idea on that.

MS. BEATY: Sure. At this stage we had envisioned it just being Mid-Atlantic Council, Commission and GARFO staff, and just a few additional folks from other parts of NMFS, maybe from Headquarters. You know, if the goal is to focus first on the Harvest Control Rule, we thought that would be the best way to do it, is to just have it be that smaller group of staff first to first try to answer questions about how can we make this work under Magnuson, and then when we get further into developing specific alternatives, maybe we could think about what other folks we need to bring in. But because we're just focusing on those initial questions, and the four species that are jointly managed between the Mid-Atlantic Council and the Commission. We hadn't planned to bring in the New England Council at these early stages.
CHAIR KELIHER: Chris Batsavage.

MR. CHRIS BATSAVAGE: Julia, I think earlier you said that some of the items on this table might be of higher priority to the Council and Policy Board. Then there are others that are more straightforward to do, and also will help the process. I was curious to know, for the last item under framework and addendum, changes to the timing of recommending federal waters measures.

Would that kind of fall under the category of being a pretty straightforward issue to address? Well, I guess it will be up to the Council and Board to determine whether they want to pursue it, but would that be one that's maybe a little more straightforward than some of the others on the list? Thanks.

MS. BEATY: Sure, yes. It could be. Another thing about these topics is that a lot of them are potentially intertwined. If we changed the timing of when we recommend federal water measures, that also relates to how we use preliminary current year MRIP data, which is listed as a separate topic. But it's related.

There are considerations related to that, like what data you have available. It would require some probably minor changes to the fishery management plan, because that timing part is spelled out in some parts of the fishery management plan for the specific type of conservation equivalency, where you can wave federal waters measures, in favor of state waters measures.

That has been allowed for summer flounder for several years, and is now an option for black sea bass as well. There are parts of the FMP that relate to that, that do spell out the timeline. For that reason, it would require a change to the FMP, and it would require a framework and addendum, so that would make it a little bit more involved, and if we could just do it through a Technical Guidance Document.

But even within that, that is potentially more straightforward than some of the other topics, because I think mostly it would just entail, you know really thinking harder about the pros and cons of the data that you have available at different times of year, and how that would play into the process.

CHAIR KELIHER: Great, Chris, do you have a follow up on that?

MR. BATSAVAGE: No, that answered my question, thank you.

CHAIR KELIHER: I've got Roy Miller and Eric Reid. Roy, go ahead.

MR. ROY W. MILLER: Julia, while these three columns are before us, I wanted to move over to the amendment side. You mentioned that that would be a lower priority, for instance, recreational sector separation, and yet as I think about it, some of the actions we've taken thus far for bluefish, for instance, and to a lesser extent for summer flounder.

That showed we've already dipped our toes into the waters of sector separation, and I'm wondering if by giving us a lower priority, are we in effect saying that future consideration of sector separation in our measures will wait, until we take action on this proposed amendment, or are we going to handle sector separation in the recreational fishery on a sort of ad hoc basis as it comes up, like we have done in the past? That's my question, thank you.

MS. BEATY: Yes, I can respond to that. I mean the intent was just not to say that we're deprioritizing it, but to say that we're focusing on some of these other things first, for the more immediate next steps. Then it would be potentially later in 2021 that we would pick up that particular amendment.

Start developing a scoping document, and moving forward with that, so that it is something that we do plan to move forward with, just maybe on a slower timeline than some of these other topics here. That is how the Council and Policy Board had talked about it back in October, but if the group wants to revisit that, then that is open for discussion too.

CHAIR KELIHER: Great, the last on my list is Eric Reid.

MR. ERIC REID: I appreciate that last question and answer. My question is about the Harvest Control Rule itself. I mean to me something is missing in that concept, the concept that is supported by the six groups. Step D is the most restrictive measure based on socioeconomics that can be tolerated without loss of business.

However, the biomass status could require a Step E, which means no fishing at all, and that has to be in any Harvest Control Rule. It's in place in some of our commercial fisheries that we use now. My question is, would the six support further development of a Harvest Control Rule if that step was included?

CHAIR KELIHER: Julia, if you're talking, you're on mute.

MS. BEATY: I wasn't talking, because I just don't feel like I can answer that question. I feel like that is a question for the groups that put that forward, and I don't think I can answer that for them. But that would be something, you know we still have to prevent overfishing, so we might have to consider something like that as part of the further developing that concept.

MR. ADAM NOWALSKY: Julia, and Mr. Chairman, this is Adam Nowalsky. Unfortunately, I don't have the ability to raise my hand right now. I'm still listed as an organizer from earlier this morning. If you would like me to respond, as having worked with those groups, I'll be happy to do so.

CHAIR KELIHER: Yes, go ahead, Adam.

MR. NOWALSKY: Part of one of the things with that most restrictive set of measures that the groups that I've worked with have definitely advocated for, is that one of the things we've learned in less management, learned it with weakfish, learned it on the commercial side with northern shrimp.

You get to a point where the set of measures that there is just no biological benefit anymore, or what we've learned with summer flounder that the path you think we go down could actually become more

destructive biologically, by going in a particular direction, such as larger maximum sizes.

Mr. Reid's comment that that set of measures should incorporate something about biology is 100 percent on point, and the addition to that, the most restrictive set of measures that industry can support. There is a second part of that that would include without providing tangible, biological benefits.

CHAIR KELIHER: Great, thanks for that Adam, filling in the blanks. I've got Doug Haymans and then Roy Miller and Tom Fote.

MR. DOUG HAYMANS: Good morning. Since Roy opened the door, I thought I would step in. I continue to beat the drum regarding sector separation. Although I realize if we dipped our toe regarding the splitting of bag limits with bluefish between charter and recreational, I still feel as though us discussing sector separation amongst four species is a very dangerous precedent to be setting, especially since one-third of our membership just voted it down with the South Atlantic Council.

I would prefer to put off recreational sector separation as long as possible, and have it as a discussion amongst the entire Commission. I realize we're here as the Policy Board, but rather than targeting these four species, I would rather debate sector separation as a Commission, its merits and its dangers, than do it amongst a committee of four species. I'll just continue to beat that each time sector separation comes up, until I get my way. Thank you, Mr. Chairman.

CHAIR KELIHER: We'll look forward to more of that drum beating later, but actually, I think that's a good comment, Doug. As we're just sitting up here in the northeast corner, kind of away from these species. But thinking about the precedent that it would set; I think it may actually deserve a broader conversation with the Policy Board at a later date. The last hand up is Tom Fote. I think Roy, your hand was up and then went down. I'm assuming you're all set?

MR. MILLER: I'm all set.

CHAIR KELIHER: Okay thank you, Tom Fote.

MR. FOTE: My follow up is to Roy's question. We did this on bluefish without actually going to public hearing. It was an arbitrary decision made at the time by the National Marine Fisheries Service that we could do this. But there really was no input from the public at the time, we did it at a Board meeting. I was very upset over the fact that we did this, so I really think if we're going to go down this road, we need to set up rules of how we do this, and how we basically take care of this before we do another sector separation without going out to the public.

CHAIR KELIHER: Thanks, Tom. I don't see any more hands. Julia, could you go back to your slide with the staff recommendation, please?

MS. BEATY: Yes, Maya will have to do that for me.

MS. MAYA DRZEWICKI: What slide is that?

MS. BEATY: Oh, sorry.

CHAIR KELIHER: I think it's the last slide.

MS. BEATY: Yes, Number eight.

CHAIR KELIHER: Perfect, great. I want to come back to this recommendation by staff, based on the comments, and several people did touch on the conversion with Magnuson. I think if we were going to move forward with this, we wouldn't need to do so with a motion, just an agreement to develop this expanded working group, to evaluate how a Harvest Control Rule would in fact work under Magnuson, and determine if there are any other issues, as well.

Does anybody object to moving forward with the staff recommendation? Seeing no hands, hearing no objections, I think we have consensus to move forward with that recommendation. Does anybody have any additional items as it pertains to Rec Reform? Mike Luisi.

MR. LUISI: I think for process, maybe I should ask the Council as well.

CHAIR KELIHER: Yes, all right.

MR. LUISI: Let me ask the Council, is there anybody that objects to moving forward with the staff recommendation? I don't have the ability to see hands raised, so Toni or Pat, if you see somebody raise their hand, please let me know.

CHAIR KELIHER: No hands are up, Mike.

MR. LUISI: Okay, so I'll assume that the Council would support that based on consensus, thank you. That's all.

CHAIR KELIHER: Great, thanks, Mike. With consensus of both the Policy Board and the Mid-Atlantic, I think we've got a direction to move forward with a working group on this particular topic. Seeing no additional hands, I think what we will do is we will end this joint meeting of the Policy Board and the Mid-Atlantic Council, and I would remind everybody that the Policy Board will stand in recess until February 4 at 1:45 p.m. With that I want to thank everybody for your time today, it was good discussion, and we'll reconvene on the fourth, thank you very much.

RECESS

(Whereupon the meeting recessed at 11:45, to reconvene Thursday, February 4 at 1:45 p.m.)

RESUME

ATLANTIC STATES MARINE FISHERIES COMMISSION
ISFMP POLICY BOARD

Winter Meeting Webinar

FEBRUARY 4, 2021
DAY 2

The ISFMP Policy Board of the Atlantic States Marine Fisheries Commission reconvened via webinar; Thursday, February 4, 2021, and was called to order at 1:45 p.m. by Chair Patrick C. Keliher.

CHAIR PATRICK C. KELIHER: Welcome everybody, we are reconvening the ISFMP Policy Board. We started with these conversations on Monday.

PUBLIC COMMENT

CHAIR KELIHER: As a reminder, we did approve the agenda, but before we get started, I do want to ask if anybody has anything additional at this point in time that they might want to add at the end. No seeing any hands, great.

MS. TONI KERNS: Mr. Chairman, as a note, we do have additional letters from two Boards, the Lobster Board and the Shad and River Herring Board.

CHAIR KELIHER: Great, I've got those, Toni, yes, I have those in my notes, thank you.

MS. KERNS: And Cheri has her hand up.

CHAIR KELIHER: I do have a hand up, Cheri.

MS. CHERI PATTERSON: I just wanted to under other business, bring up a question and a recommendation in regards to including TC or PRTs recommendations when we do our canned motions, thanks.

CHAIR KELIHER: Great, I will call on you under Other Business, thanks, Cheri. Anybody else? Not seeing any other hands. Great, as is customary when we start any of our meetings, I know this is kind of Round 2 for the Policy Board. I would like to ask if there is any member of the public that has anything that they would like to bring to the Policy Board that is not on the agenda? Desmond Kahn.

MR. DESMOND KAHN: Actually, my name is pronounced Kahn, but I know you couldn't tell that. In any case, I would like to speak for a minute about the MRIP program. I understand that some members of the Policy Board and other people have been expressing unease with some of the MRIP results, and I myself and other colleagues share that concern. Before the new version of MRIP, which greatly increased the estimates of effort and catch, my

colleague Dr. Victor Crecco from the Connecticut Bureau of Marine Fisheries, he's now retired, started studying MRIP. He found that it was very difficult to ground truth the estimates from MRIP. However, there was one of their products that could be compared with other sources, and that was their estimate of the number of participants in fisheries.

On their query, you know query form, you can request that information. This was back in like say around 2010 or a little before. When we produced their estimates of the participants in the fisheries, they were extremely high, they were inflated. They were usually between three and four times the number of marine licenses sold in a state.

For example, I'm from Delaware, I was working for Delaware at the time. We were selling something like 110,000 licenses. According to MRIP, there were over 300,000 participants in our fishery most years. The one thing that implies is that the majority of people in our fishery, and this is also true for Connecticut, did not have licenses, because they couldn't.

Both Dr. Crecco and I checked with our respective enforcement agencies to find out, you know what percentage of people that they checked are unlicensed. In both cases it was about 15 to 20 percent. That evidence seemed to falsify the MRIP estimates. Now, since they were very greatly overestimating the number of participants, we thought that could indicate they were overestimating the number of fishing trips, and consequently the catch.

We talked to them about this, but they said well, that estimate of participants is not really the same thing as what we use to estimate trips and effort, and so forth. We were kind of stonewalled for a minute there. But then they did this upgrade. They were telling Dr. Crecco on some of the ASMFC Boards, they are trying to fix this. They did a big effort, as you know, and it came up with all of a sudden, now they've got far more trips. I recently went back and queried them for the number of participants in the fishery, just to see if that had changed. Well, turns out they output the number of participants up to, I think it's 2016, and after that they do not derive anymore estimates. Now that is since they've increased the estimates of trips.

I don't know why they stopped producing these estimates, but I would like to suggest that the Commission consider investigating this, and find out how they calculate these estimates, because that's why they are not producing them currently, at least the last time I checked last year. See if that gives some kind of clues as to what has been going on with the MRIP estimates. I can provide the Board with reports, a report that Dr. Crecco wrote, and also some data I collected. I made a presentation to the Striped Bass Board.

CHAIR KELIHER: Desmond, I do have to cut you short, you're over three minutes into this. I appreciate you bringing that forward. If you do want to supply anything to the Commission, I would ask you to do so. I think you brought up issues that I know have been talked about amongst managers in the past. I do appreciate you raising that again, and again, please feel free to share anything that you might like to.

MR. KAHN: Yes, thank you.

CHAIR KELIHER: You're welcome, and sorry about mispronouncing your name. I knew how to do it, it just caught be by surprise. Any other members of the public? Not seeing any other hands go up.

EXECUTIVE COMMITTEE REPORT

CHAIR KELIHER: I am going to move right into the Executive Committee report, and I'll ask Director Beal to jump in and back me up on a couple of these issues.

As you all know, the Executive Committee has been meeting also by phone, in between the regular meeting schedules, to address issues in particular the CARES Act. I think we've had probably four or five, maybe even six calls between the October meeting

and now. The February 3rd Executive Committee is part of this winter meeting.

It was fairly extensive. We discussed a few bigger topics. We discussed several times in particular, we've had many calls, excuse me, in particular around the CARES Act, and the third was no exception. We had a presentation by Kelly Denit on the CARES Act. She did explain to us that Round 2 was approved by Congress.

There will be an additional $255 million that will go out to the states and territories, and another $30 million for federally recognized tribes, and $15 million for their Great Lakes Region. NOAAs company working with the new administration on the timing regarding the release of the funds, and they currently don't have an estimate at when that might happen.

I did tell the Executive Committee that they do have a date of September 2021, that they need to have the money out the door by, but as was the case last time, the states will have more flexibility on that, as long as their spend plans have been finalized. There will be some additional information coming regarding the remaining funds from Round 1 as well, and the fact that they are not going to be able to be comingled with funds that will be available in Round 2.

More details, as I say, will be coming on that. I know Laura Leach will be engaged in those conversations around that financial management of funds. The Executive Committee did have many questions for Kelly. I'm not going to go through them all here today. She has tried to work with us on a lot of these questions and answers over time, and I've been very appreciative of the support that she's given to all of the states.

There was one question in particular that was asked, I think that will be interesting for folks to find out, and hopefully we'll receive positive information. But it was in regards to the "made more than whole." Bill Anderson asked the question around whether they could put a floor on that, because it's not part of the Act.

It's actually a policy that NOAA has put forward associated with the spend plans, and if their floor could be put in place, and we wouldn't have quite so much oversight on the "made more than whole." We are looking forward to getting an answer back in particular on that topic as well.

She did promise that she'll follow up with us on that, and many other questions, and I'm sure we'll have her back to the Executive Committee for any additional questions that might come up. As she gets that information, regarding the new Round 2, I know she'll be reaching out. With that, I'm going to just pause for a second to see if there are any questions that pertain to the CARES Act. Not seeing any hands, I'm going to keep going. Bob Beal did give us an overview of some legislative and appropriations issues.

He updated the Executive Committee. Bob presented that he and Deke will continue to monitor all Congressional activities, as always is the case. At this time there seems to be no focus on anything pertaining to the Atlantic Coast Act, so that is good news. As I'm sure you're all aware, the Secretary of Commerce appointment has been made, that is Governor Raimondo from Rhode Island.

I believe her confirmation hearing was today, and likely the vote will be today. Several leadership positions within NOAA, including the Chief of Staff have been named. The Assistant Administrative Position is yet to be filled, but Paul Doremus, who we all know, has been named the Acting Assistant Administrator.

Bob also reported out that the Hill Committees and the membership on those committees are continuing to be worked out, especially on the Senate side, with a 50/50 split in makeup. They are trying to figure out who will be leading what committee, so I'm sure it's going to be a little bit before we hear anything more final on that.

The Executive Committee also has approved a letter that was advanced by the Legislative Committee. This

letter has been drafted and reviewed by the Executive Committee to be sent to the Office of Management and Budget. It spells out the priorities of the Commission. This particular letter did draw some conversation at the Executive Committee around the Chesapeake Bay and needed money for doing some assessments within the Bay, pertaining to menhaden.

The Executive Committee did support including a line around that need for additional dollars, and that change in the letter will be made and shared with the Executive Committee before it is sent out. If you did see my Chairs memo, in regards to the committee makeups and appointments. One of the committees that we did leave unnamed at the time was the Legislative Committee.

The Legislative Committee was renewed with new focus and energy last year, and it has been very active, looking at issues that are important to the Commission. The reason I left it blank this year was to not only review its progress, but determine whether we needed to strengthen the membership with people with stronger Hill experience.

I do want to make it clear with that statement, I'm not disparaging the people that are on it by any stretch of the imagination, but the conversations that Bob and I have had around Hill work, pertaining to a new administration coming in, raised the issues of do we need more people on that Committee with stronger Hill experience?

There was not a lot of input from the Executive Committee on that topic, other than seeing some head nods seeming you're on the right track. We will be looking at the membership, and we'll finalize the makeup of the Legislative Committee in the coming weeks. Are there any questions about the legislative issues or budgets for Bob or I? Not seeing any hands, I will continue on. Switching gears, Laura Leach did update us on the 2021 Annual Meeting. Obviously, we're hoping by October the travel restrictions for all the states will be lifted, and we'll be seeing some positive changes dealing with the pandemic.

This we're going to hold true to the plan from last year, so Joe Cimino and the New Jersey delegation will be hosting us in 2021. Under new business, the Executive Committee did have a conversation around black sea bass allocation, and the decision that happened on Monday. Jim Gilmore from New York raised the issue, not to rehash the vote, but just to discuss how we as a body are going to deal directly with the allocations issue in the face of climate change.

John Hare did chime in on this topic, and reminded us that the Science Center, along with the Commission and the Nature Conservancy are pulling together a contract that would allow us to do some scenario planning on that topic. There will be more information coming on that, but after the meeting we did talk about the need for having a presentation to the Policy Board on scenario planning, and Dr. Hare did promise to make staff available to do that presentation.

There will be a lot more conversations around this going forward. There was recommendation that a working group consisting of members to the Policy Board get together to start working on this. Bob and I will be discussing that more, and the Executive Committee will hash that out, and we'll bring something back to the Policy Board for consideration, likely at the spring meeting.

That concludes my report of the Executive Committee. Does anybody have any additional questions before we move on with the agenda?

PROGRESS UPDATE ON THE RISK AND UNCERTAINTY POLICY

CHAIR KELIHER: Seeing no hands, we'll move right on to Agenda Item Number 8 then, which is Progress Update on the Risk and Uncertainty Policy, and that is Jason McNamee. Jason, are you out there somewhere in the virtual world? Go ahead, Jason.

REVIEW DRAFT OF THE RISK AND UNCERTAINTY POLICY

DR. JASON McNAMEE: Thanks everybody. We wanted to give you an update. There has been some work done on the Risk and Uncertainty Policy, and we've got our presentation that I'll jump through here. Just a reminder, the goal of the Policy is to provide a consistent yet flexible mechanism to account for risk and uncertainty in the decision making that we do as a Commission.

The reason for this is to protect all of the Commission managed stocks from the risk of overfishing, as one example, and to also minimize adverse social, economic, or ecosystem effects, or at least take account of them within our risk management, and when we're making these decisions. The tool consists of a series of questions. The questions, not shockingly, are related to risk and uncertainty.

These responses are weighted, based on their relative importance within the overall decision tree. These weighted responses are combined, and what they spit out at the end is a recommended probability of achieving whatever management objective it was that we were trying to achieve. As an example, it could be the probability that we want F to be less than that F threshold. That is just a graphical representation where you can see the weightings go along with the responses to each of the questions. They kind of make their way through the decision tool, and then provide a recommended probability. The tool questions are split basically into four components. The first is stock status, so that's one we talk about routinely. The second category is additional uncertainty, so that is model uncertainty, management uncertainty, environmental uncertainty. The third category is sort of an additional risk category.

One of the things that we've been thinking about for that category right now is ecosystem importance, so the importance of whatever species it is that we're talking about within the ecosystem. Then there is a fourth category where we will consider socio and economic issues. The way the tool works is the first three components, they add to the probability, meaning they make it more conservative, depending on how much you add in, or where you are with regard to stock status and things like that.

This is the unique part for the tool that we're trying to develop. The socioeconomic component can add or subtract from that probability, so if you were going to, for instance impact dramatically a highly dependent fishing community. That would actually pull that buffer back, you know to make it less conservative to consider those types of factors.

We're talking a little bit more in detail about the criteria. The Risk and Uncertainty Working Group was tasked with refining the criteria for the decision tool inputs, basically the responses that would go into the tool, and a group of Risk and Uncertainty Working Group members and Assessment Science Committee members provided input on basically those first three categories, the model and management and environmental uncertainty.

I'm sorry, the third category, which was the model, management, and environmental uncertainty, and not the third category but the second category, sorry. From that group we got a recommendation, and that was for the criteria for those components, for them to be broad. The reason for that, that would allow the Technical Committees to adapt their scoring to factors that are most relevant for their species.

It's basically to allow customization for the species being analyzed. The individual technical committees may develop specific scoring rubrics for their species, so it will be spelled out specifically for that species, but everything will be working basically under the same framework. There is consistency there, but allowing for some customization, because each of the species that we manage have their own foibles, and they are unique.

The refined criteria, they include a list of factors that the Technical Committee may consider when scoring each decision tool question, and again, which factors

are important for each individual species is up to the technical committee. They are going to provide that guidance. This is just a subsample of the different types of things that could fit under these different categories, just to give you a sense of what we're talking about here.

There is a little bit more in the meeting materials, a little more detail that you can look at. But this gives you, you know a sense of what we're talking about here. Model uncertainty would be things like retrospective patterns, sensitivity runs, and the uncertainty associated with those. The model fits, management uncertainty would be the performance of a management that we implemented in the past, initiation of relevant management actions, like how long does it take us to get those going, and then things like illegal or underreported fishing activities. Then under the categories of environmental uncertainty, we could be talking about environmental drivers on recruitment, climate vulnerability, natural mortality, or uncertainty in the natural mortality for that species.

Then the ecosystem trophic importance that could be, does the species provide some specific ecosystem services. What is the importance of that species to other key species in the ecosystem? That gives you a sense of the types of things that the Technical Committee could consider, and what they would build into their species-specific rubric for the decision tool.

Now, getting into some of the socioeconomic criteria. The Committee for Economic and Social Science, they've developed specific criteria for scoring these socioeconomic components. It's pretty formulaic. You've got short term and long-term effects of proposed management, and then those are subdivided into commercial and recreational.

You end up with roughly four questions for each sector, commercial or recreational, you have a short term and a long-term effect. This is just a graphical representation of what I just talked about on the last slide, so for the commercial fishery importance you have the economic value of the fishery.

The fishery dependence for the communities that exist in the fishery, then you've got your short-term management effects, your long-term management effects, and then you get your score from those, same thing on the recreational side. You have your fishery desirability, like how popular, how many people participate in that fishery, and again dependent communities on that fishery, and then short term and long-term effects.

Now, these all pivot off of the proposed management action or actions that are being considered by the Board. I'll talk a little bit more about, you know the early stuff that I've been talking about, and then these socioeconomic criteria, and how those work in the process in a minute. The following indicators, they would be used for scoring that socioeconomic criteria.

You've got commercial and economic value, things like total ex-vessel value along the coast. Then you've got your commercial community dependents, and so that could be defined as ex-vessel value as a percent of the ex-vessel value for all species, for the top ten communities. I won't read through the entire slide; you can read it.

But, the idea here is you look at a three-year average for each of these and then this is the data you would put together to create your socioeconomic score. A little bit about the weightings, so I mentioned that early on. What the weightings are, they are multipliers that impact how much each decision tool question impacts that final outcome.

If you change the weightings, what that can do is it can actually change the size of the buffer that you're adding, so whether the overfished status adds 2 percent to 5 percent to 10 percent, you know onto your buffer, but it also defines the relative importance of that component within the overall tool. The example here is, is stock status on equal footing with the other components in the tool, or is it two times as important, ten times as important, et cetera, et

cetera. You can get a sense of the importance of these weightings, and this is the really important policy aspect of the overall tool. How do we get at these weightings? One of the ways we could do that is we could develop a survey, and we can use that survey to determine the Board's preferences, and there is an example survey within the meeting materials. I think it's Page 58 of the PDF under the first link to the Policy Board meeting materials.

You can take a peek at that, and that is one mechanism we could use to get at these weightings, in kind of in an objective and comprehensive way with the Boards. Okay, so a little bit about the process. Some adjustments were made to what we've talked about previously with the risk and uncertainty process, and we did this to avoid bottlenecks in the management process.

It keeps the creation and updating of the decision tool from the actual, when you're in the throes of a management action, you want to have that tool developed already, to some extent, ahead of time. But it also allows the socioeconomic component to then assess the effect of the specified proposed management action. This would be separated out, so you would separate out the socioeconomic component, because that would be kind of more of the immediate reaction to a proposed management action.

This is where the Board can really, you know dig into this tool and have their influence. The nice thing about that, and what we've talked about all along is having these things kind of explicitly spelled out provides a lot of transparency in our process. We're out there telling the public why we're down weighting the short-term effect, or up weighting the short-term effect, relative to the long-term effect, and things of that nature.

Developing the decision tool, this tool is developed separately from the management action. Generally, the Board provides input on the weightings, and then the Technical Committee and the Committee for Economic and Social Science, they provide the responses to the decision tool questions. But then the Board can make adjustments to those inputs if appropriate.

When developing the decision tool, all of the components of the decision tool will be completed, except the management effect portion of the socioeconomic component. Those will be scored when a specific management action is being developed and considered, and then this can be iterative. The Board can provide feedback on those weightings in the decision tool answers, and that will kind of feedback in to the tool, so it can evolve over time.

You're not locked into some static decision. But you'll have to do those types of changes explicitly, and yearly define why we want to make those changes. Almost to the end here, Mr. Chair. Let's say we had an anticipated management action for a species, so we had a stock assessment, and there is a need for action.

That will trigger a review, possible update of the decision tool. Then the Technical Committee, they are going to take a look at that. They may leave it. Everything might still be relevant, so they might not have much work to do at all, or they'll make any necessary updates that they need to make, you know based on stock assessment outputs or whatever.

Then they'll produce the preliminary probability and harvest level. This is without that socioeconomic component. Then that will be developed into a report. That report, including that preliminary probability will be forwarded to the SES. The SES then evaluates the management effect portions of the socioeconomic component.

They'll base that on the preliminary harvest level and other relevant information provided by the Technical Committee, and they may also update the other socioeconomic scores as needed. Then the final socioeconomic scores are added to the decision tool in a final recommended probability is produced.

The report is then made to the Board, it will include all of those decision tool influx justifications, and that

preliminary probability and harvest level, and then the final recommended probability will be there for the Board's consideration. Then the Board can get involved. We can make any changes to the decision tool, and you just need to justify those changes, and add those to the reports, and now we've got a good document of our process.

Then once that probability is approved, it will be used to develop those management options. Here is a look at the striped bass example. Important note, this is just illustrative. There are a lot of things, we just made this up, just to kind of show you what it would look like. To orient you to the table, you can see here we've got the column called weight.

Those would be the weightings for each of those, and you can see in this case the weightings are all equal. Then you can see the various scores associated with each of those line items in the decision tool, and then you get your outcome. In this mock example this would have been a recommended probability of 62 percent probability of whatever the management objective was supposed to be.

Here is our proposed next step. You asked us previously to walk through that striped bass example. We've provided that a couple of times, I just did a quick run through. What we would like to do now is use the actual developed tool on the upcoming update assessment for tautaug. This would be a pilot case for the Policy. Unlike the striped bass example, which was just kind of mocked up, this will be a real implementation of the process, but we're doing that prior to making this the official policy of the Commission.

If the outcome, we're going to provide you the outcome. You could consider it in your management action that you take at the end of the tautaug assessment process, but you won't be bound by it. You can kind of see how it goes, and then we can update the decision tool by running through this real-world example. With that, Mr. Chair, I am happy to take any questions that anybody has.

CHAIR KELIHER: Great Jason, I appreciate that. That was a great presentation. There will be a test at the end of the meeting. Does anybody have any questions of Jason? Bill Hyatt.

DISCUSS STEPS TO CONSIDER FINAL APPROVAL OF THE POLICY

MR. WILLIAM HYATT: Yes, Jay, I have a question. I've read through the materials, but I just can't grasp why socioeconomic uncertainty is combined with the bilateral stock assessment uncertainty, into a single outcome number. It just sort of intuitively makes more sense to me that those would be presented as separate uncertainty levels. I guess I don't know exactly how the justification for combining them, and I guess I don't understand why there is a benefit to combining them as opposed to presenting them separately.

DR. McNAMEE: Thanks, Bill. I mean I think that the short answer to your question is. I don't know how the Board would manage within our existing process with two kind of competing separate probabilities, you know of setting like a fishing mortality threshold tolerance, or something to that effect.

Now if your concern is that you want to be able to kind of look at these things separately. You'll be able to do that in that you'll have all of the information separated out. Remember in this latest process, we are actually doing the latter portion of the tool separately. That happens, you know once there is a management action proposed and on the table.

You can kind of see it, like what it's doing within the overall probability that is produced. But in the end what the Technical Committee needs is or the Stock Assessment Committee or whoever. What they need is a probability with which to then produce some options for the management board of different potential management outcomes. What we tend to do now is, you know we have this kind of multiplicative, okay give us a 40, 50, 60 percent probability of these four possible management actions. This cuts out that first layer of that and simplifies the process.

CHAIR KELIHER: Bill, did that answer all your questions?

MR. HYATT: Well, it certainly gave me more to think about. I think it's going to take me a while to wrap my mind around this concept in total, but thank you, Jay.

CHAIR KELIHER: I have David Borden, John Clark, and then Eric Reid. David.

MR. DAVID V. BORDEN: Jason, fine job as always. Would your tautaug example, since we have multiple stocks, will the estimates be made? Will we have an estimate for each one of the stocks?

DR. McNAMEE: Yes, thank you for that, David. I said that same thing to Sara. Sara's very funny response was, "The good thing about using tautaug is that we get to test it four times, because there are four separate stocks, and the bad thing about doing the tautaug example is that we have to do it four times." Yes, that is the idea is there would be kind of four unique outcomes here, so good observation, David.
CHAIR KELIHER: I've got John Clark, Eric Reid, and then Justin Davis.

MR. JOHN CLARK: Thank you for the presentation, Jason, and this is really amazing work. My question is the weightings. I mean obviously that seems to be the more subjective part of this whole formula. Is the idea kind of like a wisdom of the crowds, where you would hope that everybody that is answering the survey is doing so independently, because obviously the results could be skewed if people knew? Well, take like if a faction of the Board knew that if we weight this heavily, it will work to the result we want to get. Just curious.

DR. McNAMEE: No, it's a really good point, John. I think you're right. You could. The first thing I'll say is, that is kind of the idea. By doing your stuff independent of a management action, it allows more objectivity. Within the overall process, yes this is absolutely. It's subjective, it the part that the Board really applies its policy desires on the decision tool. That's kind of, it's subjective, but it's also reflective of the Commission or the Board's policy.

Meaning, we want to have really high weight, technical information, and less weight on the economic and social information, or we want equal weights on those things. Someone could game it. I think there could be things within it that would have counterintuitive effects. I guess I would suggest that people should take the survey and be truthful and sincere in taking the survey, because what they think they might be gaining in the system might backfire on them. I guess I'll end my yammering there.

CHAIR KELIHER: Thanks, Jason, Eric Reid.

MR. CLARK: Thanks, Jay, that was very interesting, and as I said, I think that if it is done in the spirit that you say, it could be very useful. Just one follow up on the economic considerations. The fact that you are weighting like short-term and long-term effects with the similar weight. Wouldn't they kind of offset themselves in some of these things? I mean, we always will say like, well we've got to cut harvest now, because it will pay off in the long run, so economically short-term pain but long-term gain.

DR. McNAMEE: Really good observation, John. I think you are right that they could offset each other, but they don't have to, and there are two ways that they might not directly offset each other. One would be if the weightings are not equal, so you thought, you know you wanted to up weight the long term over the short term. That could create a situation where they are not always just canceling each other out.

Then, the other way is in the actual score. You could have equal weightings on these things, but then the scores, depending on whatever the management objective is, management action that is being proposed. The scores could be different. You know you could get a really significant short-term effect with little long-term benefit, and so those two scores would be reflective of that, and they wouldn't cancel each other out.

CHAIR KELIHER: Great, all set, John?

MR. CLARK: Yes, thanks a lot, Jay. That was very interesting.

CHAIR KELIHER: I've got Eric Reid, Justin Davis and then Tom Fote.

MR. ERIC REID: Thank you, Mr. Chair and thank you Doctor. I appreciate the fact that this socioeconomic data is in there. If I remember correctly, I think I have a vague memory of the few items we do with our partners at the Mid-Atlantic, I think there are a few. I appreciate the socioeconomic data being included there, especially in relationship with National Standard 8, which addresses communities. But my question is, I see in the presentation you talk about ex-vessel price and weightings and so on and so forth. Where does the economic multiplier for any particular species fit into this program? Do you also consider willingness to pay in the commercial fishing industry?

DR. McNAMEE: Awesome questions, Eric. The prime construct of these came from the experts on the Committee for Economic and Social Science, as some good solid metrics that they thought might be a good place to start. Now, as mentioned a couple times, I think some customization could occur within the tool itself.

If there were other metrics or ways of looking at the existing metrics in a different way, I think those could be built in. I think that's what we were talking about with regard to, you have this overarching framework that we've stepped through in this presentation. But then you would kind of get down to the species level, and that's where the stuff that you're talking about can kind of come into the tool, and influence it.

I think the stuff you're talking about could be built in as a standalone metric, or as a supplement to one of the existing four metrics that we've offered. I think those would have to be done, I would guess the economic multipliers and effects and things like that are very different for the different species. That is where that would come into play.

CHAIR KELIHER: We're going to move right along to Justin Davis then Tom Fote.

DR. JUSTIN DAVIS: Thanks for the presentation, Jason, and all the work by you and the Workgroup. I've followed this with a lot of interest as it has moved along. I think this is great. It's providing transparency and standardization to a process that I think all of us as Commissioners or delegations do in our own heads, when we're making management decisions.

But we're all probably doing it a little different, or weighing things differently. It's probably a good idea to get it all out on paper and standardize it. One thought I had, in looking at the schemes you laid out. It's possible I missed this, but there is a point in there for input from the Board, from the TC, and from the Committee on Economic and Social Science.

But I'm thinking there should be a point in there where the Advisory Panel has some input, particularly when you're considering socioeconomic impacts. I think that is something that we have to give our Advisors a chance to weigh in on, because they have context and understanding there that probably goes beyond what the Board and TC have.

DR. McNAMEE: Justin, thank you very much, I think that is a really excellent point. I vaguely recall thinking about where the AP would fit into this process, and I think you've kind of put that back on the radar. That is an important consideration that we'll go back and figure out. I'm guessing it comes in, in parallel with where the Board kind of comes in. I think that would be the most logical place for that to come in. But we will address that, and I'll come back with a response to that.

CHAIR KELIHER: Thank you. Moving along to Tom Fote.

MR. THOMAS P. FOTE: I know there is a lot of work going into this. I'm always very concerned when I hear, you know the short-term pain, we're going to see long-term gain. Now, we've been telling that to

commercial and recreational fishermen for the last 30 year, and we keep cutting back on the quotas, as we've done over the last 30 years and put more and more restrictions.

The only thing a lot of them have seen is commercial fishing is going out of business, recreational party and charter boats going out of business, recreational tackle stores going out of business. The short-term pain just turns into a long-term pain for a lot of members of the industry, both commercial and the recreational fishing industries.

We weight things, and the weighting seems never to basically really look at the pain it caused those fishing communities, both fishing communities. I have real concerns. I made promises 30 years ago, and one of those promises that I thought would actually happen never did. As we ask politicians, are we better off than we were 30 years ago?

Yes, we might have more fish in the water according to the estimates of MRIP, but has the recreational and the fishing communities done any better? When you start catching 25 percent of what fish you were catching 30 years ago when we started in most species, and we're just seeing more and more regulations.

We don't see the rebuilding of the stocks like we thought we would see, or because of the approaches we used are precautionary, are basically not allowed for those even increases to be circled through the community. I'm always concerned when we get new models, because the models are only as good, I learned a long time ago when I was going to graduate school, and I was in computers and advertising, and that's what my background was.

The surveys and the modeling you do is only as good as the data you put in. I'm still very concerned that that data that we put into it, especially with the new MRIPs numbers causing all this pain, and considerations that I'm not sure that those numbers are any better than the numbers we had before. That's just my comments on it.

DR. McNAMEE: Yes, Tom, you know I think that's totally fair. What I would offer you. I appreciate the comments. I hear them myself; you know in Rhode Island. I think one of the attributes of this decision tool is, you can express that in here by up weighting the short-term effects and down weighting the long-term effects.

The long-term effects like you said, they are uncertain. I think there is a track record there as well, although it may be different, depending on the stock you're looking at. But you can actually express your views that you just offered, within the mathematics of this tool, by adjusting the weights commensurate with that.

MR. FOTE: Just one short follow up. If you're using tautaug, I know in the last 15 to 20 years, because New Jersey thought that was, and we all thought that one of the fish that state-by-state, because unlike black sea bass and summer flounder, they don't usually migrate out and north, they usually migrate in and out. The thing that we could basically get proposed to actually do state by state management of this. Even with all the data we tried to accumulate, we always got told it was not enough. Finally, we gave up, because you're spending time and effort trying to do that. You just find out you're never going to be able to do it. If this would help, I don't know.

DR. McNAMEE: Good point.

CHAIR KELIHER: Bill Gorham.

MR. BILL GORHAM: I think Tom's points are very well put. It seems like it's very important to get a lot of the socioeconomics right. Just looking at some of the more recent decisions by certain fisheries. It was in the recreational community, the subsections, that people that don't own boats.

There are bucket fishermen, pier fishermen, and maybe it's just a policy or acknowledgement, the Board or Commission needs to acknowledge is that when we get these reports in, if there is going to be an

adverse effect on a certain subsection like pier fishermen, that we can reassess.

Oftentimes, you know we see reports and it's not taken into account. We're at this stage of the game we can't go back, but the report itself is lacking critical socioeconomics. I'm just wondering if that is something that this model has the capability of doing, if something is missed, you know during the input process. Thank you.

DR. McNAMEE: Yes, and you can kind of redirect me if I'm not actually answering the question you asked. But I think the answer is absolutely. This is meant to be kind of an evolutionary process; you know it's supposed to iterate. In particular in the beginning, you know we're going to learn as we go.

We learned a lot by running through kind of the mock striped bass example, and we're hoping we think it's improved a lot, and we hope that it continues to evolve. That is exactly how it is sort of built, to progress. Let's just stick with striped bass. Let's say we got to the Board and you noticed that, hey we've got a highly dependent shore fishing community, and that is not identified here. That comment could be made, and the tool can be adjusted to account for that.

I think there is, and we want to get to a point, where at some point it stabilizes, and we're not adjusting it every single time, because it sort of loses its effectiveness. But in particular on the first couple of uses, I do see that happening. Sometimes that's the best way to go, right? You don't recognize some things until you are kind of confronted with them. This process that we've outlined here, allows the ability to update and evolve.

MR. GORHAM: Yes, thank you. I think it is really critical, as you were going through the presentation, there was a lot of TC involvement, I guess a lack of public involvement, to where my fear is that we could continue to overlook things that just aren't captured in the data, which we know is abundant. But if there is the ability to go back and reweight it, and a willingness to go back and reweight it, regardless of timeline. Not necessary process, but to get a better understanding of the world of the fishery and on the stocks, I think it would be fantastic, because on paper it looks great. But if it's lacking the critical information, it just looks great. Thank you.

CHAIR KELIHER: I see Tom Fote your hand is back up, and we have a member of the public that wants to make a comment. Are there any other Board members that have not spoken on this topic yet? Tom, do you have a very quick follow up?

MR. FOTE: I do.

CHAIR KELIHER: Go right ahead.

MR. FOTE: When he was starting to talk about shore-based anglers, and one of the things that really has grated me over the years, is that we look at the management measures we put in place, especially in the recreational community. We never look at the impact it has amongst different sectors of the fishery.

For example, every time we raise the size limit, we put shore-based anglers further and further away from the resource, because they do not see the same size fish as the boat anglers. Because they are not at most of the meetings, and you have the party and charter boats, which is important to the industry and everything else, but they get squeaky wheels, and we kind of loose those people on the side.

Over the years I've brought this up many times, but we've basically forced a lot of shore-based anglers, if they want to actually take a fish home to eat, they are going to be poaching most of the time, because they don't really see the size limit that we put in. Are you fishing Jamaica Bay stuff? You'll never catch one that is big enough to take home to eat. We could weigh this, if I am understanding this. We could give that more weight that we don't alienate that population when we do a rule.

DR. McNAMEE: Yes. You know I think in that specific example, that would come into those dependent community parts of the socioeconomic aspects. Now the ability to get that granular with it, we'll just have to see how that kind of plays out, because I actually don't know if it can get that defined. But the answer to your question is yes, like that type of thing is directly, that is where that community dependency part comes into play.

CHAIR KELIHER: Captain Julie Evans, do you have a comment?

CAPTAIN JULIE EVANS: Yes, sir. Yes, I do. I'm amazed at this model, and appreciate it so much. I'm also, I've known Tom Fote for a very long time, and I appreciate his comments, as they are very true. I've been a reporter in commercial and for-hire industry in the past. I've also been a participant. There is one thing I might want to remind, well there are two things. We have more and more subsistence fishermen, as Tom was referring to in Jamaica Bay. I'm located in Montauk.

But people are, I think, more dependent on shore-based fishing and not just for fun recreation, but for food. That is one thing. I would like everyone to kind of be cognizant of that fact. The other is that we're faced here in East Hampton with a project that is going to be very disruptive to the fisheries. Our town leaders have gone into an agreement with a wind development company called Orsted, and they are going to be running a cable from Cox's Ledge to Wainscott.

CHAIR KELIHER: Julie, I'm going to ask you to stay on topic, as it pertains to the Risk and Uncertainty Policy.

CAPTAIN EVANS: Well, I was wondering whether the Risk and Uncertainty Policy would be considerate of the fact that will be disruptive to fishermen and fisheries.

CHAIR KELIHER: Okay, thanks for that question. Jason.

DR. McNAMEE: Yes, I think so. I appreciate the question. I think it's a tricky one, in that it would depend if that management action were somehow integrated into the Commission management process. Then things like that could be vetted in here. Now things are happening that are kind of outside of the realm of the Commission management action, you know that it wouldn't connect into this tool. Hopefully that made sense.

CAPTAIN EVANS: If I might. If people might be willing to think about this as something that might be put into this management tool in the future, I think a lot of people would appreciate it, thank you.

CHAIR KELIHER: Thank you, Julie. I'm going to ask staff if they can go back one slide, please with the recommendations here. Thanks for that. The proposed next steps are using this for a pilot case with tautaug. I just wanted to get a sense of the Policy Board and the direction you want to go. I don't think we need a motion on this, but if we have consensus, I think we can give Jason and the team what they need to start moving forward.

Is there anybody that would be opposed to the next steps? I'm not seeing any hands go up. Nobody is jumping in, so Jason, I think you have an answer and support for your proposed next steps. I want to just take a step back and thank you for that. I mean that is very comprehensive work that you've done, and I think it will be very beneficial as we move forward. I want to personally thank you for all that work.

DR. McNAMEE: Thank you, Mr. Chair. Could I have just five more seconds? I would like to thank someone also. You know Sara Murray has really kept this going, and so I get to be the front man here, and that is fun for me. But behind the scene Sara Murray has been the ASMFC person who has really kept on top of this and kept it rolling, and so my thanks go to her for a lot of the work in keeping this moving forward.

CHAIR KELIHER: Great, thank you for saying that. Your thanks are also our thanks as a Policy Board, so great

work, great team. Thank you very much. We will continue now to move right on, on the agenda.

REVIEW AND DISCUSS THE 2020 COMMISSIONER SURVEY RESULTS

CHAIR KELIHER: The next item is Review and Discuss the 2020 Commissioner Survey Results**.** I believe, Deke, you're in the queue to give a presentation on that.

MR. DEKE TOMPKINS: Good afternoon! I think we can head over to the second slide, please, Maya. Cool, so this is a presentation of the overview. I'm going to break the analysis of the 2020 Commissioner Survey down into four categories. Check out some whole time series trends, the lowest and highest scores for 2020, and then we'll look at the declines and increases from last year to this year.

Finally, we'll do a brief summary of the comments. All right, so the survey was initiated in 2009. The 2020 version of the survey was open from January 7 through 24, and it is composed of 16 rating questions, and 5 comment questions. As I'm sure everyone who filled it out noticed there is a new question on the 2020 survey, asking you to rate the ACCSP product, so that is similar to Science and ISFMP. This slide shows the number of respondents and average scores for each year in the time series. It's pretty self-explanatory, you can see both categories ticked up just a little from last year. This is the whole time series slide, and this slide describes the negative trends throughout the whole time series, using a linear trend line.

Essentially, this is the slope of the trend running across all years, so you can see these are the questions that have gone down when you've got a linear trend line to that data point. I would also note that Questions 7, 8, and 9 are in italics, because those were added to the survey in 2014. Now when you get to the good news slide, these are same as last slide, but the questions have been trending up throughout the whole time series, and note Question 14 and 15 were new to 2014, so they don't go back all the way to 2009.

You can see here is a number of questions that are making good progress as well. This slide shows the lowest scores for the 2020 survey, and I would note that these were also the lowest two scores from 2019 as well. I'll also note that the score for Question 8, progress to end overfishing has fallen every year since 2017.

These are the highest scores, so everything that go above an 8, Questions 11, 13, 14, 15, and 16 have remained above 8 throughout the time series, so those are among our highest performers every year, and Questions 6 and 10 for securing resources and engaging with Legislator, while a bit noisy, are trending up overall in the time series, as described back in Slide 6.

We are going to now talk about the questions that had a score declining from last year to this year. It's pretty self-explanatory, cooperation with federal partners, progress to end overfishing, our relationship with constituent partners, cooperation among Commissioners, and engaging our state and federal legislators, all took a little reduction. This slide shows all the questions with a gain of over 0.1 on a scale of 1-10.

These are starting up top with some high performers, and then going down it's a pretty small increase, but I wanted to provide a complete picture here for you. All right, now we're moving into the comments. It's really tough to distill all the comments down into a couple slides, but I tried to stack the comments that were commented multiple times up top. For the obstacles to rebuilding fish stocks, I think you can see climate change and environmental conditions were a very popular one, and so was politics, cooperation, and outside interests. I think the second one and the first one both are really getting at some of the allocation issues that we have been dealing with recently, and that down there, there are actually some that definitely just referenced allocation. The most useful ASMFC products, so the science is always up there, and that was up there again.

The meeting materials, all of Tina's great outreach products, and ASMFC staff and the ISFMP products are some of the most noted, and then Lisa Havel's Habitat technical products were also pretty popular ones, so thanks. This is always a tricky one, request for additional products. I think quota monitoring web page has been mentioned for a couple years now.

Then there are a number of other ones, I'm not going to read through all these, and they are in the meeting materials, if you want to take a closer look. These are issues needing more attention, and once again climate change and the environment is right up there on top. Public outreach and politics and cooperation and outside interest were up there.

Data management and MRIP was also one that received a couple multiple comments. Lastly under additional comments, this one should make all the ASMFC staff feel good, and thanks for the complements. A lot of these had to do with Laura's shop, and helping with the CARES Act stuff. With that I'll take any questions.

CHAIR KELIHER: Thanks, Deke, any questions on Deke around the survey? Steve Bowman.

MR. STEVEN G. BOWMAN: I was just noting the one page that dealt with a significant reductions. In looking over that page I was just wondering, it just seems to me that some of those things that have gone down may be an artifact of the pandemic that we're dealing with, the lack of being able to work with each other, see each other, and things like that. I just wanted to put that out for consideration. Thank you.

MS. KERNS: Pat, if you're talking, we can't hear you.

CHAIR KELIHER: Thank you. For some reason my computer has just frozen up here a little bit. Can you hear me now, Toni?

MS. KERNS: Sure can.

CHAIR KELIHER: You kind of froze up and all the audio stopped on there for a second, about half way into Steve's comment. Do I need to follow up with you, Steve on anything? I'm sorry.

MR. BOWMAN: No, sir, I was just indicating that before we take those comments too, not to be a double negative, but negatively. I was just making the point that I thought that maybe some of those may have been a result of the pandemic that we're dealing with, and the lack of our face-to-face communication, whether with our constituents, whether with our fellow Commissioners or other artifacts of that possibility. Thank you.

CHAIR KELIHER: Yes, the fact of angst. Steve, I think those are real good comments. Certainly, we are in a very, very different time. I looked at that survey as much more positive than negative. Actually, when I was talking to Toni about it, she said kind of we've got to look at the scale here of what some of those declines are. They are just off by a bit. Overall, I see it as very positive. Joe Cimino.

MR. JOE CIMINO: Thanks, Deke, I appreciate it when you hit us with this. There are always some interesting things in there. I think one of them to me was our Commissioner's concern with being able to deal with overfishing. One of the reasons why I say that is, it started in 2017 that we've been saying that.

It really wasn't until after we received the new MRIP numbers that we saw a stock status of overfishing for two of our key species. I think before that we were dealing with depleted status in quite a few species, but maybe only tautog that had overfishing. Yet, I still had to rank it high, because those are two species along with sea bass and fluke, where we can't necessarily seem to manage our way out of these things.

Rec discards and environmental conditions are such a challenge. I just wanted to put it out there that, you know we had a curve ball thrown at us in a big way with the new MRIP estimates, changing an entire understanding of our time series of management. But you know still a very real concern. Thank you.

CHAIR KELIHER: Thanks, Joe, for those comments. Any other members of the Board like to comment? I don't see any other hands going up. I know Toni you had a comment you wanted to make?

MS. KERNS: Yes. You know Deke addressed for a couple years now; some folks have had interest in a quota monitoring page. It's not that we have been ignoring that suggestion, it's the difficulty that we find for the species that are left that have state-by-state quotas that aren't covered under the quota monitoring page through NOAA Fisheries, have a lot of confidentiality issues with them. We wouldn't be able to show several states landings, and so we seem to be settling with how then we would show quota monitoring page for those species.

CHAIR KELIHER: Seeing no other hands on this, Deke, I want to thank you for pulling all that information together. The survey, you know sometimes when I get it, I was like, ah the survey is here again already. It seems like we just did it. But I think it's important. We have a good reply rate from members of the Board.

I think it's important that we do this on an annual basis, to kind of keep us all on track.

REVIEW STATE MEMBERSHIP ON SPECIES MANAGEMENT BOARDS

Deke, I want to thank you again, and with that we'll move on to the next item on the agenda, which is Review State Membership on Species Management Boards, so that is you, Toni. It's all yours.

REVIEW PENNSYLVANIA'S MEMBERSHIP ON THE ATLANTIC MENHADEN MANAGEMENT BOARD

MS. KERNS: Since we moved the first half of this agenda item to Monday, we're going to go to the second part, which Bob is actually going to cover which is Pennsylvania's membership on the Menhaden Board.

EXECUTIVE DIRECTOR ROBERT E. BEAL: Mr. Chair, is it okay if I jump right in?

CHAIR KELIHER: Yes, please do, Bob, sorry.

EXECUTIVE DIRECTOR BEAL: I wasn't sure if you had any comments before I jumped into it.

CHAIR KELIHER: No, no, no, no, go right ahead.

EXECUTIVE DIRECTOR BEAL: I'll try to keep this brief, but the Executive Committee has talked about this a number of times. There are a number of members of the Policy Board that probably haven't sat in on those conversations, or sort of been caught up on the whole issue around Pennsylvania and the Menhaden Management Board.

For those reading along in the briefing materials, Page 60 of the Policy Board materials has a draft memo that may memorialize the decision of the Policy Board at the end of this process. Ultimately at the end of this conversation, the Chair will likely ask if you are comfortable with that wording, and if so, we can adopt the language in that memo.

The quick background is, in February of 2016, five years ago, the Policy Board unanimously approved Pennsylvania's participation on the management board. Pennsylvania asked to be put on, and the Policy Board quickly and unanimously said yes that that works out. Since 2016, Pennsylvania, coincidentally, fell behind on their due's payments to ASMFC for a variety of reasons that have all been adjusted, and Pennsylvania is currently up to date, and in great standing financially with the Commission.

But, when they were in arrears the Executive Committee was looking into the consequences and impacts of states being behind on the due's payments, and we worked with the Commission's Attorney, Sean Donahue, to look into that issue and sort of figure out, all right if a state really falls behind, what can we and what do we do about that?

Coincident to that review, Attorney Donahue noticed, sort of brought to the attention of the Executive Committee, and he did this from the perspective of

being a good attorney and good Commission Counsel, and said hey, you guys may have some exposure or liability here with Pennsylvania serving on the Menhaden Board.

His rationale for that was that he went back to the Guiding Documents of the Commission, the Compact and the Rules and Regulations. In the Compact there are a number of descriptions on how states operate and where states can and can't participate. One of those provisions is pretty direct, and it says Pennsylvania and Vermont are essentially limited to participating in the Commission process for anadromous species.

He raised a red flag and said, hey you may want to think about this issue, and should menhaden continue to be, continue to participate on the Menhaden Board. You know there may be some exposure here that the Commission needs to think through a little bit. We had that back-and-forth conversation at the Executive Committee. Then as the conversation evolved a little bit, the Commission also approved Ecological Reference Points through the Menhaden Board, and ultimately the Policy Board. As everyone knows, the Ecological Reference Points sort of intimately linked menhaden and striped bass, striped bass obviously being an anadromous species. As the conversations at the Executive Committee evolved, they came up with essentially what's included in this memo, which is given the importance and the linkage between menhaden as a forage base, and striped bass as an anadromous predator.

It seems to be acceptable for Pennsylvania to stay on the Menhaden Board, given that relationship between menhaden and striped bass. That's what's recorded in this memo. We talked through this with our Attorney again, and he feels that given the sort of new direction that the Commission is moving in, toward ecosystem management, and linkages between predator and prey.

He does not have remaining concern about exposure or liability of the Commission, feels that the Commission can justify keeping Pennsylvania on the Menhaden Board, if they choose to do so, and that does not cause significant or concerns to him that down the road he'll be in front of a judge or have a case that he's not able to adequately justify why Pennsylvania is participating on the Menhaden Management Board.

Again, the summary of my sort of long-winded background here, is included in that short memo. The last item, the last bullet Number 4 I think is important as well, which is this. This doesn't set a precedent, it is unique, it's sort of a one-off situation, where Pennsylvania is listed as a state in the charter that has limited participation in some of our species.

But, given that this sort of direction that the Commission is moving in, it seems to be okay in this one instance. But if there are other instances, we'll have to consider those individually in the future. I'm happy to answer any questions, Mr. Chair, but that's my somewhat quick summary of the issue.

CHAIR KELIHER: Thanks for that, Bob. I think that Bullet Number 4 in particular, or Item Number 4, is particularly important, as far as precedent setting. The fact, I think, the Executive Committee had a couple different conversations about this. I think the fact that the Attorney has looked at this and feels comfortable as well with this new information, gave the Executive Committee some comfort having this move forward, memorializing it with a memo in the file, so it's not lost in the future.

Before we make any final decisions here, I want to open it up for any questions or comments to Bob. Any hands? I don't see any hands. From a process standpoint, we do not need a motion, because Pennsylvania is on the Board. From my standpoint, Bob, correct me if I'm wrong, we can just memorialize this that consensus was reached on this issue, and we can put this letter in the file.

EXECUTIVE DIRECTOR BEAL: Yes, that's correct. We'll finalize this memo, you know include today's date, and I'll sign it, and we'll be all set. I can obviously share a copy of this with all the Commissioners, in

case they want one just to have it in their files. But that is a good plan moving forward, Pat.

CHAIR KELIHER: Okay, that sounds good. Well, I don't see any other hands on this issue, or any hands on this issue, so with that we will have this letter signed. I think, Bob, that is a good idea, as far as getting this copy out to everybody on the Policy Board. If you guys could do that, that would be great. Okay, Toni, I don't think you had anything else under this item.

MS. KERNS: I did not, Mr. Chairman.

DISCUSS COMMISSION PROCESS FOR WORKING ON RECREATIONAL REFORM ISSUES WITH MAFMC

CHAIR KELIHER: Okay, we'll move right along, because you're up next as well, so Item Number 11 is Discuss Commission Process for Working on Recreational Reform Issues, Toni.

MS. KERNS: I have two, I guess things to go over with the Board on this one. The Policy Board has been meeting jointly with the Mid-Atlantic Council on Rec Reform for Commission species, summer flounder, scup, black sea bass, and bluefish. The Policy Board has been involved, because it is two management boards that are being addressed.

Since the Policy Board is the overarching management board for all the species management boards, we thought it made the most sense for this body to engage with the Mid-Atlantic Council on these Rec Reform issues. At some point along the way we said we would come back to this Board and confirm that that is the way we want to move forward, as management documents are initiated.

We have initiated a management document, so one, the first thing we want to do is just to confirm that it is this Policy Board that should be engaging with the Mid-Atlantic Council on these issues. Then the second piece of information that we want to get advice from the Policy Board is, how to move forward with voting with the Mid-Atlantic Council. What we're looking for today is recommendations to bring back to the Council, as the two bodies discuss how voting would take place.

But we just want to get the position of the Policy Board before moving into those discussions with the Council. For the Summer Flounder, Scup, and Black Sea Bass Board and the Bluefish Board, who have joint FMPs with the Mid-Atlantic Council, the process that we use is making like decisions. If a motion is raised, each body has to have the exact same motion for that motion to be able to be voted on. Both bodies have to pass that motion for the motion to carry.

This is a unique system that we have with the Mid-Atlantic Council for these jointly managed species. When we take on issues that are for species that are complementary with other management entities, such as the South Atlantic Council, or the New England Council, we do not use this like-motion process. We are looking for recommendations on how we want to discuss the voting with the Mid-Atlantic Council. That is the second part, and that is my background of this discussion, Pat.

CHAIR KELIHER: Thank you, Toni, questions of Toni on this issue? Tom Fote.

MR. THOMAS P. FOTE: Thank you for your hard work on that, Toni. I mean I'm looking at, I see a serious problem here, and I'll just pick bluefish, because it basically shows the whole problem. We basically have representation from North Carolina to New York on the Mid-Atlantic Council. We have some New England representatives; Eric sits here as a representative from New England Council. When we come to the South Atlantic, there is no representation whatsoever, and those states do not have the votes on the Council to basically equalize. I mean I'm just looking at; the Mid-Atlantic Council can control what happens in the South Atlantic and the New England part.

Some of the member states from both New England and South Atlantic don't really like that too much, and I agree with them. There is a problem there. I don't know how we get around it. I mean if we had a super

council, or a committee of the three councils that would meet on species like this, that we have a total membership of up and down the coast, that would make more sense.

But basically, the Mid-Atlantic Council as a deciding vote from our four members or five members below them, including southern then because of North Carolina, and from Rhode Island north. How do we correct that problem? That is one of the things I've been trying to think about. I think with everything else, over this pandemic it's actually given me more time to think about the whole process in what I've been doing. I think that's why some of those comments in the survey were more interesting this year. I'll leave it at that.

CHAIR KELIHER: Thanks, Tom for that. I've got two other hands up, Ritchie White and then David Borden.

MR. G. RITCHIE WHITE: Yes, sitting in black sea bass for the first time in a number of years. Watching or participating in that process, it just struck me that in the process the Mid-Atlantic gets to veto whatever the Commission comes up with, as the Commission determines votes first. The Commission would pass a motion, and then the Mid-Atlantic Council can just say no to it.

The concern is that it's obviously state waters and federal waters fishery, but to me I think it's new, in that it's allowing you know a federal entity or representative of the Feds, control over state water fisheries. I don't know the answer, because obviously species has to be managed in both entities. But it was new to me, and it gives me some concern, but I don't have any recommendations.

CHAIR KELIHER: I'm going to try to bring us back with some recommendations in a moment, but I would like to recognize Dave Borden, and then Adam Nowalsky.

MR. DAVID V. BORDEN: I'm just going to follow up on both Tom's point and Ritchie's point. You know over a long period of time I have had my ears burned by New England fishermen about the lack of New England representation on the Mid-Atlantic Council.

The issue that really comes up in my mind, is the fact that since you need identical motions, and there are no New England representatives on the Mid-Atlantic Council, then in essence it's very difficult for the New England contingent to get a motion, even on the floor. I think that is a real problem with the system. Like Ritchie, I don't know how to address it.

CHAIR KELIHER: Adam Nowalsky.

MR. ADAM NOWALSKY: Great, thanks very much, and I appreciate Ritchie's comments. I don't know if Mike Luisi is participating today that he would want to comment as Chair of the Mid-Atlantic Council. But I do want to highlight that the process that took place earlier this week between the joint bodies, was somewhat different, with regards to the order of voting that took place, and was in fact requested by some member states from the Commission.

It's typically the process when we vote on joint motions at a joint meeting that the Council and the Commission would alternate on a motion-by-motion basis, which body votes first, which then essentially gives the other body that veto power. When on black sea bass commercial, the two bodies met jointly in December.

It was determined, again at the request of board members in consulting with leadership. When we discussed the issue of inclusion of the allocations in the federal FMP, it was decided for the December meeting on that portion of the agenda, that we would forego the alternating process, only have the Mid-Atlantic vote first on those options, followed by a vote from the Board, if the Mid-Atlantic motion passed.

Then for the issue of the allocations at this meeting, it was again determined ahead of time that the Board would vote first on all of these motions, followed by the Council. But our typical joint meeting process is not what we saw. We typically go back and forth. The

Board votes first on one motion, which gives Council, as you call it veto authority.

The next motion the Council would vote first, which again in the terminology we're using would give the Board veto authority, and go back and forth on motions throughout the order of the business of the day that way. This meeting was different this week. I know it's been a few meetings since New Hampshire has been a part of that, but I did want to highlight that.

CHAIR KELIHER: Thanks, Adam, I'm going to go to Mike Luisi, and then I'm going to try to bring an idea forward. Mike, go ahead.

MR. MIKE LUISI: Is there something that's being asked of? You know we've been dealing with joint meetings for quite some time, and I speak not as a member of the Policy Board, but as the Chair of the Mid-Atlantic Council. I feel like we try to make sure that everybody has an opportunity to speak, and to be represented, as far as the decision-making groups.

You know, I will say that I missed the beginning part of this conversation, I was on a phone call during another meeting. I don't know, Pat. Is there something being asked of the Mid? You know maybe I can ask you that question, and see where we go from there. But I'll limit my comment to that point, and see what you think.

CHAIR KELIHER: Yes, thanks, Mike, I appreciate that. There may be a question asked of the Mid. I've been talking to staff about this. I guess the one benefit of sitting up here in the northeast corner is that I've been kind of watching it from afar. Listening to the conversations, both at the table and obviously the online table, I guess I should say, as well as talking to a few folks around the virtual table, but talking to staff as well. We've got two issues we've got to consider, the first is the simpler one. Is the Policy Board still the right Board to take part in these discussions? Then second, what's the voting process? Does the Policy Board, if it is the Board, want to recommend to MAFC? There may be a decision point here. As it has been stated by Toni, and you know we've got two Commission management boards. It seems reasonable for the Policy Board to take part in these discussions.

It was suggested that would be the case. Before I go on, I just want to make sure. Does the Board agree that the Policy Board is the right body to continue these discussions with the Mid? If not, is there a better process from who is going to be engaged in this? Does anybody object to the Policy Board continuing with those discussions?

MS. KERNS: Pat, can I just clarify that we're talking about Rec Reform here. We're not talking about how we engage with the individual Bluefish Board and the Mid-Atlantic Council, or the individual Summer Flounder, Scup, and Black Sea Bass Board and the Mid-Atlantic Council, it's about Rec Reform issues only is what we're getting a recommendation for, so then we can carry forward a recommendation to the Council about how we vote together, as well as is this the right body.

CHAIR KELIHER: Yes, thanks, Toni for saying that, because I think there is still a lot of energy around that black sea bass issue, so thanks for kind of refocusing this on the Rec Reform issue. Is there any objection from the Policy Board that the Policy Board remains the board that will be engaged with the Mid on this issue? Adam Nowalsky, your hand is up.

MR. NOWALSKY: I don't want to object to that process, but I just want to ask a question. Does the wording in the FMP allow the Commission as a whole to be part of that joint process for these jointly managed species? Is there something that explicitly states that joint management action takes place with one of those species-specific boards? In which case, action is part of Rec Reform that might modify the FMP, might need to come from the Board specifically. I don't know the answer to that, but I did want to ask.

CHAIR KELIHER: Yes, thanks Adam, that's a great question. I'm going to let staff jump in, but from my perspective, because this is an overarching policy around Rec Reform, the Policy Board is the right place,

and then when it gets used at the lower levels with the species board, then that's where they become engaged. Toni or Bob, do you want to jump in on that?

EXECUTIVE DIRECTOR BEAL: Yes, Pat, I can jump in. I would have said the exact same thing you said, which is the Policy Board is the overarching board, and traditionally our practice is for the Policy Board to tackle multispecies issues, or issues that span more than one species management board. While I'm talking really quickly, Toni may have said this in her opening statement.

You know the other unique thing with Rec Reform is, some of our Commissioners during the development of this have suggested that, you know if we come up with some really good ideas in Rec Reform, those may be applicable to other Commission only managed species, striped bass, tautaug, whatever it might be. Sort of part of that conversation was, you know it seems awkward or strange maybe for the Mid-Atlantic Council to be too involved, if the Commission is developing a broad policy on rec reform that may apply to species outside of the four that we jointly manage with the Mid. That kind of muddies the water even a little bit more. Happy to answer questions on that.

CHAIR KELIHER: Mike Luisi.

MR. LUISI: Yes, I think honestly, you know I'm speaking on behalf of the Council at this point, as Chair of the Council. You know I think you, Pat, I think you, Bob, Toni and I, Chris Moore, we need to just have a conversation about how we're going to work forward with this Rec Reform Initiative.

You know I'm willing to have that conversation with you guys, to try to figure out how we're going to operate, so that we don't find ourselves in the position where the decisions that we make are questioned, to the point where whether the Commission or the Council votes in a particular way. I just think that we need to be transparent in how we're going to handle that down the road. Right now, it's all kind of theoretical. You know there is a lot of good work to be done, but at some point, there are going to be motions made, and we just need to figure that out.

CHAIR KELIHER: I agree that we're going to have to have more discussions on this, and I note that there are a couple other hands that have gone up, and I'm going to come to you in a second. But I do want to put an idea on the table for the Policy Board's consideration, and I think it would fit into that broader conversation that you just referenced, Mike.

You know Toni discussed this earlier, as far as the joint management process, where we need to have like motions between the Commission and the Council. Sitting up here in the northeast, I looked at that process. It certainly does give the Mid kind of more voting power the way it is currently set up.

Adam brought up this idea about kind of switching back and forth on who gets potential veto power. In talking to staff, what we've come up with is potentially an idea that kind of removes that kind of veil of veto power. What I would like to do is suggest as far as Rec Reform decisions are made, like motions would not be required, as they are in a joint management process to vote on issues.

While this could potentially mean separate documents in final decisions, it preserves an equal voting voice in power among the states, as it's intended under ACFCMA. A little bit more work, two sets of documents, but after those things are done, then it would be kind of bring these things together, to try to resolve. But it just felt better than trying to see one body having veto power over another.

That is the thinking that has evolved with staff and myself. Again, I'm kind of looking at it from a distance. We have those two issues, the Policy Board, and this type of decision making, a new type of decision-making process. I've got two hands up. Karen, when your hand went up earlier, did you still have a question, or did your question get answered?

MS. KAREN ABRAMS: I put my hand down. Thank you, Mr. Chair.

CHAIR KELIHER: I have a bunch of hands going up now. I'm going to start with Tom Fote, Eric Reid, Jim Gilmore, Joe Cimino, and Mike Luisi.

MR. FOTE: I have confidence in the Commission. I mean we have a lot of checks and balances that the Councils do not have. When you voted a caucus vote, you have to get a legislator, a state director, and a governor's appointee all to agree on a vote, otherwise you wind up with a null vote, we wind up with an abstention, or we wind up voting for an issue.

But it also makes sure that we basically cover all, whether commercial or recreational, it doesn't matter. You've got to work with your other Commissioners, so you all work together on getting into a consensus of what should be done for all your fishermen in your state. The Councils are set up a little differently.

You know I know they are supposed to represent all the fishermen, and look beyond whether you're commercial or recreational. After dealing with the Council for 35 years, I've noticed that that doesn't happen much. That is why I have confidence in the way the Commission deals with these issues.

Sometimes New Jersey is on the short end of the stick. We've been there a couple times, but at least I know I'm dealing with three Commissioners that have to caucus together, to bring out a decision. I always respected and still respect that process to no end, and will defend that process. I do not feel the same way as I've been watching the Council system operate over the last couple of years.

It's gotten more partisan to how you feel about it, you know how it affects you, not how it affects your state. I think that's where we do the best job at doing this. I want to complement the Commission for the job it does, because that's what it does best.

CHAIR KELIHER: Eric Reid.

MR. REID: I do appreciate this particular piece of guidance. I am fine with the Policy Board handling it. I am the liaison from New England to the Mid-Atlantic, and Chairman Luisi and Dr. Moore give me a lot of latitude. But at the end of the day, I'm not voting. I can't do it; I can't do a lot of things. That is not very comfortable. I've mentioned in every meeting there is, sooner or later how the New England position is diluted in the process, even joint with the ASMFC. If that helps distill the diluted mess down a little bit, I'm 100 percent for it.

CHAIR KELIHER: Thanks, Eric. I was going to say something about we all give you a lot of latitude, but I won't say that. Next on the list is Jim Gilmore.

MR. JAMES J. GILMORE: I think Pat, your suggestion, and first off yes. The Policy Board is the right place to do this. Your suggestion of trying to do this, I think some agreement between the Commission and the Council, I think is a good start, because if we can resolve this at the lowest level. I think that we'll give it a try, and maybe we can come up with something that works. My concern with it though is, and it really comes down to how the Councils were formed, which is now 45 years ago when Magnuson was passed. I don't think Magnuson envisioned a lot of things, maybe that the fisheries were going to be more static than they are now. As I've said, I've mentioned this before. A few years ago, we all went down to D.C. and the one thing that came out of that, that was clear, that was the governance based upon the structure of the Council was problematic for what we're dealing with, with stocks shifting around.

Unfortunately, I think if we really want to try to fix this beyond your suggestion, Mr. Chairman. I don't know if the statute that originally created Magnuson is going to allow for that. I guess we'll have to deal with it. But I think it's a good suggestion. Let's try to do this in a cooperative effort with the Council, and then if it doesn't work, we'll have to maybe do some more serious options.

CHAIR KELIHER: Joe Cimino.

MR. CIMINO: I support the Policy Board's involvement in this. At first blush, your suggestion that for Rec Reform like motions aren't needed, sounds reasonable to me. I know a lot of us fear that the biggest challenges to some of those very good ideas in Rec Reform will be strict interpretation of Magnuson. As the Commission develops an overarching policy for other species, that may not be an issue. I do worry about those species that are jointly managed.

At times the Council, for certain species like sea bass and fluke will come up with non-preferred options, kind of nuclear options, if NOAA is too concerned that the options being chosen are not risk averse enough. I would worry that if Council and Commission are making different decisions for state waters on jointly managed species, that it could put the Council in a tough position at times.

CHAIR KELIHER: Thanks, Joe. Mike Luisi, back to you.

MR. LUISI: Yes, Joe just summarized where I was kind of going. Do you think there is an opportunity for the Policy Board and, so I guess my question to you, Mr. Chairman is, at what point are we going to make a decision on this? Is today the day to make a decision about whether or not the Policy Board and the Council don't have to have like motions in moving forward with Rec Reform?

I mean, my opinion would be that I don't think that's the right way forward. I think if we're going to do something, you know at the federal level and with the Council, that we would do it together. But I guess I'm looking for some advice, or some guidance from your end, as to when. It's part of the discussion today, but do we need to have a more thorough, more informed conversation, you know between now and when a decision gets made? I'm just looking to you for some advice, as to how you think the Commission is going to work through this.

CHAIR KELIHER: As I was thinking about this, you know a little spit balling here. You made a comment earlier, Mike, as it pertains to leadership getting together. I think there is likely agreement around the table now that the Policy Board is the right board from a Commission standpoint. Maybe what we need to do from this point is take this concept that I laid out, have leadership for both Mid and the Commission get together, to kind of work on that concept, you know just in the spirit of cooperation, and see where we go from there. I wouldn't mind getting Toni or Bob's thoughts on that as well.

MS. KERNS: Mr. Chairman, I think you hit the nail on the head. It was the intent here. We knew that this discussion needed to happen, and we wanted to know what it was that this body wanted us to bring forward in those discussions. We didn't want to speak for you, we wanted to know how you guys wanted to carry out actions. If we have that recommendation from this body, then we can take that to leadership. I see that Bob has his hand up as well, so I will let him take the reins from here.

CHAIR KELIHER: Go ahead, Bob.

EXECUTIVE DIRECTOR BEAL: Yes, I agree with where you're going, Pat, and Toni's comments. Only thing, sort of responding to Mike's question on the timeline, and when do these decisions need to be made. We don't have to do it today necessarily; we can have a leadership call.

But, I think we need to decide pretty soon because the Rec Reform schedule is ambitious, to say the least. You know, we're going to have to have a number of meetings throughout the remainder of this year to try to get that done, and maintain that schedule. We'll need to figure something out, whatever it looks like, pretty quick.

CHAIR KELIHER: Mike, does that make sense to you, this approach?

MR. LUISI: Yes. I think that the sooner the better. I'm going to be working out of my kitchen for the next year probably. I'm willing to have the conversation with leadership from ASMFC and the Council, you

know anytime you guys want to plan it. But I do think that, so what I would like to see is a discussion that gets brought back to the Policy Board. The problem is, Bob and you guys, there is not another Policy Board meeting until May. Like the spring meeting is going to be the next time the Policy Board gets together, or could you do something in between now and May?

CHAIR KELIHER: I think there is possibility with a webinar to do something between now and May.

MR. LUISI: I would hate for a delay.

CHAIR KELIHER: Yes, I think as Bob said. I agree, Mike. As Bob said, there is an ambitious schedule that is laid out here. I think we may have to come back around to this, unless the Policy Board wants the Executive Committee to deal with it directly. I think the first step is, let's get, as long as there is agreement from the Policy Board now.

We agree that the Policy Board is the right body. Leadership gets together with the Mid to kind of work on this concept that came out, to see if it is the right way to go. Then we make a determination yes or no, and bring that back to the Policy Board for final adoption. We may be able to do it with an e-mail vote, or if it's needed, we may be able to pull together a webinar. Bob, I'll let you jump in.

EXECUTIVE DIRECTOR BEAL: I was going to say the same thing that a webinar between now and May, you know we can find an hour and a half or so to bounce this off the Policy Board, I would think. Unless the Policy Board wants to delegate the authority to the Executive Committee, and that is up to the group that's on the webinar right now.

CHAIR KELIHER: I've got one new hand that just, Tom Fote, I see your hand up. I'm going to actually go to Roy Miller who has not made a comment on this. Roy, go ahead.

MR. ROY W. MILLER: I would just suggest that we stick to the Policy Board, rather than the Executive Committee. If it's the Executive Committee then we lose a lot of potential participation from LGA. Right now, only Dennis Abbot and I represent the LGAs on the Executive Committee. I think everyone should be kept abreast of what develops with this Rec Reform issue, and joint voting with the Mid-Atlantic Council representation, et cetera. My opinion, thank you.

CHAIR KELIHER: Thank you, Roy, I think it's a solid opinion as well. Tom Fote.

MR. FOTE: I was just going to say what Roy was going to say. Also, the fact that we need to really do it, so we can get the LGAs basically at these meetings. It's hard for people, with their schedules, even though a lot of us are at home. It is hard for some people that still have to work, scheduling in between teaching their kids and everything else. You really need to have these meetings scheduled at a certain time, and not when it is a Council meeting, maybe not when it's a Commission meeting.

CHAIR KELIHER: I've got two other new hands that have gone up. I've got double O, Dennis Abbott. Dennis, the floor is yours.

MR. DENNIS ABBOTT: I agree with Roy. Neither he or I would be prepared to properly represent the LGAs in this issue. Their voices need to be heard individually, thank you.

CHAIR KELIHER: David Borden.

MR. BORDEN: I totally agree with your suggested way forward, and I think it's logical. I think it's in the best interest of the Commission, thank you.

CHAIR KELIHER: Seeing no other hands. Unless somebody wants to object, the Policy Board will continue to be the body that will move this forward. I agree with the comments, as far as bringing this back around to the Policy Board and not the Executive Committee. Staff will reach out to leadership of the Mid.

We'll get meetings set up as soon as possible, figure out what the time constraint is going to be on that, and then we will report back out to the Policy Board on how those discussions are going, and if we're going to need a meeting to adopt anything. If there are any objections to that, please raise your hand, if not, we're going to move this conversation along to the next item.

DISCUSS POSSIBLE REPORTING PROGRAMS TO CAPTURE RECREATIONAL RELEASE DATA

CHAIR KELIHER: Great, thank you very much that was a good conversation, and moving along on the agenda, Item Number 12, which is Toni again. Discuss Possible Reporting Programs to Capture Recreational Release Data.

MS. KERNS: This is a bit of a follow up from the Bluefish Board discussion that was had earlier today, and as well back in December when we met jointly with the Mid-Atlantic Council. I'll briefly cover for the background. In a recent review, the Biological Reporting Requirements, the Bluefish TC had noted that the stock assessment recommendation to accurately characterize the recreational release length is very integral to the assessments.

Improvements to the methodology used to collect this data is recommended. You heard this today at the Bluefish Board meeting. The TC discussed options for electronic reporting that could be used for collecting recreational angler release data to remove the need for states to create their own individual data collection system.

The TC at that time had recommended the Bluefish Board advance the importance of bodily collecting reliable recreational release length frequency data for all recreational species, by asking the Bluefish Board to ask the Policy Board to task the Assessment Science Committee to work with ACCSP, to develop a comprehensive program for recording released fish of all recreationally important species that the Commission manages.

The Bluefish Board had concerns about the lack of specificity in the recommended tasks, and weren't prepared to do so. What we said was that staff would put together some information for the Policy Board to think about, in terms of recreational discard data collection, and provide some recommendations to the Policy Board, instead of going to the specific task.

There are a lot of different electronic reporting Apps out there. In the past and currently, some concerns have been raised when discussing reporting Apps that produce population level estimates of recreational catch. A large portion of anglers would have to consistently use them to report accurate information about their fishing trips, and a specifically valid probability-based sampling survey would also have to validate self-reported data, monitor the extent of the reporting, and account for unreported trips.

But option or non-mandatory angler reporting Apps have been found useful in some cases for collecting quantitative data via citizen science incentives. For example, the Florida Fish and Gamefish Foundation, anglers working with Florida Fish and Wildlife assessment scientists to collect and use angler data in stock assessments.

However, in most cases the lack of comprehensive data collection and validation has limited the use of that data in stock assessments. But there are aspects of these opt in on mandatory angler reporting Apps that can be used for other information. Some of these reporting Apps that are being used, but none are completely comprehensive for the entire east coast.

A couple of examples are the scamp release program. Previously it was only used for scamp, but that program is adding other snapper grouper species in April of 2021. The My-Fish Count focuses on South Atlantic species. It has 23 species that can be reported through this APP, but not bluefish, iSnapper focuses on snappers, but in Gulf Waters. ACCSP is currently developing Scifish. This product is a combination of Scamp Release and Catch You Later, which is North Carolina DMF. It focuses on ten grouper species, plus flounder, spotted sea trout, weakfish, kingfish, and red drum.

ACCSP is in the process of conducting scoping meetings for the Scifish application that will expand the features and standardize the data collection. The medium to long term goal is to expand this application, so that it can be customized for many different species. There will be a questionnaire that is going to be distributed on February 8, and there will be Town Hall meetings on March 9 and 11.

You can contact Julie Simpson at ACCSP for more information on these meetings. It's our staff recommendation that instead of having the Commission develop a specific program themselves that Commission staff and Assessment Science Committee continues to engage with ACCSP, as they develop Scifish.

The Assessment Science Committee continue to receive updates and advise in communication with the Rec Tec lead to this specific program. The comments and information that we can provide back to ACCSP will be relative to information that would be useful for Commission managed stock assessments, and management activities. We thought that this would be a more streamlined approach to trying to bring into the data needs for our stock assessment, instead of trying to recreate the wheel.

That is all I have here, and I can answer questions, and I also have some backup folks for questions that I cannot answer. I'm not really looking for an action here, I was just trying to provide a different path forward from the Bluefish TCs recommendation, but still find ways that we can co-access information. It might not be this year that these applications are ready for bluefish, but perhaps in the next coming years.

CHAIR KELIHER: I've got a couple hands up already for questions. Jim Gilmore and then John Clark.

MR. GILMORE: Toni, just a couple of questions, and I agree, I think the going with the ACCSP approach with Scifish, although it sounds like a cable channel. Just a couple of questions. I'm assuming this would be an App that they would develop, and will there be a fee associated with it?

I think we should go with it, because I know we hitched our wagon to a couple of things like Pocket Ranger and Fish Rules that was a freebee to get information, and now they are all coming back looking for significant amounts of money now to keep the thing going. Yes, I think it makes sense to do our own thing, but what would it cost, and is this developing our own App?

MS. KERNS: We need to phone a friend for this, Mr. Chairman. I would ask that Geoff or Julie answer this question, one of them.

CHAIR KELIHER: Yes, go ahead, just remember you only have three lifelines.

MR. GEOFF WHITE: Thanks Toni, this is Geoff. Just confirm you guys can hear me on this headset.

CHAIR KELIHER: You're all set, Geoff, go ahead.

MR. WHITE: In terms of availability to the anglers developing it in-house, there is already plans for the development cost for Scifish for 2021. Those were two ACCSP approved projects. The cost to use these Apps out in the field is of course nothing to the anglers, and then the ongoing thought of what would it cost to support this, interact with the anglers. Points well taken, Mr. Gilmore, and the long-term costs have not been fully identified.

CHAIR KELIHER: Great, thanks, Geoff. I see Julie had her hand up too. Julie, did you have something on that topic?
MS. JULIE DEFILIPPI SIMPSON: I'm going to go with what Geoff said.

CHAIR KELIHER: Perfect, Excellent. John Clark.

MR. CLARK: Along the lines of what Jim was bringing up about the cost. I was approached by one of the three applications that Toni mentioned, and they did want a pretty sizable payment to provide it to anglers

in Delaware, you know for Delaware Fish and Wildlife to pay for it. If we can get something that doesn't cost that would be great.

CHAIR KELIHER: Any comment on that? Toni.

MS. KERNS: Not beyond what Geoff provided.

CHAIR KELIHER: Jim Gilmore, your hand is back up, follow up?

MR. GILMORE: No, Mr. Chairman, I'm just sleeping, I've got to put it back down, thanks.

CHAIR KELIHER: I should have done that myself. They gave me control, which is always dangerous. I don't see any other hands up at this time. I take that back, Bill Gorham.

MR. GORHAM: I sent the e-mail to Mr. Beal yesterday, and there are line items for the most recent budget of 3.5 million to go to help the states implement such a plan. I would be really interested to see if you were to just put this out to the public, how many Apps we could probably get for relatively free, just getting the angler feedback information. But I would love to see it happen, and if you have to go through appropriate channels, and that seems to be the fastest way, I would love to see this go through.

CHAIR KELIHER: Toni, you're not looking for a motion here. What do you need from the Policy Board?

MS. KERNS: I don't need really anything, it was more of an informational update and a different route, a different solution/recommendation to what the Bluefish Board had started to talk about back in December.

CHAIR KELIHER: Hearing no objections, you did get some feedback, so I think Commission staff should move forward and engage with ACCSP on that. Assuming you will bring those conversations back to the Policy Board at the next meeting.

MS. KERNS: I'm not sure it will be at the next meeting, Pat, but we'll keep you updated on the progress of the application and we'll go from there.

CHAIR KELIHER: All right, that sounds good, perfect.

COMMITTEE REPORTS

CHAIR KELIHER: Great, moving right along on the agenda. We have Committee reports. We've got Habitat Committee up first, so Lisa.

ATLANTIC COAST FISHERIES HABITAT PARTNERSHIP

MS. LISA HAVEL: I'm going to start with ACFHP, since we don't have any action items for this one. The Steering Committee met virtually November 9 and 10, and we discussed the National Fish Habitat Conservation through Partnership Act. This was signed by President Trump at the end of October, and it codifies NFHP into law.

There are some major changes for how the Partnership operates that goes along with this Act, and how it administers funding. We're hopefully spending this year, 2021 to figure out this implementation collectively. We also had updates on current on-the-ground projects funded by the Fish and Wildlife Service, NOAA Recreational Fishing as well as NOAA GARFO and the Fish America Foundation.

We discussed the finalized conservation mapping project that I've presented to you all in the past. The funded projects in conservation mapping projects are on the ACFHP website under the Our Work tab, if you wanted to see more. For FY2021, Fish and Wildlife Service on the ground conservation funding, we received 14 applications this year, and we will be recommending 11 for funding.

We received proposals from seven states in the North, Mid, and South Atlantic sub-regions. These proposals would improve tidal vegetation, riverine bottom and shellfish bed priority habitats, and benefit species such as shad and river herring, Atlantic sturgeon, striped bass, American eel, horseshoe crabs and more.

Mutually, the Fish and Wildlife Service announces which projects are funded in the late spring. We also

endorsed a couple of projects since my last presentation to the Board back in August. The first one is the Big Pine Key Aquatic Habitat Hydrological Restoration Project. This is co-led by Florida Fish and Wildlife Conservation Commission and the U.S. Fish and Wildlife Service, and it's taking place on Big Pine Key in the Florida Key.

It will restore 108 acres of freshwater marsh, 28 acres of mangrove forest, and 16 acres of salt marsh to provide fresh water to threatened and endangered species in the Florida Keys National Key Deer Refuge. Another project that we endorsed was evaluating an approach to long-term SAV monitoring in North Carolina. This was led by the Albemarle Pamlico National Estuary Partnership. As I said, it takes place in North Carolina, and this is in support of an RFP for the National Estuarine Research Reserve Science Collaborative. This project, if funded, will evaluate the effectiveness or recommended protocols for a North Carolina coast polyhalene sea grass monitoring and assessment program, and ACFHP serves on the Advisory Panel for this project.

Finally, the last project that we endorsed was Tuckerton Reef. This project is led by Stockton University, and takes place in Little Egg Harbor Bay, New Jersey. It is a research and restoration project on a constructed oyster reef, and they are hoping to expand the reef, as well as do some research on it.

It will improve water quality and provide fish habitat, and it involves state, local, NGO, academia, and industry partners. ACFHP would like to thank ASMFC for your continued operational support, as usual, and I'll move on to the Habitat Committee report, and I'll take questions about ACFHP at the end, if that's okay.

CHAIR KELIHER: Yes, that's fine.

HABITAT COMMITTEE

DR. HAVEL: Great. The Habitat Committee met virtually November 12 and 13, and we received updates on the documents in progress, the acoustic impacts to fisheries and fish habitat, as well as the Habitat Hotline. The Habitat Hotline was released at the end of December, and focused on fish and fish habitat sustenance along the coast.

We also continued working on the fish habitats of concern. We've been making good headway with that project, and we had a discussion on dredge windows elimination proposal in the Army Corps Wilmington District, and I'll get into that a little bit more next. We included in the supplementary materials a comment letter about the dredging windows.

In August, the Army Corps of Engineers proposed to eliminate existing hopper dredging windows in portions of Wilmington Harbor and Morehead City Harbor, so that maintenance dredging and bed leveling can occur year-round, with offshore or nearshore placement of dredge material.

In December, the Army Corps addendum limits this proposal, which was originally put out in August, to a three-year period, ending at the end of December, 2023, and commits to studies on the impacts. But these studies are yet to be specified. The purpose of eliminating their window is to maximize flexibility to obtain contract dredges for maintenance dredging.

The current window is from December 1 to April 15, and has been in place for over 20 years, in order to minimize impacts to fishery resources migrating between the ocean and vital nursery habitats. The Habitat Committee was concerned with this decision. Concern for both the immediate impacts on ASMFC managed species in North Carolina, as well as the precedent it sets for the rest of the coast.

The comment letter that was included in the supplemental materials for your consideration, it includes references to other agencies and organizations that have made comments on this EA, and it elaborates on specific ASMFC managed species that this decision could impact. The draft letter was presented to the Executive Committee in early January, but it was updated to include information from the Addendum. Action is needed to approve the

letter if the Policy Board so decides. I'm not sure if you would like to discuss action on the letter now, or at the end of my presentation.
CHAIR KELIHER: Let's do it at the end.

DR. HAVEL: Okay, great, I'll continue. Finally, for the Habitat Committee, there were a couple of updates to membership. We have a couple of new members. Robert LaFrance is representing Connecticut, Claire Enterline is representing Maine, and we're very excited about both of these members, because Connecticut and Maine haven't been represented for a few years now on the Committee.

"Tripp" Boltin is representing Fish and Wildlife Service for the Southeast Region, replacing Wilson Laney's position, and Wilson is now representing North Carolina Coastal Federation. We have a new Chair, Jimmy Johnson from North Carolina, and a new Vice-Chair, Russ Babb from New Jersey.

ARTIFICIAL REEF COMMITTEE REPORT

DR. HAVEL: I'll move on to the Artificial Reef Committee Report. The Artificial Reef Committee usually meets around now, but we decided to meet later in the year, with the hopes of possibly meeting in person. If not, we will meet virtually, but we decided to have a little hope for that. But in the meantime, the Committee drafted an update to the ASMFC profiles of state artificial reef programs and projects, which was published in 1988.

This update highlights some of the accomplishments of artificial reef programs in the states over the last 30 plus years. It summarizes the number of permitted sites, mitigation reefs, and average annual operating budget along the coast. It has an introduction and information for each state that has an artificial reef program.

For each state there is a summary table and contact information, as well as a map of the reefs, pre-1988, and post 1988. There is a summary of the state's programs since 1988, and some of the highlights over the past 30 years. States have chosen to identify specific reefs, different successes in monitoring or collaborations, and this update will also include photos, once the text is approved by the Policy Board, if you so decide to approve it.

For this document, which was included in the briefing materials, we're seeking approval of the document text to go ahead with the formatting and the publication of this update. As always, we welcome the suggestions for action items that you would like for the Habitat and Artificial Reef Committees to work on, and with that I'm happy to take any questions, or comments on the two requests for approval for the document. Thank you.

CHAIR KELIHER: Thanks, Lisa, I appreciate that. Before we get to the letter, approval of your letter, is there any questions of Lisa? John Clark.

MR. CLARK: Thanks for the presentations, Lisa, very interesting. I just have a question about that Tuckerton Reef in New Jersey. You said it was going to be a constructed oyster reef. What material will that be made from? Is it still going to use shell, or is it going to be something different?

DR. HAVEL: I believe that it is a combination of, I think it's seeded reef balls, but I can follow up with you if I go back and look at the proposal for you. There is already a reef there, and then they are looking to expand upon the reef that is already there.

CHAIR KELIHER: Any other questions? Seeing none, Lisa, can you just do a very quick overview of the letter? I think a lot of people are aware of the letter and the issue, and just give it a couple minutes, and then we need to move, I think take action and approve it, as long as there are no objections, obviously.

DR. HAVEL: Sure, so the letter contains first background information on the Commission, and a little bit of background on the EA that the Army Corps put out, as well as the Addendum that they put out in December. The letter would be commenting on something that was already decided, but we have

found in the past that even if the window for comments has closed, they do take what the Commission has to say into consideration.

Then it specifically calls out these different species that are likely to be impacted by the Wilmington District specific proposal, including alewife, American eel, shad, croaker, menhaden, striped bass, sturgeon, black drum, blueback herring, hickory shad, red drum, spot, spotted sea trout, and bluefish.

There is a potential for a lot of impacts, since a lot of these species migrate between the ocean and the nursery habitat, so we call that out in the letter. We also acknowledge the other agencies that have commented already, and then we have an attachment that lists all the species that I just mentioned, as well as who manages it, whether it's ASMFC, or it is jointly managed with the Council, and then under which fishery management plan it falls under as well. It's in total five pages, and that includes the attachment of the list of species.

CHAIR KELIHER: Great. Thank you, Lisa. Joe Cimino has got his hand up.

MR. CIMINO: Just to get back to John Clark's question, so Lisa doesn't have to follow up later. It's all going to be spat on shell for the Tuckerton Reef, John.

CHAIR KELIHER: Back to the letter. Are there any objections from the Policy Board to sending that letter? Jim Gilmore.

MR. GILMORE: Not an objection, just when Lisa went through the species, I didn't hear all of them. It was all of our managed species, but is there any mention of endangered or threatened species in that? That is a lot of the windows we have up in our core district, they tend to pay attention to Atlantic sturgeon and things like that, and the rest of the species there we're always fighting with them on. Are they included in the letter?

DR. HAVEL: We kept the letter focused on only species under ASMFC jurisdiction, and those that occur within the geographic range, which includes Beaufort and Cape Fear River Inlets, since that is what the proposed EA would impact. But we do express the concern that this could set precedents for other districts along the coast that also fall under the Commission's geography.

CHAIR KELIHER: I know the precedent setting issue is certainly what's important to my state. If there are no objections, I think we can just say that there is consensus that the letter would be sent, and seeing no hands, I think we can get that letter out by the end of the week. Great, thank you very much, Lisa. Moving along, Item Number 14 is Review Noncompliance Findings, Jim your hand went back up. Did you just to forget to put it down?

MR. GILMORE: No, no, I just had a quick follow up to Lisa on artificial reefs. I saw in New York it says we have our annual budget is zero. You can make that $750,000.00 now, and the actual price last year was 10 million, but I don't think I'm getting that this year, just if you want to include that update, thanks.

DR. HAVEL: Okay, thank you. I'll make that edit. Mr. Chair, is it okay to have a discussion on the update to the artificial reef profiles as well, to get that approved?

CHAIR KELIHER: Oh yes, please. Is there anything else you want to bring forward on that? Any objections to that approval? I don't hear any objections, Lisa, so I think you're all set on the Artificial Reef Proposal as well.

DR. HAVEL: Great, thank you, Mr. Chair.

REVIEW NONCOMPLIANCE FINDINGS

CHAIR KELIHER: Moving along to Item Number 14 is Review Noncompliance Findings, and we have none, which is always good, which brings us to the last agenda item, which is Item Number 15.

OTHER BUSINESS

CHAIR KELIHER: We do have some letters that need to be approved, so I'm going to ask, first I'm going to go to Dan McKiernan to discuss the letters that were brought forward in the Lobster Management Board discussion.

LETTERS REQUESTED BY THE LOBSTER MANAGEMENT BOARD

MR. DAN McKIERNAN: Thank you, Pat, there are three letters that came out of the Lobster Management Board. The first one had to do with the National Marine Fisheries Service's recent Biological Opinion on the bundled Biological Opinion concerning the impacts on endangered species, and notably right whales. The second is a comment letter on the proposed Take Reduction Plan Rules and the Draft Environmental Impact Statements. That particular comment period is open until the end of February.

Then the third is a letter concerning the Northeast Canyons and the Sea Mount. The Department of Interior is mandated by President Biden to comment on whether to amend President Trump's Executive Order, which allowed fishing within that particular monument. We hope that the Policy Board would approve three letters, one on each item. I believe there are some text for some motions that can be brought up to the screen.

CHAIR KELIHER: Did you have anything that you were going to show us, Toni?

MS. KERNS: Maya is working on just getting the motions up on the board for you guys to see. Two different motions.

MS. DRZEWICKI: I have them on separate slides, do you want me to put them all on one slide?

CHAIR KELIHER: That one slide fills the screen with the first letter. Dan, do you want to just read that into the record? It does not need a second, because it's a motion that is coming from the Board.

MR. McKIERNAN: I certainly can. On behalf of the Lobster Board, move the Commission send letters to NOAA Fisheries with comments on the proposed rule to amend the regulations implementing the Atlantic Large Whale Take Reduction Plan and the draft opinion. The Biological Opinion letter should include the following:

First, the Bi-Op should be completed so it will support the proposed rule to avoid jeopardy. A statement that addresses the burden the U.S. Fishery could bear based on the actions of Canada. The Atlantic Large Whale Take Reduction Plan letter should include the following: The rule should be completed by the end of May to ensure the court does not intervene.

Implementation timeline recommendations that address practical start dates. Supporting trawl equivalency, I think that may be a typo there, that would allow for modifications related to trawl length, such as to address the need to fish a single end line in the areas, example 8 traps with 2 endlines equals 4 traps with 1 end line. Finally, to support enforcement and coordination with state agencies.

CHAIR KELIHER: Great, thank you, Dan. That is the motion on the floor, it does not need a second, coming from the Board. David Borden.

MR. BORDEN: I totally support the Commission submitting a letter. The only thought I've had since is, we have two deadlines, one for the Bi-Op, and the other one for the proposed rule. One is February 19, and the other one is March 1. It might make some sense to request a minor extension in the comment period on the Bi-Op, so that both comment periods end on March 1. I don't think that will delay anything at NOAA. But in terms of how to handle it, Mr. Chairman, I'm prepared to make that as a motion to amend, or we could do it as a standalone motion, whatever you prefer.

CHAIR KELIHER: David thanks. I think what I would like to do is vote on this motion, and then bring that up as

a standalone motion. Let's do that after we take care of this letter and the Monument letter. Karen Abrams.

MS. ABRAMS: This is Karen Abrams, NOAA Fisheries. I certainly have no objections to this motion, but I'm going to abstain from this vote.

CHAIR KELIHER**: Okay, thank you very much for that, Karen. Any objections to the motion? Noting the one abstention from NOAA Fisheries, and hearing no objections, the motion passes**. If we could put the next motion up on the board for the second letter. Dan, you've got the floor again.

MR. McKIERNAN: Sure. Move to request the Commission send a letter to NOAA requesting a short extension of the comment period on the Endangered Species Act Section 7 Consultation-Biological Opinion from February 19 to March 1, 2021.

CHAIR KELIHER: Well, that was not the one. Let's put a hold on that. That was the motion that Dave was going to make. Maya, you should have another letter or another motion from the Lobster Board on the Monument. There it is right there. There you go, Dan.

MR. McKIERNAN: Okay. Regarding the Monument: On behalf of the Lobster Board, move the Commission send a letter to the Secretary of the Interior restating the Commission's position on modifying the Northeast Canyons and Seamounts Marine National Monument.

CHAIR KELIHER: Great, thank you very much. Are there any objections to the motion on the board? It does not need a second. Karen, I assume you will be abstaining again, am I correct on that one?

MS. ABRAMS: Yes, that is correct, Mr. Chairman.

CHAIR KELIHER: Mike, I assume you'll be abstaining?

MR. MIKE PENTONY: Yes, sir.

CHAIR KELIHER: Noting that both NOAA and U.S. Fish and Wildlife will be abstaining, are there are any objections to the motion? Hearing and seeing none, the motion passes. Maya, if you could put that other motion back up. I think that is the motion that David Borden was going to make. David, if you wanted to read that into the record.

MR. BORDEN: I move to request the Commission send a letter to NOAA requesting a short extension on the comment period on the Endangered Species Act Section 7 Consultation-Biological Opinion from February 19 to March 1, 2021. I so move.

CHAIR KELIHER: This is not a motion of the Lobster Board, so it would need a second. Cheri Patterson.

MS. PATTERSON: Yes, I'm seconding the motion.

CHAIR KELIHER: Thank you. Motion by Mr. Borden, seconded by Ms. Patterson. Is there any discussion on the motion? Karen, I'm assuming you're abstaining.
MS. ABRAMS: Yes, that is correct, thank you.

CHAIR KELIHER: Noting the abstention from NOAA Fisheries, is there any objection to the motion? Seeing no objections, hearing no objections, the motion passes. Great, thank you very much. That concludes the letters from the Lobster Management Board and the new motion by Mr. Borden. We do have one more letter that has been recommended by Shad and River Herring Board. Mike Armstrong, are you online?

MR. MICHAEL ARMSTRONG: I am.

CHAIR KELIHER: Great, would you like to read this motion into the record?

LETTER REQUEST BY THE SHAD AND RIVER HERRING BOARD

MR. ARMSTSRONG: Sure. On behalf of the Shad and River Herring Board, move to send a letter to NOAA Fisheries to request that shad be made a higher

sampling priority, particularly for genetic stock composition sampling, to improve our understanding of the impacts of mixed-stock fisheries on system-specific stocks, as recommended by the 2020 Assessment and Peer Review and the Technical Committee.

CHAIR KELIHER: Great, thanks, Mike. This is a motion brought forward by the Shad and River Herring Board, it does not need a second. Are there any questions of Mike? Karen, assuming it's an abstention?

MS. ABRAMS: That is correct, Mr. Chairman.

CHAIR KELIHER: Mike, the same with Fish and Wildlife?

MR. PENTONY: Yes sir, thank you.

CHAIR KELIHER: Noting the abstentions of both NOAA Fisheries and U.S. Fish and Wildlife Service, is there any objections to the letter? Seeing no objections, the letter passes. Thank you very much. That concludes the votes on what ended up being five separate letters. Cheri, you had one new item for business. Why don't you go ahead with that?

MS. PATTERSON: Yes, thank you. I'll start out with a question. When we are voting on species specific plans, and there are recommendations from the PRTs or the TCs, but yet we don't include those within the vote of accepting these plans. Is that correct that they follow through with the vote to accept these motions, or do we need to be including the recommendations from the PRTs or the TCs?

CHAIR KELIHER: I'm going to use one of my lifelines, and ask Bob or Toni.

MS. KERNS: Thanks, Mr. Chairman. Cheri, I would say oftentimes recommendations come in the form of tasking a body to do something for doing research. Those would require a Board tasking, so it would not automatically happen by approving the FMP review. If the Board does want a task to occur that is being recommended, then you would need to task that body to do so. The approval does not make it automatic. Does that answer?

MS. PATTERSON: It does, thank you. I would just like to have a recommendation that when we are voting on, for example compliance reports and such, that there be an additional slide that indicates what the TC or the PRTs are recommending, so that that can be inclusive into the motions to accept. This is just an example, any compliance reports. It would extend out beyond that to assure that when we're approving a motion for accepting these reports, or whatever, that we can be inclusive of what PRTs and TCs are wanting us to include.

MS. KERNS: Following up, if that's okay, Mr. Chair.

CHAIR KELIHER: Yes, please.

MS. KERNS: When the ISFMP staff member, they would ask the Board that specific question, are you including any of the specific recommendations in this motion, or do you want us to remind the Board of that? Is that what you're asking for, or are you sort of saying in general, folks that are making that motion would need to also include the language of what recommendations they want to carry forward?

MS. PATTERSON: Inclusive with the, a lot of times we just have a canned motion that indicates, will you approve, for example the compliance report. If there was a PRT or TC recommendations to that, it might be nice for the management board to be able to see those recommendations, and include those in that canned motion.

CHAIR KELIHER: Cheri, if I might. I think I'm following where you're going, but I think there is a level of complication here, and looking at the hour. I'm wondering if we might want to just bring this back up at the Executive Committee, since we'll be having several calls between now and the next meeting, just to make sure we fully understand. Then we can have if need be, have additional Policy Board conversations around it.

MS. PATTERSON: That's fine with me. Thanks.

CHAIR KELIHER: Great, thank you, Cheri, I appreciate that. Is there any additional business to be brought before the Policy Board? Bob Beal.

EXECUTIVE DIRECTOR BEAL: No, I was going to comment on the last thing, but all set. I knew my arm was tired. I guess I was holding my hand up too long.

CHAIR KELIHER: Great. I really appreciate the conversations we've had this week. This has been a long week, and ending here at 4:30 on a Thursday afternoon. The only benefit is we're not all running to Washington Reagan to jump on a plane. A lot of good conversations, a lot of difficult conversations this week. You know states' rights continue to prevail within the organization, which I'm always appreciative of. But obviously more work to do, and based on the survey results, there is always more work to do.

ADJOURNMENT

CHAIR KELIHER: At this time, knowing that we do not need a Business Session, I would be looking for a motion to adjourn. Steve Bowman. Steve has made a motion to adjourn, seconded by Doug Haymans. Any objections to the motion to adjourn? Seeing none. Mel Bell, your hand is up. Did you have something? Mel Bell's hand is now not up, so motion to adjourn passes without objection. I want to thank you all again for a very productive week. Have a great rest of the week, and be safe. Thank you very much. This concludes our business for the winter meeting.

(Whereupon the meeting adjourned on Thursday, February 4 at 4:30p.m.)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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March 19, 2021

Patrick C. Keliher, Chair
Atlantic States Marine Fisheries Commission
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22201

Re: New York State Appeal of Black Sea Bass Addendum XXXIII (commercial state allocations)

Dear Mr. Keliher:

The State of New York hereby appeals the February 1, 2021 decision of the Atlantic States Marine Fisheries Commission (ASMFC) Summer Flounder, Scup, and Black Sea Bass Management Board ("Board") in Section 3.1 Management Options for Commercial State Allocations of Addendum XXXIII: the removal of New York's initial 2% quota increase while granting the same increase to Connecticut, as part of the modified Option F proposed by Massachusetts and detailed in its memorandum to the Board and the Mid-Atlantic Fishery Management Council.

Background

Under section 3.1 of the draft addendum, the Management Board selected Alternative F (75:25 distribution of quota based upon initial allocations and regional biomass) with the inclusion of a modified Alternative B that increased Connecticut's historical allocation by 2% for an initial allocation of 3%. These changes to the fishery management plan (FMP) were the result of amendments to a main motion that originally included 2% increases to the historical allocations of both Connecticut and New York. A 2% increase to the historical allocations of both states was repeatedly introduced as part of the Dynamic Adjustments to Regional Allocations option, as an amendment to a trigger option, and finally as part of the initial percentage option.

The recent expansion of black sea bass into Long Island Sound was documented in the addendum by the inclusion of spring indices from the Connecticut Long Island Sound Trawl Survey (LISTS) which collects samples from the waters of both Connecticut and New York. The historical black sea bass allocations of Connecticut and New York were based upon historical landings from 1980 through 2001, a time when black sea bass were not abundant in Long Island Sound, as shown by the LISTS index. At this time, the New York commercial fishery for black sea bass operated primarily in the waters of the Atlantic Ocean. A dramatic increase in black sea bass abundance was observed in

Long Island Sound beginning after 2010. In the face of this abundance increase, Connecticut's historical allocation (1% of the coast-wide allocation) was deemed insufficient to allow for a directed fishery in Long Island Sound and the need for additional initial quota was universally recognized. New York State shares Long Island Sound with the State of Connecticut and is experiencing the same new availability of black sea bass. Historically, a fishery did not exist within Long Island Sound for New York State fishermen, just as it did not for fishermen from Connecticut. Despite these circumstances, the increase to New York's historical allocation was described by some Board members as a "handout" and the increase was removed from the motion under consideration with little justification.

The dramatic increase in black sea bass abundance in Long Island Sound was documented independently of the trawl survey index by Mercaldo-Allen et al. (2021) using fish traps. Bell et al. (2015) analyzed the spring NEFSC trawl survey data and found that the black sea bass center of biomass along the shelf has shifted north due to climate. These two changes in circumstance, acutely experienced by New York State fishermen, were not equitably addressed by the Management Board's decision on February 1, 2021.

Justification for Appeal

Commercial black sea bass allocations remain heavily based upon landings history from 1980-2001 despite the significant changes that have occurred since then in reporting, stock status, biomass distribution, and the species' range. While this appeal focuses on the approved Addendum's failure to properly address the expansion into Long Island Sound and its impact on all affected parties, we note as a broader matter that the species' climate driven shift has rendered 30+ year old landings patterns obsolete and inappropriate for management.

The Addendum's continued heavy reliance (~75%) on historic allocations violates the ASMFC Interstate Fisheries Management Program Charter's Standard 2 (best available science), Standard 4 (minimize waste) and Standard 7 (fairness and equity). Management measures, specifically commercial allocations, remain heavily based upon historic landings data despite the dramatic changes in the resource demonstrated by the best available science. It violates standard 4 because it is wasteful to allocate outsized shares to fishermen far removed from the biomass center who must travel significant distance to catch and land sea bass now found in greater abundance further north. This waste is compounded by an FMP that results in fishermen with access to an abundant nearshore resource to have to discard valuable fish they can neither avoid nor land. Finally, it violates standard 7 because New York fishermen are entitled to a share of the fishery that reflects the abundance shift towards the waters off Long Island rather than continued reliance upon outdated and incomplete landings history.

For the purpose of focusing this appeal, New York specifically calls the Commission's attention to the following defects arising from the Addendum's failure to properly

address equitable access and the increased abundance in Long Island Sound based upon Appeal Criteria 1, 2, and 4:

1. Criterion 1 - Decision not consistent with Statement of the Problem Section of Addendum

The last paragraph in The Statement of Problem in Draft Addendum XXXIII under section 2.1 reads:

"*In some cases, expansion of the black sea bass stock into areas with historically minimal fishing effort has created significant disparities between state allocations and current abundance and resource availability. The most noteworthy example is Connecticut, which has experienced significant increases in black sea bass abundance and fishery availability in Long Island Sound in recent years but is only allocated 1% of the coastwide commercial quota (this allocation was based loosely on landings from 1980-2001).*"

While perhaps "the most noteworthy" because of Connecticut's 1% historical allocation, New York State has also experienced a significant disparity between allocation and abundance/availability. This is due to the same expansion of the stock into the same waterbody, Long Island Sound, an area with historically minimal fishing effort for sea bass and historically low resource availability as shown by the LISTS index. Connecticut sees its historical allocation increased by 200% under the selected option and New York State fully supports this move by the Board. New York sought a similar increase of 2% for itself due to the same shared circumstances that would have increased its historical 7% allocation to an initial 9%, a relative increase of about 29%. This increase would help to address the new access fishermen have to black sea bass in state waters. New York's historical landings were amassed by fishing vessels operating largely outside of Long Island Sound. The dramatic expansion of the species into the Sound has put the same amount of pressure on New York's fisheries as it has on Connecticut's. The commercial fishery in New York State in recent years has been plagued by low trip limits and frequent unplanned closures, due in part to the increased abundance of fish in Long Island Sound where they were not historically available. The second aspect of the option, the redistribution of 25% of coastwide quota according to regional biomass, addresses the shift in distribution and increase in abundance of the black sea bass resource currently available to the traditional northern region fisheries, including those found in New York State.

2. Criterion 2 - Failure to follow process as identified in the ASMFC Interstate Fisheries Management Program (ISFMP) Charter, Rules and Regulations or other ASMFC guiding documents (e.g., conservation equivalency guidance).

The commercial black sea bass decision made by the Management Board when adopting Addendum XXXIII to the fishery management plan violates Standard 7 of the ISFMP Charter's (August 2019) Standards and Procedures for Interstate Fishery Management Plans:

(7) Fairness & equity.

(ii) Fishery resources shall be fairly and equitably allocated or assigned among the states.

The Board selected Alternative F with the inclusion of a modified Alternative B that increased Connecticut's historic allocation by 2% for an initial allocation of 3%, acknowledging the expansion of the black sea bass stock into Long Island Sound, an area with historically minimal fishing effort, and the significant disparity that exists between the state's allocation and current abundance and resource availability. In contrast, a similar 2% increase to New York State's historic allocation was rejected by Board members, despite the fact that Long Island Sound shares its boundaries with the coastline of both states and that the commercial management of black sea bass in both Connecticut and New York has become significantly more difficult due to the new presence of an abundant nearshore resource. New York's historic allocation of 7%, relatively low compared to its similarly sized neighbors' level of access, was established at a time in which no significant Long Island Sound fishery for black sea bass existed. A fishery in Long Island Sound now exists where it once did not, and the fishermen from New York State merit the same consideration from the Board as those from Connecticut.

3. Criterion 4 - Management actions resulting in unforeseen impacts that were not considered by the Board as the management document was developed.
The Board selected Alternative F (75:25 distribution of quota based upon initial allocations and regional biomass) with the inclusion of a modified Alternative B that increased Connecticut's historic allocation by 2% for an initial allocation of 3%. This is the first Atlantic Coast joint managed species plan that allows domestic commercial access to evolve with resource distribution. This option also made significant progress towards addressing Connecticut's low allocation in the face of an expanded, newly available resource. These are both important improvements to the fishery management plan. However, the removal of a similar provision for modifying New York State's historic allocation from the approved option has further exacerbated allocation differences between New York State and its other similarly sized regional neighbors. Under the historic allocations, New York State had 13%, 4% and 6% less allocation than New Jersey, Rhode Island and Massachusetts, respectively. As a result of the Board approved option (under recent stock conditions), those differences remain significant between New York and New Jersey (11.5%) and increase to 4.7% and 7.1% between New York and the states of Rhode Island and Massachusetts. This is contrary to the stated goals of this action, which include achieving a "more balanced access to the resource." This impact on balanced regional access by the approved Addendum was not considered by Board members who repeatedly spoke out against an initial increase to New York State's historic allocation and made amendments to remove a New York increase from motions being voted upon.

Corrective Action

The February 1, 2021 decision by the Summer Flounder, Scup, and Black Sea Bass Management Board on commercial sea bass allocation as part of its approval of Addendum 33 was not consistent with the Addendum Statement of the Problem, violates the ISFMP Charter with regards to the Standard of Fairness and Equity, and results in unforeseen impacts that were not considered by the Board.

New York State's commercial fishery has experienced the overall increase in resource availability in the north due to the documented shift in biomass distribution and the significant expansion of the stock into the Long Island Sound, a body of water the state shares with Connecticut that formerly did not support a robust black sea bass fishery.

Many of the votes taken on this action were very close and were split along regional lines with predictable results given the current composition of the Management Board. New York State requests reconsideration of this allocation decision by the ISFMP Policy Board which includes jurisdictions without a stake in the fishery. This review is necessary to assess a fair and equitable outcome for all states within the management unit.

Specifically, New York State requests that in place of the February 1, 2021 Management Board approved option that allows for the initial increase of 2% only to Connecticut, the Policy Board approve commercial black sea bass allocations that include the 2% initial allocation increase to both states in addition to the subsequent distribution of 25% of the coastwide commercial quota according to regional biomass. This preferred allocation scheme is identical to the original motion made by the Commissioner from the State of Massachusetts and was included as part of the Winter Meeting briefing materials. It is worth noting that while this change would offer considerable relief to New York State, its impact on other fishery participants would be of a lesser nature. New York State does not discount the loss of fractions of a percent in allocation that would be experienced by other members of the management unit. In particular, it is noted that the greatest contributors to this change (from the currently approved Addendum) would be its 3 larger fishery-sized neighbors (Massachusetts, Rhode Island, New Jersey). The State of Rhode Island and Commonwealth of Massachusetts both opposed the removal of New York from inclusion in the 2% initial increase that occurred during the Board's deliberations. In addition, the corrective action identified here decreases the disparity in access among these four states, described above in the third appeal criterion.

New York State is unaware of other options to gain relief at the Management Board level and is aware that the inclusion of state allocations in the federal FMP by the Mid-Atlantic Fishery Management Council will present additional difficulties. Allocation decisions are difficult affairs in which equity and science-based management may be at odds with the social, political, and economic self-interests of participating states and state representatives. Proposed amendments to the Magnuson Stevens Act include solutions that would remove such issues from our immediate control. This is an indication that the Commission and Council are not alone in their struggle to deal with

allocation decisions in the face of climate driven species shifts. It is hoped that the ISFMP Policy Board, due to its more expansive membership, will be able to render a decision that equitably considers the needs of all states with a stake in the fishery.

Sincerely,

James J. Gilmore
Administrator

Emerson C. Hasbrouck
Governor's Appointee

Senator Todd Kaminsky
Legislator

Atlantic States Marine Fisheries Commission

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Patrick C. Keliher (ME), Chair *A.G. "Spud" Woodward (GA), Vice-Chair* *Robert E. Beal, Executive Director*

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

April 9, 2021

James Gilmore
Director of Marine Resources
New York State Department of Environmental Conservation
Division of Marine Resources
205 North Belle Mead Road, Suite 1
East Setauket, New York 11733

Dear Mr. Gilmore,

This letter responds to New York's March 19, 2021 appeal of the Atlantic States Marine Fisheries Commission's (Commission) approval of Addendum XXXIII (Addendum) to the Summer Flounder, Scup, and Black Sea Bass Interstate Fishery Management Plan (FMP). On March 26 and April 5, 2021, in accordance with the appeals process, Commission Chair Patrick Keliher, Vice-Chair A.G. "Spud" Woodward, Mel Bell (Leadership), and Commission staff convened on a conference call to review the New York appeal. Mel Bell replaced James Gilmore, the Commission past-chair, on the Leadership call because Mr. Gilmore is a signatory of New York appeal. The purpose of the review was to assess the issues New York raises in its appeal and to determine whether those issues are of the type and substantiality that warrants review by the Interstate Fisheries Management Program (ISFMP) Policy Board.

During the call, it was determined the appeal **could be forwarded** to the ISFMP Policy Board for appeal consideration under criterion one (not consistent with the statement of the problem), however, the appeal did **not** meet the qualifying guidelines under appeal criterion two (failure to follow process) and criterion four (unforeseen impacts). Appeal criterion three was not considered because it was not referenced in the appeal.

A. Claims Under Criterion One: Decision Not Consistent with the Statement of the Problem

The appeal referenced criterion one, "decision not consistent with, or is contrary to, the stated goal and objectives of the current FMP." Under this criterion, the appeal argues the allocation method fails to meet the statement of the problem of the Addendum by specifically increasing the base allocation of the resource for Connecticut to address the expansion of the stock into Long Island Sound (LIS), but not for New York. See letter from New York Commissioners to ASMFC Chair Patrick Keliher, pp. 3 (March 19, 2021). Leadership concludes the Policy Board should further consider New York's claim.

The Addendum's statement of the problem discusses the distribution of the black sea bass stock has changed, abundance and biomass have increased significantly, and there have been corresponding changes in fishing effort and behavior. Further, the Addendum addresses changes in the distribution of the stock specifically for LIS, which has experienced significant increases in black sea bass abundance and availability. New York correctly notes the Addendum only discusses this increase as it relates to Connecticut in the statement of the problem, though New York is similarly affected by the increase as LIS is a shared waterbody of the two states.

B. Claims Under Criterion Two: Failure to Follow Process as Identified in the ISFMP Charter

The appeal cited criterion two, "Failure to follow process as identified in the ISFMP Charter, Rules, and Regulations or other ASMFC guiding documents." Under this criterion, the appeal states the decision made by the Board when adopting the Addendum violated Standard 7 of the ISFMP Charter's Standards and Procedures for Interstate Fishery Management Plans, specifically fairness and equity in that fishery resources shall be fairly and equitably allocated or assigned among the states. See letter from New York Commissioners to ASMFC Chair Patrick Keliher, pp. 3-4 (March 19, 2021). Leadership rejects this claim.

Criterion two of the appeals process, "failure to follow process as identified in the ISFMP Charter, Rules, and Regulations or other ASMFC guiding documents", exists to guard against neglect and abuse of Commission processes. This criterion can be claimed as the basis for an appeal when a management board acts in a manner that does not comport with the accepted process and procedures identified in Commission Guiding Documents such as the ISFMP Charter. The standards identified in the Charter serve as guiding principles for the conservation and management programs set forth in the Commission's fishery management programs. A standard does not define process or procedure. For example, while management boards strive to make decisions that are fair and equitable, there are no prescribed processes or procedures identified in the Charter that must be followed to ensure the decision is fair and equitable to all. Therefore, an appellant should not use criterion two when they believe a decision has been made that is not fair and equitable unless there has been a clear neglect or abuse of a process or procedure that resulted in a decision that is not fair and equitable. Leadership concludes that substantial grounds for an appeal are not present on this issue.

C. Claims Under Criterion Four: Management Actions Resulting in Unforeseen Impacts That Were Not Considered by the Board.

The appeal letter cites criterion four, "Management actions resulting in unforeseen circumstances/impacts that were not considered by the Board as the management document was developed." The appeal recounts the Summer Flounder, Scup, and Black Sea Bass Management Board's (Board) decision to not increase New York's base allocation further exacerbated allocation differences between New York and its other similarly sized regional neighbors. The New York appeal states the difference in allocation between New York and Rhode Island and Massachusetts increased as a result of the allocation method approved in the Addendum. In the appeal, New York claims Board members did not consider the resulting imbalance within the region at the time the Addendum was approved. See letter from New York Commissioners to ASMFC Chair Patrick Keliher, pp. 4 (March 19, 2021).

Leadership disagrees with New York's position that these impacts were unforeseen during the Board discussion. In fact, for each of the motions considered by the Board, staff presented slides showing the resulting state-by-state allocations. While a direct comparison of New York's quota relative to the other states was not presented, Board members could easily determine the difference in quota from state-to-state with the data presented.

When considering action on the allocation method, scenarios were presented where New York would have different allocation percentages which would increase or decrease their allocation relative to other states in the region. The Board did consider the regional imbalance when, during the Board deliberation, Mr. Gilmore stated his concern that New York's allocation would not get closer to the allocation of Rhode Island and Massachusetts if the state's base allocation was not increased to 9 percent (see Draft Board Proceedings pp. 43-44). Since Commissioners recognized and weighed the potential impacts, Leadership does not find the allocation consequences of this Addendum as unforeseen.

In light of these conclusions, Leadership finds there are grounds for the appeal to be heard by the ISFMP Policy Board as to one of the three claims, under criterion one specified in New York's letter. Leadership concludes it is appropriate to provide New York an opportunity to present its appeal on this issue to the ISFMP Policy Board. During the ISFMP Policy Board meeting on May 6, 2021, the ISFMP Director will present background on the Addendum and the Board's justification. Following this presentation, the Commissioners from New York will be provided 15 minutes to present their rationale for the appeal and their suggested resolution of the issue. The ISFMP Policy Board will then be provided an opportunity to discuss the issue, consider the recommendation from Leadership and then decide what issues, if any, should be remanded back to the Summer Flounder, Scup and Black Sea Bass Board for corrective action. No additional public comment will be taken in connection with the appeal.

Thank you for the continued partnership and commitment to the Commission process and actions.

Sincerely,

Patrick Keliher
Chair

cc: Emerson Hasbrouck,
Senator Todd Kamisky
Interstate Fisheries Management Program Policy Board

Atlantic States Marine Fisheries Commission

APPEALS PROCESS

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 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.

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 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.

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.

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.

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.

Atlantic States Marine Fisheries Commission

ADDENDUM XXXIII TO THE SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS FISHERY MANAGEMENT PLAN

Black Sea Bass State-by-State Commercial Allocation

Approved February 2021

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Table of Contents

1.0 INTRODUCTION

Addendum XXXIII and the complementary Amendment developed by the Mid-Atlantic Fishery Management Council (Council) modify the allocations of the coastwide black sea bass commercial quota among the states, which were originally implemented in 2003 through Amendment 13 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (FMP), and extended indefinitely through Addendum XIX (2007). Through the Council Amendment, the state-specific allocations will be added to the Council's FMP, and federal regulations for in-season closures of the coastwide fishery will be modified. These actions, jointly approved by the Council and Commission, address significant changes in the distribution of black sea bass that have occurred since the original allocations were implemented, and also account for the historical dependence of the states on the black sea bass fishery.

The management unit for black sea bass in US waters is the western Atlantic Ocean from Cape Hatteras, North Carolina northward to the US-Canadian border. The black sea bass fisheries are managed cooperatively by the states through the Commission in state waters (0-3 miles), and through the Council and NOAA Fisheries in federal waters (3-200 miles).

2.0 OVERVIEW

2.1 Statement of Problem

State-by-state allocations of the commercial black sea bass coastwide quota were originally implemented in 2003 as part of Amendment 13, loosely based on historical landings from 1980-2001. The state shares in Amendment 13 allocated 67% of the coast-wide commercial quota among the states of New Jersey through North Carolina (North of Cape Hatteras) and 33% among the states of New York through Maine. These state commercial allocations had been unchanged since they were implemented in 2003.

Over the last decade, the distribution of the black sea bass stock has changed, abundance and biomass have increased significantly, and there have been corresponding changes in fishing effort and behavior. According to the most recent black sea bass stock assessment, which modeled fish north and south of Hudson Canyon separately, the majority of the stock occurred in the southern region prior to the mid-2000s (NEFSC 2019). Since then, the biomass in the northern region has grown considerably. Although the amount of biomass in the southern region has not declined in recent years, the northern region currently accounts for the majority of spawning stock biomass (Figure 1). This shift in black sea biomass distribution has also been supported by other peer reviewed scientific research (e.g., Bell et al., 2015).

In some cases, expansion of the black sea bass stock into areas with historically minimal fishing effort has created significant disparities between state allocations and current abundance and resource availability. The most noteworthy example is Connecticut, which has experienced significant increases in black sea bass abundance and fishery availability in Long Island Sound in recent years but is only allocated 1% of the coastwide commercial quota (this allocation was based loosely on landings from 1980-2001).

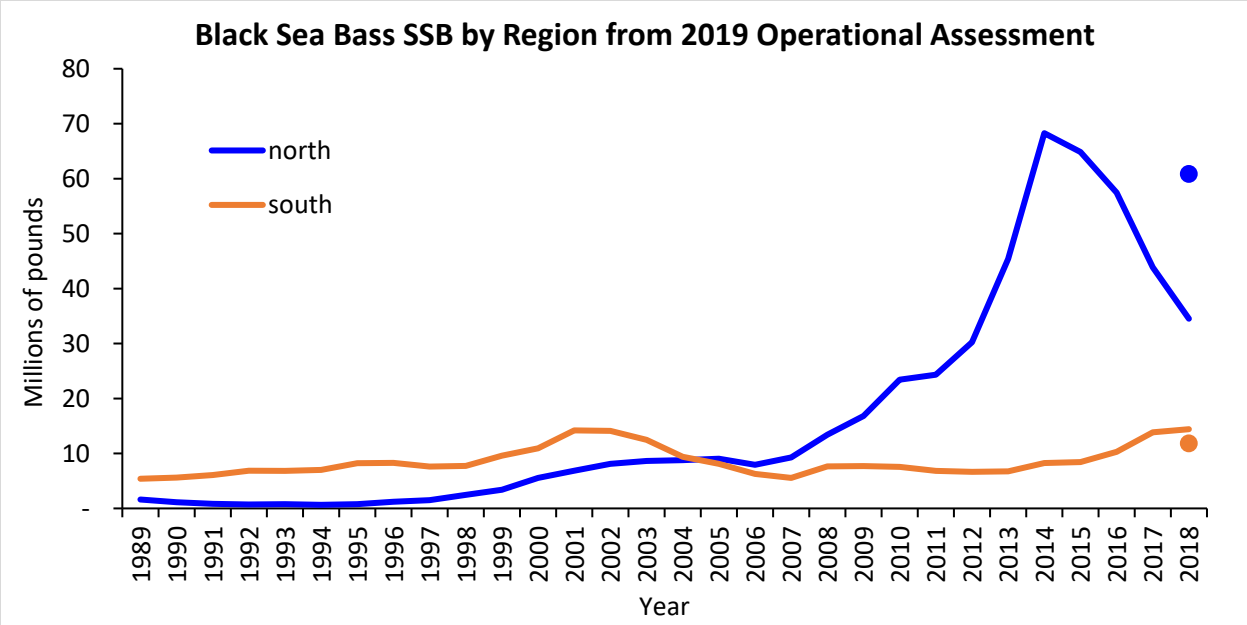

Figure 1. Black sea bass spawning stock biomass by region from the 2019 Operational Assessment Update. Open marks represent retro-adjusted values (used to set catch limits). Source: Personal communication with Northeast Fishery Science Center.

2.2 Background

The Commission's FMP for black sea bass was approved in October 1996. The Council added black sea bass to their Summer Flounder FMP in 1996 through Amendment 9. Both FMPs established an annual process of developing commercial quotas, recreational harvest limits, and recreational and commercial management measures, as well as a series of permitting and reporting requirements. Under the original FMP, the annual coastwide commercial quota was divided into four quarters: January 1 through March 31, April 1 through June 30, July 1 through September 30, and October 1 through December 31.

Under the quarterly quota allocation system, the fishery was subjected to lengthy closures and some significant quota overages. Fishery closures occurring as a result of quotas being fully utilized or exceeded resulted in increased discards of legal sized black sea bass in mixed species fisheries for the remainder of the closure period. Significant financial hardship on the part of the fishing industry also resulted from a decrease in market demand caused by a fluctuating supply. To address these issues, the Management Board enacted a series of emergency rules in 2001 establishing initial possession limits, triggers, and adjusted possession limits. While these measures helped reduce the length of fishery closures, the frequent regulatory changes confused fishermen and added significant administrative burden to the states. Addendum VI (2002) provided a mechanism for setting initial possession limits, triggers, and adjusted possession limits during the annual specification setting process without the need for further emergency rules.

The quarterly quota system was replaced with an annual quota system under Amendment 13, approved by the Commission and Council in May 2002. The Amendment implemented a federal coastwide commercial quota, and a state-by-state allocation system for 2003 and 2004 to be

managed by the Commission. This system was adopted to reduce fishery closures, achieve more equitable distribution of quota to fishermen, and allow the states to manage their commercial quota for the greatest benefit of the industry in their state.

At the time of final action on Amendment 13, the Council expressed a desire that the state allocations be managed at both the state and federal levels and contained in both the Council and Commission's FMPs. However, the NOAA Fisheries Regional Administrator at the time said a state quota system at the federal level could not be monitored effectively with the then current monitoring methods due to the anticipated low allocations in some states. As a result, the Council approved a federal annual coastwide quota, acknowledging that this would facilitate the use of state allocations through the Commission's FMP. Many of the concerns with monitoring state quotas at the federal level have subsequently been resolved with changes to how commercial landings are reported.

State-specific shares were adopted as follows: Maine and New Hampshire 0.5%, Connecticut 1%, Delaware 5%, New York 7%, Rhode Island, North Carolina and Maryland 11%, Massachusetts 13%, New Jersey and Virginia 20% (Table 1).

The individual state shares management program was continued in 2005 and 2006 through Addendum XII (2004). Addendum XIX, approved in 2007, extended the state shares of the commercial black sea bass quota indefinitely. No further changes have been made to the black sea bass commercial state shares. Addenda XII and XIX (2004 and 2007, respectively) allowed for the transfer of black sea bass commercial quota among states, and Addendum XX (2009) established the process for state to state quota transfers. Under the management program established through these Addenda, states have the responsibility of managing their quota to provide the greatest benefit to their commercial black sea bass industry. The ability to transfer or combine quota further increased the flexibility of the system to respond to annual variations in fishing practices or landings patterns.

In response to some states' concerns about changing resource availability and associated fishery impacts, the Board formed a Commercial Black Sea Bass Working Group in August 2018 to identify management issues related to changes in stock distribution and abundance, and propose potential management strategies for Board consideration. In February 2019, the Board reviewed the Working Group report. The key issue the Working Group identified is that the state commercial allocations implemented in 2003 do not reflect the current distribution of the resource, which has expanded significantly north of Hudson Canyon. The Board then requested the Plan Development Team (PDT) perform additional analyses and further develop proposed management options related to the issue of state commercial allocations. After reviewing the PDT report, in October 2019 the Board initiated Addendum XXXIII to consider changes to the black sea bass commercial state allocations. In December 2019, the Council initiated a complementary amendment to consider including the state shares in the Council FMP.

Table 1. State shares of black sea bass quota as allocated by Addendum XIX to Amendment 13.

State	Percent of Coastwide Quota
Maine	0.5 %
New Hampshire	0.5 %
Massachusetts	13 %
Rhode Island	11 %
Connecticut	1 %
New York	7 %
New Jersey	20 %
Delaware	5 %
Maryland	11 %
Virginia	20 %
North Carolina	11 %

2.3 Status of the Stock

The most recent stock status information comes from the 2019 operational stock assessment, which was peer-reviewed in August 2019 and approved for management use in October 2019 (NEFSC 2019). The assessment indicated that the black sea bass stock north of Cape Hatteras, North Carolina was not overfished and overfishing was not occurring in 2018, the terminal year of data used in the assessment.

The operational stock assessment updated the Age Structured Assessment Program (ASAP) models used in the 2016 benchmark stock assessment with commercial and recreational catch data, research survey and fishery-dependent indices of abundance, and analyses of those data through 2018[1]. For modeling purposes, the stock was partitioned into two sub-units divided approximately at Hudson Canyon to account for spatial differences in abundance and size at age. The sub-units are not considered separate stocks. Although the stock was assessed by sub-unit, the combined results were used to develop reference points, determine stock status, and recommend fishery specifications.

Spawning stock biomass (SSB), which includes both mature male and female biomass, averaged around 8 million pounds during the late 1980s and early 1990s and then steadily increased from 1997 to 2002 when it reached 22.2 million pounds. From 2007 to 2014, SSB dramatically increased, reaching a peak in 2014 at 76.5 million pounds. Since 2014, SSB has trended back down but remains above the target level. After adjusting for retrospective error in the model, SSB in the terminal year (2018) is estimated at 73.6 million pounds, approximately 2.4 times the target SSB reference point (SSB_{MSY} proxy= SSB40% = 31.1 million pounds) (Figure 2). The (similarly adjusted) fishing mortality rate (F) in 2018 was 0.42, about 91% of the fishing mortality threshold reference point (F_{MSY} proxy= F40%) of 0.46. Except for 2017, F has been

[1] In July 2018, the Marine Recreational Information Program (MRIP) replaced the existing estimates of recreational catch with a calibrated 1981-2017 time series that corresponds to new survey methods that were fully implemented in 2018. The new calibrated recreational estimates are significantly higher than previous estimates, especially in later years of the time series. These revised data were incorporated into the 2019 operational stock assessment. This change was one of multiple factors which impacted the understanding of overall biomass levels.

below the F_{MSY} proxy for the last five years. Average recruitment of black sea bass from 1989 to 2018 was 36 million fish at age 1. The 2011 year class was estimated to be the largest in the time series at 144.7 million fish and the 2015 year class was the second largest at 79.2 million fish. Recruitment of the 2017 year class as age 1 in 2018 was estimated at 16.0 million, well below the time series average.

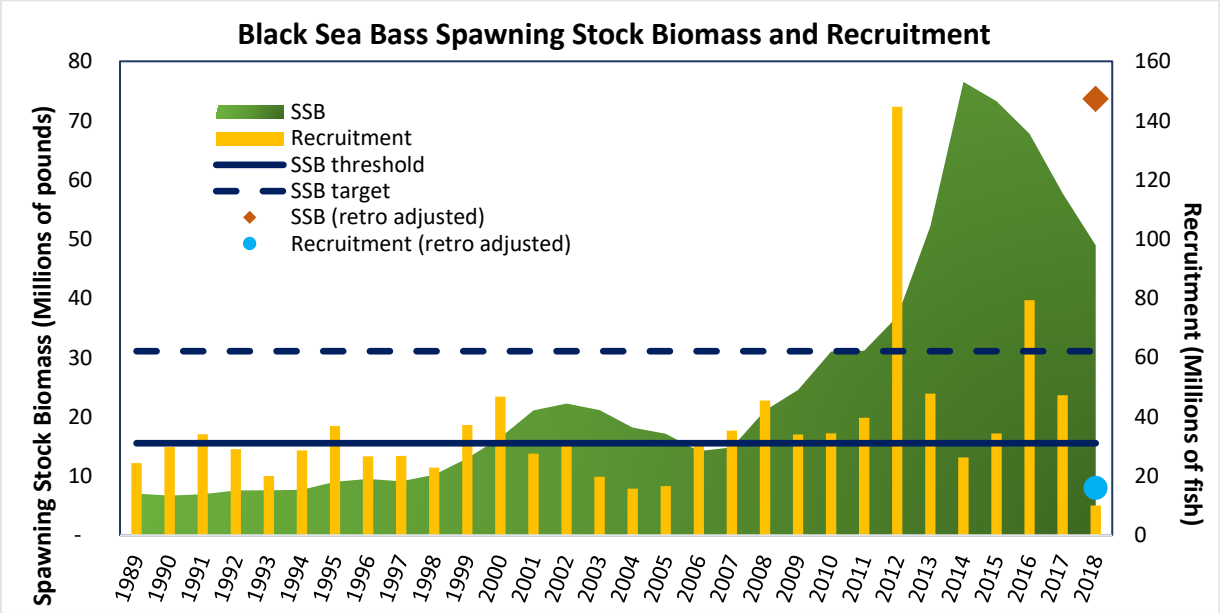

Figure 2. Black sea bass spawning stock biomass and recruitment. Source: 2019 Operational Assessment Prepublication Report, Northeast Fishery Science Center.

2.4 Status of the Fishery

The following information is based on commercial fishery dealer data (landings), the most recent stock assessment (discards), federal vessel trip reports (gear types and area of catch), and input from a small sample of fishermen and dealers. Input was provided by 6 individuals who primarily identify as fishermen and 4 individuals who represent two commercial fish dealers. Collectively, these 10 individuals are from 5 states and use three different gear types (i.e., bottom otter trawl, pot/trap, and hand line). Their input is not intended to be a representative sample of the commercial black sea bass fishery as a whole, but was solicited to provide context to trends shown in the data and document relevant information not captured in the available data.

Commercial landings have been constrained by a coastwide (i.e., Maine through Cape Hatteras, North Carolina) commercial quota since 1998, and state allocations were introduced in 2003. From 1998 to 2019, coastwide landings have closely followed quotas, ranging from a low of 1.16 million pounds in 2009 to a high of 3.98 million pounds in 2017. State landings have also closely followed quotas since they were implemented in 2003. A process for interstate quota transfers was established in 2009, but until 2017 states were highly constrained by low quotas and thus there was not much opportunity for transfers. Under higher quotas more interstate transfers have occurred; in the last three years, the states of Massachusetts through New

Jersey have all received quota transfers from other states to prevent or mitigate overages of their state quotas.

Since the coastwide quota was implemented in 1998, commercial discards have constituted 17% of total commercial removals on average. Over the last five years of the time series (2014-2018) discards were generally higher, averaging 33% of total commercial removals; discards in recent years have likely been influenced by high availability coupled with quota and minimum fish size limitations.

The average price per pound paid to fishermen by dealers for black sea bass (adjusted to 2019 values based on the Gross Domestic Product Price Deflator) appears to show an inverse relationship with landings in the southern region states (New Jersey - North Carolina) during 2010-2019 (i.e., price generally decreased with increases in landings, $p=0.002$). There did not appear to be a strong relationship between price and landings in the northern region (Maine - New York) during 2010-2019 ($p=0.498$, Figure 3). Some fishermen and dealers said temporary price drops can occur at both local and regional levels due to increases in the coastwide quota, state-specific seasonal openings, or individual trawl trips with high landings, all of which can be interrelated. They note that these sudden price drops are often temporary and the price usually rises again. This is evident in the coastwide relationship between average price per pound and the coastwide quota, which increased by 52% mid-year in 2017 and then decreased by 15% from 2017 to 2018. The average coastwide price per pound dropped from $3.92 in 2016 to $3.49 in 2017, but increased to $3.82 in 2018 (all prices are adjusted to 2019 values based on the Gross Domestic Product Price Deflator).

Input from fishermen and federal vessel trip report data from 2009-2019 suggest that in years with higher quotas, bottom trawl gear accounted for a greater proportion and pots/traps accounted for a smaller proportion of total commercial landings compared to years with lower quotas. For example, the lowest quotas during 2010-2019 occurred in 2010-2012. During those years, bottom trawl gear accounted for around 39-41% of total commercial black sea bass landings (depending on the year) and pots/traps accounted for about 33-36%. In comparison, the highest quotas occurred in 2016-2019, during which around 52-61% of total commercial black sea bass landings could be attributed to bottom trawl gear and around 21-26% to pot/trap gear. Some fishermen have said trawlers are better able to take advantage of increases in quota as they can land higher volumes than vessels using pot/trap gear. This can be especially beneficial when the price of black sea bass drops (usually temporarily) in response to sudden increases of fish on the market.

According to commercial dealer data for 2010-2019, the average coastwide ex-vessel price per pound for black sea bass caught with bottom trawl gear was $3.90 (adjusted to 2019 values), 6% greater than the average price for black sea bass caught with pots/traps ($3.70). However, some fishermen report that they can get higher prices for black sea bass caught with pots/traps as they can market their fish as fresher and better quality than trawl-caught fish. Pot/trap and hook and line commercial fishermen in some states also sell black sea bass to live markets, which offer even higher prices. Some fishermen and dealers say size has a greater impact on price than gear, though the two are interrelated as black sea bass landed using bottom trawl gear tend to be larger than those landed using pots/traps.

The states have taken different approaches to managing their commercial black sea bass fisheries. Delaware, Maryland, and Virginia use Individual Transferable Quota (ITQ) systems, while other states utilize different combinations of quota periods, closed seasons, and initial or adjustable trip and possession limits to prevent quota overages. For some states like Connecticut, quota availability and resulting management measures are highly dependent on quota transfers from other states. Some fishermen and dealers say they take these differences in state management measures into account when deciding when to fish, where to sell fish, and what price to offer for fish. For example, the price offered by local dealers may be higher when neighboring states are closed. Alternatively, some fishermen and dealers in comparatively low allocation states say they generally do not make business decisions based on black sea bass. Due to the low allocations in some states, black sea bass provides supplemental income for these fishermen and dealers, but is not a primary target species. For these reasons, the economic impacts of changes to state quotas can vary in part based on how states adjust their management measures in response to quota changes. For example, an increase in the possession limit could have different impacts than an extension of the open season. ITQ fishermen may be impacted differently than non-ITQ fishermen, and impacts may vary between gear types.

From 2010-2017, the commercial black sea bass landings from Maine through North Carolina which were caught in the northern region (as defined in the stock assessment, corresponding to approximately Hudson Canyon and north) increased steadily, with the greatest increases occurring during 2015-2017. After 2017, the proportion caught in the northern region declined, but remained much higher than the proportion from the southern region. During 2010-2019, the amount of commercial black sea bass landings caught in the southern region did not vary greatly (Figure 4).

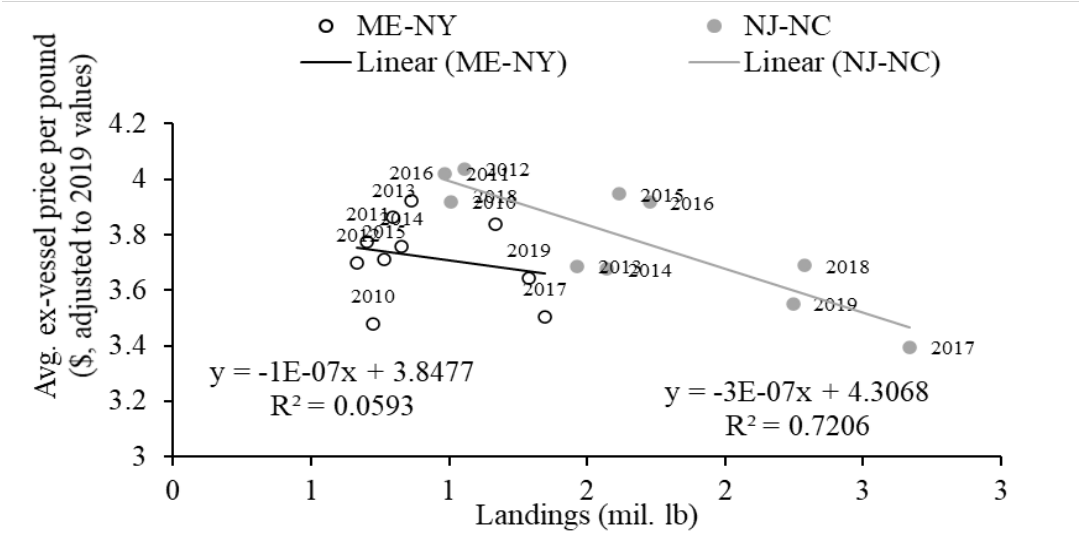

Figure 3. Average annual ex-vessel price per pound for black sea bass compared to annual black sea bass commercial landings by region (ME-NY and NJ-NC), 2010-2019, with associated linear relationship. Prices are adjusted to 2019 values based on the Gross Domestic Product Price Deflator. Data source: dealer data (CFDERS, provided by the NOAA Fisheries Greater Atlantic Regional Fisheries Office Analysis and Program Support Division).

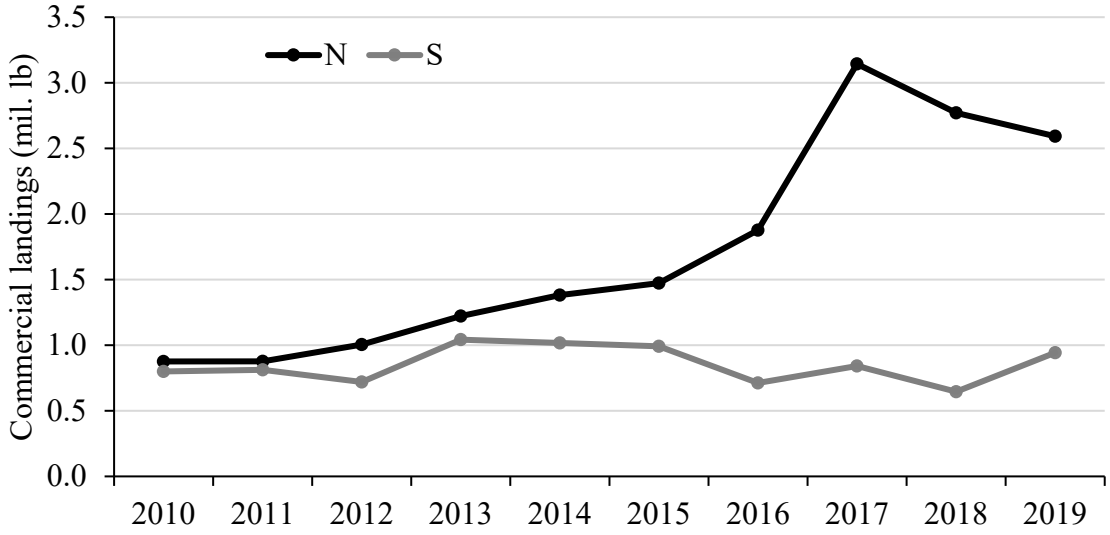

Figure 4. Total commercial black sea bass landings, 2010-2019, Maine through North Carolina, by region of catch location (North or South). Region is assigned based on statistical area of catch using the delineation defined in the stock assessment. Landings with an unknown statistical area were assigned to region based on the state of landing. Data source: dealer AA tables provided by the Northeast Fisheries Science Center

3.0 MANAGEMENT PROGRAM

3.1 Revised State Commercial Allocation Process *(The following management program replaces Section 3.1 of Addendum XIV to Interstate FMP for Summer Flounder, Scup, and Black Sea Bass).*

This Addendum establishes a new process for establishing the annual state allocations of the coastwide commercial black sea bass quota. The first part of this process establishes new baseline allocations, as described in Section 3.1.1. The second part of the process is to distribute a portion of the annual coastwide quota to the states according to the baseline allocations, and the remaining portion according to regional biomass from the stock assessment, as described in Sections 3.1.2 and 3.1.3.

3.1.1 Baseline Quota Allocations

Baseline quota allocations have been established (Table 2). Connecticut's initial quota allocation is increased to 3% of the coastwide quota by adjusting other state allocations as shown in Table 2.

Connecticut has experienced a substantial increase in abundance of black sea bass in state waters over the last seven years, though the state's original allocation was only 1% of the coastwide quota. This allocation increase attempts to reduce the disparity between the abundance of black sea bass in Connecticut waters and Connecticut's historical allocation. These revised allocations are used as the starting point for additional allocation changes described in Section 3.1.2.

Table 2. Changes in baseline state allocations from historical allocations under Addendum XXXIII

State	Historical Allocation	Change in Allocation	New Baseline Allocation
ME	0.5%	-0.25%	0.25%
NH	0.5%	-0.25%	0.25%
MA	13.0%	-0.23%	12.77%
RI	11.0%	-0.19%	10.81%
CT	1.0%	2.00%	3.00%
NY	7.0%	0.00%	7.00%
NJ	20.0%	-0.35%	19.65%
DE	5.0%	0.00%	5.00%
MD	11.0%	-0.19%	10.81%
VA	20.0%	-0.35%	19.65%
NC	11.0%	-0.19%	10.81%

3.1.2 State by State Coastwide Quota Distribution

Annually, 75% of the coastwide quota will be distributed to states using the baseline allocations established in Section 3.1.1 (Table 2). The remaining 25% of the coastwide quota will first be allocated regionally based on the most recent regional biomass proportions from the stock assessment. Then, regional quotas will be distributed to the states within each region in proportion to their baseline allocations, with the exception of Maine and New Hampshire. Maine and New Hampshire will each receive 1% of the northern region quota.

The regional biomass proportions used to allocate 25% of the coastwide quota are dependent on information from the most recent stock assessment. Therefore, they will be updated according to future stock assessments, which may result in changes to the state allocations. An example of state quota calculations using the regional biomass proportions from the 2019 Operational Assessment is provided in Appendix 1.

3.1.3 Regional Configuration

For the purposes of allocating a portion of the coastwide quota on a regional basis, the following three regions will be used: 1) Maine through New York; 2) New Jersey; and 3) Delaware through North Carolina (North of Cape Hatteras). New Jersey is a distinct region, addressing its geographic position straddling the border between the northern and southern spatial sub-units (approximately at Hudson Canyon as defined in the stock assessment; Figure 5). New Jersey's initial baseline allocation of 19.65% (Table 2) is treated as follows: 9.83% is considered to come from the northern region, and 9.83% from the southern region. As the regional allocations change, New Jersey's "northern" 9.83% of the coastwide quota will change according to the proportion of biomass in northern region, and the "southern" 9.83% will change according to the proportion of biomass in the southern region. New Jersey's total allocation is the sum of the northern and southern components of its allocation. This is consistent with the spatial distribution of black sea bass landings in recent years, which is roughly an even split between north and south of Hudson Canyon (Table 3).

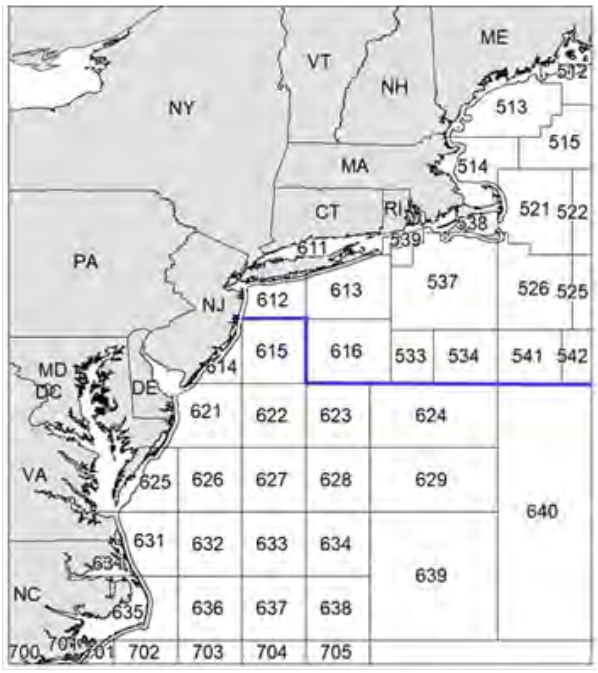

Figure 5. NMFS statistical areas showing the dividing line between the northern and southern regions as defined in the black sea bass stock assessment.

Table 3. Proportion of black sea bass commercial harvest landed in New Jersey from northern and southern region statistical areas. Only landings associated with valid northeast region statistical areas were included in the calculations. Data were provided by the ACCSP. Landings by area were estimated by applying VTR proportions of landings by area to dealer data.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	**Average 2010-2019**	**Average 2010-2014**	**Average 2015-2019**
% North	38%	28%	47%	46%	54%	78%	65%	74%	58%	57%	**54%**	**43%**	**66%**
% South	62%	72%	53%	54%	46%	22%	35%	26%	42%	43%	**46%**	**57%**	**34%**

3.2 Recommended Changes to Federal Regulations

A Council Amendment was developed in conjunction with Addendum XXXIII. The Commission and Council recommended the following changes to federal regulations be implemented through the Council Amendment.

3.2.1 Commercial state allocations included in both Commission and Council FMPs

The Commission and Council recommended that commercial state allocations for black sea bass be included in both the Commission and Council FMPs. As a result, future changes to the allocations will be considered through a joint action between the Commission and Council. This change will require NOAA Fisheries, rather than the Commission, to monitor landings against state quotas and to receive and process all quota transfers between states. Transfers of quota between states will continue to be allowed, but will be subject to the NOAA Fisheries review process.

Adding the state allocations to the Council's FMP will not change how overages of state quotas are handled. States will only pay back quota overages if the entire coastwide quota is exceeded. If a state exceeds their quota in a year when the coastwide quota is exceeded, then that state may be required to pay back overages of their quota.

3.2.2 Federal in-season closures

The Commission and Council recommended modifying the federal regulations for in-season closures, such that the entire commercial fishery would close in-season for all federally permitted vessels and dealers, regardless of state, once landings exceed the coastwide quota plus an additional buffer of up to 5%. The Council and Board will agree to the appropriate buffer for the upcoming year through the specifications process. The intent behind allowing an additional buffer is to help minimize negative economic impacts of coastwide closures on states that have not fully harvested their allocations. This is not expected to create an incentive for quota overages as states would still be required to close when their state-specific quotas are reached, and states will still be required to pay back quota overages as described in Section 3.2.1.

4.0 COMPLIANCE

The management program contained in Section 3.1 of Addendum XXXIII to Amendment 13 is effective January 1, 2022.

5.0 LITERATURE CITED

NEFSC. 2019. Operational Stock Assessment Report

Bell, R. J., Richardson, D. E., Hare, J. A., Lynch, P. D., and Fratantoni, P. S. 2014. Disentangling the effects of climate, abundance, and size on the distribution of marine fish: an example based on four stocks from the Northeast US shelf. ICES Journal of Marine Science, doi: 10.1093/icesjms/fsu217

MAFMC. 2003. Amendment 13 to the Fishery Management Plan for Black Sea Bass. Available at: http://www.mafmc.org/sf-s-bsb

APPENDIX 1. Example state quota calculations using the most recent biomass distribution

The table below shows example calculations for state quotas resulting from the allocation system adopted under Addendum XXXIII, using the regional biomass distribution from the 2019 Operational Stock Assessment and a coastwide quota of 6.09 million pounds. The regional biomass proportions are dependent on the most recent stock assessment, and are subject to change as regional biomass changes.

Each state's total quota under the Addendum XXXIIII allocation system is calculated using both the state's baseline allocation (Column B) and regional allocations based on the most recent stock assessment (Column C). The regional biomass proportions based on the most recent stock assessment are 84% in the north (highlighted in orange) and 16% in the south (highlighted in blue) (Column C). These regional allocations are distributed to the states within each region in proportion to their baseline allocations, except that Maine and New Hampshire each receive 1% of the northern region quota (Column D).

Each state's baseline allocation is multiplied by 75% (Column E). Then, each state's proportion of the regional allocation (Column D) is multiplied by 25% (Column F). The resulting state allocations (Column G) are the sum of the portion based on the baseline allocation (Column E) and the portion based on regional biomass (Column F). New Jersey's total allocation is the sum of its northern and southern components. The annual state quotas are calculated by multiplying the resulting state allocations (Column G) by the annual coastwide quota.

Step 1: Calculate the Baseline Based Allocation

$$Baseline\ Based\ Allocations\ (Column\ E) = Baseline\ Allocation\ (Column\ B) \times 75\%$$

Step 2: Calculate the Biomass Based Allocation

$$Biomass\ Based\ Allocation\ (Column\ F) = State\ Proportions\ of\ Regional\ Allocation\ (Column\ D) \times 25\%$$

Step 3: Add Together for the Final Allocation

$$Final\ Allocation\ (Column\ G) = Baseline\ Based\ Allocation\ (Column\ E) + Biomass\ Based\ Allocation\ (Column\ F)$$

A	B	C*	D*	E	F	G	H
State	**New Baseline Allocations**	**Regional Biomass Distribution (2019 Assessment)**	**State Proportions of Regional Allocation**	**Baseline-based Allocations (75% of Column B)**	**Biomass-based Allocations (25% of Column D)**	**EXAMPLE ALLOCATIONS based on current biomass distribution**	**EXAMPLE State Quota Based on 6,090,000 M lb Coastwide Quota**
ME	0.25%	84%	0.84%	0.19%	0.21%	0.40%	24,208
NH	0.25%		0.84%	0.19%	0.21%	0.40%	24,208
MA	12.77%		24.22%	9.58%	6.06%	15.64%	952,230
RI	10.81%		20.50%	8.11%	5.12%	13.23%	805,733
CT	3.00%		5.69%	2.25%	1.42%	3.67%	223,646
NY	7.00%		13.28%	5.25%	3.32%	8.57%	521,841
NJ - N	9.83%		18.63%	7.37%	4.66%	20.10%	1,223,939
NJ - S	9.83%	16%	2.80%	7.37%	0.70%		
DE	5.00%		1.43%	3.75%	0.36%	4.11%	250,089
MD	10.81%		3.08%	8.11%	0.77%	8.88%	540,599
VA	19.65%		5.61%	14.74%	1.40%	16.14%	982,908
NC	10.81%		3.08%	8.11%	0.77%	8.88%	540,599
Total	**100%**	**100%**	**100%**	**75%**	**25%**	**100%**	**6,090,000**

* These values in these columns are dependent on the most recent regional biomass distribution estimates from the stock assessment. They will be updated whenever regional biomass information changes, and the state allocations will change as a result. The methodology for calculating the allocations will not change.

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS MANAGEMENT BOARD

AND

MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

Webinar
February 1, 2021

TABLE OF CONTENTS

INDEX OF MOTIONS

1. **Approval of Agenda** by Consent (Page 1).

2. **Approval of Proceedings of May 2020** by Consent (Page 1).

3. **Board Only Motions**
   Move to approve the following 2021 recreational conservational equivalency season adjustments: New Jersey summer flounder fishery (May 28 through September 28), and Massachusetts's black sea bass fishery (options A, May 15 – Sept 3, and B, May 22 – Sept 14), and approve Virginia's proposal for adjusting recreational black sea bass measures to account for February harvest (Page 3). Motion by Jim Gilmore; second by Mike Luisi. Motion carried (Page 3).

4. **Board and Council Motions**
   Main Motion
   Move to Approve:
   Modified Option B - Increase CT to 3% and NY to 9%, with the change occurring over 2 years,

   Option C - DARA approach, with the following sub options:
   - **Sub-option C1-B: allocations based 50% on stock distribution and 50% on the initial allocations at the end of the transition phase**
   - **Sub-option C2-A: 5% change in weights per adjustment**
   - **Sub-option C3-A: annual adjustment to factor weights**
   - **Modified allocation adjustment cap (C4-A): cap the change in regional allocations at a maximum of 5% per adjustment.**

   Regional configuration option G2 – NJ as separate region
   Board: Motion by Jason McNamee; second by Emerson Hasbrouck (Page 19).
   Council: Motion by Tony DiLernia; second by Maureen Davidson (Page 20).

   Motion to Substitute
   Move to substitute to address Black Sea Bass Commercial State Allocations by approving Option B - Increase Connecticut Quota to 3%; Option D - Trigger Approach, with a trigger of 4 M lbs. (a trigger value between Sub Options D1-A and D1-B); Sub-option D2-B - Distribution of surplus quota based on regional biomass from stock assessment; Sub-option D3-B - Proportional distribution of regional surplus quota; Sub-option D4-A - Static base allocations; Option G - Regional Configuration Options; and Sub-option G2 - Establishing three regions with New Jersey as a separate region.
   Board: Motion by John Clark; second by Ellen Bolen (Page 21).
   Council: Motion by Ellen Bolen; second by Joe Cimino (Page 21).

   Motion to Amend Substitute Motion
   Move to amend the substitute motion option b: "increase Connecticut's base allocation to 3% and New York's base allocation to 9%."
   Board: Motion by David Borden; second by Justin Davis. Motion fails for lack of a majority (5 in favor, 6 opposed, 1 abstention) (Page 30).
   Council: Motion by Dan Farnham; second by Tony DiLernia (Page 30).

INDEX OF MOTIONS (continued)

Motion to Substitute
Move to substitute to address Black Sea Bass Commercial State Allocations by approving Option B - Increase Connecticut Quota to 3%; Option D - Trigger Approach, with a trigger of 4 M lbs. (a trigger value between Sub Options D1-A and D1-B); Sub-option D2-B - Distribution of surplus quota based on regional biomass from stock assessment; Sub-option D3-B - Proportional distribution of regional surplus quota; Sub-option D4-A - Static base allocations; Option G - Regional Configuration Options; and Sub-option G2 - Establishing three regions with New Jersey as a separate region.

Board: Motion by John Clark; second by Ellen Bolen (Page 21). Motion fails for lack of a majority (6 in favor, 6 opposed) (Page 38).

Council: Motion by Ellen Bolen (Page 21); second by Joe Cimino.

Main Motion
Move to approve:
Modified Option B – Increase CT to 3% and NY to 9%, with the change occurring over 2 years

Option C – DARA approach, with the following sub options:

- **Sub-option C1-B: allocations based 50% on stock distribution and 50% on the initial allocations at the end of the transition phase**
- **Sub-option C2-A: 5% change in weights per adjustment**
- **Sub-option C3-A: annual adjustment to factor weights**
- **Modified allocation adjustment cap (C4-A): cap the change in regional allocations at a maximum of 5% per adjustment.**

Regional configuration option G2 – NJ as separate region

Board: Motion by Justin McNamee; second by Emerson Hasbrouck (Page 19). Motion fails for lack of a majority (6 in favor, 6 opposed) (Page 37).

Council: Motion made by Mr. DiLernia and seconded by Ms. Davidson (Page 20).

Main Motion
Move to adopt the following options for black sea bass commercial allocations:

- **Modified Alternative B: Increase CT's base allocation to 3% and NY's base allocation to 9%.**
- **Alternative F: Percentage of coastwide quota distributed based on initial allocations:**
- **Sub-alternative F1-B: 75% of the coastwide quota allocated using the initial allocations.**
- **Sub-alternative F2-B: Remaining quota (25%) allocated based on regional biomass from the stock assessment.**
- **Sub-alternative F3-B: Proportional distribution of regional quota.**
- **Sub-alternative G2: Establish three regions: 1) ME-NY; 2) NJ; and 3) DE-NC.**

Board: Motion by Nichola Meserve; second by Justin Davis (Page 40).

Council: Motion by Maureen Davidson; second by Dan Farnham (Page 41).

Motion to Amend
Move to amend to modify alternative B to remove "and NY's base allocation to 9%" and add at the end of the motion "to review the state by state allocations in not more than 5 years".

Board: Motion by Chris Batsavage; second by John Clark (Page 42). Motion carried (6 in favor, 5 opposed, 1 abstention) (Page 48).

Council: Motion by Chris Batsavage; second by Joe Cimino. Motion carried (14 in favor, 5 opposed, 1 abstention) (Page 42).

INDEX OF MOTIONS (continued)

Main Motion as Amended
Move to adopt the following options for black sea bass commercial allocations:

- **Modified Alternative B: Increase CT's base allocation to 3%.**
- **Alternative F: Percentage of coastwide quota distributed based on initial allocations:**
- **Sub-alternative F1-B: 75% of the coastwide quota allocated using the initial allocations.**
- **Sub-alternative F2-B: Remaining quota (25%) allocated based on regional biomass from the stock assessment.**
- **Sub-alternative F3-B: Proportional distribution of regional quota.**
- **Sub-alternative G2: Establish three regions: 1) ME-NY; 2) NJ; and 3) DE-NC.**

Review the state by state allocations in not more than 5 years.
Board: Motion carried (10 in favor, 2 opposed) (Page 52).
Council: Motion carried (13 in favor, 7 opposed) (Page 52).

5. **Board Only:**
Move to approve Addendum XXXIII, as modified today, with an implementation date of January 1, 2022 (Page 54). Motion by Nichola Meserve; second by Justin Davis. Motion carried with one abstention (NOAA Fisheries (11 in favor, 1 abstention) (Page 53).

6. **Council Only:**
Move to submit the Black Sea Bass Commercial State Allocation Amendment, with identification of the preferred alternatives, to NMFS (Page 54). Motion by Peter defur; second by Joe Cimino. Motion carried (13 in favor, 2 opposed, 3 abstentions) (Page 54).

ATTENDANCE

Board Members

Cheri Patterson, NH (AA)
Ritchie White, NH (GA)
Nichola Meserve, MA, proxy for D. McKiernan (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)
Matt Gates, CT, proxy for Sen. Miner (LA)
Jim Gilmore, NY (AA)
Emerson Hasbrouck, NY (GA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Joe Cimino, NJ (AA)
Tom Fote, NJ (GA)
Adam Nowalsky, NJ, Legislative proxy
John Clark, DE, proxy for D. Saveikis (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)
Ellen Bolen, VA, proxy for S. Bowman (AA)
Shanna Madsen, VA, proxy for Sen. Mason (LA)
Chris Batsavage, NC, proxy for J. Batherson (AA)
Jerry Mannen, NC (GA)
Bill Gorham, NC, proxy for Sen. Steinburg (LA)
Marty Gary, PRFC
Mike Pentony, NMFS

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

Ex-Officio Members

Staff

Bob Beal
Toni Kerns
Kristen Anstead
Maya Drzewicki
Emilie Franke
Chris Jacobs
Jeff Kipp
Laura Leach
Dustin Colson Leaning
Savannah Lewis
Sarah Murray
Kirby Rootes-Murdy
Mike Rinaldi
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Dennis Abbott, Newmarket, NH
Karen Abrams, NOAA
Fred Akers
John Almeida, NOAA
Bill Anderson, MD (AA)
Nathan Andrews, RI DEM
Max Appelman, NOAA
Regina Asmutis-Silvia
Pat Augustine, Coram, NY
Richard Balouskus, RI DEM
Julia Beaty, MAFMC
David Behringer, NC DENR
Rick Bellavance
Alan Bianchi, NC DENR
Sarah Bland, NOAA
K. Bradbury, Ofc. Sen. Whitehouse
Bonnie Brady
William Brantley, NC DENR
Delayne Brown, NH F&G
Jeff Brust, NJ DEP
Richard Cody, NOAA
Heather Corbett, NJ DEP
Morgan Corey, NOAA
Karson Coutre, MAFMC
Jessica Daher, NJ DEP
Kiley Dancy, MAFMC
Jessica Daher, NJ DEP
Maureen Davidson, NYS DEC
Lorena de la Garza, NC DENR
Jeff Deem
Peter deFur
John DePersenaire, RFA
Greg DiDomenico
Anthony DiLernia
Steve Doctor, MD DNR
Michelle Duval, MAFMC
Warren Elliott, PA (LA)
Julie Evans
Dan Farnham
Lynn Fegley, MD DNR
Marianne Ferguson, NOAA
Cynthia Ferrio, NOAA
James Fletcher
Tony Friedrich, SGA
Jack Fullmer

Guests (continued)

Alexa Galvan, VMRC
Angela Giuliano, MD DNR
Kurt Gottschall, CT
Sonny Gwin
Jon Hare, NOAA
Bridget Harner, NOAA
Amalia Harrington, Univ. Maine
Dewey Hemilright
Jay Hermsen, NOAA
Helen Takade-Heumacher, EDF
Rich Hittinger
Asm. Eric Houghtaling, NJ (LA)
Rachel Howland, NC DENR
Peter Hughes
Bob Humphrey
Miluska Olivera-Hyde, USGS
Jeff Kaelin, Lund's Fisheries
Emily Keiley, NOAA
Moira Kelly, NOAA
Adam Kenyon, VMRC
Tony Kratowicz
Kris Kuhn, PA F&B
Robert LaFrance, Quinnipiac U.
Nicole Lengyel, RI DEM
Scott Lenox
Tom Little, Ofc. Asm. Houghtaling
Paul Lozeau
Pat Geer, VMRC
Chip Lynch, NOAA
John Maniscalco, NYS DEC
Genine McClair, MD DNR
Ashleigh McCord, NOAA
Chris McDonough, SC DNR
Dan McKiernan, MA (AA)
Conor McManus, RI DEM
Mike Millard, FL FWS
Chris Moore, MAFMC
Patrick Moran, MA Env. Police
Jerry Morgan
Wendy Morrison, NOAA
Brandon Muffley, MAFMC
Allison Murphy, NOAA
Kennedy Neill
Gerry O'Neill, Cape Seafoods
Derek Orner, NOAA
Hanna Rose Peralta
Mike Plaia
Chad Power, NJ DEP
Paul Rago
Jill Ramsey, VMRC
Paul Risi, City Univ. of NY
Jessica Ruggieri, URI
Mary Sabo, NOAA
Scott Sakowski, NOAA
John Schoenig
Tara Scott, NOAA
Lewis Gillingham
Matthew Seeley, MAFMC
McLean Seward, NC DENR
Thomas Sminkey, NOAA
Somers Smott, VMRC
Scott Steinback, NOAA
David Stormer, DE DFW
Mark Taylor
Mark Terceiro, NOAA
John Toth, JCIA
Wes Townsend, Dogsboro, DE
Corinne Truesdale, RI DEM
Sam Truesdell. MA DMF
Mike Waine, ASA
Megan Ware, ME DMR
Craig Weedon, MD DNR
Philip Welsh
Peter Whelan
Patrick White
Meredith Whitten, NC DENR
Kate Wilke, TNC
Angel Willey, MD DNR
Sara Winslow
Steven Whitthuhn
Anthony Wood, NOAA
Chris Wright, NOAA
Phil Zalesak
Erik Zlokovitz, MD DNR

The Summer Flounder, Scup, and Black Sea Bass Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Monday, February 1, 2021, and was called to order at 9:30 a.m. by Chair Adam Nowalsky.

CALL TO ORDER

CHAIR ADAM NOWALSKY: Let's welcome everyone to the winter meeting of the ASMFC. This is the Summer Flounder, Scup, and Black Sea Bass Management Board. This will be Board action only this morning, but we are joined by the Mid-Atlantic Council today. We will have joint actions that will be taken up throughout the day, the Policy Board meeting coming up after this meeting, followed by continuation of this Board meeting for Black Sea Bass Commercial Addendum action, which will be joint actions with the Council.

Welcome everyone! To those being impacted by weather today, be safe. Enjoy, if you like the snow. If not, well put the shades down on that side. This meeting has been called to order.

APPROVAL OF AGENDA

CHAIR NOWALSKY: We'll begin with an approval of an agenda, the agenda that was provided in the meeting materials. We'll note that after we recess this morning, we do plan to reconvene jointly at 12:45, not one o'clock. Are there any other objections to the agenda as provided, or changes?

Seeing no changes and hearing no objections, the agenda is approved by consent.

APPROVAL OF PROCEEDINGS

CHAIR NOWALSKY: Next, we'll go on to approval of proceedings from the August, 2020 Board meeting. Are there any objections to approval of those proceedings? Okay, I'm not seeing any objections, so those proceedings will stand approved as provided.

PUBLIC COMMENT

CHAIR NOWALSKY: Next, we'll go on to public comment for any actions that are not on this morning's portion of the agenda, which is state proposals for the 2021 recreational season.

Is there any public comment for anything else that is not on our agenda? Not seeing any hands raised or hearing anything, we will then proceed.

2021 RECREATIONAL MANAGEMENT MEASURES FOR SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS

CHAIR NOWALSKY: The next agenda item is a presentation for 2021 Recreational Management Measure changes by a select number of states. We'll turn it over to staff for that, thank you very much.

CONSIDER STATE PROPOSALS FOR ADJUSTING 2021 RECREATIONAL MEASURES

MR. DUSTIN COLSON LEANING: As was just alluded to, this is the Summer Flounder, Black Sea Bass and Recreational Proposals Consideration for the Board. This agenda item was originally an hour and 15 minutes, and it got whittled down to 30 minutes, so I'll keep it very concise and to the point.

We'll just cover the background, give a little perspective on what this process is about, and then we'll cover the proposals to modify recreational fisheries themselves, then followed by the TC recommendations, and then the Board Action today will be considering approval of the proposals. Just to jog your memory, this happened before the holiday break. The joint meeting in December that was hosted by the Council was with the Board as well, and they voted to maintain status quo of summer flounder, scup, and black sea bass recreational measures for 2021. However, there was the exception made where the Board was allowed to have states submit proposals for small adjustments to season for recreational fisheries through the conservation equivalency process.

This would just allow states to add some flexibility, if they wanted to start on a Friday or a Saturday, considering that the dates were set as a number not a day of the week. In all, we received three proposals. Two are going through the conservation

equivalency process, New Jersey and Massachusetts for summer flounder and black sea bass respectively.

Then we have the annual Virginia February fishery proposal for black sea bass, and Savannah will be covering the black sea bass items. I'll launch right into the New Jersey proposal for summer flounder. This proposal is actually very similar to last year's proposal; New Jersey is very keen on opening on the Friday of Memorial Day Weekend, which would mean a May 28 to September 28 season.

This proposal would actually delay the start of the season by six days, compared to the status quo dates of last year, and it would then add nine days to the end of the season to account for the delay. It's not a one-for-one adjustment there, or a day-for-day adjustment, because we estimated effect of moving the season forward by six days would have a greater reduction than six days being added to the end of the season.

When you look at daily harvest rates, computed by taking total landings per wave in numbers of fish, and dividing by the number of days in each wave for each year. Then you get a daily harvest rate for Wave 3 and Wave 5. This analysis found that Wave 3 harvest daily average harvest is greater than Wave 5, using 2018 and 2019 MRIP data.

The proposal ends with just three more days than they would have had last year, but the actual harvest itself is projected to be 0.09 percent lower than harvest done under the status quo season. It's important to note here that all other regulations will be kept consistent. We're only talking about a small seasonal adjustment. Next slide, and Savannah, you can take it from here.

CONSIDER VIRGINIA PROPOSAL FOR WAVE 1 RECREATIONAL BLACK SEA BASS FISHERY

MS. SAVANNAH LEWIS: Now I'm going to review the proposals that we got for black sea bass. We received a proposal from Massachusetts to modify their 2021 recreational black sea bass fishery under conservation equivalency. Traditionally they've had a Saturday opening. Currently, under status quo, the season will open on a Tuesday.

They came up with two different alternative options to have the season opening on a Saturday. Option A, which opens the Saturday before status quo on May 15, and Option B, which opens the Saturday after status quo on May 22. To account for the shift in season opening, they looked at modified season closure dates.

These dates were calculated using the mean daily harvest rates by wave for 2018 and 2019. The TC ended up approving a combined 2018 and 2019 methodology. Due to the difference in harvest rates for Wave 3 compared to Wave 5, different season openings resulted in different season closures dates. For Option A the season will close on September 3, for a total of 112 days. For Option B the season will close on September 14, for a total of 116 days. All other regulations will be kept consistent, and the options, if approved today, will be taken out for public comment to determine which option Massachusetts will go with. Both options are expected to produce harvest that is similar or less than previous harvest rates. They have to calculate the differences in season closures due to the different harvest rates between Wave 3 and Wave 5.

For Virginia, as Dustin alluded, this is again a traditional opening now for them. They will be opening their recreational black sea bass from February 1 to February 28, as a response to NOAA Fisheries opening in federal waters.

They intend to calculate landings in February from their mandatory angler reporting, and make appropriate season adjustments. Due to the lack of MRIP data in 2020, 2021 harvest will be compared to daily harvest rates by wave from 2018 and 2019 MRIP landings in pounds, and the number of days open in each wave by year.

VMRC will then submit a proposal for season adjustments for the remainder of 2021, to account for all February harvest. All other regulations will be kept consistent. The Technical Committee met on January 19 via webinar, to review the proposals from

the three states. The Technical Committee had no concern for the proposals, and found all of the methods to be technically sound.

The Technical Committee recommends approval of all three proposals for adjusting measures. The Technical Committee was also supportive of streamlining this process, such that the TC would review proposals over e-mail, and the Board would then vote via e-mail instead of at a meeting.

Finally, here is a list of the Board actions to be taken today. First, the Board can consider approval of 2021 Summer Flounder Recreational Fishery Proposal from New Jersey, consider the approval of the 2021 Black Sea Bass Recreational Fishery for Massachusetts, and consider approval of 2021 Black Sea Bass February Recreational Fishery Proposal from Virginia. With that Dustin and I are happy to take any questions.

CHAIR NOWALSKY: All right, thank you very much to staff for that presentation. Are there any questions from anyone around the table on the information provided? Okay, not seeing any hands up or hearing anything for anyone that can't raise their hand. Our next step would be to entertain a motion for approval of these. Would anyone be willing to make that motion? First hand up I saw was Jim Gilmore. Would you like to make a motion regarding these proposals, Jim?

MR. JAMES J. GILMORE, JR.: Sure, Mr. Chairman. I move to approve the recreational measures for summer flounder for New Jersey, black sea bass for Massachusetts, black sea bass for Virginia. Oh, you've got one up already, all right, I'll go with that.

MS. TONI KERNS: Jim, we'll need you to read that for the record, please.

MR. GILMORE: Move to approve the following 2021 recreational conservational equivalency season adjustments: New Jersey summer flounder fishery (May 28 through September 28), and Massachusetts's black sea bass fishery (Options A, May 15 – September 3, and B, May 22 – September 19), and approve Virginia's proposal for adjusting recreational black sea bass measures to account for February harvest.

CHAIR NOWALSKY: Very good, thank you very much, I see a hand raised from Mike Luisi. Is that to second this motion?

MR. MICHAEL LUISI: That is Adam, thank you, yes, I'll second that.

CHAIR NOWALSKY: Very good, so we have a motion that has been made and seconded. Is there any discussion on this motion? Jim, did you want to go ahead and provide any other information, or was your hand still up from making the motion?

MR. GILMORE: Sorry, Mr. Chairman, my hand was just up. I'll put it down and I'm good to go.

CHAIR NOWALSKY: Very good, thank you very much, I've got a hand raised from Nichola Meserve.

MS. NICHOLA MESERVE: I just wanted to point out that the date for Option B in Massachusetts should be September 14.

CHAIR NOWASLKY: All right, we've corrected that on screen. Is there any objection to having that that perfected on screen with the Option B motion being corrected to an end date of September 14? Not seeing any objections to that. Would you like me to go ahead and reread the motion, since there was that change made to it since it was originally read in, or is that not necessary, Toni?

MS. KERNS: I think it's okay, since we have that correction on the record.

CHAIR NOWALSKY: Very good, is there any public comment on this motion? All right, not seeing any public comment, I am going to go ahead and ask the Board**. Is there any objection to this motion? Okay, seeing no objections the motion stands approved.** Thank you very much. With that, unless there is any other business to come before us this morning, we're ready to move to recess, Toni, for Policy Board.

MS. KERNS: That's correct, Adam. Policy Board starts at 10:15.

RECESS FOR ISFMP POLICY BOARD & MID-ATLANTIC FISHERY MANAGEMENT COUNCIL (MAFMC) DISCUSSION ON RECREATIONAL MANAGEMENT REFORM INITIATIVE

(Whereupon a recess was taken and the Board and Council reconvened at 12:45.)

RECONVENE AS A JOINT MEETING WITH MAFMC

ATLANTIC STATES MARINE FISHERIES COMMISSION
SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS MANAGEMENT BOARD AND
MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

CONSIDER ADDENDUM XXXIII AND COUNCIL AMENDMENT ON BLACK SEA BASS COMMERCIAL STATE ALLOCATIONS FOR FINAL APPROVAL

MS. CAITLIN STARKS: Okay, this is Caitlin Starks. I am the, I guess outgoing FMP Coordinator for black sea bass. After this meeting we'll be passing that off to Savannah Lewis. But I'll be going over the Draft Addendum XXXIII and Council Amendment presentation today. In this presentation I'll first cover some background information on this action leading up to this meeting.

Then, I'll review the different options for the black sea bass commercial state allocations, go over the way forward versus the action on the Addendum and Amendment, and take steps for implementation. As a reminder, Draft Addendum XXXIII and the Council Amendment mainly address two things.

First is, considering modifying the state commercial allocations as the black sea bass quota, and second is whether to add those state allocations to the Council's FMP. In the December joint meeting the Board and Council met at the Mid-Atlantic Council meeting, and they reviewed Draft Addendum XXXIII and the Council Amendment, the public comment, AP input and a Draft Impact Analysis.

At that meeting the Board and Council selected alternatives for the federal management portion to the action, but agreed to postpone decisions on the allocation and the final action on the document until February 2021, for this meeting. This table summarizes the proposed alternatives for federal management that were selected, and the boxes highlighted in green are those alternatives that were selected by the Board and Council at the December meeting.

For the first issue, the Board and Council voted to add the state allocations to the Council FMP, and maintain status quo for payback of state quota overages, and on the next issue they voted to modify the regulations for federal in-season closures, so that a quota would occur when landings are projected to exceed the coastwide quota, plus a buffer of up to 5 percent, which would be established annually through specifications by the Board and Council.

Today the Board and Council will consider which of the options for the state allocations to adopt. I'll go over each of those options, which are summarized again on this flow chart, and I'm going to move fairly quickly through these, since they have been presented to the Board and Council before, but I can always come back with questions on more detail if there any at the end.

Option A is status quo state allocations, which are shown in the table at the right, and these allocations were implemented in 2003 through Amendment 13, and were loosely based on historical landings from 1980 to 2001. Option B proposes to increase Connecticut's allocation from 1 percent to 5 percent, in order to address the disparity between their current allocation and the increased availability of black sea bass in Connecticut state waters.

The option proposes to get that allocation from 1 percent to 5 percent by holding Delaware and New York constant, moving 0.25 percent each from Maine and New Hampshire to Connecticut, and finally moving some quota from each of the remaining states to Connecticut, in proportion to their current allocation as we get to that total of 5 percent for Connecticut overall allocation.

The last column in the table shows what the allocations would be that result from this method. I'll note again that this option is intended either as a standalone change to the allocation, or as a starting point for additional allocation changes through one of the other options. Option C is dynamic adjustments to regional allocations a.k.a. the DARA approach, which aims to practically address the state allocations while incorporating information on the changing stock distribution.

During the first phase a transition would take place over several years, where the initial allocations are gradually adjusted using a formula to become more dependent on the current stock distribution. At the end of that transition period the allocations would be based partially on stock distribution information, and partially on the initial allocation.

In Phase 2, the formula is no longer being adjusted to give more weight to the stock distribution component, but instead allocations would only be updated when new information on regional stock distribution becomes available, such as when there is a new stock assessment. The sub-options for this approach are designed to represent ranges of values that the Board and Council can work within to determine how fast and how much the allocations are changed overall through this approach.

As a quick reminder of how the DARA approach works, the first step is to divide the coastwide quota into one portion that would be allocated based on the initial allocations, and one portion that would be allocated according to the stock distribution. What those percentages are in each year would be determined by the sub-options that are selected.

Next, the first portion gets distributed to all states, based on their initial allocation, and the second portion is divided regionally, based on the proportion of stock biomass in each region. Then those regional portions get allocated to the states in each region in proportion to their initial allocation, and finally each state gets its overall allocation from the part of it that got allocated using initial allocation, plus the part of the quota that allocated regionally.

As a quick note, this would look slightly different in the last few steps if New Jersey were made an individual region. Sub-option set C-1 for the DARA approach determines the relative weight of the initial allocations, versus the resource distribution information in determining the state allocations at the end of the transition phase.

Option C1-A is that at the end of the transition phase the allocations would be 90 percent based on stock distribution, and 10 percent based on the initial allocations. Option C1-B is that the allocations end up being based 50 percent on stock distribution and 50 percent on the initial allocation.

As a reminder, the Board and Council could choose a final option falling between these two if desired. These are just examples of how those would be split out under these two options. Sub-options set C2 would determine how much the relative weights of the initial allocation and the resource distribution factors change with each adjustment during the transition phase. Sub-option C2-A is that the relative weight could change by 5 percent per adjustment, which is a slower transition, and Sub-option C2-B is that the relative weights would change by 20 percent per adjustment, and that would give you a faster transition to those final weights. DARA Sub-option set C3 determines how often during the transition period those adjustments are made to the weight of the initial allocation and stock distribution factors, and the two actions are either to do adjustments every year or every other year.

Set C4 provides the option to set a task on the amount of change in the regional allocations per adjustment during the transition period. There are three options here, a 3 percent cap, a 10 percent cap, or no cap. The general function of a cap is that it reduces the amount of change in the allocations that can happen during a single adjustment.

If during an adjustment the formula is dictating that there be no allocations to change by 9 percent overall, but you have that 3 percent cap in place. In that adjustment the regional change would only be 3 percent. That does end up drawing out the

transition period over time if the cap is needed during all full years.

The next proposed option is Option D, which is the trigger approach, and this establishes a minimum level of coastwide quota as a trigger for a change in the state allocations, and if the annual coastwide quota exceeds that trigger then the amount of coastwide quota up to and including that amount, would be distributed to the states according to the base allocation, their initial allocation, and the surplus quota above the trigger would be distributed differently.

Sub-options D1-A or D1-E would determine the trigger levels, and D1-A is a 3-million-pound trigger, whereas D1-B is a 4.5-million-pound trigger. The figure just shows how the trigger levels compare to the coastwide quotas since 1998, and as a reminder these sub-options are also meant to provide a range so the Board and Council could select something between 3 and 4.5 million pounds.

Sub-option set D2 determines how the surplus quota above the trigger value is distributed to the states. Option B2-A is to distribute the surplus quota evenly for all states from Massachusetts through North Carolina, and Option B2-B is to distribute the surplus quota among regions, based on regional biomass proportions from the stock assessment.

Under both of these options, Maine and New Hampshire would each be receiving only 1 percent of the surplus quota. If Option D2-B is chosen from the last set, then there are two sub-options that would determine how the regional surplus quotas would be divided among states within each region.

D3-A is that the states would each get equal shares of the regional surplus, and D3-C is that the regional quota would be divided among the states in a region in proportion to their initial allocations. Again, Maine and New Hampshire are the exception, each only getting 1 percent of the northern region surplus.

The last set of options for the trigger approach determines if the base allocations for the quota up to and including the trigger would change over time, and these sub-options are only applicable if the options for regional surplus allocations is selected. Sub-option D4-A is for a static based allocation, where the quota up to and including the trigger would always be allocated using the same initial allocation, and Sub-Option D4-B is for dynamic based allocations. That means that each year the quota up to and including the trigger amount would be allocated according to the previous year's final state allocation. That results in those base allocations changing over time. Next in Option E, this is also a trigger approach, but the surplus quota would be applied to increase the Connecticut and New York allocations first, before going to other states.

It proposes using the 3-million-pound trigger level, and the first 3 million pounds would be distributed based on those initial allocations, and then surplus quota would first be used to increase Connecticut's allocation from 1 percent to 5 percent, and then additional surplus after that would be to increase New York's allocation from 7 percent to 9 percent.

Then lastly, any remaining surplus quota would be split between the northern and southern regions, based on the proportion of biomass in each region from the stock assessment, and then allocated to the states within each region in proportion to their initial allocation. The last approach is Option F, which we're calling the percentage approach.

The way it would work is that it would allocate a certain fixed percentage of the annual coastwide quota to the states, based on the initial allocation, and the remaining percentage would be allocated in a different way, either evenly among the states or regionally. Sub-option set F1 determines the percentage of coastwide quota that would be allocated based on the initial allocations.

The two options are either 25 percent or 75 percent, and like other sub-options these are also meant to represent a range for the Board and Council to work within. The 25 percent option would result in allocations that are more different from the current allocations, and the 75 percent option would result in allocations that are more similar to the current allocations.

Like the trigger approach, this percentage approach also has sub-options that determine how to distribute the percentage of the annual quota that is not allocated based on the initial allocation. With Sub-option F2-A, remaining quota would be allocated to all states equally, except for Maine and New Hampshire, which again get 1 percent each of the remaining portion.

With Sub-option F2-B the remaining quota is distributed based on the regional biomass from the stock assessment, and if Option F2-B is chosen then Option set F3 determines how the regional quota is distributed to those states within a region. F3-A is to distribute the regional quota evenly to states within each region, and F3-B is to distribute the regional quota in proportion to the initial interregional allocation.

Again, under both these options Maine and New Hampshire are getting 1 percent of the northern region quota. For those options that would use a regional distribution of black sea bass from the stock assessment as a basis for regional allocation. There are two options for defining the regional configuration.

Option G1 would establish two regions, a northern region, including Maine through New York, and a southern region including New Jersey through North Carolina, and Option G2 would establish three regions, Maine through New York would make up the northern region. New Jersey would be an individual region, and Delaware through North Carolina would make up the southern region. While both of these are generally aligned with the spatial sub units used in the stock assessment, which are just divided approximately at Hudson Canyon, Option G2 is attempting to address New Jersey's unique position where some of its waters are in the northern region and some in the south.

Under Option G2, New Jersey is treated as if half of its initial 20 percent allocation comes from the northern region and half from the southern region. That covers all of the options for the state commercial allocations, and this is just a summary table of everything I just went over for reference.

That brings us to today, the Board and Council will be considering which of the state allocations to adopt, and following that decision considering final approval of Addendum XXXIII and the Council Amendment. If the Addendum and Amendment are approved today, then these are the next steps for each action.

For the Commission Addendum, the Board can select the implementation date, and that's when a new allocation would go into effect for the states. For the Council Amendment, if approved, the Council would need to write out the Draft Environmental Assessment and submit that with the Amendment to NOAA Fisheries, and then additional changes to the document might be made based on the feedback from NOAA Fisheries, and once that's done, the federal rule making process would begin, including the proposed rule and public comment period, and then Final Rule.

From today to publishing the Final Rule, you would usually expect this process will take between 10 and 16 months, but there is a possibility of that taking longer if there is additional workload of some other actions ongoing. With that, that is all I have to cover, but I will pass it over to Julia Beaty of Council staff now, to go over the Council staff recommendation.

MS. JULIA BEATY: Just to kind of kick off the discussion. This is the Council staff recommendation for changes to the allocation percentages among states. It's based on the percentage approach, but it does first allow for that increase for Connecticut, the increase from 1 percent to 5 percent.

Then it uses the percentage approach to first allocate 75 percent of the annual quota, based on those initial allocations, which would account for that Connecticut increase to 5 percent, and then the remaining 25 percent of the quota will be allocated based on the most recent regional biomass distribution information from the assessment.

Then that regional amount is further divided among the states within the regions in proportion to their initial state allocations, which would account for that Connecticut increase to 5 percent, and accept that

Maine and New Hampshire would each receive 1 percent of the northern region quota, as Caitlin described.

Under this recommendation there is the three-region approach, with Maine through New York as one region, New Jersey as its own region, and Delaware through North Carolina as a third region. The reason that this combination of alternatives is the Council staff recommendation, is that first of all it addresses the unique position of both Connecticut and New Jersey, and they are unique for different ways. As Caitlin described, Connecticut has this particularly low current allocation, which is kind of a mismatch with the big increase in availability that they've seen in recent years, so this recommendation addresses that.

Then it also addresses the fact that New Jersey is in a unique position, in that it straddles the border between the northern and southern sub-units as defined in the stock assessment, so it allows for that kind of, for New Jersey to be treated as if it's different from the other states in that way.

But also, the rationale behind the percentage approach is that it allows for some amount of the quota to account for recent distribution information, regardless of whatever the overall quota level is. This is different than this trigger approach, for example. A trigger approach would have the allocations change, depending on what the overall quota level is.

This approach is the same no matter what the overall quota is. You always have some amount of the quota that would account for distribution information, but most of the quota, 75 percent would be allocated according to these initial allocations, so it is seeking to balance a desire to account for the historical dependence of states on the fishery, that is that 75 percent, and then while also allowing for some amount of allocation to shift around to account for more current biomass distribution.

This would be updated every time we get new distribution information from the stock assessment. In that way it will help to provide continued fair access to the resource, because it is not going to send allocation, this is going to stay completely unchanged for you know two decades, because part of it would be always updated every time, we get that new biomass distribution information.

There is an example of what the recommendations would look like under that most recent biomass distribution information, which is based on data through 2018, the information that we have right now. Again, the staff recommendation is to approve that process that I described. You wouldn't be approving a specific percentage to a state in any given year, but this is an example of what that process would result in with the current biomass distribution information.

To kind of walk through this table, there is a row for every state, and then that first column there is what the allocations currently are, and then the next column is what would be to find the initial allocations accounting for first bringing Connecticut up to 5 percent. Then the next column is the revised allocations, where 75 percent of the allocations is based on those initial allocations, and the remaining 25 percent accounts for biomass distribution, according to the most recent information that we have.

Then the last column is the difference between that revised allocations column and the current allocations column. You can see that under this example, no state would lose more than 4.21 percent of the total coastwide quota, and no state besides Connecticut would be more than 2.1 percent. It moves a total of 10.21 percent from New Jersey to North Carolina to Maine through New York. It does move some allocations to account for recent biomass distributions, but it's not taking a huge amount from some states and giving a huge amount to other states, so it's trying to keep a balance in that way. That's all I have for the Council staff recommendation for the group to consider, and I think that's it for the whole presentation. I don't know if Caitlin, you needed to say anything else at this point. But that's all I have to say for the Council staff recommendations.

MS. STARKS: Thanks, Julia, no that is all I have as well, so I think we're happy to take any questions, if that's okay with the Chairs.

CHAIR NOWALSKY: All right, thank you very much both Caitlin and Julia. First, let me begin for thanking Caitlin for all her time and efforts on black sea bass over the years. It's been a pleasure working with her. I suspect no one is counting down the clock until 4:30 faster than Caitlin today. That being said, let me first turn to Mike Luisi, to see if he's got anything he would like to add, based on the presentation we've heard. Then we will turn to the Board and Council for questions.

CHAIR LUISI: No, I don't have anything to add, other than I think what we need to discuss is process. During our December meeting we had the conversation about voting on these alternatives. We decided that at the time the Council would vote first on whether or not to add the allocations into the federal FMP, and we did that.

I think at this point, you know Adam, you and I Have talked. We're at the point where any motion that is made regarding a state-by-state allocation will be taken up first by the Board, then the Council will follow, and I'll call the question for the Council. As far as process that is the one thing I wanted to add. The other thing I wanted. I had a question, if it's okay, Mr. Chairman, if I ask a question of Julia or Caitlin, is that okay?

CHAIR NOWASLKSY: One hundred percent okay.

CHAIR LUISI: I wanted to get a little better handle on what the difference is between New Jersey being its own region or being within the southern region. Is there information about how allocations would be different, or does it all basically smooth out and, you know once it is all said and done, if New Jersey is its own region.

Are the allocations all the same? I just want to get a little bit better understanding about what the difference is between them being by themselves, or being with the southern region, as far as allocations go, based on the alternatives? Maybe that's a question for Julia, or Caitlin, but if you can help me with that that will be great, thanks.

MS. STARKS: Mike, this is Caitlin. I'm happy to try and answer that in a general sense. In Draft Addendum XXXIII there were some analyses done in the appendix with all the different examples of the trigger approach and the percentage approach, and how those outcomes might look. Some of those examples included a two-region approach, and some included a New Jersey individual region. That is a good place to look if you want some specifics. But in general, I would say, from looking through most of those examples that were done, is that New Jersey when It's treated as an individual region, because it's treated as if some of its quota is coming from the northern region and some of it is coming from the southern region. As those allocations are shifted, based on the regional distribution of biomass, New Jersey has seen some increases for a part of this.

Its quota is derived from the northern region in part, so it is seeing an increase from that part, and a decrease simultaneously from the southern region. New Jersey's allocation doesn't change as much as some of the other states do over time, and I would say it kind of hovers around that 20 percent, more closely than some of the other state allocations, if that makes sense.

CHAIR LUISI: Yes, that helps, thank you.

CHAIR NOWALSKY: All right, so a full disclosure in the list of questions. Mike did have his hand up first, so that contributes to his 100 percent okay rating for going ahead and answering questions. In terms of hands that I see right now. I've got Jim Gilmore, Tony DiLernia, and then Jay McNamee, so we'll go to Jim Gilmore first.

MR. GILMORE: I got it pretty clear from Julia and Caitlin, so the staff recommendation was under F, and I think you explained pretty well the rationale behind it. However, the one thing you didn't elaborate on and I wish you could, is that I guess it supposes that this is better than the DARA option.

But I'm still having a little trouble understanding why the DARA options are not being considered, or the F option was a higher priority than the DARA option, because the one thing that any of the triggers or Option F does, we're still holding onto the past. We're going to forever use data that we have that will become at some time 50 to 80 years old, and we're going to possibly include that.

To me the one thing that the DARA option provides is that it does this gradually, and it really looks at leaving the past and going into the future may be the right way to do it. Some of those DARA options provide less impact to the southern states, the percentages are a lot smaller. Could you just elaborate a little bit more, as to why the DARA options were not chosen, and why the F ones are really superior to them?

CHAIR NOWALSKY: Jim, before I turn to staff, let me just make a couple of clarifications. Number one, the recommendation that is before us right now is a Council staff recommendation, it is not an ASMFC staff recommendation at the present time, and Julia was kind enough to offer that up as a starting point for discussion. But let me say that as we go through the day, after we get through questions and we get to motions.

It is not my intention to have that be the first motion. It will be at the discretion of the Board. If in the order of operations of people speaking, we get to a point where we're ready for motions, and somebody chooses to make that motion and it becomes the first motion, so be it. But it is not the default first motion that we're going to consider, it is a Council staff motion and it is not an ASMFC staff motion. I just want to provide that little bit of clarity before we turn to Julia, if she wants to elaborate, since it was a Council staff recommendation or any other staff members that would be appropriate to provide feedback to Jim.

MS. BEATY: This is Julia, I can respond to that. You know in short, the reasons this was preferred by staff over the DARA approach is that it's more simple. The intent by half behind having it be the 75/25 percentage, is that gets at a similar idea to what you said with DARA, where it's not making a big change.

It would be updated every time you get new biomass distribution information that 25 percent as provided among the regions would shift, potentially every time you get new biomass distribution information. But you're right with the DARA approach, you could kind of phase the changes in more explicitly, and if you wanted a bigger change you could phase that in over time through the DARA approach, and this does not have a phase-in.

But because this 75 percent is always distributed based on the initial allocations, Council staff thought that this could be okay to not phase it in, because it's not a tremendous change. If there is any other part of the question that I missed, I can elaborate. But you know as far as this is a more simple, straightforward approach that was trying to achieve some similar things to what the DARA approach is trying to achieve.

MR. GILMORE: Thanks, Julia, that's good.

CHAIR NOWALSKY: I suspect there is going to be a lot more discussion as we get into motions about the merits of the opposed view, so thank you. Next up we're going to Tony DiLernia.

MR. TONY DiLERNIA: To continue this discussion on the DARA approach and what Julia was mentioning. Julia, the DARA approach basically is a percentage distribution, but could you use the formula in the DARA percentage distribution and apply it to the regions? Is that a way that this could be, the calculation of the DARA approach be applied towards the different regions. Can you do that?

MS. STARKS: This is Caitlin. I'm just going to jump in front of Julia, because I think I probably can answer that. First, I want to make sure it's clear that the DARA approach does a regional approach. That is the first part. I guess with that knowledge, does that answer your question?

MR. DiLERNIA: No, no, that is what I thought. I thought I could use the DARA approach; it is

extremely clear as a regional approach. Then, I guess the next question is a process question to leadership again, to you, Mr. Chairman. If there is going to be a decision tree that occurs in this discussion.

I would think that the first decision would be what the regions would look like. If we're going to use a regional approach and what the regions would look like, because once that is determined then I think everything else flows from the composition of the different regions. That's my thought. I don't know what your preference was, Mr. Chairman, in making again, following this decision tree. But my recommendation would be first to decide if we're going to use regions, and if we are going to use regions what those regions would look like.

CHAIR NOWALSKY: Well, I'll offer my thoughts on that. The document as it currently lays out would suggest that perhaps the greater precedent is what to do with regards to any slot late adjustment to any state, Connecticut in particular. With regards to the regional approach, I think the implication of those regions vary by approach that we take, and for example, once we get down to the trigger, the trigger does what it does regardless of what the configuration of the regions are.

From my perspective, in our conversations with leadership and staff. We did not come into this discussion with any preconceived notion of what the order of decisions would be. Again, I think I would leave it to the Board and the Council, and the preference of motions that are made, to actually decide that. I'll turn to Mike if he's got any other thoughts with regards to the preference, and whether he feels there is a need for a regional decision to be made before any other decisions.

CHAIR LUISI: No, nothing more to add. To Tony's question. Tony, I think what's going to happen, from discussions that I've had with folks over the week, last week, is that kind of a full suite of the allocation decision is going to be kind of packaged together like a suite of options that combined together present the direction forward.

But like Adam said, if you would rather take it piece by piece that's okay too. I just think that it might be cleaner if all of it presented, all of the allocation alternatives are presented in one package. I think of it as like a package. That might be an easier way to make decisions, because you're making a decision based on the full suite of options, instead of one option at a time.

MR. DiLERNIA: You're right, I understand what you're staying.

CHAIR LUISI: It's up to the Board and the Council how they want to deal with it.

MR. DiLERNIA: Okay, but there is a lot of moving parts here all at the same time. Maybe going back to what Adam was discussing, I want to say suggesting that maybe we make the decision first, do we want to use the trigger approach or not? If you don't want to use the trigger approach, if you discount the trigger approach, then that discounts automatically a whole bunch of different options, so that you can begin to focus on other options as you go down that decision tree.

That's fine. My suggestion would be somehow to try to just make this a linear type of decision process in which you decide trigger or no trigger. If there is no trigger then what's the next, that would probably be DARA, and then once you get there, well it would be DARA, and then do we want to do what are the regions going to look like? Just try to kind of slow down all these parts going in a different direction. Right now, I feel like an octopus here, trying to cover everything at the same time.

CHAIR NOWALSKY: What I've got on a list of people right now, and this is questions. Let's make sure that we leave ourselves enough time. Again, I'm expecting a number of motions to be made on this topic, and I think we're going to have a lot of debate and we're going to need time on them. Let's make sure that any questions right now are relevant to what is going to impact your decision making, as to whether or not you want to put a motion up. I'm going to go through a list of people that I have right

now to speak, and if you have a question, raise your hand now.

We'll go through this process one more time after this bout of questions, to see if it raised any other questions. Then after we get through the list of questions, then I'll come back and we'll go ahead and we'll have a race to raise hands to see who can get the first motion on the table first. Let me see a show of hands of people that have a distinct question that is going to impact their decision making. I had Jay McNamee from before, other hands have gone up.

I've got Eric Reid, I've got Emerson Hasbrouck, I've got Dan Farnham, and I've got Dave Borden. We're going to go with that for a list of questions, and then again, I'll ask one more time after we go through these five individuals, and then we'll get on to the business of decision making. Jay, you're up next with a question. I see Jay toggling back and forth in the webinar, but we're not getting anything on this end. Let me go on to the next person, Eric Reid, and then I'll come back to Jay again after Eric.

MR. ERIC REID: I've got a general question on, maybe on the process. Would that be fair game right now?

CHAIR NOWALSKY: Go ahead.

MR. REID: Since this is now a joint action of the Commission and the Council, my question relates to National Standard 4, which is allocations, and it's with regards to two specific states. Section B, National Standard 4 is discrimination amongst residence of different states, and it says that an FMP may not differentiate among U.S. citizens, national resident aliens or corporations on the basis of their state of residence.

Subsection 1 further states that an FMP that restricts fishing in the EEZ to those holding a permit from State X that violates Standard 4, with State X fishing permits only their own citizens. I asked this question. State X relates to Maryland and Delaware, and their ITQ fisheries which occur in the EEZ. Is there any guidance on how this action affects those?

CHAIR NOWALSKY: Thanks for the question. Let me turn to staff to see if they've given any consideration, as I know they've done a lot of analysis work that would have to be included in an Amendment. Let me turn to staff first, and depending on what they're able to provide, perhaps we can go to Fisheries Service. I'm guessing if we were all in a room together, they would probably be looking at each other, wondering who was going to try to kick it.

MS. BEATY: This is Julia. I can start, I guess. On the one hand, from the federal perspective, it's not restricting who can have a permit in which state. It's just saying how much black sea bass can be landed in each state. The federal side of things isn't going to restrict to individuals as a resident of a state for example, it's just going to say where can these black sea bass be landed, and I'm not sure if there is anything else to add to that from the individual state perspective. Also, maybe GARFO might have other things to weigh in on that. But that's all I can say from my initial first thoughts on that from a Council staff perspective.

CHAIR NOWALSKY: Anything from the Service or legal from the Service might want to weigh in on National Standard 4 on the discussion so far, understanding that they haven't seen all the documents of the analysis, but based on Eric's questions? Mike Pentony, I see your hand is up. Is this to weigh in on this question?

MR. MIKE PENTONY: Yes.

CHAIR NOWALSKY: Go ahead, please.

MR. PENTONY: I'm actually trying to figure out, or see exactly what it was that Eric Reid was just reading, because there was some text that he was reading that went beyond the script reading of what is in National Standards 4 in the Magnuson Act, which in terms of this approach is. National Standard 4 says that allocation shall be fair and equitable to all fishermen, reasonably calculated to promote conservation, and carried out so that no individual has an excessive share. I'm hoping to get,

maybe Mr. Reid can point me to the additional text that he was reading.

CHAIR NOWALSKY: Eric, are you able to help Mike out on that?

MR. REID: Yes, sure. I'm reading an electronic code of federal regulations CFR data, current as of January 1, 2021. It's National Standard 4, which is 600-325, and I'm referring to Section B and Subsection 1 in that line.

MR. PENTONY: That's also sent out from the National Standard Guidelines. Let me take a quick look at that and I can get back to the Board and the Council on that.

CHAIR NOWALSKY: Yes, that would be great. If you just go ahead and put your hand down, and put your hand back up when you're prepared to go ahead and provide some more input, we'll come back to you. Next, Jay McNamee. How are you making out with audio on your end?

DR. JASON McNAMEE: Hi Mr. Chair, can you hear me?

CHAIR NOWALSKY: Outstanding, you're good to go.

DR. McNAMEE: Okay, and what I will do is say never mind, I'm good. Thank you.

CHAIR NOWALSKY: All right, well we've proved that we can get your audio going, so that gets you in a good spot. All right, next up Emerson Hasbrouck.

MR. EMERSON C. HASBROUCK: Thank you, Caitlin and Julia for your presentations. I have a couple of questions. Jim already asked kind of what I was going to ask, so I don't need to repeat that. But I'm wondering, Caitlin or Julia, would you have any information or a table that shows what percentage of the state quota each state harvested, in like 2020 or 2019? Have all states been harvesting 100 percent of their quota? I would like to see that; you know what percentage of the individual state quota states are harvesting.

CHAIR NOWALSKY: Do we have that information available, or would that be something we would have to pull up and come back to?

MS. STARKS: I would have to pull it up and come back to it. We do have the information for previous years, although I would say for 2020 data is still preliminary, so definitely not final. I don't know if we should share those data or not. More vetted, but I can pull up information from 2019 and previous.

CHAIR NOWALSKY: All right, we'll give you an opportunity to do that and come back to that. Emerson, did you have another question you wanted to ask? Right now, you're on mute on the webinar, Emerson.

MR. HASBROUCK: Yes, I'm sorry, Mr. Chairman. I couldn't hear what the response was. I lost audio from the webinar.

CHAIR NOWALSKY: The response from staff was they don't have that information immediately available; they will try to pull up 2019 info in short order. They may not be able to provide 2020 at this point, due to it not being finalized. We'll try to get an answer to that percentage of state allocation that was harvested as quickly as they can. While they are looking at that did you have another question you wanted to ask?

MR. HASBROUCK: No, thank you, Mr. Chairman, I'm good for now.

CHAIR NOWALSKY: We'll check back with staff. Just chime in, since I can't see hands raised for staff. Just when there is a break here just go ahead and chime in if you've got an answer to that. Let me go back to Mike Pentony, he's got his hand back up to try to address Eric's question about NS4 document. Mike.

MR. PENTONY: Yes, thanks. This isn't probably going to be a terribly helpful response, and John Almeida may want to follow on. As I'm reading the National Standard Guidelines, the section that Eric Reid was reading is kind of an expansion of National Standard 4, Subpart A. The National Standard is that all allocations, well allocations shall not discriminate between residence of different states.

Any allocations that are necessary should be fair and equitable to all such fishermen. Then the National Standard 4 kind of expansion of that is getting at that you can't differentiate among citizens on the basis of their state of residence. I've always interpreted that, and I believe the Agency has always interpreted and applied that to mean that our regulations can't be based on the state of residence.

In other words, if we issue a fishing permit to Vessel A. We can't say, well your possession limit is 10,000 pounds if you come from Massachusetts, but if you come from New York your possession limit is 100 pounds. We issue a federal permit, and the federal permit does not discriminate what you can or can't do based on your state of residence. Now that's a very different issue than allocating quota of what can be landed in a state, which we've clearly done in a number of FMPs on the federal side, summer flounder and bluefish jump immediately to mind, and we've never had any National Standard 4 issues with the state-by-state allocation.

Allocating quota to a state for landing is, in my mind, a very different question than discriminating of the residence of the state, in terms of what they can or can't do with their federal permit. I hope that helps a little bit.

CHAIR NOWALSKY: All right, thanks Mike, we'll take that as a reply for right now, and as we get into motions later, perhaps that information will be used in rationalization for the motions, thank you. Next up I've got Dan Farnham, and Dan you are presently muted in the webinar. There you go, you are unmuted in the webinar, make sure your local device is not muted and go ahead.

MR. DAN FARNHAM: Number one, my internet is starting to go, I'm sure I might lose it here. If I do, I'm going to call you on my cell phone. But in the meantime, I just have a quick question for staff. On the memo for staff recommendations that I have. For regional configuration alternatives, I thought the original memo had down Sub-alternative 1G-1, which is two regions. But now in the presentation, if I heard it correctly it's 1G-2 with three, with New Jersey being alone. If that's the case, is there any rationale. If I read this right and I see it right, what was the rationale for changing the opinion, if you did?

CHAIR NOWALSKY: You did read that correctly. That was a change in the Council staff recommendation from the December meeting. Julia, would you like to go ahead and offer Dan some feedback on that?

MS. BEATY: Sure, yes, that is correct. Back in December the Council staff recommendation was for two regions. Again, because it was a more simple approach, kind of just directly taking the regions and splitting them up that way. But then after further consideration, and you know discussion with staff and others. You know it was determined that New Jersey is in a unique position, and the stock assessment itself did acknowledge that New Jersey straddles that boundary.

It's not overly complicated to add on another step to it, split New Jersey out the way that is described in the document, where New Jersey will be treated as if half of its allocation is associated with the north and half associated with the south. Just further consideration it did seem appropriate to add one additional step in the calculations to acknowledge the unique position of New Jersey.

CHAIR NOWALSKY: Great, thanks, Julia. Next up I've got Dave Borden.

MR. DAVID V. BORDEN: I've got a couple of questions, simple ones. It's highly likely that somebody is going to propose something that is between, the values will be between some of the values that have been analyzed. Do we have all of this information in a spreadsheet, so it can be analyzed on the spot to answer questions about its impact on different states?

CHAIR NOWALSKY: I can't promise, Dave, that we're going to have every analysis for every possible range of percent option that could be come up with between status quo and the changes that these documents contemplate at their greatest divergence, if staff is able to at the time provide information. We will certainly ask them to provide as much as they

can. But I can't guarantee that for every motion that comes before us today you're going to be able to see a concrete analysis of what that percent change means to every state, and in what timeline that is going to be.

MR. BORDEN: Okay, and then the follow up would be. On the landing information, I looked earlier on the NOAA site at the landing information. Basically, I recognize that it's preliminary, subject to change, and it will change. But that landing information basically indicates that most of the New England states, with the exception of Rhode Island, caught their quota in 2020, and the states south of New Jersey did not, some by very substantial amounts.

I would just make the comment that that I think is a significant factor we're all going to have to take into consideration. The last question relates to an issue that has already come up, which is ITQs. I'm just wondering whether or not the Council staff has gotten any guidance from NOAA about this issue. We have three states in the Mid that have ITQs, which is certainly their right. Do they have, has the Council staff looked at the issue of extending those ITQ fishing rights into federal waters without going through the formal process that is required by Magnuson?

CHAIR NOWALSKY: We'll turn to staff, if they have any input again, or the Regional Office, with regards to the implications of ITQs, and these allocations being written into the federal fishery management plan.

MS. BEATY: That sounded like a question related to alternatives impacting federal waters, so I think I'll take a stab at. This is Julia. If I understood the question it was, does the document contemplate using ITQs in federal waters basically, or extending the state waters ITQ to federal waters. The answer is no.

There are no changes to the federal waters permit, which the federal waters permit allows you to fish anywhere in federal waters, and that would continue to be the same under any of the alternatives in the document. The changes in this document that we're talking about today just relate to how many fish can be landed in any particular state. Anybody who has the appropriate permits could land in whatever state.

If you have a federal permit you can catch your fish anywhere in federal waters, and you know all the states have different requirements for who can get a permit. There are plenty of fishermen who have permits in multiple states. Anything under consideration in this document you could continue to land in the states that is open, if you have the right permits. If you have a federal permit you could continue to fish anywhere in federal waters. There is no contemplation of extending ITQs into federal waters in this document.

CHAIR NOWALSKY: Thanks for that. It's a direct answer with regards to not extending the ITQs into federal waters. I appreciate that. Again, since we've already had the motion to go ahead and move that into the federal FMP, we'll leave that there, absent some motion to reconsider, which I don't think that anyone is intending to make that has been brought to my attention so far. We went through a list of initial people.

Additional hands have gone up during that discussion include John Clark and Wes Townsend, so I am going to go to both of those individuals. Let me also just bring to Dave Borden, Dan Farnham, Mike Pentony and Emerson Hasbrouck that your hands are still up. If you do have something else you need to add, I see we've got a lot of them down with that so that's good. But if you did have something else to add, then go ahead and leave the hand up. Let me go to John Clark and then Wes Townsend. John, you're up.

MR. JOHN CLARK: We have direct experience. Eric mentioned Delaware specifically on the question about the ITQs. We did have a black sea bass federal permit that was up for sale a couple years ago. We were challenged about the fact that you also needed a Delaware permit to land in Delaware.

Not to belabor the point, the upshot was that yes, we were found to be fine. We were operating under

Magnuson Stevens, and there was no problem at the federal side, as far as us requiring both a federal and a state permit to land black sea bass in Delaware, and it was also fine for us to allocate our black sea bass by ITQ. Thank you.

CHAIR NOWALSKY: Thanks for that follow up, John. Wes Townsend, question?

MR. WES TOWNSEND: No, Mr. Chairman, just to answer Eric. Similar to what John had to say. There is, all Delaware permits are not owned by Delaware residents, and it's the same way in Maryland. All Maryland permits are not owned by Maryland residents. All right, thank you.

CHAIRMAN NOWALSKY: Paul Risi, did you have a question you wanted to ask? All right, I'll give him a moment. Again, I've got Paul's hand up, but I see he is muted in the webinar right now. We'll give him a moment. We're an hour into the agenda, we've gone through presentations, we've gone through quite a few questions. I'm going to ask one last time.

I've got Jay McNamee's hand up, we'll come back to him. We'll try to get Paul Risi here. Are there any other pressing questions before I ask everybody to put their hands down? Then I think we'll get onto the business of somebody getting a motion before us. Hands up if you have any more questions that have to get answered before we move forward. Let me go back to Jay McNamee, and then again, we'll try Paul, if he can get unmuted off the webinar, go ahead, Jay.

DR. McNAMEE: I was just nervous before that somebody had asked my question. I didn't want to waste everyone's time, but I don't think it has. My question is, there was a little bit of economic information in the document itself. My question is, I was wondering if there has been any synthesis of that information, either by the Mid-Atlantic Council or the ASMFC. I'm not sure, seeing as how this wasn't in the federal plan up until recently. I'm not sure if NOAA has looked at the economics, or doing any economic analysis. But I would be curious if there is any information on the economics of these various options that anybody is willing to share.

CHAIR NOWALSKY: I'll turn to staff for trying to answer the question. Is there any economic information to help inform our decision making today?

MS. BEATY: This is Julia, I think I might be the best one to jump in here, unless Commission staff want to. But we did have some pretty simple economic analysis in the document. It's one of those backup slides, it looks like it's Slide Number 57, if someone could move to that slide. There is a figure in the document that shows the relationship between the average price per pound and total landings broken down by region. Yes, that one.

This is as fancy as we got. Landings, and sorry about that X axis. It's supposed to say 0.51, 1.52, not 11-22-33, so sorry about that. Anyway, the open circle, so the average price per pound associated with the landings in that year for the northern region states of Maine through New York, and in this figure, New Jersey is included with the southern region.

Then New Jersey through North Carolina are lumped together in those solid gray dots. What this is showing is that when you, if you first look at those gray dots, and there is a gray line associated with it. There is generally more towards the white, because there are higher landings on the right.

The states of New Jersey through North Carolina as a group have a greater amount of the allocation than the other states, but they have higher landings in any given year. Then you can see that that line is kind of like angling down, and that means that in years when there are higher landings in those states, the average price per pound tends to be a little bit lower.

Then for the northern region states that are over to the left, with the open circles, I guess. There is also a downward sloping line there, but you can see the equations on the chart that lower our squared value means that it's not a significant relationship. You can see that those open circles are kind of all over the place, they are not forming a clear downward trend like the gray circles.

Long story short that there does seem to be more of a relationship between price and volume landed in the southern region states compared to the northern region states. But the southern region states have been able to land more historically than the northern region. We didn't get into any particular specific alternative, in terms of quantifying the economic impacts in this way.

But in general, if you look at a figure like this you could make a conclusion, based on this price and volume relationship, maybe this would suggest that if you have a high amount of total allowable landings, and you shift some of that to the north. You know maybe that would have different economic impacts in the north than the south, because the south does seem to have more of this negative relationship between price in volume landed.

At the higher landing's levels, they are not seeing, you know from just this whole, some of that increase is mitigated by this relationship between price per pound, and there is not that same relationship in the north. Maybe the total economic benefits to harvesters could be increased if you moved some amount of allocation from the south to the north. But we didn't specify, this is the exact percentage that would maximize economic benefits. We didn't try to spell it out for any individual alternatives.

Also, you could make a socioeconomic statement along the lines of, you know if you knew how the states manage things differently. Maybe there are differences in terms of number of people that can participate in the fisheries, as you shift things to different states. It kind of makes some general statements along those lines, but nothing that can conclusively say, like this is the alternative. These are the allocation percentages that would maximize your economic benefits.

CHAIR NOWALSKY: I think the answer to your question, Jay, is that there has been some economic analysis done. Whether or not you feel it is complete enough or accurate is a different question. But I think this is something that there is some economic analysis has been done so far.

DR. McNAMEE: I appreciate that, thank you.

CHAIR NOWALSKY: Let me try Paul again, I did see him get the webinar to toggle off his muting. Let's see if he can get that again. Paul Risi. Yes, there you go, you are able to speak on the webinar. Make sure your device is not muted, go ahead.

MR. PAUL RISI: My question is about the Council recommendation. I'm curious. Can staff offer any insight about how maintaining the volume harvest rate of the present state is affecting, and going forward how it is going to affect the already diminishing biomass that is down there? Like is there a table of local fishing mortality in each state, compared to the FMPs target F?

CHAIR NOWALSKY: With regards to the question about diminishing biomass. I think we've got a lot of information about increasing biomass in the north. I'll defer to staff if they think that information has suggested there has been a decrease in southern biomass, or if this increase is the increasing at the northern end at a faster rate. Then beyond that I'll turn to staff, to see if they've got anything else that they would like to add.

MS. STARKS: This is Caitlin, and I can at least answer the first part of the question related to the stock biomasses in each region. You are correct in saying that the southern region hasn't necessarily diminished over time, it's kind of a flattish line with a slightly increasing slope at the end of the last couple of years of the time series.

But the northern region has increased much more drastically over time, and you know there has also been a slight decrease in the northern region in the last year or two, according to the stock assessment. Then as for the question related to F in the different states. I don't believe we have that information. Julia, feel free to jump in if you have a different answer than that, but when it's appropriate I also have an answer to the previous question that was asked about the states harvesting their quotas as a percentage averaged over time.

CHAIR NOWALSKY: Great, so let me just see if Julia has anything else that she would like to add on this topic, and then we'll come back to you about that question that Emerson had. Julia.

MS. BEATY: I would like to add on to that. It's true, there is a figure that we didn't put in the presentation, but it's in a document that shows biomass remaining fairly stable over time in the south, but increasing in the north. In general, the stock assessment does show that overall biomass is on, last we knew anyway, it's still very, very high overall, but on a downward trend compared to a peak of a few years ago.

But I also wanted to make it clear that we don't have separate regional like target biomass levels or reference points. We're not managing them separately, so we're not aiming for like a target fishing mortality level for each region, or a target biomass level for each region. That is not the intent of this action at all. We're still managing it as one stock, with one biomass target, you know one overall catch limit.

The stock assessment does use a regional structure, but in the various levels of peer review of the assessment it was kind of very clear that they are not meant to be managed as separate stocks, that they're modeled separately because it helps into the model, but they are not separate stocks. We are going to continue to manage them kind of as a coastwide unit, and all these alternatives would do is just shift around where those fish could be landed.

Like I said earlier, if you have a federal permit you can still fish anywhere in federal waters, and then you can land them in any state that you have the permit for. States do allow you to have permits in multiple states, like was discussed you don't have to be a resident of the state to be able to land in that state.

You might have to meet some other conditions, depending on the state, but this is not expected to really change where the fish are harvested. It is going to change where they are landed. If you only have a state permit, maybe that will impact where you harvest your fish, if you're not already fishing in federal waters.

But if you're already fishing in federal waters, to some extent you're already going where the fish are. You are choosing where to fish, based on a number of factors, and then you're landing also based on a number of factors, one of which is the allocation. I just want to make it really clear that we're not going to manage these with separate catch limits. We're not managing separate regions. We're just considering changing how many fish can be landed in each state.

CHAIR NOWALSKY: All right, thanks for that, Julie, I appreciate it very much. Let's go back to Caitlin at this point to try to wrap up Emerson's earlier question.

MS. STARKS: As I mentioned, 2020 data is not final, so I am going to be talking just about 2019 back to 2015 as kind of the most recent years. In those years, in general the states from Massachusetts to New Jersey have harvested their share of the coastwide quota, and then some of those states have also harvested beyond that through the use of transfers from other states. As for the states of Delaware through North Carolina, they've generally been close to their allocation. In some years they've fallen a little bit more below, and they have provided transfers to other states. That's a general sense, I don't know if you would like me to give more specific percentages, but that's kind of the average across those years.

CHAIR NOWALSKY: Emerson, is that generalization satisfactory right now, or do you need to see specific percentages inform you that are going to inform your actions as we go through motions today?

MR. HASBROUCK: Well, it's okay but it's just general, right. I mean it was some years they were generally below their quota. I don't know what that means, you know was it 5 percent below, or was it more significant than that? Dave Borden mentioned before that he had some preliminary 2020 data that showed that the southern states were utilizing far less than what their quota is.

CHAIR NOWALSKY: Emerson, magic is appearing right before your very eyes, kind of like snowflakes out of the sky.

MR. HASBROUCK: That's great, thank you.

CHAIR NOWALSKY: I'll give staff an opportunity to go ahead and put this up here. I don't intend to get into a long discussion about it, but I'll ask staff to leave it up here for consumption by everyone.

What we're going to do at this point is I'm going to ask if anybody has still got a hand up from the Board and Council, we're going to go ahead and put hands down.

We will go to the public with regards to comments on motions before we vote on anything. We'll be sure to go to the public before we take a vote on motions. What we're going to do, is in a moment I'm going to go ahead and ask for hands to go up of people that intend to make a motion here.

I'll call on the first one that I see that goes up at that point. That motion will need to, it can be made by either the Council or the Board. It will need a second from the same body. It will then need to be made and seconded by the other body, either the Board or the Council. We will then go ahead, and if somebody has a substitute motion, I'm going to get right to getting that substitute motion posted at the same time.

Once somebody makes a motion, if there is a desire to make a substitute to the motion that is posted. We're going to get that up at the same time. At that point I'll then get a show of hands, and we'll go ahead and begin debating the motions. I expect they are going to be somewhat in opposition to each other. Then we'll make sure that if one of those motions, if we get to a point that we vote on it up or down, it becomes the main motion. If there is another action that needs to be taken on it, we'll go ahead and do that as well.

The vote again, as Chairman Luisi mentioned earlier, will be done Board first, and then assuming it passes, the Board, motions will then need to go before the Council. With that let me go ahead and see a show of hands of people that intend to make a motion on these state allocations.

All right, so I saw three hands up. In the order that I saw them, I saw Jay McNamee, John Clark, and then I saw Nichola put her hand down. Let me first go to Jay McNamee, for an opportunity here to make a motion. From Jay it would be coming on behalf of the Board, so it would need a second by a Board member, and then it will need like motions from the Council. Then we'll go ahead and turn to John Clark afterwards. Go ahead, Jay.

DR. McNAMEE: I'll make the motion, and then if I get a second, I'll come back to my reasoning. **The motion is, I move to approve a modified Option B, which is to increase Connecticut to 3 percent, New York to 9 percent, with a change occurring over two years. Then further that motion to approve Option C, the DARA approach, with the following sub-options. Sub-option C1-B, which is the allocations will be based on 50 percent on the stock distribution and 50 percent on the initial allocations at the end of the transition phase.**

Sub-option C2-A, which is a 5 percent change in weights per adjustment. Sub-option C3-A, that there will be annual adjustments to the factor weight, a modified allocation adjustment cap, which is a modification for C4-A, which is to cap the change in regional allocations at a maximum of 5 percent per adjustment. Then finally, I will offer a regional configuration of Option G2, which has New Jersey as a separate region.

CHAIR NOWALSKY: All right great, thanks for reading that and sparing me. I appreciate it very much. Let me just make a note to staff. Be prepared, please resize this, so we could fit something of similar size on the screen at the same time, when we get another motion. As you suggested, once we go ahead and get a valid motion with seconds and like motions.

I will come back to you to offer rationalization before I go back to John Clark. A second from the Board for

this. John Clark's hand was still up, but I don't believe that was to make a second. If I'm wrong, John, just let me know. I believe I saw Emerson Hasbrouck's hand go up. Emerson, are you seconding this motion for the Board?

MR. HASBROUCK: Yes, Mr. Chairman, I am.

CHAIR NOWALSKY: The next hand I saw go up from a Council member was Tony DiLernia. **Tony, are you making this motion on behalf of the Council?**

MR. DiLERNIA: Yes, Mr. Chairman, I so move, thank you.

CHAIR NOWALSKY: Thank you very much. We'll need a second from the Council to move forward. Do we have a second for this motion from the Council? We've got Maureen Davidson with her hand raised. Maureen, are you seconding this motion on behalf of the Council?

MS. MAUREEN DAVIDSON: Yes, I am.

CHAIR NOWALSKY: Okay, very good. We now have a valid motion before us. I'm going to turn back to Dr. McNamee to offer opportunity for rationalization on his motion, and then I'm going to turn to John Clark next. Then we'll debate the motion's pros and cons. Go ahead, Dr. McNamee.

DR. McNAMEE: I'm going to start off, I know there was a lot of hesitancy with the DARA approach, at least early on, where folks were concerned about its complexity. What I'll offer is, it's not actually at its core that complex. It's just the, it's addition, you know with some weighting. But it's fairly simple, and what made it appear complex was all of the options that got added in.

But those options were added in, not for the sake of complexity, but to give the Board maximum control over how they wanted this approach to work, and how fast they wanted it to go and how far they wanted it to go. I guess I just wanted to offer a comment that at its core it's really not that complex, it's just simply taking those distributions and historical allocation, weighting them, and kind of combining them together.

The proposal that I've offered here kind of locks those things that made it seem kind of complex. It locks them in, so it takes away some of the mystique of the proposal. What this particular configuration does, it allows the change to occur slowly over a fairly long period, and it continues to give high weight to the historical allocations, even at the end.

It's still half of the weight on the historical allocation. I believe that this is the only option that truly addresses, Caitlin showed those two objectives of the document, and this one truly addresses that initial bullet. You know this one can account for climate driven population shifts, but it's also important to remember that these shifts can occur in both directions.

A lot of what happens with climate driven effects is there is a lot of uncertainty, a lot of variability in what goes on. The DARA approach can account for that. This configuration, it's a really slow transition. It continues to weight the historical, and it also addresses at the top there the inequities that have been voiced both by the state of Connecticut and New York, so it gets them lined up with the rest of the state.

Then the rest of the process kind of goes along. They do something like this right now with the Canadians, so this isn't a new approach, it's been used in other applications for a long time, over a decade at least. If we can do it with a whole separate country, I'm sure we could do it amongst the states. A couple of final points, Mr. Chair, and I'll wrap it up.

One thing I'll note with some of the trigger options is that when you're putting in a hard threshold, based on poundage. You're going to run into an issue if the assessment rescales at some point, and we've seen that happen with a number of different Commission stocks over recent years.

I just caution folks that that hard biomass trigger that's in there. You're going to run into difficulty if the assessment rescales it. Those 3 million, 4 million,

5-million-pound thresholds might not make as much sense in the future. Again, this approach is truly dynamic, so if the biomass shifts back to the south, you know south of the Hudson Canyon. This approach is going to be able to track that, and it will be able to adjust to that reverse shift in biomass. I think I've said enough there, Mr. Chair, so I'll let others have a chance to speak.

CHAIR NOWALSKY: With regards to the seconder for the Board, and the motion makers for the Council, I will come back to them and give them the opportunity to speak on this. Let me next go to John Clark, however, to see if in fact he had raised his hand when I asked for people who wanted to make a motion. John, do you have a substitute motion that you would like to offer us?

MR. CLARK: I do have a substitute motion. I sent it to staff before, it's a motion developed by the Administrative Commissioners of the southern region, and I will read it. Move to substitute to address Black Sea Bass Commercial State Allocations by approving Option B – Increase Connecticut quota to 3 percent.

Option D – Trigger Approach, with a trigger of 4 million pounds, which is a value between sub-options D1-A and D1-B; Sub-option D2-B, Distribution of surplus quota based on the regional biomass from stock assessment. Sub-option D3-B, proportional distribution of regional surplus quota, and Sub-option D4-A, Static base allocations, and Option G – Regional Configuration Options, and Sub-option G2 – Establishing three regions with New Jersey as a separate region.

CHAIR NOWALSKY: All right, thank you very much, John. Maureen and Jay McNamee, your hands are still up. Unless you intend to make a motion as part of John's motion, if you could put them down that would be great. Again, we'll come back to you with the opportunity to speak. Do we have a second for this motion on behalf of the Board?

We have a second on behalf of the Board from Ellen Bolen. Okay, let me next turn to the Council. Do we have an individual from the Council who would like to make this motion on behalf of the Council? Ellen, did you want to make it both as a second for the Board and as a motion for the Council?

MS. ELLEN BOLEN: I am happy to make the motion for the Council as well.

CHAIR NOWALSKY: We'll have that motion made by Ellen Bolen. I had seen Joe Cimino's hand. Joe, were you going to second this on behalf of the Council?

MR. JOE CIMINO: I will, Mr. Chair.

CHAIR NOWALSKY: All right, very good. In like manner to the last motion, let me turn to John to offer rationalization on his motion, and then what we're going to do is we're going to take a five-minute break, we've been at this for an hour and a half.

During that five-minute time, I'm going to ask staff to take these two motions, format them a little bit to get the like sections in a similar order, so we can compare and contrast these motions on the screen very easily. We'll start by going through the individuals that had seconded and made the motion, and speaking for them, and then we'll open it up to the rest of the Board and Council members. John, you're up.

MR. CLARK: Going through the motion bit by bit, the first part of course it does provide a chance for Connecticut fishery, which we all recognize is a unique situation. A fixed trigger gives the necessary stability to harvesters in the southern region, who haven't been catching their allocations. Four million pounds is between the two options in the plan that's mentioned, and it's about a 66 percent of the 2021 total quota. It redistributes more of the current quota than the percentage approach, allocating 75 percent, as it would allow a third of the quota to be allocated based on distribution.

As it's been expressed at a previous meeting, and on this call right now, while the center of black sea bass distribution shifted north, there are still plenty of black sea bass in the southern region. Once again, we are not having a problem in the southern region,

most of the southern region, we're catching the black sea bass.

We also recognize the fact that due to the changes in the sector allocations and commercial quota based on the assessment, there could be changes necessary for the future, and I think the southern region is well aware of that, and will consider those down the road. But for the time being, this motion provides more of the quota to the north, and also provides stability for the southern region. Thank you.

CHAIR NOWALSKY: All right, very good. We're going to take a five-minute break. We're going to come back at 2:25. Let's just go ahead and change the Board motion by Mr. Clark, to be consistent with everything else that we've done, and then during the five-minute break, if I could just ask staff to reformat this motion here, to make it look like it's divided the same way that the previous motion was. Perfect, they've already done that.

We're still going to go ahead and take the five-minute break though. Now staff gets a break also, so I'm actually really happy to see this, because I don't have to feel bad about myself now. Five minutes, 2:25, we'll have Emerson, Tony, Maureen, Ellen, and Joe up, and then we'll get a show of hands for additional people that want to speak on these motions. Thanks, see you in five minutes.

(Whereupon a five-minute break was taken.)

CHAIR NOWALSKY: I've got 2:25, so let's continue now that we've got a couple valid motions here. Let me begin by going back to the seconders and the makers of the motion for the Council. I will first ask individuals if they want to speak on it. Emerson, would you like to speak on behalf of the first motion, which is essentially in speaking.

When we vote, our first vote that we'll be taking will be on the substitute motion. Essentially, if you're speaking in opposition to the substitute at this point, you're basically speaking in favor of the main motion. Let me go to Emerson, would you like to speak?

MR. HASBROUCK: Yes, thank you, Mr. Chairman. I'm opposed to the substitute motion. Stand by for a second, I've got several devices going here, and our caucus is still talking in the background. Sorry, Mr. Chairman. I'm in opposition to the substitute motion, and obviously I'm in favor of the original motion, for all of the reasons that Jason outlined when he made the motion. The substitute motion keeps us stuck in the past, stuck on those base allocations that for a variety of reasons were detrimental to New York and some of the other states. We need to move forward with an allocation based on biomass, not based on landings from 20 years ago or more. The northern region has 84 percent of the biomass, but it only has 33 percent of the allocation. We need to go into the future with this, not stuck in the past.

Also, I think all of you have seen the letter from New York Senator Schumer, who is also now the majority leader of the Senate, who is watching this very closely on behalf of fluke. We can either take care of business ourselves here with the Board and the Council, or we can chance having this decided for us through federal legislation. I would rather we take care of business ourselves, and I think the best option is the original motion. I cannot support the substitute motion. That's all I have right now, Mr. Chairman.

CHAIR NOWALSKY: Ellen Bolen, would you like to speak in favor of the motion to substitute?

MS. BOLEN: Sure, thank you, Mr. Chair. I want to echo Mr. Clark's comments, since he laid out a lot of the reasons that we support this. I think one of the things that I would stress is that we have a lot of uncertainties on the table right now for our commercial fisheries, when it comes to commercial recreation reallocation, stock assessments et cetera. One of my objectives is going to be to try to get some certainty for the commercial fishery, and I think that the DARA approach will create a lot of havoc initially, and I think that the trigger approach is the best way forward right now.

CHAIR NOWALSKY: Tony DiLernia, would you like to speak?

MR. DiLERNIA: I would like to speak to my motion. I think Jason mentioned that he said that this approach has been in use for quite some time. Actually, I think it was first developed when we had to deal with the Hague Line in the late seventies and the early eighties. It's up in New England for cod fish, and it's worked out pretty good.

I agree with everything that Jason said, that's why I was quick to jump on making that motion for the Council, because I believe that it is very consistent with, some of you may have seen a position paper that I've written recently regarding addressing species shift, how we should be managing species shifts.

I think this is consistent with some of the sentiments in the paper that has to be distributed to you, as well as it's consistent with the thinking of the current administration in DC, regarding how we're going to deal with climate change. Clearly, we're going to have to deal with climate change and species shifts in the management of our stocks.

As a matter of fact, in 2014 the Agency, NMFS, ran a whole workshop about dealing with species shifts, and very little has come out of it since then, but this is a good attempt at dealing with and addressing the species shift. It also does preserve the southern states ability to fish. We're not just swiping fish, but we're looking at it, and it's consistent with you know trying to preserve the past, while at the same time we address what's carrying the future. That's really about it. We either have to stay in the past, which is the substitute motion, or we can go forward in the future. Again, let me emphasize something that Jay said, this should go both ways. This goes back and forth. This is a way of addressing where the biomass is, which is consistent with the Magnuson Act. The Magnuson Act said, fishermen get to manage fish offshore of their states. Well, that's what this does. For all a whole bunch of reasons I think that are right, I made the motion, and I continue to support my original motion, and I oppose the substitute.

CHAIR NOWALSKY: Before I go to Maureen and Joe, and then get a list of hands that want to speak. I see John Almeida's hand up. If you want to raise an issue with the process we're following here.

MR. JOHN ALMEIDA: Just process wise. If I could make a suggestion. It might be the best approach with a motion to substitute that the bodies try to perfect the motion, so that when the vote for whether to substitute or not comes up, we have the motions as the bodies would best like them to be, so they can make the choice then. Does that make sense?

CHAIR NOWALSKY: Certainly. I haven't heard any suggestions for perfection of these motions along the way. Did I miss a comment that suggested a perfection of one or both of these motions from the speakers so far?

MR. ALMEIDA: I might have misunderstood. But I thought I heard the path that you were proposing was to go straight to the motion to substitute, but not necessarily entertaining motions to amend to perfect the two options here. But if I misunderstood, and that option is still on the table, then by all means I would suggest that would be the way to go.

CHAIR NOWALSKY: No. Thank you for that clarification, and no I would certainly not be precluding anything that would be under normal operations of Roberts Rules at this point. It's not my intention to preclude any other parliamentary procedures outside of the motion.

MR. ALMEIDA: Thank you, Mr. Chair.

CHAIR NOWALSKY: No, thank you very much. I appreciate it very much. All right, so let me go to Joe Cimino. Did you want to speak on these motions, Joe?

MR. CIMINO: Yes, thanks, Mr. Chair. I want to say, I appreciate all the work that has gone into this document by staff and others, including Jason McNamee for bringing this DARA approach along. I have a lot of respect for it. Jay mentioned a concern that there is a lot of strong feelings that the model is too complex. To me, I agree, the model is math. It's not too complex. But there are a lot of moving parts

within this. When we talked about the socioeconomic impacts of any of these many, many alternatives.

To me that is where the DARA approach seems to be too complex. If we're slowly shifting quota away from states, only to get to a point where we're slowly shifting them back, in such short order that no state has a chance to really increase trip limits, or have extended seasons, compared to what they had. I don't know what it buys us, and I have great concerns over that, especially considering we have commercial rec reallocation looming. I support the substitute motion for that reason. I think despite this idea that we have to move on from the past. I think many state representatives would agree that you also have to protect the infrastructure and businesses that this has been so important to all these years. The trigger amount in the motion that is here is going to get more quota to the north in the short term. As I said, we're going to get by a new allocation amendment, that being commercial and recreational, and we'll have an updated assessment in the near future. I don't see this not being revisited in the future. I think for right now this is the best motion.

CHAIR NOWALSKY: Maureen Davidson, would you like to speak?

MS. DAVIDSON: Yes, thank you. I would like to speak in defense of the original motion. The motion to amend is heavily based on historic landings. Now, are we now and will continue to rely on landings that occurred decades in the past, regardless of where the actual biomass distribution is?

I understand now one of the reasons why we're doing this is to protect the investment and infrastructure of certain states. But in doing so, we're leaving other states to struggle economically, and not be able to improve their infrastructure, despite the fact fish are right there off their shores.

I understand the need to protect what you have and what your state has invested in. But through the DARA system the changes would be gradual, not as though one day your state has fish, and the next day your state doesn't. Okay, we're just looking for a more fair and equitable opportunity to catch the fish that are right on our shore.

Now, the DARA system is responsive to where the biomass is located. Instead of us being chosen, we're going to be constantly competing for the fish that are there, either protecting our infrastructure, or trying to promote our economy in other states. You would have something that as we see the biomass change through a stock assessment, we would be able to adjust.

All of the states would be able to adjust to what is actually happening to the stock. I am very concerned that we are going to remain locked into the landings that happened a long time ago, and sort of for some people could remain feeling secure that their fisheries are fine, nothing is going to change, we'll always have that, and other states will not be able to have that kind of security.

I understand that we're all trying to protect our fisheries. We're trying to protect our investments. But how long will we do this? I would like to see some change. Let's move away from these historic landings, maybe not 100 percent, but let's step away from this, so that all the states can have an opportunity to benefit from, shall we say the amount of black sea bass we now have off our coast. All right, thank you very much. I didn't mean to go on for too long.

CHAIR NOWALSKY: Thank you very much, much appreciated. I do have a hand up from the public. Again, I will go to the public for any other questions or comments, prior to taking a vote on the motion. John Almeida, your hand was still up. Did you have anything else to add, or was that just up from your comments before, John?

MR. ALMEIDA: Yes, I'm sorry, it was up from before. Is it still up? I'm sorry.

CHAIR NOWALSKY: Still up as of right now. Great, now it's down, thank you so much. Let me now go ahead, and let me get a show of hands. If everybody could put their hand down for a moment. Let me get

a show of hands that want to speak in favor of the motion to substitute. Okay, I've got Mike Luisi and Tom Fote, and I had Peter Hughes.

I don't have Peter Hughes any more, it's one of those up and down things in the room that we looked at and was not sure what it is. I try to look at this screen, and I try to envision people's faces and hands going up when I see it. It makes it more real here for me. For right now I've just got Mike and Tom. Let me see a show of hands.

If you two could put your hands down for a moment, of individuals that want to speak in opposition to the motion to substitute. I'm jotting them down; I've got a fairly substantial list here. In terms of Council and Board members, we've got Dave Borden, Justin Davis, Dan Farnham, Mike Pentony, Jim Gilmore, Nichola Meserve and Tony DiLernia. I see Dave Borden's hand went down. Dave was that just because I had recognized you added to the list, or because you did not want to speak in opposition to the substitute?

MR. BORDEN: Because you recognized me.

CHAIR NOWALSKY: All right great, thank you. Is there anyone else who would like to speak, but they aren't sure that they want to commit to the substitute in favor of/in opposition, but they know they want to speak and get something with regards to Board and Council members? Okay, nobody on the fence here right now.

I'm going to try to split this up somewhat evenly here, to try to maintain some decorum of debate. Let me go with Dave Borden and Justin Davis. Then I'll go back to Mike Luisi, then I'll take a couple more in opposition, and then I'll come back to Tom Fote. I would request that when you're making comments, please make comments that are new rationale for your position. We can save some time hopefully by not rehashing comments that other people have made. Dave Borden, you're up.

MR. BORDEN: I favor the underlying motion. I'm opposed to the motion to substitute. Jason did an excellent job of characterizing the reasons to do that, and Emerson's added. I won't repeat that in the interest of time. But what I would like to emphasize is that part of the reason we're in this situation is we've had an underlying deficiency, in terms of Connecticut, for going on two decades.

That same deficiency exists for the state of New York. New York basically controls half of Long Island Sound, and that is where the Connecticut fish have been most abundant. I think we should, and I would be willing to make a motion to amend, a motion to substitute to add a provision, which would increase the New York base allocation to 9 percent.

CHAIR NOWALSKY: All right, so you're offering an amendment to the substitute, which would be a third level, which under Roberts Rules we could entertain. Are you offering that increase to 9 percent in conjunction, I guess, with the Connecticut increase, so it would look similar to what Jay's initial motion was, Dave?

MR. BORDEN: That is correct. You could use the exact language, so it would read Option B, increase Connecticut's quota to 3 percent, and increase New York's quota to 9 percent. I so move.

CHAIR NOWALSKY: Let me ask you this question, Dave. Before we take this up now, do you think this will materially change the vote on the motion to substitute, that it's worth taking that amendment up right now, or we should see whether or not the substitute becomes the main motion, and then pursue that amendment, if it should become the main motion.

MR. BORDEN: My answer, Mr. Chairman is yes, and I'm also prepared to make a motion to adjust the trigger.

CHAIR NOWALSKY: Well, we can go three levels deep with Roberts Rules, so if there is a modification to the motion to substitute that you would like to make, we can entertain those. Let me do the following. Let me go through our list of speakers, see where we are at that point, and then I'll come back to you with that potential modification.

Joe Cimino, were you raising a point of order? No, I don't think that's what it was, or were you just speaking, we're okay then. Let me go through a couple more comments, and you're suggesting that, and can you just describe the proposed change to the trigger that you would be offering also, Dave?

MR. BORDEN: I'm going to do it in separate motions. In the interest of time, it might be better to take it up separately. The concept would be to lower the trigger to Sub-option B1-A, the trigger value of 3 million pounds.

CHAIR NOWALSKY: Okay, so at least we know that that is out there. Let me get through a few more comments, and then we'll come back to pursuing an amendment to the motion to substitute. Justin Davis.

DR. JUSTIN DAVIS: It seems like Dave Borden and I are thinking along the same lines, so I think I'll save some of the comments I was going to make until the point at which we're able to have those motions for an amendment to the substitute motion on the board to discuss. I'll just make a couple of general points.

One is that I wanted to specifically address the fact that both these motions incorporate an increase of Connecticut's quota to 3 percent, rather than the 5 percent contemplated in Option B. I just wanted to get on the record that Connecticut is okay with that. Our ask under Option B had been for 5 percent.

We feel that generally the state was within its rights, wasn't making unreasonable ask to propose being increased to 5 percent, given that is sort of the de facto minimum allocation along the coast right now. As everyone around the table seems to agree, Connecticut's quota being at 1 percent was just way too low, and didn't make sense. Connecticut would acquiesce to an initial increase to 3 percent, for the sake of creating more room and more flexibility to achieve a follow-on action for broader reallocation along the coast. Along those lines, I do support the original motion, but not the substitute motion, for one reason being that incorporates an increase to New York as well as to Connecticut initially.

New York has also experienced a substantial rise in abundance of the species in their waters, particularly in the shared waters of Long Island Sound. Like Connecticut, they also do a relatively low current allocation within the northern region. I think an initial increase to New York, as well as Connecticut is completely appropriate. If you think about it, if you're thinking of increasing Connecticut from 1 to 5 percent that's a 4-percentage point increase.

Taking that and splitting it in half, and giving 2 percent to Connecticut and 2 percent to New York, I think is a very reasonable approach. I'll also just make a general point that I prefer the DARA approach to the trigger approach, because I think it is more forward looking. When you think about these approaches on a gradient of, to what degree are we using historical information and historical patterns of landings, and not incorporating new scientific information.

I view the DARA approach as being all the way on one side, where we're really making a big loop towards a more dynamic way of thinking about allocation that incorporates more information, and the trigger approach being all the way on the other side, where it's more conservative, particularly with a trigger formally in pounds, which I view as too high, and sort of giving heavy weight to historical allocations.

I completely understand the appeal of the trigger approach to those states that currently have high allocations, and has a history built up around those allocations. I recognize that a trigger approach might be the only path forward that is palatable to those states. But I expect we'll have some more conversation later on, when there is an amendment to this motion, about what the appropriate level of a trigger ought to be.

CHAIR NOWALSKY: I was planning to go to Mike Luisi next to speak in favor of the motion to substitute. However, the Chairman has indicated he's dealing with some technical difficulties, so let me go to Tom Fote to speak on behalf of the motion to substitute.

MR. THOMAS P. FOTE: When I look at species distribution, it's been used I think in some ways wrongly. When we started making adjustments, back when we first put the black sea bass in the summer flounder plan, we started raising the size limits on black sea bass. We started to raise the size limit of summer flounder.

As we basically have known historically, as we raise the size limit and fish move to the north. The bigger they are, and it keeps going further and further north. When you wound up with the distribution of bigger fish up north, which means the poundage was larger. I don't know if the numbers of fish are any larger.

Nobody has really given me, and I've asked that question a couple of times, but we redistributed the number of fish that you can catch by doing this. I look at what was going on. No matter what happens, New Jersey is going to pretty much remain the same. In order to make this plan work years ago, New Jersey gave up 20 percent of its commercial quota. Though we look like we're going to be giving up a few percentages here no matter which way we say. We have no problem with that.

But most of that quota was given to New York, to basically firm up, because they said they didn't have a quota, so we used that 20 percent. We did not give it to the south, as far as I can remember. But I wasn't sitting on the Board at that time. That was the year I was off, way back when. I look at that and I basically say, okay. I have no problem giving Connecticut. I would have given you the 5 percent, because they really have gotten stuck by this.

But again, when I look at New York, I don't hear them saying, well we'll take 8 percent or 7 percent instead of going to 9 percent. They're just looking for an increase, and the same way they have looked at summer flounder and other species. They use the excuse of climate change and those fish are moving north, and a lot of time it's just because there are bigger fish up north, and they're landing by the size of the fish, and you pushed us out.

I also remember that when we first did this, the southern state's summer flounder took a huge hit, when we raised the size limit of summer flounder. The same thing happened with bass. New York, New Jersey, and other states didn't take a hit at all. We just increased our catch, because we basically got bigger fish.

History means something. I've been around a long time, and I get a lot of heat when I basically do history lessons here, but it does mean something. I'm not prone to basically flip a switch and just arbitrarily decide that we should move it here, and so I'm really, not really understand what is going on besides climate change. I agree climate change is sad to see. I mean look at cobia, and how its moving further and further north.

But again, we don't know what happens with some species. I don't know what's happened to weakfish, and I don't know what's happening with the clams. I think I know what happened, but we don't manage for environmental conditions, and it's a lot more than climate change that's the problem, it's the pollution and everything else we're doing in the Bays and estuaries. To conserve time, I'll just stop where I am right now. That's why I'm supporting the substitute.

CHAIR NOWALSKY: Next up we'll go to Dan Farnham. Do you have something you would like to add in opposition to the motion to substitute that we haven't heard so far? Dan, if you did want to speak, you're presently muted on the webinar. All right, while we're waiting on Dan, let me go to Mike Pentony.

MR. PENTONY: I'm not sure if I was jumping the line, or if you had me on your list already.

CHAIR NOWALSKY: I had you on the list.

MR. PENTONY: Okay, thanks. I think everybody recalls from the last meeting, I voted in opposition to the motion that proposed to bring the state-by-state allocations into the federal FMP. But given that I did not prevail on that, we are now looking at a joint amendment that would bring the state-by-state

allocations into the federal FMP, you know I'm paying close attention to this discussion. I will say that, you know at times there is discussions of, we need to do what is legal, and I don't know that this is one of those. I guess what I mean is, I think we're not talking about something that is legal versus something that is not legal.

I think what we're talking about is, how can we get the optimal outcome in this situation, given these discussions?. I think in this case, I have some concerns about the trigger approach, you know largely because it's not as adaptive as the DARA approach. I think with climate change, changes in stock distribution.

I'm hoping that the Commission, the Board, the Council, you know can start moving the needle to be responsive, and look at management strategies and approaches that can adapt more easily, and evolve as conditions change in the ocean. I'm concerned that the trigger approach as currently described, really doesn't do that. It certainly, you know is an approach to the right, you know it's going in the right direction when black sea bass stock levels are high, as they are right now.

But should we see a downturn in the stock, which obviously with climate change things can be pretty unpredictable. We could easily find ourselves back in a situation with 3.5, 4-million-pound quotas, and the stock having moved significantly during that time, or contracted to the north as the stock declines, and yet the allocations would still be based on the original allocations that don't reflect a shift to the north.

I'm going to vote against the motion to substitute, because I really want to see the DARA approach, you know kind of get its day in court, if you will, for a full discussion. I think what the DARA approach presents is an opportunity for the Council and the Board, as I said, to move the needle forward, to look at a more responsive, more adaptive management approach that can evolve as conditions in the fishery and in the resource change.

CHAIR NOWALSKY: Dan Farnham, did you get the, yes you are able to unmute yourself, go ahead.

MR. FARNHAM: I did, thank you, Mr. Chairman. I had to switch modes there. We lost our power at the east end of Long Island. I'm going to be brief here. I want to reiterate everything that Mr. Pentony just said, and I'm going to elaborate a little bit on that. In my mind we're going to have to address the discard issue, and potentially increasing discard issue that this fishery is going under right now. I mean we're not just seeing a slow increase in the biomass up here; we're seeing a large push to the east and the north with these fish.

We've had fish catch black sea bass last week on the Hague Line. Now, as these things start moving that way and become more prolific up in that area. If we don't allow more opportunity for the fishermen to keep what they're catching, they're not even targeting these fish. But right now, they have to discard them, and unless we give them more access to them as they move north and east, we're going to continue to have discards. Now this is an opportunity to turn discards into landings, if I've ever seen one.

CHAIR NOWALSKY: Mike Luisi, you're back with us, Mr. Chairman, I believe.

MR. LUISI: Wow, so after Mr. Pentony's comments, I'm a little, first of all let me just say that I support the substitute motion. I am not in favor of the leap, which I see it as, regarding the first motion on the DARA approach. You know it's really easy when you are a state asking for more, you can ask for more, it's really easy to do that.

But as a state that is going to be giving something up, it makes it very challenging. There are six states, including New Jersey, in the southern region that have discussed how we would approach this allocation review. We're committed, all of us are committed to finding a solution that works for everybody, something that works for our industry, as well as providing for additional resources, allocation resources, in New England, where their stock is plentiful.

I've heard a number of times during this conversation, I've heard a number of people say that the stock has shifted into New England. Well, that's not the case. Okay, everybody needs to understand that this is an expansion of the stock, and not a shift. We have lost nothing down in the Mid-Atlantic. We have the same resource that we had ten years ago here now.

You know our commitment to finding a solution to give more access to southern New England, is a real one. There are issues like Connecticut has with the quota that they have. You know we're committed to finding a little bit extra for them. But this leap into this DARA approach. There is so much uncertainty.

The uncertainty is where I personally, and where I won't speak for my other states in the southern region. But I think they would all agree, the uncertainty about where we're going to be in the near future, not only with the stock assessment coming up, but with the sector allocation amendment that we're dealing with. The uncertainty is too much.

The state of Maryland relies entirely on its black sea bass quota. The fishermen, and there are a few of them on this call today. They will support me in what I'm saying, in that black sea bass is the glue holding our fort together. If we give up too much, it's going to fall apart. What I'm committed to, what we are committed to in Maryland, is the substitute motion, which would give Connecticut a slight increase in their quota, so that they can have a directed fishery, and set an appropriate trigger.

We're talking about a 4-million-pound trigger. The quota is at 6 million pounds right now. That's a third of the quota is going to get distributed, 85 percent to New England. I don't understand why there are so many people against the idea of moving forward in that direction. It's making me crazy a little bit.

You know here we are as a group of states, where the stock has not changed. We have the resource available to us. We're trying to deal with the problem, and we've come up with a solution. We're saying that we would send some quota north to increase all the northern states quotas to some degree, and we can all get onboard with that. All I've been hearing is negative criticism around that. We've built an industry. Our industry has built the infrastructure around black sea bass. If we lose too much, it's going to fall apart. This is a first step. I see it as a first step, this substitute motion is a first step in getting the time to try to solve some of the problems. But not taking away so much from the industry and the infrastructure that we have that things collapse. I hope that there are more people on this call that will support that idea, and you know continue to review. Maybe we review this in five years, and we'll see where we are.

I would have no problem with that. But right now, jumping to the main motion and going to the DARA approach, is just too much of a leap. There is too much uncertainty, and I can't support that. I'm going to support the new motion, thank you, Mr. Chairman, sorry for the long-winded explanation.

CHAIR NOWALSKY: Thank you, Mr. Chairman, for getting yourself back online. I appreciate it. We all have to take on this new role of being Tech Support pros for ourselves here that we didn't see coming a year ago. We've heard a number of comments in favor and in opposition. I had three more speakers that I was going to acknowledge on the opposition to the substitute, but one of the speakers so far has expressed a desire to amend the substitute motion.

At this point I'm going to go back to Dave Borden, who wants to offer a motion to, I believe his intention is to offer a motion to amend the substitute, and assuming that's the case, then we'll go to those other speakers I had in the queue. Dave Borden, let me come back to you now. You wanted to take these one at a time, which I think would be great. Do you intend to make a motion to amend the substitute?

MR. BORDEN: Yes, sir. Are you ready?

CHAIR NOWALSKY: Please go ahead with your motion to amend the substitute.

MR. BORDEN: I would amend Option B to read, increase Connecticut's quota to 3 percent, and New York to 9 percent.

CHAIR NOWALSKY: That would not incorporate the two-year change that was in Dr. McNamee's original motion. Your period was your period.

MR. BORDEN: Correct.

CHAIR NOWALSKY: All right, thank you, I did not want to put words in your mouth, but you were very clear with the period, so thank you. Waiting for staff to complete getting that up on my screen. I don't know if they're still working on that.

MS. MYRA DRZEWICKI: Could you repeat the motion, please.

CHAIR NOWALSKY: Sorry Dave, can you repeat that once more?

MR. BORDEN: The motion would read: To move to amend the substitute motion to increase Connecticut's quota to 3 percent, and New York to 9 percent.

CHAIR NOWALSKY: Let's just change the wording of the beginning of this. Move to amend the substitute motion Option B.

MR. BORDEN: Correct. Thank you, Mr. Chairman.

CHAIR NOWALSKY: Thank you for your patience. Okay, you're making that on behalf of the Board. Again, if I could just get everybody else to drop their hands. Justin, do you want to make the motion to second on behalf of the Board?

DR. DAVIS: That's correct, Mr. Chairman. I'm also wondering if I could offer a friendly suggestion of the wording, if that's appropriate at this point.

CHAIR NOWALSKY: Go ahead.

DR. DAVIS: I'm wondering if it would be better worded as increase Connecticut's base allocation to 3 percent and New York's base allocation to 9 percent, to reflect that that is what we're doing is increasing the base allocation, and not setting Connecticut and New York's overall quota to 3 and 9 percent.

CHAIR NOWALSKY: Let me turn to staff, if they think that is more appropriate.

MS. STARKS: All right, I was trying to find my mute button, but I do agree with that. It does reflect that it's the base allocation that is changing to 3 percent and New York 9 percent.

CHAIR NOWALSKY: Then I assume when we get back to the other motion, we can make a similar perfection on those. But let's just deal with this right now. We're going to change the word quota to base allocation in the motion here. Dave, you're fine with that?

MR. BORDEN: Correct.

CHAIR NOWALSKY: We've got the motion by Dave Borden now read, move to amend the substitute motion, Option B, increase Connecticut's base allocation to 3 percent and New York's base allocation to 9 percent. Motion for the Board by Mr. Borden, seconded by Mr. Davis. Would someone like to make this motion on behalf of the Council? Mike Luisi, I saw your hand go up. Was that a comment as my Co-Chair here today, or was that actually to make that motion?

CHAIR LUISI: No, thank you, Mr. Chairman. No, I will not be making that motion. I had a question. But let's see if it becomes a motion first, before I ask my question.

CHAIR NOWALSKY: All right, I've got Dan Farnham's hand up. Dan, you would like to make this motion on behalf of the Council?

MR. FARNHAM: Yes, I would, Mr. Chairman, thank you.

CHAIR NOWALSKY: Do I have a second on behalf of the Council? Tony DiLernia, are you seconding this

motion on behalf of the Council? You are presently on mute on the webinar, Tony.

MR. DiLERNIA: Yes, Mr. Chairman, I will second this on behalf of the Council, but do not presume that I endorse the substitute motion. But I will second the amendment to the substitute motion.

CHAIR NOWALSKY: We have a motion by Mr. Farnham, seconded by Mr. DiLernia. All right, so now let's discuss and debate the amendment to the substitute only. Let's stay very focused just on that. People that I had listed to speak previously, do you want to speak on this motion? I had Jim Gilmore, Nichola Meserve, and Tony DiLernia. Jim, do you want to speak on this motion?

MR. GILMORE: Yes, Mr. Chairman.

CHAIR NOWALSKY: Go ahead, please. Are you speaking in favor or in opposition?

MR. GILMORE: I'm speaking in opposition to it, and I didn't get a chance before, so I'm going to delve back into the reasoning for the whole deal here. First off, it is an improvement, the 9 percent. Thanks to Dave Borden for recognizing the south side of Long Island Sound is indeed New York, so thank you, Dave.

It's an improvement in the motion, but it's still problematic to me, because it is the past, as I said before. I won't reiterate a lot of that. But what we've done in my entire time with the Commission and the Council and before that, was our management is snapshots. We take a snapshot.

We have these battles in these meetings, and then we come up with a solution, and then everybody doesn't want to touch it again for five, ten years, and sorry Mike, in five years we may want to look at it. No one is going to want to look at this again in five years, after the pain we're going through.

What we need is a change, an overall management change approach to a lot of what we're doing, not just black sea bass, not just summer flounder. John Hare's study a few years ago, and it's continued to, I think there are only 30 species that are moving up and down the coast from climate change.

If we keep continuing to do these little tweaks to fixing this problem, we're all probably going to be in health problems, because of like the arguments we have to go through. We need a new approach to this. Unfortunately, the substitute motion is just taking what we've done for decades and tweaking it a little bit more, just to think that we're trying to fix this overall problem, when in indeed we're not doing that at all.

The DARA approach is really where we need to go in the future, for not only black sea bass, but a whole lot of species. It is the future. The way Jason McNamee has proposed it, it minimizes impact over a very long period of time, so these issues about infrastructure change and loss of fisheries. We're all talking about little tiny changes over time that eventually focuses us in on what the populations are doing, and how they're moving, and we should be managing for that, because that's what we all signed up for, to manage the resources as they change.

Additionally, that DARA approach doesn't run in conflict with Magnuson, it's using the most recent data. It's using the equity. It's essentially providing equity for all the states, so Magnuson there is no issue with that. It really comes up with, Mike Pentony used the word, it's an adaptive way to doing management, and it's really the way we should be going.

Just my last point to what was said earlier was that we've got a lot of focus on this from the federal government. Beyond some of the elected officials that wrote letters, we also have the Hoffman Bill, and now we've got the west coast looking at this, and looking at changes in distribution because of climate change, and recognizing that the way we've managed since Magnuson was passed in '76 is just not working anymore.

DARA is the future, and it's where we've got to go, so I am opposed to the amended motion, the substitute, and I'm back to the original motion, because I firmly believe it's where we need to go,

and with that we can minimize impacts to each one of the members. I understand going back to your state and saying I lost 1 percent is difficult to do, they think they are being betrayed. But the reality is they are probably not going to harvest that 1 percent, because it's moving away, and we really need to move forward on this.

CHAIR NOWALSKY: All right, so I'm going to go to Nichola and Tony, because I had their hands up still from before. Speaking on this motion, or since you had your hands up before on the other motion. Nichola Meserve.

MS. MESERVE: My comment was going to be on the initial substitute motion. I do support the amendment to the substitute, because I think it helps to move New York in the direction that they seek to move away from the historical allocations that are incomplete for their state. But I don't support the substitute, because it uses the trigger approach, and as has been said, it fails to address the change in the stock, and the fishery conditions, as soon as you get one pound pull that trigger.

It doesn't meet, you know neither the Council or Commission's strategic plans that call for us to have adaptive management approaches that respond to these changing fishery conditions. It's been referenced as kind of good enough for now, and since it's a short-term fix, but I'm really more interested in a longer-term solution to the issue.

The semantics of a stock shift and expansion continue to come up, and I just wanted to address the fact that I recognize that the southern states have not seen a decline in their sea bass availability, but we are awash in them in the north. The increasing quotas that all the states have enjoyed last year is the consequence of that northern expansion growth/shift, all of it.

I do appreciate that the more southern states come in with this motion, and putting forward something that would reallocate 34 percent of the quota. However, it doesn't provide any stability, in that sense, as the quota may change. I go back to supporting the initial motion for DARA, thank you.

CHAIR NOWALSKY: Thank you, Nichola, Tony DiLernia.

MR. DiLERNIA: I agree completely what I just heard come from Jim Gilmore and Nichola Meserve, 100 percent I agree with them. Let me just point out that this morning the Commission listened to petitions from northern states to add the speckled sea trout and Spanish mackerel. We recognized those states and put them on the management board for those species. It's consistent with the Commission's philosophy of managing, giving the states the ability to have a say in managing the fish offshore of their coastlines.

That is what the DARA approach does. I supported the amendment to the substitute motion, because I like the amendment, but I still oppose the substitute motion, and I will support the original DARA approach, because it is consistent with everything what we're trying to do here, recognizing climate change. It is not a shift; it is an expansion of the stock and it lets those states manage the expanded stocks offshore of their coasts. For all those reasons I will support the amendment and oppose the substitute. Thank you.

CHAIR NOWALSKY: All right, so at this point I'm going to ask for a show of hands of Board and Council members that wish to speak solely on the amendment to the substitute. Who would like to speak in favor of the amendment to substitute? Only keep your hand up if that is what you would like to speak to.

All right, I have no hands of people to speak in favor of the motion to substitute. Hands of people who would like to speak in opposition to the amendment to substitute. Yes, I've got two hands, three hands, and I've got a Dave Borden hand. Dave, you were going to speak in opposition of your amendment?

MR. BORDEN: No, sir. I would just like to, and I don't have to do it right now, you can call on the rest of the list. But I would like to comment on Mr. Gilmore's comment.

CHAIR NOWALSKY: We're going to go ahead and I've got Mike Luisi, I've got Justin Davis, and I've got Tom Fote. Let me start, the first hand I saw go up was Justin, so Justin you can speak in opposition to the amendment to substitute, and then I'm going to ask Mike and Tom to consider whether what they need to offer is going to materially change the conversation. Justin, you're up.

DR. DAVIS: I think there was a miscommunication. I was planning on speaking in favor of the Amendment. I'll defer to you as to whether you would like to give me the floor at this point or not.

CHAIR NOWALSKY: No, go ahead. I was somewhat surprised to see you as the seconder, so go ahead in favor of the amendment to substitute, Justin.

DR. DAVIS: I'll just real briefly reiterate some of what I said earlier in the discussions about the two motions we had up on the board. I think New York has also experienced a substantial increase in black sea bass abundance in their local waters, particularly in the shared waters of Long Island Sound. I think providing some initial increase to their base allocation, as well as Connecticut is appropriate.

I've heard at least one person around the table today say that they were in favor of Connecticut increasing to 5 percent in our base allocation need, that means that person is in favor of a 4 percent increase being given to Connecticut. What this is essentially doing is taking that 4 percent and splitting it between Connecticut and New York, which I think is appropriate, so I am in favor of the motion to amend here.

CHAIR NOWALSKY: Mike Luisi, in opposition of the motion to amend the substitute.

CHAIR. LUISI: Going into this discussion and considering these changes to allocation. I was comfortable with Connecticut's suggestion for increasing their allocation. They only have a 1 percent allocation. With 1 percent of the coastwide quota there is no way to have any type of directed fishery.

With the expansion of the stock into the Sound, I totally understand Connecticut's ask for additional quota, so that they can actually try to manage a commercial fishery. Under the alternative that I would be supportive of, which is the substitute motions for the trigger approach, two-thirds of the quota is going to be moved, 84 percent of it is going to move to New England.

I think that under that scenario, New York, Rhode Island, and Massachusetts, the other states that are in that area are going to receive additional allocation to help supplement their baseline quota. Therefore, I do not support the handout to New York with its base allocation increasing it to 9 percent. I feel like Connecticut had a point; we're going to address that point. But I cannot agree on just a handout to New York from a state perspective.

CHAIR NOWALSKY: Tom Fote, do you have anything to add that's going to materially change people's minds on the motion to amend the substitute?

MR. FOTE: I guess I think I do, Adam. I mainly was listening to the National Marine Fisheries Service, justifying his shift to the north. Instead of really looking at the quota, realize that we've had an artificially low quota, not based on what I consider real science, but basically considered on a lot of precautionary approaches, and because the north and the south again were not allowed to harvest, which should have been harvesting a larger quota for the last five years on black sea bass.

Now to get out of the fact that we haven't been able to basically harvest those, NMFS is agreeing that we should shift the quota to the north. I really find this strictly objectionable. I mean I really have a hard time dealing with this. You know, when we start talking about politicians, we've got the same politicians, and they happen to belong to the same party as the ones in charge of New York, so it's going to be an interesting battle if we want to go to Congress over this. I didn't want to use that; you know I think that's a false herring putting on us in this environment. But again, I will state what I said before. There is not any less fish in the south than there was before. That is why this trigger approach,

basically, and I didn't talk about it before. I agree with what Mike Luisi just said. You're giving them allocation of more fish up north. I don't know where New Jersey is going to fall.

I mean, a place where we're going to be by ourselves or are we going to be put in the south, where we really get penalized, and you take away more than the 20 percent we gave years ago? I really have to look at, and when you say well, it's only going to be a small percentage in the southern states. We'll all surviving on small percentages.

With the COVID-19 and everything else that we've had in the south, and basically, we watched markets dry up the same way as New England has. Our industry is suffering unbelievably, and a lot of people are going out of business, both commercially and recreationally. Anything you do that will affect the next couple of years will have a dramatic effect of maybe putting those businesses out of business. I've really got to look out for what's going on to all the states south of me.

CHAIR NOWALSKY: Dave Borden, last word on this motion. Then I'm going to go to the public, specifically on the motion to amend the substitute. We're going to caucus, and then we're going to vote.

MR. BORDEN: I would just like to follow up on Jim Gilmore's comment. I totally agree with all the logic that he presented. I just want to be clear on the record that I like the original motion that Jason made, but since we have a substitute that's on the table, and we're going to vote on it first, which we may never get back to the original motion in that case, under certain circumstances.

I'm trying to make the underlying motion as palatable as possible, not because I prefer it, because I want to fine tune the ingredients in that motion, so that should it have, it addresses some of the concerns that various Board members have raised. That is my purpose, in terms of making these amendments. I still support the underlying motion, the original motion that Jason made, and will probably vote that way in the end. But I'm trying to at least correct some of these deficiencies.

CHAIR NOWALSKY: If I could have Board and Council members put their hands down. Most everybody, I've got four still up that are people that have spoken recently. Let me next turn to the public, specifically for or against comments on the motion to amend the substitute motion. I've got Greg DiDomenico, go ahead.

MR. GREG DiDOMENICO: This is Greg DiDomenico, Lund's Fisheries, Cape May, New Jersey. On behalf of Lund's Fishery, we oppose the substitute motion, thank you.

CHAIR NOWALSKY: Thank you very much for being very direct, greatly appreciated. James Fletcher, comment with regards to the motion to amend the substitute?

MR. JAMES FLETCHER: We at National Fishermen's Association oppose this motion, but we also think it's right that we have put on the table a way to enhance the stock that New York and Connecticut can get fish, rule in hand, and not have to take anything from the southern states, and it has not been discussed. But we oppose this motion.

CHAIR NOWALSKY: Okay thank you very much, Mr. Fletcher. We're now going to take two minutes to caucus. What I'm going to ask states to do during their caucusing also, and maybe we'll extend this out to three minutes, is to begin the conversation at the state level on the other motions as well.

Let's take a couple moments to caucus. We will come back. We will call the question on the motion to amend for the Board. If it passes the Board, Chairman Luisi will then take the motion up for the Council. Three minutes, 3:33. All right, I've got 3:33, is there any state delegation on the Commission side that is not prepared to vote? Okay, I'm not seeing any indication of that.

MS. KERNS: Adam, I'm going to take these hands down, if that's okay. There are three hands that are up, I think they are leftover.

CHAIR NOWALSKY: Greg DiDomenico, Dave Borden, Mike Luisi, Justin Davis. Toni is about to remove

your hands. All right, it gives new meaning to all thumbs now. **Okay, on behalf of the motion, move to amend the substitute motion, Option B, Increase Connecticut's base allocation to 3 percent and New York's base allocation to 9 percent.**

All those state delegations in favor of the motion, please raise your hand. I have four in favor, Connecticut, Rhode Island, New York, Massachusetts. Please lower those hands. All those state delegations in opposition to the motion to amend the substitute please raise a hand. I count six, I have Virginia, Delaware, Maryland, New Jersey, North Carolina, Potomac River Fisheries Commission.

Please go ahead and put those hands down. Abstentions on the motion to amend, I have two, New Hampshire and National Marine Fisheries Service. **That is 12 votes. The motion fails the Board, 4 in favor, 6 opposed, 2 abstentions.** Chairman Luisi, did you have something to add with your hand?

CHAIR. LUISI: No Adam, sorry, I thought I put it down.

CHAIR NOWALSKY: The motion fails, 4 in favor, 6 opposed, 2 abstentions.

CHAIR. LUISI: It doesn't need to go to the Council at this point, because it failed the Board.

CHAIR NOWALSKY: That is correct.

CHAIR. LUISI: We're back to the substitute and the main motion.

CHAIR NOWALSKY: That is correct. I'm going to come back to Dave Borden. You had suggested you might have something to further modify Option D. However, given that the Option B Amendment did not pass, again I'll ask you, do you think this is going to materially change the vote on the motion to substitute, or does it make sense to move forward on dispensing with this motion, and potentially take further action, should the substitute become the main motion? Dave, how would you like to proceed?

MR. BORDEN: I think it changes the results. In other words, I think 3 million pounds is a lot more consistent with the quotas that we've had over the last few years, and that 4 is setting the value too high. But given the vote on the last motion, I think we all know the results without voting. I'm not going to make that. If somebody else thinks that is important, please step up and make that motion.

CHAIR NOWALSKY: We've had an awful lot of debate on this so far. What I'm going to do at this point is I'm going to go back to the public for an opportunity to comment on the motion to substitute, with the allowance for going ahead and providing comments on the main motion at this point as well.

At that point I will then come back and ask for any more for and against, or any other action to modify the motion to substitute, before we vote on that. Let me go back to the public again for public comment on the motion to substitute and the main motion. Yes, I've got a hand up Captain Julie Evans you can go ahead and speak. Please provide your name and any affiliations that you are speaking on behalf of today, thank you very much for doing that.

CAPTAIN JULIE EVANS: Yes, nice to meet you and thank you for recognizing me. I'm assuming you can hear me now. I represent the East Hampton Town Fisheries Advisory Committee, and I am very impressed by the way everyone is speaking and is so knowledgeable about this very complicated situation we have going forward.

I appreciate both sides of the issue, having been running commercial and charter boats in the Florida Keys and in Montauk with my late husband, Captain Mike Brown. You know it's important that people who are in the industry and have the ability to catch fish, can put them in the boat and provide them for public consumption when they're available.

My industry tells me there are a lot of fish in the area right now, I don't know black sea bass. I am for the first, the original Option B that would increase New York to 9 percent, because the fish are here. I also believe that the DARA approach is a nimble approach and will allow our people to make changes when

necessary, and I do like the fact that it will go over two years, it's not going to be something we're going to just jump into.

However, I do appreciate the people in the south, you know being a little anxiety ridden about losing any quota. We've gone through that too here. I do think that we need to change the way things are done, and so I ultimately, I hope that the people that can vote will vote for Option B, thank you.

CHAIR NOWALSKY: Thank you so much for joining us today, and taking the time to comment. I don't see any other hands up from the public. Is there anybody who is on the phone only, and doesn't have access to the webinar that wanted to comment on these motions? Okay, seeing no other comments from the public. I still have hands up from Mike and Cheri. Did either or both of you need to speak on something, before I go ahead and ask for, for and against of the motions here for any further debate? Mike's hand is down. Cheri Patterson.

MS. CHERI PATTERSON: I don't know what happened. There was some sort of delay. We were voting yes on that last, or we were going to vote yes on that last motion, and it ended up being an abstention.

CHAIR NOWALSKY: All right, let me turn to staff. Given the fact that that would not materially have changed the outcome of the vote, is there a level of comfort with just modifying this to reflect 5, 6, 1, or at this point that we've moved forward, should we leave it as such? How would staff like to proceed?

MS. KERNS: Adam, I think we can just reflect the 5, 6, 1 in the vote in this record. It doesn't change the outcome, you are correct.

CHAIR NOWALSKY: All right, so let the record reflect that the vote then will be 5 to 6, 1 that New Hampshire had a vote and did not abstain, had voted in favor of the previous motion. All right, let me ask again. We've had a lot of debate on this. I'm not still sure where we go. I think I'll just put out there that I believe there is a possibility that should the motion to substitute become the main motion, that there may be another motion yet to come before us.

Again, given where we're at in time for the day, is there anyone else who needs to speak in favor or against the motion to substitute, before we go ahead and take the vote? All right, so I'm not seeing any hands. I had requested delegations consider caucusing on the last topic as well. I've got Mike Pentony's hand up, Mike.

MR. PENTONY: I guess this is a point of order question, which is, we have a motion to substitute and a main motion. I know this was mentioned earlier. I've certainly been at meetings where the idea is both motions get perfected before you vote on the motion to substitute, with the idea that if the motion to substitute passes, becomes the main motion, then you bar any future amendments, because those should have been brought forward while it was a motion to substitute. I'm not clear if you were going to entertain motions after this point, or if these two motions are effectively frozen as of right now.

CHAIR NOWALSKY: Well, at this point, Mike, we've had an awful lot of discussion. I did not hear anyone else, other than Dave Borden, offer suggestions for modifications to the motion to substitute. He had two options, one of them we went forward and voted on. The second item he decided to withhold. I haven't had anyone else bring anything forward.

I did not hear anything during discussion about interest in changing anything about the main motion, but following on John Almeida's comments earlier, I will allow before we go ahead and vote on the motion to substitute, is there any specific interest in making a modification to the main motion. Again, let me ask it with, do you think it's going to materially change the outcome of the motion to substitute of the vote? Again, to go ahead and to make a motion for something to change. Again, let's hear what you've got, but I would ask that it comes forward only if you think it's going to materially change the outcome of the motion to substitute. I've got one hand went up, Justin Davis, go ahead.

DR. DAVIS: Just a clarifying statement, I don't have a motion to amend the substitute now that were it to become the main motion, that at that point you wouldn't entertain any more motions to amend it.

CHAIR NOWALSKY: No, what I'm saying is that should the substitute motion become the main motion, I will entertain whatever other motions the Board would like to make, that are in order at that point to modify the motion that has become the main motion. What I'm saying is that if you believe there is something about the current main motion made by Dr. McNamee, that you think at this point.

Given the discussion we've had, we need to have discussion about modifying that main motion made by Dr. McNamee that's going to materially change the outcome of the vote on the motion to substitute, I'm willing to entertain that now. But any other motions, should the substitute become the main motion, we will then entertain those. That didn't quite come out as clearly as I hoped it would, but did that get through?

DR. DAVIS: It did, thank you, Mr. Chairman.

CHAIR NOWALSKY: I'm not seeing anything else. Mike Pentony, your hand was still up from raising that question, or did you? That's down, Justin, if you're good you can put your hand down please. **We are back to going ahead, and we are now going to vote on the motion to substitute.**

Does the Board need additional time to caucus? I'm not seeing any hands raised, nor am I hearing anything. Therefore, we're going to proceed with the vote on the motion to substitute. All those delegations in favor of the motion to substitute, for the Board, please go ahead and raise a hand.

I'll just note for Council members that we're presently on a Board vote, so if you're a Council member, please do not raise your hand right now. I'm not even saying that was the case, I'll just say that was a reminder, in case anybody was thinking about it. Okay, I have 6 votes in favor of the motion to substitute; Virginia, Delaware, Maryland, New Jersey, North Carolina, PRFC. Please go ahead and put those hands down. Those have been cleared. All delegations in opposition to the motion to substitute. Okay, I have 6 in opposition. I have New Hampshire, Connecticut, National Marine Fisheries Service, I'm back to 5, I lost one. Just make sure everybody who is in opposition please go ahead and raise your hand. All right, I'm back to 6 again. I've got 6 hands up; I'm going to read them again.

New Hampshire, Connecticut, National Marine Fisheries Service, Rhode Island, New York, and Massachusetts. Okay, so you can go ahead and put those hands down. **That is 12 votes, 6 in favor, 6 opposed. The motion fails for lack of a majority.** No action is required by the Council. We are now back to the main motion. I think at this point staff can go ahead and push everything below the main motion down the screen below the main motion back up, and we can then entertain a way to proceed on that. I've got a hand up from Dennis Abbott. Dennis, you're muted on the webinar presently, if you are trying to speak, and now unmuted on the webinar, go ahead.

MR. DENNIS ABBOTT: Thank you, Adam, you've been doing a wonderful job keeping this going. I don't think anyone could have done better. A question I would have. The substitute motion failed. Can I assume that anything that was in the substitute motion cannot be amended to be put into the main motion, being that it has failed previously? That would be my question.

CHAIR NOWALSKY: If the question is can you take anything from the substitute motion, and bring it into the main motion. I would say I would entertain that. I think the substantive point of the two was a trigger approach versus the DARA approach. I think if there is some element of things that want to modify something, I would certainly entertain it, and hear it, and then I would have to rule on it. But right now, I think my position is that that was the substantive difference between these two motions was the DARA approach versus the trigger approach.

MR. ABBOTT: Follow up, Adam?

CHAIR NOWALSKY: Yes, please go ahead, and your comments are greatly appreciated.

MR. ABBOTT: On Option C, we're really talking basically DARA versus trigger approach. I don't think that someone could come in and substitute Number 2 the DARA approach with the trigger approach. Maybe some sub-parts of that but not the major part. That's my issue. But thank you, Adam.

CHAIR NOWALSKY: All right, Chairman Luisi, where we're at, at this point. Would you like to add something?

CHAIR LUISI: Yes, thanks, Adam. I'm just going to jump ahead and say that I think we all know where we stand on all of this. With the votes being 6, 6, I don't expect that there is going to be any difference in any vote that is made over the next hour or two, where the southern region and the northern region are going to find compromise.
If we were to take a vote on this option right now, which is the main motion, it's going to be 6, 6, it's going to fail. The southern region has worked really hard to try to find some compromise, as a region who is giving up an enormous amount of fish to try to address the problem, and I'm just disappointed in the fact that we couldn't see through the options and find some compromising solution to something that the group that is giving up the most was okay with.

I'm just disappointed in that. I'm not going to support this motion. I would support another motion, perhaps that stayed with the trigger approach, perhaps with maybe some different numbers, but I'm not going to support the DARA approach. I think it's too much of a leap with the uncertainty that we have, and it's not something that I'm going to be able to support. I'll leave it there, thanks, Adam, I appreciate you calling on me.

CHAIR NOWALSKY: Thanks for that insight, and in full disclosure, my goal is to wrap this up in 37 minutes, not another hour or two, but we'll do the best we can. I do think it would be reasonable, given, we don't know for sure. I think we've got some insight. If we took a vote on this motion right now, what would occur?

I think we've got some insight to that at this point. I think it warrants some discussion about what happens at that point. Should that fail, any motion fails on setting allocations. I think at that point we have no document, and this process stops entirely, or I'll defer to you, Mike. I'll defer to staff for some other way forward.

I'm of the opinion at this point that if we can't come up with an option that is acceptable to both bodies here today, that essentially it brings these documents to a halt. Again, I'm open to other thoughts on that. Let me hear. Mike, if you've got something to add, staff has something to add. Then I think my next step is to say, is there anyone that wants to make any other motion relative to the main motion.

My thinking again was that the difference between the two approaches in the motion was substantially the DARA approach versus the trigger approach. If there is another approach that someone felt a motion to make, I think we could entertain that. If anyone wanted to make any material modifications to this main motion, I think we can entertain that.

Mike, staff, do you have any thoughts about that if we can't move forward with this today, we're pretty much tossing this process, and everything just remains as it is, without anything in the FMP at the federal level. Then once we complete that, then we move into if anyone wants to make any other motions.

CHAIR LUISI: Yes, thanks Adam, you know I appreciate you recognizing me. I'll take that. I won't be long winded. Yes, we're at the point where, based on the previous vote in the interest of the southern region, unless one of the states decides to support this, this isn't going to pass either. That leaves us at status quo.

Status quo, it's not solving any of the problems that exist. The challenge is, the southern region put up a proposal that we thought was going to get some

support, in an attempt to provide more allocation, more resources to southern New England, but it failed, and now we're here. My biggest fear is that we end up with nothing, because I've been committed all along, and I made a point on the record and to my colleagues from other states that we're committed to trying to find some solutions.

This isn't the answer. This option is not the answer. It's too much of a reach with the uncertainties that exist. I'm hoping that maybe we can try to find something. Maybe there is a way. Maybe somebody can come up with another substitute motion. I don't know, I would like to hear from states about maybe dropping the trigger line down to 3.75 rather than 4. I mean its another 250,000 pounds being allocated to the northern states.

But Adam to your question, I think we need to end this. This isn't something, in my opinion, that should go on to another meeting. I think we need to come up with some kind of compromise today, and we need to solve the issues at hand at best we can as managers today, rather than punting this until, you know the spring meeting, or you know a meeting of the Council. That's where I am. As your Co-Chair that is my advice, but I'll leave it up to you to decide how we move forward, thank you. I appreciate that, Adam.

CHAIR NOWALSKY: Well, Mike, I want you to know that I really appreciate your making sure that this wound up at this Commission meeting for me to resolve that, thank you. I greatly appreciate it.

CHAIR LUISI: Yes, if we postpone it again, it will make us make sure that it's the Commission's spring meeting instead of the Council's June meeting.

CHAIR NOWALSKY: I don't want to go back and forth and have discussion about where we are, we've got to complete this or not. What I really want to do is if somebody has, one of two things is going to happen. One, we're going to take a vote on this motion, or two, somebody is going to offer a substantive change to the motion, via amendment or substitute, that they believe is likely to change the outcome of this process. That's where we're at. Either we're going to vote on it, or somebody is going to make a motion to change something. I have a number of hands that are up. But I'm going to ask you to only leave your hand up, if you are ready to make a motion to modify this main motion.

MR. PENTONY: Point of order, Mr. Chairman.

CHAIR NOWALSKY: Yes, go ahead.

MR. PENTONY: I guess I'm trying to understand why those are the only two options. We have a motion, a main motion. We had a motion to substitute, a lengthy discussion over the motion to substitute. We're back to the main motion. This could pass, it could fail. If it fails, I fail to understand why at that point someone wouldn't be free to make a new motion.

CHAIR NOWALSKY: My preference would be at this point. I think we have a good sense of what will likely happen at this point. You raise a good point. No, just because we take a vote on this motion, the meeting does not come to an end. That is a valid point, thank you for raising it, and if I've provided that as the sense of things, fine.

But my sense is if somebody is going to make another motion, now is the time for that motion to come forward, is my sense. You want from the procedural perspective that if this fails, then some other motion may come forward afterward. But I think my preference would be to get that out on the table now. Nichola Meserve.

MS. MESERVE: You may have seen my hand go up and down a couple times there, because I'm a bit conflicted. I do potentially have a motion for another option, but I do not want to make it before I know for certain that the DARA approach cannot pass, so I'll just put it out there that if we can take this vote, conclude whether or not DARA can pass, then I would be in a position to make a different motion for an option that I think breaches the two.

CHAIR NOWALSKY: Okay. Emerson, do you have your hand up to make a motion?

MR. HASBROUCK: I have my hand up to call the question.

CHAIR NOWALSKY: All right thank you for that. I'll go ahead and give one last chance here, and again, in line with Mike's comments, which again are completely valid that just because this motion fails doesn't mean we can't entertain any additional motions. But the point is that if we don't take definitive action on the allocations today that is when things come to a halt.

Do any of the state delegations need to caucus at this point? Then not seeing any hands nor hearing anything, we are going to go to the judges. **We are back to the main motion. All of those delegations in favor of the main motion, please go ahead and raise your hand. I have six in favor, New Hampshire, Connecticut, National Marine Fisheries Service, Rhode Island, New York, Massachusetts.**

Let's go ahead and put those hands down. Waiting on Connecticut, all right thank you. All those delegations that are opposed to the motion, please raise your hands. **We have six opposed, Virginia, Delaware, Maryland, New Jersey, North Carolina, and PRFC. The motion for the Board fails, 6 in favor, 6 opposed.** Are there any other motions that someone would like to put forward today? Nichola Meserve.

MS. MESERVE: I appreciate working through the steps with you. I would like to make a motion that maintains some elements of the first motion, but changes the most substantive change is changing the Option F, which is the Option in where a set percent of the coastwide quota is distributed based on the initial allocations.

This is very similar to the staff's recommended motion, but does make that change for the modified alternative B, where Connecticut goes to 3 percent and New York goes to 9 percent. I'll read it into the record, and I'll hope to get a second. **Move to adopt the following options for Black Sea Bass Commercial Allocations, modified Alternative B, increase Connecticut's allocation to 3 percent and New York allocation to 9 percent. Alternative F, percentage of coastwise quota distributed based on initial allocations, Sub-alternative F1-B, 75 percent of the coastwide quota allocated using the initial allocations. Sub-alternative F2-B, remaining quota (25%) allocated based on regional biomass from the stock assessment. Sub-alternative F3-B, proportional distribution of regional quota, and Sub-alternative G2, establish three regions, 1, Maine through New York, 2, New Jersey, and 3 Delaware through North Carolina.**

CHAIR NOWALSKY: Thank you, Nichola. Before I ask for a second for that, just to confirm, so this is the Council staff recommendation with a change to Alternative B. Instead of increasing only Connecticut, it is a change to both Connecticut and New York by increasing each of those state's base allocations by 2 percent. I'll just note that the language you have for Sub-alternative F3-B, differs slightly from how staff has worded it. But you make no modifications in your motion to F3-B from what appears in the document.

MS. MESERVE: That is correct.

CHAIR NOWALSKY: Thank you very much for clarifying that. Do I have a second from the Board? John Clark, are you raising your hand to second this on behalf of the Board?

MR. CLARK: No, Mr. Chair. I didn't realize my hand was up, sorry.

CHAIR NOWALSKY: Okay, Justin Davis, are you raising your hand to second this on behalf of the Board?

DR. DAVIS: That's correct, Mr. Chairman.

CHAIR NOWALSKY: Okay, thank you, Justin, we now have a valid motion for the Board. **Do we have a like motion on behalf of the Council? Maureen Davidson, are you raising your hand to make this motion on behalf of the Council?**

MS. DAVIDSON: Yes.

CHAIR NOWALSKY: Dan Farnham, are you raising your hand to second this motion on behalf of the Council?

MR. FARNHAM: Yes, I am Mr. Chairman, thank you.

CHAIR NOWALSKY: Nichola, let me turn to you, to give you an opportunity to further. I mean I think you went into pretty good detail before you made the motion. Now that you know it's a valid motion before us, would you like to add anything else?

MS. MESERVE: Just to reiterate a couple of points that were kind of already made on the prior motions. You know the problem with the DARA, I believe, was that the 50 percent redistribution was too much. This is 25 percent, which is less than the trigger option that was proposed using a 4-million-pound quota, based on the current quota. That would have reallocated 33 or 34 percent of the quota, so this is only 25 percent, so this moderates that problem.

But the problem with the trigger approach from a number of our standpoints is that it does not do any reallocation, if you go below that trigger level. It was my attempt here to find an option that is in between the two, and hopefully finds enough for both sides to support, so that we can do something here today, and not leave with the status quo situation, which you know is my sense that is really not a tenable situation at this point, so I appreciate it.

MR. NOWALSKY: Well, we appreciate your patience in getting to this as well. I think we worked through every possible combination before getting back here. Let me ask for a show of hands of Board and Council members that would like to speak in favor of this motion. Just put your hand up if you think you need to speak in favor of it. Again, I think we've had substantive discussion, so if you need to speak in favor because you think what you have to say you really need to sway somebody else's vote, I want to hear from you. Otherwise, we've had an awful lot today. All right, so I've got Justin and Tony to speak in favor. Is there anyone that wants to be recognized to speak in opposition to the motion? Mike Luisi, did you raise your hand to speak in opposition?

CHAIR LUISI: Yes.

CHAIR NOWALSKY: Okay. Chris Batsavage, I've had your hand come up. Were you going to speak for or against or somewhere in between?

MR. CHRIS BATSAVAGE: Probably more along the lines of somewhere in between. We'll see how it goes.

CHAIR NOWALSKY: All right. I'm going to go Justin in favor, Mike against, Tony DiLernia in favor, and then I'll come back to Chris. All right Justin, you're up.

DR. DAVIS: In the interest of time, I will try to be brief here. I think this option is sort of a Goldilocks option, it's just right, it's kind of in the middle. From the standpoint of trying to preserve some of the historic access to the resource that states with higher allocations have enjoyed, this option takes 75 percent of the quota, three-quarters of it, and says we will allocate that according to the initial allocations.

To me that represents a substantial sort of pretension of the historic allocation. However, it does take 25 percent, and say we will allocate that based on science, based on regional biomass, regardless of the overall quota levels. This gets away from the issue of the trigger option, where we're going to do reallocation, but only when the quota is above some level when times are good.

Then when times are tough, we're just going to resort back to the old way of allocating, and make those states that were enjoying the above trigger reallocation, essentially bear the brunt of conservation when we drop below the trigger. I think this incorporates options that I think there was general consensus around today at the table that there is some value in increasing Connecticut and New York states allocations, and of establishing three regions.

But for me I think, you know this option sort of meets that need that if these two bodies do our job, everybody should walk away from the table feeling like they got some of the things they wanted, but not

everything. This is sort of a good compromise middle ground. I'll just add that I think it would be really just a disaster, if at the end of this multiyear process all these meetings, all this work put in by staff and the Agency folks, contributions from the public.

If we get to a point where we can't take action and do something here, I just think that is a real black eye for both the Commission and Council. I really urge my fellow folks around the table today to give this some serious consideration as a reasonable compromise, and maybe just takes a small change to this to get it over the line, then somebody should offer an amendment. Thank you.

CHAIR NOWALSKY: Mike Luisi.

CHAIR LUISI: Thanks Justin for your comment. I agree with a lot of what you said. You know based on my previous comments, I have a little bit of a problem with modified Alternative B, considering New York in this case. In looking at the numbers, under the scenario that we're in with the quota that we have, this alternative actually provides less fish to the southern New England region than the trigger alternative.

But that is under the current situation. The concern that I have, speaking for my industry. If this quota were to fall, and get below 4 million pounds, we're going to really start to feel the pinch in our state. I don't know, I know we've talked a little bit about the idea of reviewing kind of how the quota allocation scenario plays out over the next few years.

I know there is an assessment this summer. I would feel a little more comfortable under this scenario right now, if the increase was only to Connecticut. Maybe there is something added to the language for a review of the allocation alternatives, if the quota drops below what the southern region kind of figured was kind of the hard line at 4 million pounds.

If the quota was to drop below 4 million pounds, maybe it would initiate some further review or action by the Council and the Board. I'm just thinking out loud, which is never a good thing. But I would feel more comfortable in moving forward with those two provisions added to this motion, thanks, Adam.

MS. KERNS: Adam, I can't raise my hand, it's Toni. I just thought I would point out that at least through the Board action process, and I think through the Council process as well, the Board and Council can choose to bring up an addendum at any point in time for a framework through the Council process. If the stock assessment shows something, the Board and Council can always do an addendum or a framework.

CHAIR NOWALSKY: Thank you, Toni, now that you have everybody else's, you can just jump in whenever you need to, so that's appreciated. Next up, Tony DiLernia.

MR. DiLERNIA: My hand was up, I guess from before, so I didn't mean to put it up. But now that I have the floor and the base of what Toni just said. That is where I was going to go. Can we revisit this? If what I think is occurring is occurring, and there is a distribution of the stock, and trying to deal with a species shift.

I would be very comfortable if somehow, we're obligated to revisit this in five years. I don't know if you wanted it to be to amend the motion. But if we could revisit this in five years, as far as what the distribution of the stock looks like five years from now, I would be much more comfortable with this motion. Thank you.

CHAIR NOWALSKY: Chris Batsavage.

MR. BATSAVAGE: I am willing to offer an amendment to this motion, I'll just see if we can move things forward. I would, I guess start by amending in Modified Alternative B, to remove New York's base allocations to 9 percent, and maybe at the end add language that the allocations will be reviewed in no greater than five years. I can make that on behalf of the Board and the Council.

CHAIR NOWALSKY: All right, so we have Chris Batsavage that is going to move to amend to modify Alternative B to remove "and New York's base

allocation to 9 percent" and add at the end of the motion "to review the state-by-state allocations in not more than five years." Did I hear you correctly?

MR. BATSAVAGE: Yes, I think that will do, and if there are any perfection that we need to that language, I'm willing to do that.

CHAIR NOWALSKY: You're making that motion on behalf of both the Board and the Council.

MR. BATSAVAGE: Yes, please.

CHAIR NOWALSKY: Okay, thank you very much, do I have a second to the motion for the Board? There were some other hands up. John Clark, your hand is one I recognize as a new hand that popped up. Are you making this as a second for the Board?

MR. CLARK: I will second for the Board.

CHAIR NOWALSKY: Thank you, John, do I have a second for the Council? Joe Cimino, I see your hand pop up. I wasn't sure if that was to be a second, or to comment. Are you seconding this motion for the Council?

MR. CIMINO: Yes, Mr. Chair, it's to second.

CHAIR NOWALSKY: All right, so we now have a motion to amend. Chris, would you like to comment on the motion to add anything beyond what you've already added?

MR. BATSAVAGE: Yes, really quick, Mr. Chair, because I think the other points have been made already. I think the motion Nichola offered is the best middle road approach to take, based on the how the votes have gone so far. The amendments I think are to cover some of the other concerns we heard today, to see if we could maybe find a solution here to reallocate the state quotas in some meaningful way.

CHAIR NOWALSKY: Let me see a show of hands, or if you have raised your hand previously, keep it up, so people that want to speak in favor of this motion. Hands to speak in favor of the motion only. Dave Borden, your hand was up prior, did you want to speak in favor of this motion, or not?

MR. BORDEN: I would like to speak on the motion,

Mr. Chairman. Could the staff put up a table of state allocations that would result if this motion passes? The underlying motion.

CHAIR NOWALSKY: The main motion?

MR. BORDEN: Correct.

CHAIR NOWALSKY: I'll go ahead and give staff a chance to think about that for a moment. We had in favor, all those people that want to speak in opposition to the motion to amend. All right, I've got Jim Gilmore, Emerson Hasbrouck, and Dan Farnham. Let me first briefly go to staff. Staff, do you feel that you can with some time or in short order, pull up something that reflects what those changes in quotas would be that would incorporate the modified alternative, or is that not something you think you would be able to pull up in short order?

MS. STARKS: This is Caitlin. I believe that if Nichola, who put the proposal together, were to send me her Excel spreadsheet, I could do it relatively quickly.

CHAIR NOWALSKY: All right, we'll go to some speakers, and then we'll see where we are. We last heard from Chris Batsavage in favor, I'll go to Jim Gilmore in opposition to the motion.

MR. GILMORE: Before when I put my hand up, I was actually sort of on the fence about this, because the one thing I clearly liked was the 9 percent for New York. I'll come back to that in a second. The thing that was concerning me still is that we were going with the past. However, with the five-year addition, that got me back over the edge.

But now that we've taken the 9 percent out, one thing that maybe some folks aren't aware of, but like several species, New York is trying to get equity within the region. If you look across the states, take Connecticut out of it, because they are obviously, I

think everybody agrees they need to have a higher percentage.

But if you go through New Jersey, New York, Rhode Island, and Massachusetts, New York's allocation has been half of those states, which I've said many times before makes absolutely no sense. If you've got a historic fishery that was harvesting those fish, and that those fish exist in the water equally, then New York gets some equal access to it.

At least the 2 percent increase for New York was making this at least going in the right direction, so I was supportive of it. However, if the 9 percent is taken out, then I cannot support this motion, because I think it's just somewhat punitive, quite frankly. Anyway, if someone wants to consider changing their mind on this, and putting the 9 percent back in, I would vote for it.

CHAIR NOWALSKY: Joe Cimino.

MR. CIMINO: I think if I was in Mr. Gilmore's place, I would feel exactly the same way, it just seems like it's punitive. I support this motion, and that's not what it is to me at all. I don't like the concept of just putting quota on the table for the sake of doing it, but none of these options were going to help Connecticut out enough to get them started in a fishery.

I hoped that 3 percent would do that. I was supportive of 5. For New York at a base of 7 percent right now, there are other states that are in a similar situation, and with some of these shifts in quotas, they'll be moving beyond that. Some states might be moving below that. I don't think 9 is necessarily a reasonable or needed baseline. These allocation discussions are tough, but you know doing it as a regional approach isn't necessarily that accurate either, right, because Connecticut is always going to be below everyone.

CHAIR NOWALSKY: Emerson Hasbrouck, on the motion to amend.

MR. HASBROUCK: I agree fully with what Jim Gilmore just said. I could support the underlying motion, but I cannot support this amendment. I think that my esteemed colleagues from the south of New York need a bit of a refresher here on geography. You have a body of water up there called Long Island Sound, and it's situated between New York and Connecticut.

The increase of fish in Long Island Sound, are within both New York and Connecticut's waters. To say that New York should not get an increase here as part of Alternative B, is like saying that in the Chesapeake if there was an increase in abundance of fish, that perhaps Virginia should get an increase in allocation, but Maryland should not, even though they fish in the same water.

CHAIR NOWALSKY: Dan Farnham.

MR. FARNHAM: I haven't been here that long. I'm not sure what New York did before I got here, to get the reaction I'm hearing on this webinar today. I don't know. New York, I can understand one thing, these fish are being caught. Fish are being caught; they are being discarded. What we are trying to do is turn discards into landings.

I cannot support this motion to amend. I can support the main motion, but not with the motion to amend. When you take away the 2 percent from New York, New York goes up from 7 percent to 8.9 percent of the overall quota. It's not going to be enough to cover what we're catching and throwing back into the water right now. That's where I stand, thank you.

MS. STARKS: Mr. Chair, I believe staff has a table of what was asked.

CHAIR NOWALSKY: All right, let's go ahead and pull that table up, thank you. While staff is pulling that table up, Tony DiLernia, you still had your hand up. Did you have something substantive to add to this?

MR. DiLERNIA: Yes, I do, Mr. Chairman. I think some of the states are being a bit disingenuous. The states to our south. Boats know what happens when boats leave that coast, they're from New Jersey, they are steaming northeast. Those boats are steaming

northeast to fish, and very often they are closer to the state of New York than they are to the state of New Jersey, when they are coming up to the northeast to fish.

They say that well, New York shouldn't get an increase in allocation of 9 percent. It's a bit disingenuous, because you realize the fish are there. You're steaming up here to fish for them in the first place, but then you say well, no, no, you guys shouldn't get an increase. Anyone who really knows how this fishery is being prosecuted understands that, and they are being a big disingenuous when you say New York should not get an increase to 9 percent.

CHAIR NOWALSKY: Thanks to staff for bringing this table up. This reflects the percentages on the main motion, and just for comparison's sake, if we were to apply the proposed amendment, I believe what that would do, is slightly decrease Mass, Rhode Island, New Jersey, Delaware, Maryland, Virginia, and North Carolina by a distribution that adds up to 2 percent, and would then increase New York by that 2 percent. Do I interpret that correctly what the amendment would do?

MS. STARKS: Mr. Chair, this table is showing the amendment that was suggested, and I also have a table for Massachusetts, the main motion that Nichola presented.

CHAIR NOWALSKY: This would include the New York 2 percent increase?

MS. STARKS: No, this includes New York with 7 percent only.

CHAIR NOWALSKY: This is the main motion as it stands, not the amendment to the main motion.

MS. STARKS: If I understand correctly, the amendment is to remove New York's getting 9 percent at the beginning, so this is the amended motion, and this is the main motion, let me make it larger.

CHAIR NOWALSKY: Okay, you're correct, thank you. You are 100 percent correct, thank you. Okay, so what we're going to do at this point is, I'm going to go to the public. I'm going to ask for comments on the motion to amend, as well as the main motion. We're then going to caucus as needed, and vote on the motion to amend.

The caucus, we're going to go ahead and take a five-minute caucus, to give people opportunity to one, get a break, because we've been at this over two hours, as well as to try to consolidate the caucus between the motion to amend and the main motion. Let me go ahead and get hands from the public. We're going to go ahead and entertain comments on the motion to amend and the main motion. I think at this point if staff could bring those both up again, so the public can comment, then I would appreciate that. Let me first go to Julie Evans, please.

CAPTAIN EVANS: Thank you for letting me speak. I have to urge people that will make this a reality to listen very closely to Jim Gilmore's comments, Emerson Hasbrouck, and Dan Farnham. This is a very small amount New York is asking for this increase. It seems very stingy, I have to say, on the part of the southern states exactly, not to allow New York a small increase of the fish that live in the waters where they fish.

These fish are going to be caught anyway, you know. They are going to be caught anyway, so I urge the people that can vote to allow New York a very small 2 percent increase, and let this proposal go forward. I do not support the amendment. I do support the original alternative, the modified alternative as presented, but I do not support the amendment on behalf of the East Hampton Town Fisheries Advisory Committee. Thank you.

CHAIR NOWALSKY: Thank you, Greg DiDomenico.

MR. DiDOMENICO: Good afternoon, Mr. Chairman. This is Greg DiDomenico, speaking on behalf of Lund's Fisheries. First, I would like to support the amendment to modify Alternative B from Mr. Batsavage and Mr. Farnham and Mr. Cimino. I would also like to point out, I believe that the intent in this

motion is not to cap New York at 9 percent, but I think they are saying 9 percent is not an appropriate baseline.

If I need to be corrected on that, that would be great. But I think I understand the intent of the motion, and consider the intent of the motion to be friendly, not stingy, and very generous. I look forward to continuing working on this amendment as it develops. But for now, I would like to see this, I do support this amendment to modify Alternative B, thank you very much.

CHAIR NOWALSKY: Bonnie Brady.

MS. BONNIE BRADY: Can you all hear me?

CHAIR NOWALSKY: Yes, Bonnie, go ahead.

MS. BRADY: Great, thank you, Bonnie Brady, Long Island Commercial Fishing Association. We cannot support the amendment. We've been asking for this on a myriad of fisheries. I've been at it for 20 years; you all have heard me. At this point, especially since we share the same waters, specifically around Connecticut. It would be really nice listening to other states who don't want to lose any of theirs, to feel the need to help to frankly throw New York a bone.

We have had one fishery after another lost via state by state, and it's always a haves versus have nots. Two percent for New York is amazing. Compared to everyone else, when we know to the north and south you both caught, we were on equal par 25 years ago. Please, I can't support the motion to amend, we support the motion as is by Ms. Davidson and Mr. Farnham, thank you.

CHAIR NOWALSKY: James Fletcher.

MR. FLETCHER: I find it amazing that those in advised where I put it on the table a number of times. I'm opposed, but I put it on the table a number of times for New York and Connecticut, if it will enhance both their stock, and justify increasing their landings more than 3 to 5 percent. All they have to do is stock enhancement program. I find it amazing that it's been on the table for at least the last four years and it never makes his point. But I'm opposed to giving, United American Fishermen's Association is opposed to giving them quota. Thank you.

CHAIR NOWALSKY: Is there any member of the public who is on the phone only, and not on the webinar, and cannot raise their hand? All right, not hearing anything. We are at the point where I'm going to ask if there is anyone else who feels they have something substantive to add at this point, prior to taking a five-minute caucus break. Dave Borden and Emerson Hasbrouck, are your hands still up from before?

Emerson's is down, Dave, your hand. All right, that hand is down. I've got four hands that are up of people that want to speak at this point, so we're going to do those four people, and then we're going to take a five-minute break, and then we're going to call the question. I'm going to do them in the order I saw them go up. Joe Cimino.

MR. CIMINO: I felt I had to raise my hand, because some of the most recent comments sounded as if this is a vote to keep New York from being able to achieve 9 percent of the coastwide quota. This is a motion that says, we don't feel that 9 percent is a needed baseline. It's not that New York won't get that amount of quota.

If the biomass is there, that 25 percent reallocation that's moving around should get them there. If it goes away, then it won't. That is part of what we're dealing with, with these baselines. Again, you know we all felt that Connecticut was in somewhat of a different situation, being so low that none of these options could help.

CHAIR NOWALSKY: Thanks Joe. I've got Justin Davis, Mike Luisi, Ellen Bolen, and then we're taking a break.

DR. DAVIS: I just wanted to make a very quick comment that Connecticut does not support the amendment here, but it's because of the first part, about removing that about New York's base allocation being increased to 9 percent. Connecticut

does support the idea of coming up with a timeline to revisit these decisions, five years seems appropriate.

I would just want to communicate that to other states that if that sort of requirement is something that might help states see their way to vote on the main motion, that even though we're going to vote no on this amendment, that is something that I think we would consider. Thanks.

CHAIR NOWALSKY: Mike Luisi.

CHAIR LUISI: Yes, I wanted to make sure that we would have the opportunity to comment after we caucused, in case there is something that comes up during that caucus regarding the motion. If we can, maybe just have an opportunity if need be, to make comments that would be great, before we cast a vote.

CHAIR NOWALSKY: Would you be comfortable with taking the vote on the motion to amend, and then take any further comments, or you think those comments may affect the motion to amend?

CHAIR LUISI: Honestly Adam, I think we're at a good stopping point. I need to talk with my representatives from Maryland. At this point, I think if we take a five- or ten-minute break, and we can talk about all of it, so that we don't have to take another caucus. You've made that recommendation before. But I think we're at a good stopping point for that discussion to happen.

CHAIR NOWALSKY: All right, Ellen Bolen.

MS. BOLEN: I think actually I was following up; I think what Mike was saying is, is there going to be a chance to speak to the underlying amendment after caucus? I know you had requested comments for both, but I just wanted to sort of figure out when those would best be spoken.

CHAIR NOWALSKY: Ellen, are you asking for a comment period from the Board and Council on the main motion or on the amendment after we come back from caucus?

MS. BOLEN: Asking clarification, not asking for further comment on the amendment, because there is going to be additional conversation on the underlying motion.

CHAIR NOWALSKY: All right, so the plan is five-minute break, we're back at 4:50. We are going to vote on the motion to amend. We are then going to open the floor for any final comments on the main motion. We are then going to vote on the main motion. See everybody in five minutes, thank you.

(Whereupon a recess was taken.)

CHAIR NOWALSKY: We have before us a motion, move to amend to modify Alternative B to remove "and New York state's allocation to 9 percent" and add at the end of the motion "to review the state-by-state allocation in not more than 5 years." Again, we're going to go ahead and we're going to vote on this motion.

We'll then open the floor for some limited additional debate, and then move on to either poling the question on the main motion, or if there are any further modifications, perfections needed there. Let me just run down a couple of hands here. Jim Gilmore, you had your hand up, was there an issue regarding the caucus still, Jim?

MR. GILMORE: It was in the caucus, Mr. Chairman, so I had my microphone off before. We just discussed a possible modification to the amendment that maybe will get us through this quicker. Is that appropriate at this point?

CHAIR NOWALSKY: How would you like to modify it, Jim?

MR. GILMORE: I would move to amend to modify Alternative B, and add at the end of the motion to review the state-by-state allocations in not more than five years. Essentially, remove this piece on the 9 percent.

CHAIR NOWALSKY: Here is what we're going to do. We're going to vote on this motion, and then if we

want to add back that five-year part to the main motion, we'll do that. Mike Luisi, did you have something else to add?

CHAIR LUISI: Yes, I was going to ask for an extra minute. I was still having a caucus with my Commissioners, but we can probably handle that without an extra minute. I'm just going to go on mute and talk with them before we cast the vote. Yes, I'll leave it there.

CHAIR NOWALSKY: I'll take a long time adding the votes up. To Jim Gilmore's point, what we'll do if the goal of delegations and possibly Council members, is to ultimately have this first part of the motion to amend removed, but keep in the second part, vote no on this motion, and then we'll come up with a way to add a review back to the main motion. All right, let's go ahead and have all delegations in favor of the motion to amend, as posted on the screen, please raise your hand. I have five in favor of the motion to amend; **I now have six in favor of the motion to amend. Virginia, Delaware, Maryland, New Jersey, North Carolina, PRFC. I'm guessing I probably didn't need to read those six. But those are the six in the record.** Those hands can go down, please.

All those delegations in opposition to the motion, please raise your hands. I need to get the hands that were in favor down. Let's go ahead. Toni, can you just clear all the hands for me, please? If everybody could just leave their hands for a moment. Toni has cleared everybody, please have the delegations in opposition to the motion raise their hand.

I have five in opposition, New Hampshire, Connecticut, Rhode Island, New York, Massachusetts. Please lower those hands. Abstentions on this motion, I have one abstention from the National Marine Fisheries Service. This vote carries, 6 in favor, 5 opposed, 1 abstention. Mr. Chairman Luisi, you may now go ahead and call the question for the Council.

CHAIR LUISI: To the members of the Council. The motion is: Move to amend to modify Alternative B to remove "and New York's base allocation to 9 percent," and add at the end of the motion "to review the state-by-state allocations in not more than 5 years". All those members of the Council that support the motion, please raise your hand. Toni, I'm going to ask you, I can't see that, so if you can give me a count.

MS. KERNS: Do you need me to read the names as well, or just count?

CHAIR LUISI: For the record, it wouldn't hurt to read the names. Yes.

MS. KERNS: I have **Adam Nowalsky, David Stormer, Kate Wilke, Ellen Bolen, Sara Winslow, Peter Hughes, Peter deFur, Sonny Gwin, Kris Kuhn, Chris Batsavage, Joe Cimino, Michelle Duval, Dewey Hemilright, and Scott Lenox.** If I didn't call your name and your hand is up, someone added their name as I was reading, and it goes in alphabetical order, so it's hard. I have 14, is that what you have, Julia?

MS. BEATY: I think I actually can't see all this, so sorry I couldn't run that.

MS. KERNS: Okay, I didn't know if you were counting or not. I have 14, I'll put your hands down.

CHAIR LUISI: Thanks, Toni, we'll get the count right, but let's go ahead and, I can't see it but are the hands down at this point?

MS. KERNS: Hands are down.

CHAIR LUISI: Let me ask, for those members of the Council that oppose this motion to amend, please raise your hand. I'm going to have Toni call that out, and I'll count as she calls it out.

MS. KERNS: Just going to give everybody a quick opportunity to get the hands up. **I have Maureen Davidson, Wes Townsend, Dan Farnham, Tony DiLernia, and Paul Risi.**

CHAIR LUISI: Is that five? I think it was five.

MS. KERNS: Yes, I had five.

CHAIR LUISI: Five and 17, that is too many people. It should be 5 and 15.

MS. KERNS: I said 14.

CHAIR LUISI: Oh, I'm sorry, I thought you said 17. Okay, so 14 and 5 is 19, without my vote, there is one person missing. Maybe we could ask for abstentions.

MS. KERNS: We have one abstention from NOAA Fisheries.

CHAIR LUISI: Okay, perfect. One abstention, the motion carries. Therefore, we've amended the main motion, and so I'm going to turn it back over to Adam, and allow staff to amend that motion, and then you can take a vote on the main motion, or consider any alternative to that motion.

CHAIR NOWALSKY: Very good, thank you very much, Mr. Chairman. We're going to take a moment and staff is going to provide the amended motion, which is now the property of both bodies, by removing "and New York states allocation to 9 percent" from the modified Alternative B, and going ahead and adding a line in about review in not more than 5 years, so we could see that as a main motion if we could get that amendment taken care of, please. We'll give staff a moment to do that.

MS. KERNS: Caitlin, for the wording of this, is that just an alternative B? Oh no, it's been modified still, because it's 3 percent. Never mind, I apologize.

CHAIR NOWALSKY: Again, this motion is now the property of the joint body, after the modifications that were made to it. At this point, again let me ask for a show of hands in favor of the modified motion. Again, please raise your hand if you think your comments are going to materially change the outcome at this point. Peter deFur, were you wanting to speak in favor, or did you have a general question, or did you want to speak in opposition?

MR. PETER deFUR: It's a general question, and I wanted to get clarification on a comment that I thought I heard staff say is that will the review in 5 years take the form of an amendment or a framework? I thought I understood him to say that because we've had such extensive discussion that it would be a framework-able item, is that true?

CHAIR NOWALSKY: I'll turn to staff for that, with one answering is it a framework on the Council side? We know it can be done by addendum on the Commission side, since that's what we're doing. Then the second element of that is would this language be interpreted as begin that process within 5 years, not more than 5 years, or have the review process completed in not more than 5 years.

MS. BEATY: I can answer that, this is Julia. Right now, this is an amendment for the Council. Once this amendment is complete, then after that we can make changes to the allocation through a framework in the future. I would assume that this would mean that that review would start within not more than 5 years. I don't think that would mean completed. I would assume it would mean that it would start.

CHAIR NOWALSKY: All right, so let's go ahead with the review. The allocations to change via framework, the review would begin in not more than 5 years from the time this goes into effect.

MS. KERNS: Adam, just to make sure I'm clear of the Board's and Council's intention here, because the way the question was just given, not. But when the Commission has had review allocation in a certain time within its management documents, it doesn't mean that you have to initiate a management document. The Board can have a discussion, review information in front of them, and then decide if they're going to initiate a management document or not. It doesn't require the management document to occur. But they do have to review data, and then make that decision.

CHAIR NOWALSKY: I think that's a good clarification. I would just request removal of the form the time this goes into effect, because it wasn't actually written into the motion before. It is in the record now that we've heard it here today. All right, so people go ahead and raise hands if you feel you need

to speak on this motion. Right now, I have Jim Gilmore and Mike Pentony. Is there anyone else that feels they need to speak on this motion before we go ahead and vote on it? Jim Gilmore, are you going to be in favor or opposed to this motion? Your hand has gone down.

MR. GILMORE: I will be opposed to the motion, Mr. Chairman.

CHAIR NOWALSKY: We've got you opposed. Mike Pentony, are you going to be in favor or against?

MR. PENTONY: It's actually a comment on the preceding discussion about the review process.

CHAIR NOWALSKY: All right, Ellen, are you going to be in favor or against?

MS. BOLEN: I think it is just more commenting on the overall situation.

CHAIR NOWALSKY: Okay, so we've got lots of commenting on the overall situation. Go ahead, Jim Gilmore.

MR. GILMORE: Just quickly too, we're going to need a caucus for a couple minutes after this, so we can put that on the list. Just quickly, and I felt obliged that Mr. Luisi commented before how he was disappointed. I am disappointed right now in that we are trying to work towards equity in the future, and it seems we're getting stuck right now.

The one comment I will make is my 13-year experience with the Commission and the Council, every time we have gotten to the point where one vote decides a management approach, we're in a lot of trouble, and a lot of agita coming up. I just wanted to make that point, and we'll be voting shortly, thank you.

CHAIR NOWALSKY: Mike Pentony.

MR. PENTONY: I just hope we can be clear on the review of state-by-state allocations in not more than 5 years, does not compel either the Council or the Board to take an action. It seems to me that is tasking the staff to conduct a review and present information for the Council and the Board, which then could be used to initiate an action.

But, whether that action is a framework or an amendment, at least I think a minor shift in allocation it probably could be done through a framework adjustment based on the current reading of this amendment. But even a substantial change or shift in how we determine the allocations in 5 years, could require an amendment, regardless of what is in the regulations regarding what can be done via framework action.

CHAIR NOWALSKY: Ellen Bolen.

MS. BOLEN: I wasn't being purposely obtuse when you asked support or opposed, but I think it's going to be a fairly last second decision for Virginia. I mean it's always a hard vote to take when it comes to allocation. I've been on the record saying that we understand that things need to shift as the stock expands.

The stock is expanding, but this stock would take quota from Virginia, when we still catch all of our quota. We catch all of our quota relatively close to our coast. It's a pretty hard vote to take, and I know that people will be walking away from the table sort of feeling like nothing went right. Anyway, I wanted it on the record that this is a pretty hard vote to take, and I also want to say that I really appreciate everybody's being willing to listen, and trying to come up with creative solutions to this. Thanks.

CHAIR NOWALSKY: We've got a number of hands that went up. Again, I'm going to come back to the point of, we're at a point where if you think there is something you want to change about this motion to change the outcome. I think it goes without saying at this point that there has been a lot of efforts been made, a lot of people have worked very hard today.

We've gone down a lot of different roads. Yes, we want to get to a point of something that we can all live with. There are no guarantees every time we come into this discussion we're going to get there. With the hands that are up, I'm going to ask, and

those additional hands at this point would include Chris Batsavage, Tony DiLernia, and Emerson Hasbrouck.

I would ask, do you intend to modify this motion, to change the outcome of the vote? I don't think that having another period of how difficult this is. We all recognize how difficult it is. Either we've got something to move this forward, or we vote on the matter, and we accept the consequence. Tony DiLernia, you still have your hand up, so I'll assume that means you've got something substantial to add.

MR. DiLERNIA: My question is actually for the Regional Administrator, who just recently said, well relatively minor. How would we define relatively minor to a change in the state by state that would require that could be done by framework, versus an amendment? Based on the answer to that question, I'll decide whether or not I'm going to vote or not vote for this motion.

CHAIR NOWALSKY: Mike, are you prepared to answer that?

MR. PENTONY: Not with anything concrete. I don't have, so I think it's a discussion that we had in the December meeting that would authorize changes to the commercial quota allocation system in the framework. I'm not sure if there are any parameters around that contemplated in this current amendment.

Council staff might be better able to answer that part of it. But in general, I think we would have to look at the situation, and determine whether we're making, you know a small shift. Small, I don't know what that would mean. But within the overall structure, or completely changing the structure.
For example, shifting from alternative F to a trigger approach, or implementing DARA in a more comprehensive way. Those types of substantial changes would clearly require an amendment, in my view. Sticking with this approach, but making sort of small change to one of the parameters might be something we could do for a framework adjustment.

CHAIR NOWALKSY: All right thanks for that. I think that's the answer we're going to move forward with. Dan Farnham, last word, and then we're going to vote.

MR. FARNHAM: I think it might be helpful if we could take another look at the revised table from the Massachusetts option here. The revised table, but with New York not at 9 percent, at 7 percent. Is there any way we could take a look at that before we caucus and vote?

CHAIR NOWALSKY: We should be able to put that up. We'll take a three-minute caucus. Staff, you can put that back up as this motion is written, correct? I'm going to take their silence as they're working really hard to make that happen. While they are going to either get it up, or they're not. We're going to take three minutes to caucus, and we'll be back. Hopefully during that three-minute period, we'll get that up there.

CHAIR LUISI: Hey Adam, this is Mike. Do you think you can maybe add a few minutes to that caucus, maybe five?

CHAIR NOWALSKY: We'll go five, Mike. We'll see everybody back here at 5:20.

CHAIR LUISI: Sounds good, thanks.

CHAIR NOWALSKY: Those that are diligently caucusing, but can still see the screen and hear me. Staff has completed putting up the percentages as they apply to the current motion. Thanks so much for your efforts. All right, we're back. Here is what we're going to do. We're going to go ahead and vote on this motion.

If the motion passes, we're then going to go ahead and dispense with the other matters regarding implementation dates. If it doesn't pass, then what we're going to do is we're going to take another five-minute break to allow myself to consult with Mike and other staff about what they think we might still be able to accomplish today, should this not pass, or just to give a final what our path forward here is at this point. But again, the shortcoming here is not

being able to be in a room to huddle somewhere. If this passes then we'll move on with our business.

If it doesn't, then I'm going to need a couple minutes just to consult with staff, and Mike as Chair of the Council, to determine what else he thinks we could possibly accomplish today. If staff could go ahead and put the motion back up on the board, please. All right, the motion is back up. For the Board, all those delegations in favor.

If you could go ahead and clear the hands, Toni. Okay, for the Board, all those delegations in favor of the motion, please raise a hand. All right, I count 10 in favor, Delaware, Maryland, New Hampshire, New Jersey, Connecticut, National Marine Fisheries Service, North Carolina, Rhode Island, PRFC, and Massachusetts. Please clear the hands.

I'm waiting for all the hands to go down. They are now all down. All delegations opposed. I have two opposed, Virginia and New York. The motion carries the Board by a vote of 10 to 2. I'll turn it over to you, Mr. Chairman to call the Council question.

MS. KERNS: Did we lose Mike?

CHAIR NOWALSKY: Well, he's on mute on the webinar. We're waiting, you're back off mute on the webinar, Mike.

CHAIR LUISI: I'm sorry about that, I was having a sidebar on the other line. Okay, so I don't need to read the motion back into the record. I'm just going to call the question of the Council. With the question before us, for those members of the Mid-Atlantic Council that support the motion, can you please raise your hand? I'm going to have Toni call your names out, since I can't see those.

MS. KERNS: Mike, I'm just letting the hands come up, because they shift in order.

CHAIR LUISI: Take your time. Once everybody gets settled, if you could just read the names of those in support, and then we'll do opposition.

MS. KERNS: I have David Stormer, Kate Wilke, Sara Winslow, Peter Hughes, Peter deFur, Sonny Gwin, Kris Kuhn, Chris Batsavage, Joe Cimino, Michelle Duval, Mike Pentony, and Scott Lenox, so I have 12.

CHAIR NOWALSKY: Add Adam Nowalsky to that list, I can't raise the hand as the organizer, thank you very much.

MS. KERNS: Thanks Adam, sorry I wasn't looking at my phone, so that is 13 in favor. I'm going to put your hands down. The hands are down, Mike.

MS. TINA L. BERGER: Toni, I count 14, sorry.

MS. KERNS: There was a member of the public with their hand up, so it's okay, thanks though.

MS. BERGER: Got you!

CHAIR LUISI: We have 13 in favor, all of those who oppose the motion, please raise your hand. Toni will count those down.

MS. KERNS: I have Ellen Bolen, Maureen Davidson, Wes Townsend, Dan Farnham, Tony DiLernia, Dewey Hemilright, and Paul Risi, so I have 7.

CHAIR LUISI: That sounds right, are there any abstentions?

MS. KERNS: I don't see any hands raised with an abstention.

CHAIR LUISI: There are 0 abstentions, motion carries the Council. Back to you, Adam.

CHAIR NOWALSKY: Thank you very much. I think everyone has done a tremendous job in working forward on this today. This has definitely been very hard, and we're not quite done yet. Now that we have approved options for the document, there are two separate actions that would still need to occur for the Board only, an implementation date would have to be approved.

I think we had seen earlier today in the presentation, it doesn't seem like today anymore, but it still is. I

think we have seen a proposed January 1, 2022 implementation date from staff. On the Council side we would need a motion to submit the Allocation Amendment to the Service. Let me start on the Board side, and again, many, many, thanks to everyone involved here today around the table, and thank you to the public for participating. We would need a motion for the Board for an implementation date.

MS. KERNS: Mike Luisi, your microphone is on.

CHAIR NOWALSKY: Nichola.

MS. MESERVE: Could I do both of those things in one motion?

CHAIR NOWALSKY: No, unfortunately not, as a Board member you're going to have to make the Board motion only, I believe.

MS. MESERVE: Right, I meant, okay if they have to be like motions then I would move to approve a January 1, 2022 implementation date for Addendum XXXIII. That was the combined motion I wanted to make, thank you, staff. Move to approve Addendum XXXIII as modified today, with an implementation date of January 1, 2022.

CHAIR NOWALSKY: Thank you, Nichola. Is there a second, Justin Davis, you are seconding this motion, is that correct?

DR. DAVIS: That is correct.

CHAIR NOWALSKY: Thank you very much. Again, this is a Board only motion. Given the nature of the last vote, I'm going to go ahead and ask for a show of hands on this. All delegations in favor of the motion, please go ahead and raise your hands. **I'm counting 9 in favor; Delaware, New Hampshire, New Jersey, Connecticut, North Carolina, Rhode Island, New York, PRFC, and Massachusetts.** Go ahead and put all those hands down. Delegations in opposition, please go ahead and raise your hands. No hands raised, abstentions.

MS. BOLEN: Mr. Chair, this isn't an abstention, I was trying to vote yes to approve as modified. I think I got my hand up late, this is Ellen.

CHAIR NOWALSKY: Let's go backwards for a moment. Let's clear the hands. We've come this far, let's do this right. All delegations in favor of the motion. **Eleven in favor, and that is going to be all states, and this is going to be an abstention from the Service, would that be correct?**

MR. PENTONY: Yes.

CHAIR NOWALSKY: This motion carries 11 in favor, no opposition, one abstention.

MS. KERNS: Adam, when you say without opposition, is NOAA Fisheries? You already, sorry.

CHAIR NOWALSKY: That's correct. There are 11 in favor, no opposed, 1 abstention, and that abstention is NOAA Fisheries.

MS. KERNS: I'm not sure if that's Maya or Caitlin now. Can you just write motion carries without objection, with one abstention from NOAA Fisheries? Thank you, because this is final action, so I just need to make that note.

CHAIR NOWALSKY: I will turn it over now to Chairman Luisi, who has now gone offline. Mike, are you still with us? Well, Wes Townsend, you're on the spot.

MR. WES TOWNSEND: All right, not a problem. I guess I don't have to read the motion either.

CHAIR NOWALSKY: Wes, you are going to have to ask for the motion to submit the Allocation Amendment to the Service.

MR. TOWNSEND: Okay, so I guess I am going to have to take the motion to ask the Council to send the recommendation to the Service, is that correct?

CHAIR NOWALSKY: I think staff will.

MR. TOWNSEND: Move to submit the Black Sea Bass Commercial State Allocation Amendment, with identification of the preferred alternative to National Marine Fisheries Service.

MR. deFUR: Move to submit, Peter deFur.

MR. TOWNSEND: Do we have a second?

MS. KERNS: Joe Cimino.

MR. TOWNSEND: All right, I don't think we need really any more discussion on this, so all those in favor raise your hand.

MS. KERNS: I'm just waiting for the hands to settle, Wes, and then I will read them out for you. I have David Stormer, Ellen Bolen, Sara Winslow, Peter Hughes, Peter deFur, Sonny Gwin, Kris Kuhn, Chris Batsavage, Joe Cimino, Michelle Duval, Dewey Hemilright, and Adam Nowalsky.

MR. TOWNSEND: All right, should be 12.

MS. KERNS: I have 12, yes, and I'm going to put the hands down for everybody when the hands are clear we'll move on.

MR. TOWNSEND: All right, all those in opposition, please raise your hands.

MS. KERNS: Waiting for the hands to settle here. I've lost some Council members. I have Tony DiLernia and Paul Risi.

MS. BOLEN: Hey Toni, this is Ellen again. I'm speaking up for Kate Wilke, who is saying that she cannot raise her hand and cannot speak.

MS. KERNS: Okay.

MS. BOLEN: But she supported the motion.

MR. deFUR: Yes, she was a yes, this is Peter deFur. Exactly what Ellen said.

MR. TOWNSEND: That means our total now should be 13 to 2, so it passes.

CHAIR NOWALSKY: Would you like to confirm any abstentions on that vote?

MR. TOWNSEND: Oh, yes, any abstentions? Thank you, Adam.

MS. KERNS: I hadn't put the hands down yet, so if you guys don't mind, let me just get the hands down, and Wes, if you could ask them to raise their hands again.

MR. TOWNSEND: Tell me when you're ready, Toni.

MS. KERNS: I'm ready now.

MR. TOWNSEND: All right, any abstentions?

MS. KERNS: I have three abstentions, Maureen Davidson, Dan Farnham, and Mike Pentony.

MR. TOWNSEND: All right, that should make our totals 13, 2 to 3, is that what you have?

MS. KERNS: Yes.

MR. TOWNSEND: With that the motion passes this time, and Adam, I guess it's back to you now.

CHAIR NOWALSKY: Mike looks like he's on about four different times now. Are you with us, Mr. Chairman? No, all right, struggling. Thanks so much for that, Wes, appreciate it. If I haven't said thank you, I'll say thank you again. Let me turn to staff. Is there any other business that needs to come before us on this action today?

MS. KERNS: Adam, I just wanted to say thank you to Caitlin for all her hard work on black sea bass, in particular this document. I don't know if everybody realizes if all the Council members know that Caitlin has switched on to some new species, and Savannah Lewis is going to be taking over full time for black sea bass. I just wanted to say thank you to Caitlin for this, and onward to new challenges with lobster.

CHAIR NOWALSKY: I'll reiterate my thanks as well from earlier today, and we managed to get an extra 68 minutes out of her on sea bass today, Toni.

MS. KERNS: I'm sure she loved it.

ADJOURNMENT

CHAIR NOWALSKY: I'm sure she did. All right, seeing no further business, and having completed the agenda as it was provided, we are adjourned. Thank you very much everyone, and many thanks to the Council for joining us today, and we look forward to you hosting us next week on the bluefish side. Thanks so much.

(Whereupon the meeting adjourned at 5:40 p.m. on February 1, 2021)

Atlantic States Marine Fisheries Commission

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ASMFC *De Minimis* Discussion Paper

April 2021

Background

The Atlantic States Marine Fisheries Commission (Commission) includes *de minimis* provisions in interstate Fishery Management Plans (FMP) to reduce the management burden for states that have a negligible effect on the conservation of a species. The *de minimis* provisions in the FMPs vary by species and include a range of requirements for management measures, reporting requirements, and *de minimis* qualification periods. Current *de minimis* provisions in Commission FMPs are summarized at the end of this document.

The ISFMP Charter includes a definition of *de minimis* and the requirement to include *de minimis* provisions in the FMP.

Definition: De minimis – A situation in which, under existing conditions of the stock and the scope of the fishery, conservation and enforcement actions taken by an individual state would be expected to contribute insignificantly to a coastwide conservation program required by an FMP or amendment.

FMP Provisions: … and provided that each fishery management plan shall address the extent to which States meeting de minimis criteria may be exempted from specific management requirements of the fishery management plan to the extent that action by the particular States to implement and enforce the plan is not necessary for attainment of the fishery management plan's objectives and the conservation of the fishery.

Previous ISFMP Policy Board Discussions

The ISFMP Policy Board has discussed the *de minimis* provisions contained in the interstate FMPs in the past. The Policy Board discussion focused on the balance between standardization across FMPs and the flexibility for the species management boards in developing *de minimis* provisions. The idea of allowing the states to request *de minimis* status for recreational, commercial, or both sectors was introduced. The Policy Board also discussed the appropriate approach to implement changes to plan *de minimis* provisions. Two options were considered, (1) establishing a broad policy that would modify the *de minimis* provisions in all FMPs or, (2) each species board would consider modification to the provisions as amendments or addenda are developed.

While no decisions were made, a number of Policy Board members favored plan-specific consideration of standardizing the *de minimis* provisions rather than a broad policy statement.

Given the current provisions in the FMPs, a broad policy that would allow states to apply for sector specific *de minimis* status for each species would result in uncertainty regarding the provisions that a state is exempted from implementing. For example, if a state applied for *de minimis* status for its recreational lobster fishery, the current wording in the FMP does not detail the management measures that the state would be exempted from. Recently, as *de minimis* has been discussed at species board meetings, the following question has been raised: if a state qualifies for *de minimis* why would it need to implement regulatory changes to the FMP, because by definition a *de minimis* states *contribution to the coastwide conservation program is insignificant?*

Does the Policy Board want to consider changes to the *de minimis* provisions of FMPs? If so should the Board (1) establish a broad policy which would have uniform provisions to qualify for *de minimis*? This would require modification of the *de minimis* provisions in the majority of FMPs. Or (2) should the Board direct each species board to consider modification to the provisions as amendments or addenda are developed. If individual species boards were directed to consider modifications, the Policy Board would need to draft specific guidance to the species boards.

Species	De Minimis Qualification (include # of landing years if applicable)	Sector Application: Commercial and/or Recreational; Both (can not split them)	Exemption From:
American Eel	Applicable by life stage if, for the proceeding 2 years, the average commercial landings (by weight) of that life stage constitute less than 1% of coastwide commercial landings for that life stage for the same 2 year period.	Commercial	Having to adopt the commercial and recreational fishery regulatoins for that particular life stage and any fishery-dependent monitoring elements for that life stage and any fishery-dependent monitoring elements for that life stage.
American Lobster	Average of last 2 years commercial landings is not more than 40,000 lbs	Commercial	All FMP requirements except coastwide measures and those deemed necessary by the Board when de minimis is granted
Atlantic Croaker	Average commercial or recreational landings (by weight) constitute <1% of the average coastwide commercial or recreational landings for the most recent three years in which data is available.	Commercial and/or recreational	A state that qualifies for de minimis for commercial and/or recreational fisheries is exempt from implementing management response for the de minimis fishery when the 30% moderate response level from the Traffic Light Approach is triggered.
Atlantic Herring	Average of last three years' combined commercial landings (weight) is < 1% of coastwide for same two years	Commercial	Not specified in Plan
Atlantic Menhaden	A state's bait landings must be less than 1% of the total coastwide bait landings for the most recent two years. State(s) with a reduction fishery are not eligible for de minimis	Commercial (There is no management of the recreational fishery)	If granted de minimis status by the Board, states are exempt from implementing biological sampling as well as pound net catch and effort data reporting.

	consideration		
Atlantic Sturgeon	NA	NA	NA
Black Drum	The average combined commercial and recreational landings (by weight) constitute less than 1% of the average coastwide commercial and recreational landings in the most recent three years in which data is available.	Both	Not specified in Plan
Black Sea Bass	NA	NA	NA
Bluefish	Commercial landings less than 0.1% of the total coastwide commercial landings in the last preceeding year for which data is available	Commercial	Allocated 0.1% of commercial quota. Exempt from the Biological Monitoring Program.
Cobia	In order for a state to be considered de minimis for its recreational fishery, its recreational landings for 2 of the previous 3 years must be less than 1% of the coastwide recreational landings for the same time period. In order for a state to be considered de minimis for its commercial fishery, its commercial landings for 2 of the previous 3 years	Commercial and/or recreational	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). Commercial de minimis states are subject to the same commercial regulations as the rest of the coastwide fishery but are not required to monitor their in-season harvests.

	must be less than 2% of the coastwide commercial landings for the same time period.		
Horseshoe Crab	For the last 2 years, a state's combined average landings, based on numbers, must be < 1% of coastwide landings for same 2-year period	Commercial	States that qualify for de minimis status are not required to implement any horseshoe crab harvest restriction measures, but are required to implement components A, B, E and F of the monitoring program.
Jonah Crab	States may qualify for de minimis status if, for the preceding three years for which data are available, their average commercial landings (by weight) constitute less than 10 1% of the average coastwide commercial catch	Commercial	States who qualify for de minimis are not required to implement fishery independent and port/sea sampling requirements
Northern Shrimp	NA	NA	NA
Red Drum	The PRT chose to evaluate an individual state's contribution to the fishery by comparing the two-year average of total landings of the state to that of the management unit.	Not specified in Plan	De minimis status does not exempt either state from any requirement; it may exempt them from future management measures implemented through addenda to Amendment 2, as determined by the Board.
Scup	NA	NA	NA

Shad and River Herring	A state can request de minimis status if commercial landings of river herring or shad are less than 1% of the coastwide commercial total.	Commercial	De minimis status exempts the state from the subsampling requirements for commercial biological data.
Spanish Mackerel	The previous three-year average combined commercial and recreational catch is less than 1% of the previous three-year average coastwide combined commercial and recreational catch.	Both	Those states that qualify for de minimis are not required to implement any monitoring requirements, as none are included in the plan.
Spiny Dogfish	Commercial landings are < 1% of coastwide commercial landings	Commercial only	State is exempt from the monitoring requirements of the commercial spiny dogfish fishery for the following fishing year. However, must continue to report any spiny dogfish commercial or recreational landings within their jurisdiction via annual state compliance reports.
Coastal Sharks	Not specified in Plan; determined on a case by case basis.	Not specified in Plan	Not specified in Plan, but unnecessary to implement all regulatory requirements in the FMP
Spot	A state qualifies for de minimis status if its past 3-years' average of the combined commercial and recreational catch is less than 1% of the past 3-years' average of the coastwide combined commercial and recreational catch.	Both	A state that qualifies for de minimis for both fisheries is exempt from implementing management response for the de minimis fisheries when the 30% moderate response level from the Traffic Light Approach is triggered.
Spotted Sea Trout	A state qualifies for de minimis status if its previous three-year average combined commercial and recreational catch is less than 1% of the previous three-year average	Both	Those states that qualify for de minimis are not required to implement any monitoring requirements, as none are included in the plan.

	coastwide combined commercial and recreational catch.		
Striped Bass	Average of last two years' combined commercial and recreational landings (lbs) is < 1% of coastwide for same two years	Both	State requested requirements that the Board approves (except annual reporting)
Summer Flounder	Landings from the last preceding calendar year which data are available are less than 0.1% of the total cocastwide quota for that year	Commercial	State quota will be 0.1 % of the coastwide quota and subtracted from the coastwide quota before allocation to the other states (state waters only)
Tautog	Most recent years commercial landings are < 1% of coastwide commercial landings or less than 10,000 lbs	Commercial	The de minimis state is required to implement the commercial minimum size provisions, the pot and trap degradable fastener provisions, and regulations consistent with those in the recreational fishery (including possession limits and seasonal closures). The state must monitor its landings on at least an annual basis. If granted de minimis status, a state must continue to collect the required 200 age/length samples.
Weakfish	Combined average commercial and recreational landings (by weight) constitute less than 1% of the coastwide commercial and recreational landings for the most recebt two year period.	Both	The recreational or commercial fishing provisions of Amendment 4, except BRD requirements and annual reporting
Winter Flounder	Preceding three years landings for which sector data are available	Commercial and/or recreational	Biological monitoring/sub-sampling activities for the sector for which *de minimis* has been granted

	average <1% sector coastwide landings		

East Coast Climate Change Scenario Planning Core Team

March 11, 2021 Meeting Summary

Attendees: Kiley Dancy (MAFMC), Deirdre Boelke (NEFMC), Roger Pugliese (SAFMC), Sean Lucey (NEFSC), Toni Kerns (ASMFC), Moira Kelly (NMFS GARFO), Brandon Muffley (MAFMC)

The core team reviewed a draft document with an overview of a proposed east coast climate change scenario planning process. The core team recommended some modifications to this document which will be provided to the Northeast Region Coordinating Council (NRCC), including leadership from the SAFMC, for discussion and approval. A summary of the core team comments during this meeting is provided below.

Core Team Membership

- The core team recommends that the NRCC consider adding Wendy Morrison from NMFS headquarters to the core team, if available. Wendy served on the previous NRCC working group and has valuable experience with other NMFS scenario planning and climate change initiatives.
- The core team also recommends requesting involvement from a Southeast Fisheries Science Center (SEFSC) staff member, if there is someone available with the relevant climate change and fisheries expertise for the South Atlantic region. The core team felt that the group could use another individual with extensive science and climate background. While there was not a specific individual recommended at this time, SAFMC staff will explore potential individuals with relevant expertise that could be requested if the NRCC and SEFSC agree to this participation.

Facilitation

- The core team was supportive of the proposed facilitation contract with Jonathan Star of Scenario Insight LLC and acknowledged throughout their meeting that much of the planning, including development of project objectives, timeline, and process, should be informed by future discussions with an experienced facilitator.
- The group discussed how the timing of bringing a facilitator on board may overlap with the beginning stages of this initiative. A scope of work for a contractor is in development currently, but it is still unknown exactly when a facilitator may start work on this project. This will influence the timing of the beginning stages of the project including scoping.

Objectives and Expected Outcomes

- The core team agreed that identifying clear objectives early is important but noted that the advice of a facilitator on the most effective and efficient way to develop objectives will be important on this subject.
- The core team will draft strawman potential objectives for NRCC feedback, targeting the NRCC's late May meeting. Ideally, the facilitator would be able to provide advice on this subject as well prior to this May meeting, but the timing may be tight. Development of objectives can be an iterative process.

- The core team noted that it would be beneficial to leave objectives and focal questions as draft through the scoping process so that they can be refined if needed based on stakeholder input. This would improve buy-in and allow stakeholders to provide some early direction for this project.
- The NRCC should also review and discuss the preliminary list of possible expected outcomes currently in the draft document. These outcomes are something that the core team, facilitator, and NRCC should continue to develop as this process unfolds, but it will be important to clarify for stakeholders what deliverables they can expect out of this process.
- The draft outcomes in the document are relatively standard for a scenario planning process, but more specificity may be needed eventually to make them more relevant and specific to east coast management processes and enhance understanding by stakeholders.
- Eventually, clarification will be needed on how specific and far reaching the expected outcomes will be. The core team notes that the results will generally be more along the lines of broader organizational planning and strategizing, and recommendations related to governance issues. This process is not likely to result in highly specific fishery management plan level proposed changes. Scenario planning is more strategic and qualitative, not quantitative or species specific like a Management Strategy Evaluation.
- Region-specific applications and recommendations could be considered later in the process, but the core team would be wary of doing so in place of coast-wide recommendations and applications, given that this initiative should be aiming for improved coordination, cooperation, and multi-jurisdictional governance structures.

Timeline

- Overall, the group felt that the tentative timeline presented to the NRCC in November 2020 (see Nov. 4 memo from MAFMC staff[1]) was overly ambitious and will likely need to be pushed back especially in the beginning stages. A facilitator has not yet started work on this process, and in addition, the group noted that scoping is likely to take longer than initially planned (see "Process and Scoping" below).
- The aim to have a scenario building workshop in late Fall 2021 may be reasonable but it depends on how quickly the scoping process gets started and how extensive the scoping phase is (e.g., use of surveys, multiple public meetings, etc.) as well as workshop preparation.
- NRCC feedback is needed on the feasibility of the draft timeline presented in the proposed process document as well as commitment from each body to provide adequate staff and resources.

Process and Scoping

- Because scenario planning will be new to most participants (i.e., managers and stakeholders) and may cause confusion, the core team recommends investing the time and effort into ensuring that participating organizations and their stakeholders are well-informed about scenario planning basics and the goals of this project. Making sure the

[1] Available at https://www.mafmc.org/s/Scenario-planning-Nov-2020-for-NRCC.pdf

scoping process is done well will help the NRCC get useful scoping input and help build stakeholder buy-in for this initiative.

- One way to contribute to up-front education would be some kind of kick off webinar and/or introductory video or presentation that could be presented to each management body, distributed to interested stakeholders, and posted online.
- Facilitator advice should be sought on the appropriate level of scoping and introductory materials. This might depend on the overall plan for how in-depth this process will be and the level of stakeholder engagement at each step. Scoping could involve regional workshops to get regional concerns first, followed by potential areas of overlap in concerns, but this should be further discussed with a facilitator.
- The core team noted that scoping feedback does have the potential to be overwhelming given the number and diversity of stakeholders involved along east coast. The need to get useful, focused input in a manageable way will have to be balanced with transparency in the process and reaching out to a broad stakeholder audience. More open-ended feedback would be more difficult to analyze, so the core team may need to consider asking fairly targeted questions.
- The proposed two-workshop model process provides a few major opportunities for potential stakeholder involvement: during scoping/development of information leading up to the first workshop, participating in the scenario building process (first workshop), and participating in the process to address applications of the scenarios (potential second workshop). Taking a broader initial approach to stakeholder engagement during scoping should be considered, while the workshops and latter stages of the process will likely need to be more focused and limited in terms of participation.

Other Comments

- The group discussed how to coordinate updates and discussions for individual management bodies. For example, the MAFMC and NEFMC will coordinate information for updates on this topic at their respective April meetings. The ASMFC intends to use similar information to discuss this topic at their spring meeting in May, prior to the NRCC meeting. However, the SAFMC met in March and will not meet again until June, so they would be unable to review and discuss this topic as a full body before the NRCC discusses this topic in May. Due to different timing of various meetings, the level of information or discussion for each group may be different throughout this process but coordination of timing and messaging to the extent possible would be helpful and the core team discussed preparing consistent slides and documents for future presentations.
- The core team noted that SAFMC representation on the NRCC for discussions related to this initiative is currently expected to consist of the SAFMC Executive Director. The core team noted that it may also be beneficial to include SAFMC Council leadership (e.g., the Council chair) in these discussions.

Proposed Framework for East Coast Climate Change Scenario Planning Initiative

DRAFT for NRCC Review

March 2021

Overview

In November 2020, the Northeast Region Coordinating Council (NRCC) agreed to move forward with an east coast scenario planning initiative as a way to explore jurisdictional and governance issues related to climate change and shifting fishery stocks. The NRCC consists of leadership from the Atlantic States Marine Fisheries Commission (ASFMC), Greater Atlantic Regional Fisheries Office (GARFO), Mid-Atlantic Fishery Management Council (MAFMC), New England Fishery Management Council (NEFMC), and Northeast Fisheries Science Center (NEFSC). In addition, the NRCC and the South Atlantic Fishery Management Council (SAFMC) agreed that the SAFMC should participate in the process as well given that governance issues related to climate change and shifting stocks will need to be addressed along the entire East Coast.

Scenario planning is a tool that managers can use to test decisions or develop strategy in a context of uncontrollable and uncertain environmental, social, political, economic, or technical factors.[1] It is a structured process for managers to explore and describe multiple plausible futures and to consider how to best adapt and respond to them. Scenario planning is not a tool for predicting future conditions; rather, scenarios are essentially stories about plausible combinations of future conditions that allow for explicit consideration of uncertainty in future conditions. Scenarios are created in response to a focal question developed based on a major strategic challenge faced by an organization.

This document describes a proposed plan for a coordinated East Coast Scenario Planning Initiative. Some of the content below is adapted from the July 2020 recommendations of an NRCC scenario planning working group,[2] which was formed in 2020 to explore this concept and provide recommendations to the NRCC. The working group included representatives from all NRCC partners as well as NMFS Headquarters and the SAFMC.

As this process develops, additional information and documents will be posted to a dedicated website: https://www.mafmc.org/actions/climate-change-scenario-planning.

Core Team

The core team for this project, listed below, will serve as the primary technical group working on this project in coordination with a contracted facilitator. Along with the facilitator, the core team will be responsible for much of the research, planning, coordination, and compiling of materials for this process. The core team is analogous to a Fishery Management Action Team (FMAT) or Plan Development Team (PDT) used in the development of Council management actions. The NRCC may determine that additional expertise is needed on this technical working group.

[1] National Park Service, 2013. Using Scenarios to Explore Climate Change: A Handbook for Practitioners. National Park Service Climate Change Response Program. Fort Collins, Colorado. Available at: https://www.nps.gov/parkhistory/online_books/climate/CCScenariosHandbookJuly2013.pdf.

[2] Available at: [link to be added]

Organization	Representative
MAFMC	Kiley Dancy
ASMFC	Toni Kerns
NMFS GARFO	Moira Kelly
NEFMC	Deirdre Boelke
NMFS NEFSC	Sean Lucey
SAFMC	Roger Pugliese

Facilitation

The NRCC agreed that an experienced process facilitator should be contracted to support the scenario planning exercise through the majority of the process. The scope of work for a facilitator is in development as of March 2021. The facilitator will be expected to work with the core team on major steps of this process including conducting a scoping process for gathering preliminary stakeholder input, developing materials and logistics for a scenario building workshop, facilitating and summarizing a scenario building workshop, and facilitating a follow up process to explore applications of the scenario building outcomes.

Funding for the facilitator will be provided by The Nature Conservancy (TNC), which was awarded a grant from the Gordon and Betty Moore Foundation to support East Coast scenario planning efforts in partnership with the NRCC. The Atlantic States Marine Fisheries Commission has agreed to administer these funds, which are expected to cover some costs of this initiative including process facilitation, meeting facilities and/or technology contracts for remote meeting platforms, potentially public invitational travel, and other miscellaneous expenditures such as printing, outreach, or scoping surveys. It is expected that the Councils, Commission, and agency personnel would have their respective participation costs paid by their organization.

Benefits of Scenario Planning

As noted above, scenario planning is a tool that managers can use to test decisions or develop robust strategies in a context of uncontrollable and uncertain environmental, social, political, economic, or technical factors. In the case of the NRCC, conducting an east coast scenario planning exercise will be designed to evaluate challenging climate change related management and governance issues in a changing ocean environment across multiple jurisdictions. Scenario planning can be a useful tool in not only exploring and describing multiple plausible futures, but also to advance discussion of how an organization can plan for or adapt to different possible future scenarios.

Scenario planning can consider broader uncertain forces in the world such as societal change, climate and environmental change, as well as changes in the policy and legal environment, and consider how these drivers that are outside of the organization's control may affect organizational priorities and planning. Some benefits of scenario planning are that this process:

- Forces participants to explore their underlying assumptions and perceptions about the range of possible future conditions.
- Reduces the tendency for managers to become overconfident in their expectations of future conditions, too focused on a limited view of the future, or paralyzed by uncertainty.
- Provides a way to organize complex information about changing conditions and stimulates creative and innovative thinking about how to prepare for change, in a way that is disconnected from the typical regulatory process.

- Provides an opportunity for proactive thinking and planning, allows participant groups to be well positioned to be collectively ahead of the curve instead of merely reacting to new and dynamic information as it occurs.
- Can enhance stakeholder engagement, provide diversity and equity in decision making, and foster creativity and social innovations from stakeholders.

Project Objectives and Expected Outcomes

The NRCC has identified the major issue to be addressed through this process as governance and management issues related to climate-driven changes in the fisheries, particularly changing stock distribution. The core team, facilitator, and NRCC will work to refine specific project objectives and focal questions to be addressed, as it is important to clarify the objectives of scenario planning at an early stage. In addition, these groups will identify a future time scale over which to evaluate driving forces in the fisheries and develop scenarios of future conditions, i.e., should the process consider possible conditions over the next 10, 20, 30 years or more? The time frame should be long enough to sufficiently consider longer term uncertainties and changes in conditions but should be short enough that near-term actions and strategies would still be relevant to influencing responses to future conditions. These objectives and time frame may need to be refined as the project progresses, particularly following a stakeholder scoping process.

The core team, facilitator, and NRCC will also work to further clarify the expected outcomes and products of this initiative. Some possibilities include:

- Development of near-term and long-term management priorities related to scenario outcomes. Specifically, managers can use the resulting scenarios to prioritize near-term actions that are likely to be beneficial under a range of future conditions and by planning to avoid actions that may reduce flexibility or increase the difficulty of adapting to future conditions. These recommendations may be organization-specific, broadly applicable across organizations, or some combination of both.
- Develop a better understanding of the limitations of current systems that may not be nimble enough to respond to change.
- Develop policy recommendations for broader governance changes that would improve our ability to adapt to varying future scenarios.
- Develop a list of data gaps, research needs, and monitoring needs for changing conditions.

Structure for Oversight and Participation

The ultimate decision-making management body for this process will be the NRCC with the addition of at least one South Atlantic representative. Given the number of management groups involved and the variation in their decision-making processes and timelines, it is unlikely to be feasible to seek explicit approval at each process step from each management body. Instead, it is expected that participating organization representatives will provide periodic updates to their respective management bodies and seek their feedback for incorporation into the core team/NRCC process.

It is also possible that Council and Commission advisory bodies could be used to inform various parts of the process where appropriate. Specifically, Committees, Advisory Panels, Technical Committees, and/or SSCs could provide input during the scoping process, during the developing of specific driving forces to be explored during a scenario building workshop, and in the development of applications and products from this process. Members of these groups could also be identified to participate directly in the planned

workshops. The core team should discuss the feasibility of involvement of these groups, weighing the additional complexity of involving many different groups.

As the process develops, further discussion will occur to identify how participants will be directly involved in the development of the scenarios and/or the development of applications and recommendations.

Proposed Scenario Planning Process and Timeline

The proposed scenario planning process consists of six major steps and is outlined in the table below. This process is adapted from the recommendations of the NRCC working group in July 2020 and is loosely based on the scenario planning process outlined in the NPS 2013 scenario planning handbook.

The NRCC working group recommended that the NRCC adopt a two-workshop model: the first workshop would be held to develop the draft scenarios in phase 4, and the second workshop would be held in phase 5 to discuss how the insights from these scenarios should be applied in the management process, including developing recommendations for management and governance strategies and priorities.

Table 1: Proposed process for scenario planning, adapted from NRCC working group July 2020 recommendations and based loosely on NPS 2013 Handbook stepwise process. Approximate timeline is tentative pending further NRCC discussion.

	Goal	Steps	Outcomes/Products	Who/What	When
Phase 1: Orientation	Establish project objectives, guidance structure, process, and timeline	• Form core team • Develop facilitation contract • Establish process, purpose, and scope of project, including focal issue (strategic challenge) to explore • Determine decision-making structure • Determine type of desired outcomes • Plan for scoping process	• Framework and timeline for a proposed process • Contract with outside scenario planning expert/facilitator • An understanding of the purpose, desired outcomes, focal issue, and scope of project • Plan for scoping	• Core team and facilitator with input from NRCC if needed	Late 2020 – Early Summer 2021
Phase 2: Scoping	Gain stakeholder perspectives on focal issue and external driving forces for east coast fisheries	• Work with core team and facilitator to conduct structured outreach ("scoping" process) • Refine project objectives and focal question if needed based on scoping feedback	• Synthesize public and stakeholder input for further use in process, particularly regarding focal question and external driving forces to be further explored during scenario building workshop • Introduce stakeholders to scenario planning and potential application in this context • Build preliminary list of possible workshop participants	• Core team, facilitator, interested stakeholders and public	Summer 2021

	Goal	Steps	Outcomes/Products	Who/What	When
Phase 3: Exploration	Identify and analyze drivers, variables, trends, and uncertainties	• Identify and describe drivers, variables, and uncertainties from interviews with experts, advisory bodies, core team, public input results • Identify potential impacts of these drivers • Plan for discussion during synthesis phase (i.e., scenario building workshop)	• A list of drivers, variables, or uncertainties that are likely to impact east coast fisheries over the specified time horizon • Supporting introductory information on these drivers, such as overview text, tables, conceptual models, charts, or maps that will help process participants discuss potential impacts	• Core team & facilitator, with input from experts, management & advisory bodies, stakeholders	Fall 2021
Phase 4: Synthesize & Create Scenarios	Produce small number of scenarios using critical drivers and potential impacts identified in Phase 3	• Determine critical uncertainties with large impact on focal issue • Hold workshop to build scenario frameworks and choose scenarios • Develop scenario narratives • Review scenarios for plausibility	• 3-5 plausible, relevant, challenging and divergent scenarios using critical uncertainties to inform, inspire and test actions/strategies	• Core team works with input from NRCC, others. • Planned workshop to create scenarios	Late 2021-Early 2022
Phase 5: Applications	Answer "So what?" questions: What are the impacts of these plausible futures? What can we do about it?	• Identify scenario implications • Use scenarios to inform development of management strategies and priorities, and policy recommendations for future governance and research • Develop recommendations applicable to collective group of participants and/or individual management organizations	• Report with list of actions, strategies, or areas for additional research based on discussions initiated by scenarios	• Core team works with input from NRCC, others. • Workshop to understand management implications	Spring/Summer 2022
Phase 6: Monitoring	Identify important indicators (trigger points) that can signal changes in the environment as future unfolds	• Select indicators to monitor • Monitor environment changes	• List of indicators and early warning signals for continued research and monitoring • A monitoring strategy	• Core team works with input from NRCC, others	Summer/Fall 2022

2021-2025 SEAMAP Management Plan

Collection, Management, and Dissemination of
Fishery-independent Data from the Waters of the Southeastern United States

Prepared by
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South Atlantic State-Federal Fisheries Management Board,
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PREFACE

Fisheries are a vital part of the nation's economy and, more specifically, the coastal communities and states of the South Atlantic, Gulf of Mexico, and Caribbean. In the region in which the Southeast Area Monitoring and Assessment Program (SEAMAP) is conducted, fisheries resources support valuable commercial and recreational fishing industries. In 2015, in the South Atlantic and Gulf region alone, commercial fishers landed over 2.9 billion pounds of seafood worth almost $1.7 billion[1]. In the same year, recreational anglers across all three regions landed at least 213 million pounds of fish[2]. Recreational fishing is a growing industry in the SEAMAP region, where over 130 million angler trips were taken in 2018[3].

Fishing and tourism industries contribute significantly to the economies of the nation's coastal communities by generating employment opportunities and associated revenues. As such, these industries directly improve quality of life and contribute to community diversity by maintaining traditional fisheries. Sustainable recreational and commercial fisheries are dependent on responsible resource management, which, in turn, requires accurate and timely data as a basis for management decisions. SEAMAP plays an integral role in providing fishery-independent data critically needed for effective fisheries management throughout the Southeastern United States, including the Atlantic, Gulf of Mexico, and Caribbean regions.

As the focus of fisheries management expands from single species management to ecosystem-based fisheries management, the need for basic information has also increased significantly. For example, in addition to the ongoing baseline data required for effective management of recreational and commercial fisheries, improved information is needed on prey and predator species life histories and interactions, essential fish habitat, and the effects of changing environmental conditions.

Long-term fishery-independent databases provide information essential to evaluating the status of the nation's fisheries, including population abundances, mortalities, recruitment, and ecological relationships. These fundamental parameters, combined with long-term assessments and monitoring, constitute the backbone of effective fisheries management. Only with this basic information can fisheries managers ascertain trends, determine potential causes of changes, and react responsibly to address these changes. Ongoing, regional fishery-independent efforts, such as those undertaken by SEAMAP, can generate data critically needed by fisheries management to address these issues.

Adequate funding continues to be a challenge in fisheries science and management. Federal and state government funding for fisheries activities will likely decrease over the coming years in order to meet the fiscal objectives of balanced budgets and reduced spending. Concomitantly, survey costs continue to increase, especially given the need for new data to

[1] Fisheries of the US 2018
[2] Fisheries of the US 2018 (excludes Texas and Louisiana).
[3] Fisheries of the US 2018.

assess the status of emerging fisheries and transition to ecosystem-based fishery management. This could significantly impact the nation's capability to manage its valuable fisheries resources. However, by building partnerships, the federal and state governments can combine their limited resources to address issues of common interest. In particular, cooperative programs for collecting essential fisheries data would benefit all partners, providing valuable scientific information for management at the state, federal, and regional levels.

SEAMAP is a model partnership for cooperative federal and state data collection. SEAMAP is truly collaborative; fiscal, physical, and personnel resources are shared among participants and decisions are made by consensus. The experience and success of SEAMAP over the last 35 years illustrate its effectiveness. SEAMAP has great potential to increase and improve its usefulness for fisheries management by expanding its fishery-independent data collection programs, provided additional funding is made available. We strongly support this worthwhile program and its expansion to collect more fishery-independent data for purposes of fishery management.

Ted Switzer	Roger Pugliese	Matthew Kammann
Chair	*Chair*	*Chair*
SEAMAP-Gulf of Mexico	SEAMAP-South Atlantic	SEAMAP-Caribbean

ACKNOWLEDGMENTS

The SEAMAP Gulf, South Atlantic, and Caribbean Committees (Appendix A) would like to acknowledge those who have helped make SEAMAP such a successful program. Many individuals from various federal, state, and academic organizations provided their expertise to SEAMAP projects by serving as members of workgroups. The committees would like to thank all of the workgroup members for their efforts. In addition, the committees would like to thank the following: Jeff Rester (GSMFC), Sarah Murray (ASMFC), and Edgardo Ojeda (UPRSGCP) for their work as coordinators; Dr. Roy Crabtree and Dr. Clay Porch NMFS Regional Administrator and Regional Science Director, respectively, for their support of SEAMAP projects, including strategic planning; and the Atlantic States Marine Fisheries Commission staff for administrative support of this project. The committees also acknowledge Dr. Eric Hoffmayer for his efforts and support as SEAMAP's Program Manager at NMFS. Contributing to the success of the program are many other persons who assisted with the resource surveys and projects by providing equipment and donating their time and expertise.

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Gulf Coast Research Laboratory (GCRL)
Gulf of Mexico Fishery Management Council (GMFMC)
Louisiana Department of Wildlife and Fisheries (LDWF)
Mississippi Department of Marine Resources (MDMR)
NOAA Fisheries
North Carolina Division of Marine Fisheries (NC DMF)
South Atlantic Fishery Management Council (SAFMC)
South Carolina Department of Natural Resources (SC DNR)
Texas Parks and Wildlife Department (TPWD)
US Fish and Wildlife Service (USFWS)
Puerto Rico Department of Natural and Environmental Resources (PR-DNER)
U.S. Virgin Islands Department of Planning and Natural Resources (USVI-DPNR)
Caribbean Fishery Management Council (CFMC)
University of Puerto Rico, Sea Grant College Program (UPRSGCP)

SEAMAP COLLABORATIONS

Marine Resources Monitoring, Assessment and Prediction Program (MARMAP)
NOAA - Beaufort, NC Laboratory
Southeast Coastal Ocean Observing Regional Association (SECOORA)
Southeast Fisheries Science Center Southeast Fishery-Independent Survey (SEFIS) group

ABBREVIATIONS AND ACRONYMS

ACL	annual catch limits
AM	accountability measures
ASMFC	Atlantic States Marine Fisheries Commission
BRD	bycatch reduction device
CFMC	Caribbean Fishery Management Council
COASTSPAN	Cooperative Atlantic States Shark Pupping and Nursery
CPUE	catch per unit effort
CSC	Coastal Sciences Center
DOC	Department of Commerce
EEZ	exclusive economic zone
EFH	essential fish habitat
FMP	fishery management plan
FSCS	Fisheries Scientific Computer System
FRL	Fisheries Research Laboratory (Caribbean)
FWRI	Florida Wildlife Research Institute
GA DNR	Georgia Department of Natural Resources
GIS	Geographic Information System
GMFMC	Gulf of Mexico Fishery Management Council
GSMFC	Gulf States Marine Fisheries Commission
GSMFC-TCC	Gulf States Marine Fisheries Commission-Technical Coordinating Committee
HMS	highly migratory species
LNG	liquefied natural gas
MARFIN	Marine Fisheries Initiative Program
MARMAP	Marine Resources Monitoring, Assessment and Prediction Program
MSRA	Magnuson-Steven Fishery Conservation and Management Reauthorization Act
NC DMF	North Carolina Division of Marine Fisheries
NCRMP	National Coral Reef Monitoring Program
NMFS	National Marine Fisheries Service (also referred to as NOAA Fisheries)
NOAA	National Oceanic and Atmospheric Administration
PR	Puerto Rico
PRCRMP	Puerto Rico Coral Reef Monitoring Program
PR-DNER	Puerto Rico Department of Natural and Environmental Resources
SAB	South Atlantic State-Federal Fisheries Management Board
SAFIMP	South Atlantic Fishery-Independent Monitoring Program workshop
SAFMC	South Atlantic Fishery Management Council
SC DNR	South Carolina Department of Natural Resources
SEAMAP	Southeast Area Monitoring and Assessment Program
SEAMAP-C	Southeast Area Monitoring and Assessment Program-Caribbean
SEAMAP-Gulf	Southeast Area Monitoring and Assessment Program-Gulf of Mexico
SEAMAP-SA	Southeast Area Monitoring and Assessment Program-South Atlantic
SECOORA	Southeast Coastal Ocean Observing Regional Association
SEDAR	Southeast Data, Assessment, and Review
SEFIS	SEFSC Southeast Fishery-Independent Survey (SEFIS)
SEFSC	Southeast Fisheries Science Center
SERFS	Southeast Reef Fish Survey
SERO	Southeast Regional Office (NOAA Fisheries)
SERTC	Southeastern Regional Taxonomic Center
USFWS	U.S. Fish and Wildlife Service
USVICRMP	USVI Coral Reef Monitoring Program
USVI-DPNR	U.S. Virgin Islands Department of Planning and Natural Resources
UPRSGCP	University of Puerto Rico Sea Grant College Program

EXECUTIVE SUMMARY

The SEAMAP 2021-2025 Management Plan provides a statement of current goals, management policies, and procedures for all SEAMAP components and partnerships. The plan also serves as a reference on SEAMAP history and accomplishments, and detailed priorities for future activities. The Management Plan complements the SEAMAP 2021-2025 Strategic Plan, which provides a prioritized list of future project activities to maintain and expand current activities if additional funding is available.

SEAMAP is a cooperative state/federal/university program for the collection, management, and dissemination of fishery-independent data and information in the Southeastern U.S. and Caribbean. Representatives from Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, Puerto Rico, the U.S. Virgin Islands, the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) jointly plan and conduct surveys of economically important fish and shellfish species and the critical habitats that support them.

SEAMAP's mission, detailed in Chapter 1 along with goals and objectives, is to provide an integrated and cooperative program to facilitate the collection and dissemination of fishery-independent information for use by fisheries managers, government agencies, recreational and commercial fishing industries, researchers, and others to enhance knowledge of marine fisheries and their associated ecosystems. SEAMAP is intended to maximize the capability of fishery-independent and associated survey activities to satisfy data and information needs of living marine resource management and research organizations in the region. The primary means of performing that task is to optimize coordination and deployment of sampling platforms used in the region to obtain regional, synoptic surveys and to provide access to the collected data through documents and accessible databases. Additional roles of SEAMAP are to document long- and short-term needs for fishery-independent data to meet critical management and research needs, and to establish compatible and consistent databases for holistic ecosystem and predictive modeling applications. SEAMAP promotes coordination among data collection, processing, management, and analysis activities emphasizing those specifically concerned with living marine resource management and habitat protection, and provides a forum for coordination of other fishery-related activities.

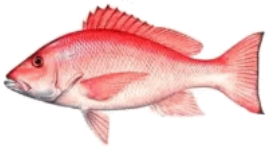
SEAMAP organization and management procedures and policies, fully described in Chapter 2, are structured to facilitate the implementation of the above roles. These policies and procedures include responsibilities of each member agency, development of planning documentation, and policies for program funding and budget priorities. The program presently consists of three operational components, SEAMAP-Gulf of Mexico (1981), SEAMAP-South Atlantic (1983), and SEAMAP-Caribbean (1988). Each SEAMAP component operates independently, planning and conducting surveys specific to the geographical region. Information dissemination conforms to administrative policies and guidelines of the NOAA Fisheries Southeast Regional Office (SERO). Joint coordination of the three regions is conducted annually.

Since 1982, SEAMAP has sponsored long-term standardized surveys that have become the backbone of fisheries and habitat management in the Southeast and Caribbean (Chapter 3). SEAMAP currently provides the only region-wide mechanism for monitoring long-term status and trends of populations and habitats within the region. As a cooperative effort, SEAMAP has the potential capability to monitor the distribution and abundance of fish and other populations from North Carolina through Texas and into the Caribbean.

SEAMAP data have proven essential in SouthEast Data, Assessment and Review (SEDAR) stock assessments, and management decisions and in answering important ecological questions, including the following:

Assessing long-term trends in coastal marine species, thus providing data for linking population trends with changes in environmental conditions such as global warming, nutrient enrichment, and overfishing (all surveys).

Documenting and defining essential fish habitat in fishery management plans for the Gulf of Mexico, South Atlantic, and Caribbean Fishery Management Councils (all surveys).



Long-term monitoring of juvenile red snapper abundances and providing necessary information for red snapper stock assessments and habitat requirements in the region (Caribbean, Gulf, and Atlantic Reef Fish Surveys; Gulf Trawl Surveys; Gulf Plankton Surveys).

Identifying and verifying the recovery of Gulf and South Atlantic king mackerel stocks, leading to increased Allowable Catch Limits (Gulf Plankton and South Atlantic Trawl Surveys).

Providing the international community with essential data, demonstrating the need to discontinue longline fishing for Atlantic bluefin tuna in the Gulf of Mexico (Gulf Plankton Surveys).

Determining population size structures, abundances, and necessary life history information for (SEDAR) stock assessments of a variety of fish, crustaceans, mollusks, and other species (Caribbean, Gulf and Atlantic Reef Fish Surveys, Gulf and South Atlantic Trawl Surveys).

Evaluating the abundance and size distribution of penaeid shrimp in federal and state waters to assist in determining opening and closing dates for commercial fisheries (Gulf and South Atlantic Trawl Surveys).

Surveying hypoxia in the Gulf of Mexico that continues to threaten the marine resources of Louisiana and adjacent states (Summer Trawl Survey).

Estimating finfish bycatch in the shrimp fisheries of the Gulf and South Atlantic, supporting bycatch reduction device regulations.

Evaluating community structure and trophic interactions in the various regions to assist in development of ecosystem models and support the transition to ecosystem-based management.

Collecting bottom habitat and snapper grouper species information, supporting designation of essential fish habitat and the establishment of deepwater marine protected areas and Spawning Special Management Zones in the South Atlantic.

Contributing to the compilation of existing deepwater habitat distribution and geologic information, which supports the South Atlantic Council's creation and conservation of 23,000 square miles of Deepwater Coral Habitat Areas of Particular Concern in the South Atlantic - the largest and least impacted deepwater coral ecosystem in the world.

Contributing to the assessment of the Deepwater Horizon oil spill impacts in the Gulf of Mexico by providing the primary baseline data in the Natural Resource Damage Assessment, as well as data used to identify species that were likely to be impacted (SEAMAP-Gulf Trawl and Plankton surveys).

The most compelling argument to continue funding is SEAMAP's ability to respond to recent and ongoing critical demands for data and information, such as those listed above, that only the program can provide. Accurate population assessments and informed resource decisions are impossible without basic annual data. Data collection and distribution activities, such as those performed by SEAMAP, are the foundation of resource assessments and responsible fisheries management. In turn, sustainable fisheries promote a continued source of recreation and employment for coastal communities. This 2021-2025 Management Plan sets the guidelines and priorities for fishery-independent data collection efforts that most appropriately use SEAMAP resources and address the needs of fisheries management in the Southeast and Caribbean regions.

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1 SEAMAP MISSION

1.1 INTRODUCTION

SEAMAP is a cooperative state/federal program for the collection, management, and dissemination of fishery-independent data in the Southeastern U.S. and Caribbean. Resulting data are used by state, federal, and interstate fisheries managers, academic researchers, and the commercial and recreational fishing industries. Long-term time series data are the foundation of SEAMAP. SEAMAP presently consists of three geographical components: SEAMAP-Gulf of Mexico (1981); SEAMAP-South Atlantic (1983); and SEAMAP-Caribbean (1988).

SEAMAP encompasses marine and estuarine waters and living marine resources within U.S. internal waters, territorial seas, and exclusive economic zones (EEZs) in the Gulf of Mexico, South Atlantic Bight, and Caribbean Sea. The scope may be expanded to include geographical areas beyond the EEZ in order to coordinate efforts with foreign governments and international bodies or commissions regarding resources of common interest. In general, the primary emphasis of SEAMAP has been on fisheries stocks subject to cooperative state/federal management, as opposed to stocks exclusively under the jurisdiction of a single political entity. However, SEAMAP can address issues involving resources managed primarily by a single entity that may affect fishery resources on a regional or national level.

SEAMAP is a successful example of a state/federal partnership in which the participants work jointly in a cost-effective manner toward common goals and objectives to obtain and utilize scientific information regarding living marine resources. Fishery management and research agencies at the state and federal levels share interest in and responsibilities for common fisheries resources, but often lack the funding needed to support regional surveys throughout the range of these resources. SEAMAP provides funds to involve regional member organizations in the coordination of fishery-independent sampling activities, sampling platforms, and procedures. Fishery-independent data are collected from research vessels following scientifically designed long-term surveys.

Successful fisheries management relies on combining fishery-independent data with information derived from fishermen. Fishery-dependent data is defined as fishery statistics, either raw or analyzed, that are collected directly from recreational and commercial fishing activities. Fishery-dependent data may be significantly influenced by varying economic conditions, changes in management regulations, changes in vessel and gear designs, discard patterns, willingness of fishermen to provide accurate data, and changes in fishing strategies and practices that cannot necessarily be measured. As managers implement alternative regulatory schemes, such as seasonal quotas or individual transferable quotas, the issue of bias in the fishery-dependent data must be considered.

Fishery-independent data are not statistically influenced or biased by changes in regulations or market considerations, and provide a relative measure of abundance compared to previous

years when conducted with standard protocols. Fishery-independent data typically provide relevant, unbiased information for conducting population assessments in conjunction with fishery-dependent data.

There is great potential for increased use of SEAMAP data in fisheries management. The South Atlantic Fishery Management Council (SAFMC) and Gulf of Mexico Fishery Management Council (GMFMC) have both developed lists of research and monitoring needs in response to the MSRA mandate for federal Regional Fishery Management Councils to develop prioritized research plans (GMFMC's Updated List of Fishery Monitoring and Research Priorities for 2020-2024; the SAFMC's Research and Monitoring Section of FEP II includes the SAFMC Research and Monitoring Priorities (2020-2025)). These priorities highlight the need for life history data and fishery-independent sampling in support of stock assessments, especially for priority snapper-grouper species. The Atlantic States Marine Fisheries Commission's (ASMFCs) 2018 Research Priorities and Recommendations to Support Interjurisdictional Fisheries Management identifies numerous needs for information on its managed South Atlantic species that may be fulfilled through SEAMAP. Specific examples of fisheries for which SEAMAP data are now being used to reach management decisions include red snapper, Atlantic bluefin tuna, king mackerel, brown shrimp, white shrimp, pink shrimp, blacktip shark, yellowedge grouper, greater amberjack, gag grouper, red grouper, gray triggerfish, and Spanish mackerel in the Gulf of Mexico; red drum, red snapper, vermilion snapper, black sea bass, scamp, red porgy, spot, Atlantic croaker, southern flounder, and Atlantic menhaden in the South Atlantic; and queen conch, spiny lobster, yellowtail snapper, whelk, parrotfish, red hind, snapper/groupers, and pelagic game fish in the Caribbean (see "Recent Data Uses" sections in Chapter 3).

SEAMAP data and the results of data management have played a key role in providing information to the SouthEast Data, Assessment, and Review (SEDAR) stock assessments. SEDAR is a cooperative Regional Fishery Management Council process initiated in 2002 to improve the quality and reliability of fishery stock assessments in the South Atlantic, Gulf of Mexico, and U.S. Caribbean. The SEDAR process has significantly improved the scientific quality of stock assessments and greatly improved constituent and stakeholder participation in assessment development and transparency. SEAMAP data have been used in SEDAR stock assessments and assessment updates for over 30 species, including snappers, groupers, sea bass, menhaden, and sharks (see SEDAR Assessment Schedule).

All directives, policies, and procedures presented in this SEAMAP five-year plan, and subsequent annual operations plans, supersede those set forth previously. Also included in this plan are descriptions of resource surveys and their data uses (Chapter 3). The 2021-2025 SEAMAP Strategic Plan provides proposed activities that restore the surveys which have impacted by decreased and stagnant funding as well as build upon the existing base program and, as such, will be dependent on the availability of additional funding.

Since its establishment, SEAMAP has developed datasets of sufficient quality and temporal scope to be particularly useful in providing indices of abundance and life history information for fisheries stock assessments. SEAMAP data have also been used in the development of fishery

management plans (FMPs) and EFH amendments. Examples include providing data on the distribution of coral in order to protect it from rock shrimp trawling in the South Atlantic, and consolidating bottom-mapping data for use by the SAFMC to define EFH. The time series and quality of fishery-independent data now available to fisheries managers and others interested in marine resources can be attributed to the success of the state/federal partnerships supported by SEAMAP. It is important to note that in addition to collecting marine fisheries data, SEAMAP collects vital environmental data, including physical, biological, geological, and chemical oceanographic information. Furthermore, SEAMAP provides sampling opportunities and educational experiences for researchers and students of various disciplines by allowing them to take part in SEAMAP cruises (if possible) to collect samples for their own analyses. This has the potential to considerably increase participation and maximize the use of survey/research platforms, especially since vessel costs are often prohibitive for smaller research projects. Thus, SEAMAP serves as a catalyst, bringing together available scientific resources and fishery-independent information within a region for use by fisheries managers, scientists, and others interested in our coastal marine fisheries.

1.2 PROGRAM MISSION AND GOALS

The mission of SEAMAP is to provide an integrated and cooperative program to facilitate the collection, interpretation, and dissemination of fishery-independent information for use by government agencies, the commercial and recreational fishing industries, researchers, and others to enhance knowledge of marine fisheries and their associated ecosystems. It is the *fishery-independent* collection of data that distinguishes SEAMAP. In the context of SEAMAP, fishery-independent data are defined as those data that are obtained without direct reliance on activities of commercial or recreational fishing. Data may be taken from such non-industry activities as trawl surveys for bottom-fish and aircraft surveys for schooling fish.

The overall approach of SEAMAP emphasizes the collection of fishery-independent data to fill specific short and long-term state, interstate, and council management needs. Maintenance of regional, multipurpose databases accessible to all participating management agencies allows for efficient data entry, storage, and dissemination. The SEAMAP database provides information for managers and scientists to monitor and assess the condition of species or species groups subject to management programs. Environmental parameters and community structure are monitored in order to provide insight concerning the dynamics of Southeast area living marine resources. Data collection and management procedures are coordinated among participants in order to enhance the usefulness of the data, minimize costs, and increase accessibility for fishery managers, administrators, and researchers. SEAMAP builds on current activities to develop optimum resource sampling and assessment capabilities.

Gathering and disseminating information are long-term goals of SEAMAP, as fisheries management is a dynamic function which continually requires current data. Moreover, as data are accumulated, their value and utility for assessing fish stocks increase. Long-term data are needed to describe and explain population trends and responses to fishing activities, environmental factors, and regulatory programs. Predictive capabilities for stock abundance, recruitment, and yield also require a long-term time series of data.

No single fishery management agency has the resources to meet the objectives of existing state, interstate, and federal FMPs currently in place, nor those planned for the future. However, SEAMAP's integrated approach to fishery-independent data collection can fulfill priority data needs for FMP development in the southeast region.

Goal 1: Collect and analyze data on economically and ecologically important species and their essential habitats to support stock assessments and management needs with emphasis on ecosystem-based management data requirements

Objectives:

- Conduct routine surveys and special studies, as needed, of regional resources and their environments
- Obtain, process, and archive, as appropriate, biological specimens and samples
- Obtain data, such as environmental and bottom-mapping data, from other agencies and organizations in order to plan and conduct SEAMAP activities
- Develop partnerships with governmental and non-governmental organizations to improve acquisition of fishery-independent data for the Southeast region
- Collect data on priority species to support stock assessments and other evaluations
- Collect information on species habitat use at different life stages to support evaluation and refinement of Essential Fish Habitat and Habitat Areas of Particular Concern designations

Goal 2: Optimize fishery-independent survey activities and enhance coordination between surveys in the region

Objectives:

- Develop and evaluate sampling systems and procedures needed for SEAMAP surveys and special studies
- Standardize and calibrate sampling systems and procedures used in SEAMAP surveys and special studies
- Sponsor special workshops and symposia to help evaluate or plan sampling strategies, design, or methods
- Cooperatively plan activities with representatives of foreign governments
- Work with existing partner state and federal surveys to identify areas of overlap as well as deficiencies in sampling and data
- Develop an annual operations plan for each SEAMAP component (Gulf, South Atlantic, Caribbean) consistent with budget and operational constraints that considers data needs of the region
- Sponsor individual and joint meetings of the SEAMAP components to cooperatively plan and evaluate activities

Goal 3: Identify and prioritize long- and short-term needs for fishery-independent data to meet current and future critical management and research needs

Objectives:

- Maintain and develop new partnerships with governmental and non-governmental organizations to increase knowledge of fishery-independent and associated ecological data needs for the Southeast region
- Serve as liaisons in various governmental and non-governmental organizations and committees to gain a more comprehensive understanding of data needs in the Southeast region
- Conduct periodic coordinated external reviews of specific management, administrative, and technical elements of the program to ensure that critical data needs are being met
- Develop a 5-year management plan for SEAMAP that makes recommendations on how to expand current or create new surveys to fill gaps in the data requirements for species assessments or management

Goal 4: Maximize the accessibility and coordination of fishery-independent survey data

Objectives:

- Design, implement, upgrade, and maintain SEAMAP data management systems that can be used to store information used to assess and monitor selected living marine resources and associated environmental and habitat factors and ensure that SEAMAP data are protected and archived
- Establish data handling and processing protocols for all SEAMAP data
- Compile and maintain a computerized directory of SEAMAP monitoring activities, including data summaries and inventories by gear, species, species-group, and geographic areas
- Create geographic information systems (GIS) and metadata products for priority species' abundance, distribution (by life stage), and habitat (such as EFH) served through an internet mapping application
- Coordinate and integrate, when feasible, the SEAMAP data management support systems (Gulf of Mexico, South Atlantic, Caribbean) with non-SEAMAP databases
- Make data and results from analyses available to stock assessment teams in an accessible format in support of assessing the status of the resources
- Coordinate and document SEAMAP administrative functions, information dissemination, the SEAMAP data management systems, archiving centers, and data collection by SEAMAP participants
- Inform fisheries research and management agencies, the fishing industry, and the general public of SEAMAP activities by the preparation and dissemination of newsletters, annual reports, annual operations plans, and/or other means
- Maintain partnerships with governmental and non-governmental organizations to improve dissemination and utilization of SEAMAP fishery-independent and ecological data
- Propose multispecies analyses that could directly inform EBFM approaches

2 PROGRAM ORGANIZATION AND MANAGEMENT

2.1 PROGRAM ORGANIZATION

The geographical components of SEAMAP – Gulf, South Atlantic, and Caribbean regions – operate independently but possess functionally similar systems. All components include systems consisting of two basic elements: program operations and program management. These elements are summarized below and discussed in more detail later in the document:

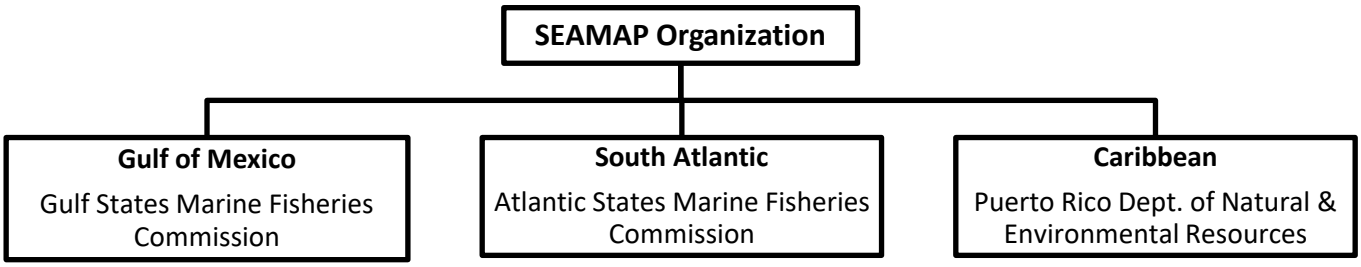
Operations

- Resource surveys
- Sampling gear assessment and standardization
- Data management
- Dissemination of SEAMAP-derived information
- Survey methodology workshops

Management

- Program and operations planning and administration
- Program evaluation

The activities for each element are performed by the structural bodies of each component, which are also similar in organization.



- Alabama Dept. of Conservation & Natural Resources
- Florida Fish & Wildlife Conservation Commission
- Louisiana Dept. of Wildlife & Fisheries
- Mississippi Dept. of Marine Resources/Gulf Coast Research Laboratory
- Texas Parks & Wildlife Dept.
- NMFS Southeast Fisheries Science Center
- Gulf of Mexico Fishery Management Council

- Florida Fish & Wildlife Conservation Commission
- Georgia Dept. of Natural Resources
- North Carolina Dept. of Environment & Natural Resources
- South Carolina Dept. of Natural Resources
- NMFS Southeast Fisheries Science Center
- South Atlantic Fishery Management Council
- US Fish & Wildlife Service, South Atlantic Fisheries Coordination Office

- University of Puerto Rico Sea Grant College Program
- Virgin Islands Dept. of Planning & Natural Resources
- NMFS Southeast Fisheries Science Center
- US Fish & Wildlife Service
- Caribbean Fishery Management Council

2.2 PROGRAM COMPONENT STRUCTURE

2.2.1 SEAMAP-Gulf

SEAMAP-Gulf of Mexico (SEAMAP-Gulf) is administered by the SEAMAP Subcommittee of the Gulf States Marine Fisheries Commission's Technical Coordinating Committee (GSMFC-TCC). The committee membership consists of one representative from each of the five participating Gulf states and representatives from the Gulf States Marine Fisheries Commission (GSMFC) and NMFS Southeast Fisheries Science Center (SEFSC). Committee approved plans, evaluations, and budget requirements are submitted to the TCC for approval. Daily operations of the program are administered by the SEAMAP-Gulf coordinator, an employee of GSMFC funded through SEAMAP, who is under the direction of the committee chair. Administrative supervision of the coordinator is performed by the GSMFC Executive Director, with authority to recruit, employ, and discharge the coordinator, in concurrence with the SEAMAP Subcommittee. The coordinator is employed on a yearly basis, subject to review by the subcommittee, subcommittee chair, and executive director.

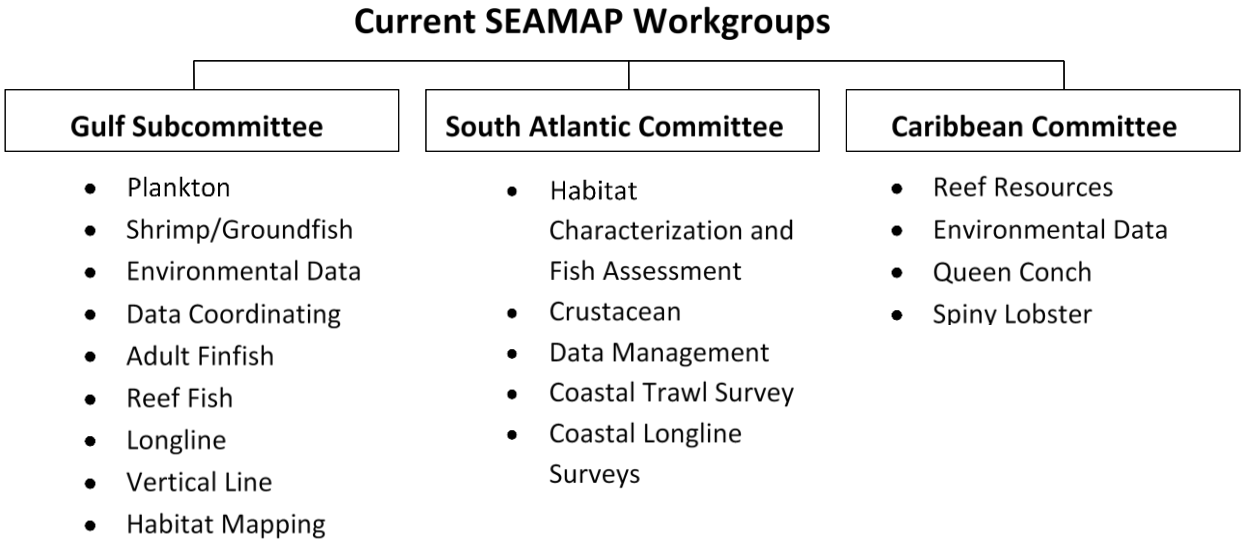
In addition to the standing management agency (GSMFC), management body (TCC), and subcommittee, workgroups are established by the Subcommittee as needed to address specific issues. Workgroups are not standing committees, but are formed to accomplish specific objectives and are disbanded upon completion. The Plankton, Shrimp/Groundfish, Environmental Data, Data Coordinating, Reef Fish, Longline, Vertical Line, Habitat Mapping, and Adult Finfish Workgroups are all currently functioning in the Gulf component.

2.2.2 SEAMAP-South Atlantic

SEAMAP-South Atlantic (SEAMAP-SA) is one of several cooperative state-federal programs under the aegis of the ASMFC's Science Program. Within the ASMFC, policy and fiscal matters for SEAMAP-SA are reviewed by the South Atlantic State-Federal Fisheries Management Board (SAB), a fisheries decision-making body composed of members from the South Atlantic state delegations (a marine fishery management agency director, governor appointee, and state legislator from each state), and representatives of the SERO, USFWS, and SAFMC. The SEAMAP-SA Committee is the technical committee responsible for budget preparation and plan preparation and implementation. The committee consists of one representative from each participating South Atlantic state (NC-FL), the SAFMC, ASMFC, and SEFSC. Routine operations are administered by the SEAMAP-SA coordinator, an employee of the ASMFC, funded wholly or in part by SEAMAP. The SEAMAP-SA coordinator receives assistance from the ASMFC office and technical guidance from the committee. Workgroups may be established in addition to the standing management agency (ASMFC), management body (SAB), and committee (SEAMAP-SA Committee). Current workgroups established by the committee include the Data Management, Habitat Characterization and Fish Assessment, and the Crustacean Workgroups. The Coastal Trawl Survey and the Coastal Longline Survey Workgroups provide guidance to their respective surveys.

2.2.3 SEAMAP-Caribbean

SEAMAP-Caribbean (SEAMAP-C) is administered currently by the University of Puerto Rico Sea Grant College Program (UPRSGCP). Due to differences in political entities, the SEAMAP-C Committee membership differs from that of the other SEAMAP components and consists of one member each from the Commonwealth of Puerto Rico Department of Natural and Environmental Resources (PR-DNER), U.S. Virgin Islands Department of Planning and Natural Resources (USVI-DPNR), UPRSGCP, USFWS, SEFSC, and the Caribbean Fishery Management Council (CFMC). The SEAMAP-C coordinator is an employee of the UPRSGCP funded in part by SEAMAP. The coordinator receives administrative support from the UPRSGCP and technical guidance from the committee. Workgroups may be established in addition to the committee. Currently, the Reef Resources Workgroup coordinates the sampling strategies of reef fish, spiny lobster, queen conch, whelk, habitat assessment, and bottom mapping.



2.3 PROGRAM RESPONSIBILITIES

2.3.1 Management Agency Responsibilities

Administrative services are provided by the GSMFC for the Gulf component, ASMFC for the South Atlantic component, and the UPRSGCP for the Caribbean component through their respective SEAMAP coordinator.

Administrative services rendered by each management agency include:

- Provide budget information to the SEAMAP committee;
- Coordinate SEAMAP meetings;
- Coordinate and schedule workshops;
- Administer funds associated with SEAMAP activities;
- Administer guidance of the coordinators;
- Supervise clerical personnel;
- Affirm committee representatives;

- Evaluate management personnel and facilities annually; and
- Review annual report.

Each SEAMAP component is sponsored by its respective management body, namely the TCC for the Gulf component, the SAB for the South Atlantic component, and the UPRSGCP for the Caribbean component. The management bodies for the Gulf and South Atlantic report to the GSMFC and ASMFC, respectively. The UPRSGCP acts as its own management body and management agency. Administrative and planning responsibilities of the management bodies include:

- Provide an ex-officio member to the respective committee;
- Review and approve component operations plans;
- Review annual report;
- Accept or reject actions recommended by an external or internal program review;
- Review and approve committee approved plans, evaluations, and budget requirements;
- Approve special surveys;
- Provide program policy; and
- Coordinate program and management agency directives.

2.3.2 Committee Organization and Responsibilities

Each program component is managed by its respective SEAMAP committee (Gulf Subcommittee, South Atlantic Committee, and Caribbean Committee). Committee membership is determined by the respective management agency, with voting rights determined by that management agency. Obligatory committee members and designated alternates to the committees are selected by participant organizations and affirmed in accordance with procedures of the management agency. A committee member may designate a proxy to serve at a given SEAMAP meeting, in accordance with the guidelines set forth by the committee member's organization. Additionally, an authorized representative from the management body to each committee may serve as an ex-officio member of that committee.

The committee chair and vice-chair are elected annually by the South Atlantic, Gulf, and Caribbean SEAMAP committees, and may serve an unlimited number of one-year terms. Each committee meets as necessary to accomplish stated goals and objectives. Meetings are open to all interested persons except during discussions of personnel matters and other actions legally conducted at closed sessions, in accordance with statutes and regulations of the various program participants. Committee decisions may be made by either consensus or by a majority of the voting committee quorum. Recorded votes will be taken upon request of one voting member. Minutes must be prepared for each committee meeting.

At least annually, the three committees meet jointly. The presiding chair is one of the committee chairs and rotates each year as determined by the collective committee chairs. Joint committee decisions will usually be made by consensus; however, important issues will be

determined by vote when requested. In such instances, each program will be assigned a single vote, for a total of three. During joint committee meetings, one of the coordinators will be selected by the chair to prepare minutes.

SEAMAP committees are responsible for program management and take the leading role in program planning. The general responsibilities of each SEAMAP Committee include:

- Determine regional fishery-independent data needs that can be met by SEAMAP activities;
- Plan activities to meet identified data needs;

- Coordinate official survey activities in a fashion that will permit collection of the most useful data in the most cost-effective manner;
- Provide technical guidance to the coordinators, data managers, and curators;
- Determine program budgets;
- Establish workgroups with specific areas of expertise to assist in the development and evaluation of survey activities;
- Develop and maintain a data management system;
- Support an archiving system to process and store SEAMAP specimen collections;
- Sponsor workshops and other activities that will generate information needed to improve program operations;
- Develop information dissemination plans;
- Approve special travel and activity requests;
- Develop short term (operations) and long term (management) plans;
- Identify funding needs for SEAMAP operations;
- Define evaluation and review policies and procedures;
- Recommend actions to correct problems that may jeopardize reliability of survey databases; and
- Submit annual report to the respective oversight body, summarizing SEAMAP activities, accomplishments, needs, and plans.

2.3.3 Coordinator Responsibilities

Coordinators are also responsible for program administration and planning in accordance with committee guidance. General coordinator responsibilities include:

- Work closely with the committee chair in all aspects of program coordination, administration, and operation;
- Implement plans and program directives developed by the committee and approved by the management body;
- Coordinate committee meetings and recommend appropriate agendas;
- Serve as information liaison between the committee and the oversight agency, participants, and organizations interested in SEAMAP activities;
- Submit preliminary administrative budget recommendations and assist the committee with preparation of the budget;

- Prepare or supervise preparation of selected SEAMAP publications;
- Distribute approved SEAMAP information in accordance with committee policies and procedures;
- Assist in representing the program to the community through public educational activities;
- Assist in the identification of regional needs that can be satisfied by SEAMAP activities;
- Maintain a file of all reports and publications which relied on SEAMAP data or SEAMAP specimens, and provide an annual listing to the committee; and
- Prepare the annual report to the oversight body.

2.3.4 Workgroup Organization and Responsibilities

Workgroups are established by a committee to address specific issues or accomplish specific objectives. Directives to a workgroup may include:

- Plan approved surveys;
- Evaluate surveys;
- Generate an appropriate sampling design;
- Develop a data format compatible with the SEAMAP Data Management System;
- Estimate costs and related needs associated with SEAMAP activities in accordance with a specific schedule;
- Develop a schedule for processing collected data and samples and recommending persons or agencies that will be responsible for accomplishing this work.

Members of workgroups are appointed by the respective committee and are generally not members of that committee. Members may be drawn from universities, state and federal marine resource agencies, and the fishing industry in order to obtain the best scientific advice. Workgroup leaders may be elected by the workgroup or appointed by the committee at the committee's discretion. When elected, leaders are subject to approval by the committee and are responsible for preparing a written report to the respective committee after each workgroup meeting. Upon the completion of specific tasks assigned to the workgroup by its appointing committee, the workgroup may be disbanded by the committee or, depending upon the objectives assigned to the workgroup, may exist indefinitely.

2.3.5 NMFS/SEFSC Program Management and Responsibilities

NMFS employees are appointed as program manager by the SEFSC Director and program officer by the SERO Administrator. These positions were created to ensure program compliance with Department of Commerce (DOC) rules, regulations, and policies. The program manager has overall authority and responsibility for the program, including allocation of funds among participants and ensuring that goals, objectives, and activities are appropriate to the program mission.

The program officer is responsible for ensuring proper program documentation by the respective components, especially cooperative agreements and cooperative agreement amendments. These documents must be complete, accurate, and submitted on time to ensure

timely processing and distribution of funds. The program officer also ensures that participants are in compliance with their cooperative agreements, and assists in communication among program components, and, when necessary, the DOC grants administration offices.

2.3.6 Cooperators and Other Interested Parties

Cooperators and other interested parties are not SEAMAP member organizations, although their input is essential to the cooperative approach of the program. Cooperators include persons or organizations actively involved in SEAMAP operations, such as workgroup members or researchers collecting data for SEAMAP. For example, Sea Grant organizations are included as cooperators in the SEAMAP Gulf and South Atlantic components. In the Caribbean component, Sea Grant is a full participating member of the program, and as cooperators, their participation is voluntary. Sea Grant organizations are invited to participate in all SEAMAP committee meetings as non-voting participants. Their technical, management, and administrative advice and assistance are often sought, especially in forming workgroups, evaluating program performance, organizing workshops and symposia, and disseminating information from and about the program. Sea Grant is generally perceived as representing all universities within a region.

Universities also serve as a major source of technical expertise for workgroups. As cooperators, university investigators are often invited to officially participate in functions of SEAMAP, such as committee and workgroup meetings, with their travel costs paid by SEAMAP.

2.3.7 SEAMAP Project Initiation

A SEAMAP survey is a fishery-independent project that is fully or partially funded via SEAMAP resources. Its data are fully integrated and compatible with other SEAMAP surveys, and are used by state, federal, and interstate fisheries managers, academic researchers, and the commercial and recreational fishing industries to provide information on managed species' stock trends and status. Data collection and sampling protocols for SEAMAP surveys should undergo a review and acceptance from partner workgroups and be approved by the appropriate management body.

The following steps are taken to develop a new SEAMAP survey within each component:

1. Partners (SEAMAP workgroups or state/interstate fisheries managers) identify a topic of concern where data are either missing or insufficient for stock assessment and/or fishery management purposes.
2. The appropriate SEAMAP workgroup(s) discusses the issue and begins developing methods to address concerns. Outside experts from state, federal, and interstate agencies should be involved in the discussion to ensure the survey is statistically robust, unbiased, and the data are suitable for stock assessments.
3. The workgroup chair (or their proxy) will present the concerns and proposed survey to the appropriate management body, including proposed methodologies, required funding, goals, expected benefits, and principal participants.

4. The appropriate management body will discuss the merits and importance of the survey and prioritize the need among existing ongoing projects. If approved, the management body will recommend the survey for funding under existing financial restrictions.
5. If approved by the appropriate management body, the principals will submit a SEAMAP proposal through the National Oceanic and Atmospheric Administration (NOAA) for funding.
6. Once established, the survey principals will provide annual updates. If the survey is long-term, it may undergo occasional peer review to ensure data collection methods and sampling remain of the highest statistical integrity.

A SEAMAP partner survey is one that receives no directed funding from SEAMAP, but whose data are valuable for regional fisheries management and stock assessment. State, federal, and interstate agencies all possess surveys that can be of value, including, but not limited to:

- USFWS: Cooperative Winter Tagging Cruise
- Georgia Department of Natural Resources (GA DNR): Ecological Trawl Survey, Marine Sportfish Population Health Survey
- North Carolina Division of Marine Fisheries (NC DMF): Juvenile Trawl Survey, Pamlico Sound Gill Net Survey
- National Marine Fisheries Service (NMFS)/South Carolina Department of Natural Resources (SC DNR): Marine Resources Monitoring, Assessment and Prediction Program (MARMAP)
- NMFS: Southeast Fishery Independent Survey (SEFIS), Bottom Longline Survey, Marine Mammal Survey, Pelagic Trawl Survey, Beaufort (NC) Ichthyoplankton Survey
- Alabama Department of Conservation and Natural Resources: Fisheries Independent Monitoring
- Mississippi Department of Marine Resources: Fisheries Independent Monitoring
- Gulf Coast Research Laboratory: Fisheries Independent Monitoring
- Louisiana Department of Wildlife and Fisheries: Fisheries Independent Monitoring
- Texas Parks and Wildlife Department: Fisheries Independent Monitoring
- Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute (FWRI): Fisheries Independent Monitoring
- South Carolina Department of Natural Resources (SC DNR): Fisheries Independent Monitoring.
- National Coral Reef Monitoring Program (NCRMP)
- Puerto Rico Coral Reef Monitoring Program (PRCRMP)
- USVI Coral Reef Monitoring Program (USVICRMP)

2.3.8 Collaborations

The coordinated efforts of data collection and management are invaluable for providing stock assessment teams and resource managers with consistent high-quality data. Centralized data management also provides an efficient quality control mechanism and can serve as a vehicle to easily update data when new information becomes available. SEDAR stock assessment research

recommendations have included the importance of and desire to standardize the collection of information across programs. SEAMAP has served as a vehicle to accomplish such standardizations. Through the input the program receives on fishery-independent sampling from multiple state agencies' collaborations with federal agencies, SEAMAP programs represent partnerships in the truest sense of the word. As SEAMAP surveys are implemented and methodologies approved by the committees and workgroups of each component, those surveys become a template by which partner states can develop future inshore surveys or modify existing fishery-independent programs within state territorial waters.

In the Gulf of Mexico, SEAMAP's partnership with the states of Florida, Alabama, Mississippi, Louisiana, and Texas has led to individual states adopting SEAMAP sampling and data protocols, in whole or in part, for state-managed fisheries research projects. For instance, Mississippi has modified the laboratory processing procedures for its inshore trawl survey to be consistent with current SEAMAP guidelines, resulting in datasets that are more readily integrated for assessment purposes. Recent longline survey development has also been a collaborative measure, with both the federal and state components discussing and agreeing to adopt uniform standards for vertical longline sampling. Additionally, states are investigating the potential for utilizing the NMFS Fisheries Scientific Computer System (FSCS) for laboratory processing of samples collected through state monitoring efforts. The integration of FSCS with electronic fish measuring boards and bench top scales provides for more efficient data acquisition, reduces data recording and entry errors, and enables efficient data integration.

In the South Atlantic, SEAMAP's mission is carried out as a cooperative effort between USFWS, NOAA Fisheries, SAFMC, ASMFC, and the states of North Carolina, South Carolina, Georgia, and Florida. An example of cooperative efforts includes fishery-independent sampling to monitor spatiotemporal trends in abundance of reef fish species in South Atlantic waters. Historically, these efforts were carried out entirely by the SC DNR MARMAP Program, until SEAMAP-SA began cooperative efforts in 2009 via the Habitat Characterization and Fish Assessment Workgroup. Beginning in 2010, the Southeast Fishery Independent Survey (SEFIS) was established at the NOAA Beaufort Laboratory (NC) to work cooperatively with MARMAP and SEAMAP-SA Reef Fish Surveys to enhance fishery-independent sampling efforts in South Atlantic waters. SEAMAP-SA and SEFIS have adopted many of the MARMAP sampling protocols and staff were cross-trained in sampling methods, sample processing, and data management. This comprehensive approach means that new data can be integrated into the long-term dataset without compromising the integrity of the existing information and analyses. Currently, the three reef fish surveys (MARMAP, SEAMAP-SA, and SEFIS) are integral partners in the fishery-independent data collection for the snapper/grouper management complex in the Southeast region, now called the Southeast Reef Fish Survey (SERFS). Relative abundance (index) and life history information acquired through these monitoring efforts are an essential part of the assessment process. Data and analyses are provided to various stock assessment teams and South Atlantic partner staff have participated in assessment workshops and contributed to the assessment reports. Data from the reef fish survey has been included in the SEAMAP-SA Oracle database and made available to third parties such as NMFS assessment teams, academic institutions, and state agencies.

In the Caribbean, the SEAMAP fisheries independent sampling program has been made possible thanks to an effective partnership among the US Virgin Islands and Puerto Rico districts, represented by the VI DPNR/DFW, and the PRDNER. Special collaboration has been received from the PR-Fisheries Research Laboratory during all the PR reef fish and the VI parrotfish gonads samples processing for the reproduction analysis. The University of Puerto Rico's Sea Grant College Program has been serving as the coordinating entity for the SEAMAP-Caribbean Program. Some queen conch survey and quality control including preliminary data analysis providing close professional help to the program, has been conducted by the Department of Marine Sciences. The University of the Virgin Islands (UVI) has also been providing collaboration to SEAMAP-C during the hydroacoustic Spawning Aggregations surveys conducted at two of the main fish SPAG's known at the USVI, the MCD and the Hind Bank. Clear sampling protocols have been produced for both PR and USVI districts through close collaboration of NMFS and the CFMC. SEAMAP-C has been collaborating with the University of South Carolina (MARFIN) while providing fish hard parts for age and growth studies of several reef fish species, and with the Virginia Institute of Marine Sciences providing parrotfish samples.

SEAMAP constituent groups are also developing cooperative efforts with groups such as the Southeast Coastal Ocean Observing Regional Association (SECOORA) to obtain oceanographic data and multi-beam bottom mapping and habitat data that can be linked to species' distribution data. SEAMAP is positioned to provide information on the distribution, status, and habitat of the South Atlantic to regional partners in collaborations and to support ecosystem-based management and marine spatial planning. Developing partnerships in the region include, but are not limited to, SECOORA, South Atlantic Landscape Conservation Cooperative, and regional fish habitat partnerships including the Southeast Aquatic Resource Partnership and the Atlantic Coastal Fish Habitat Partnership (ACFHP).

2.4 PLANNING DOCUMENTATION

Three levels of planning documents are used in SEAMAP: the five-year plan, annual reports, and cooperative agreements. This five-year plan serves as the basis for program coordination among the Gulf, South Atlantic, and Caribbean components and provides a set of goals and objectives for all components, along with an outline of policies and procedures for program management. This plan is revised every five years to assure current relevance to all aspects of SEAMAP. Details of activities developed by each component to meet annual objectives for their region are given in the joint annual report. Cooperative agreements serve two purposes: they provide the basic legal document used by NOAA to transfer funds, and they provide the detailed annual operating and budget plan for each SEAMAP partner, with the exception of NMFS and other federal agencies. Annual detailed NMFS plans are included in each of the cooperative agreements prepared by the other participants. If SEAMAP funds are transferred to another federal agency, such as in the Caribbean component, the transfer is done through a memorandum of understanding which details that agency's activities under SEAMAP.

2.5 PROGRAM FUNDING AND BUDGET MANAGEMENT

2.5.1 Program Funding

Funding for SEAMAP activities depends on congressional and state legislative allocations, with the largest share funded through NOAA. Federal funds provided through SEAMAP are used primarily to fund or expand existing state and federal survey programs.

Fiscal Year	Gulf of Mexico 41.3%	South Atlantic 32.9%	Caribbean 10.5%	NMFS 15.2%	TOTAL (millions)
2016	$1,781,296	$1,418,999	$452,872	$659,901	$4.313
2017	$1,769,178	$1,409,346	$449,791	$655,410	$4.283
2018	$1,956,840	$1,558,838	$497,502	$724,931	$4.738
2019	$,1950,274	$1,553,608	$495,832	$722,499	$4.722
2020	$1,981,466	$1,578,456	$503,762	$734,054	$4.798

SEAMAP is conducted as a zero-based budget program. Federal funds are allocated annually to each geographic program component in accordance with approved annual operations plans, while non-federal participants contribute various amounts of support for SEAMAP activities such as salaries and equipment. Allocations of federal funds to participants are made to maximize participation and operating efficiencies. The components have agreed to percent allocations as follows: Gulf of Mexico (41.3%), South Atlantic (32.9%), Caribbean (10.5%), and NMFS (15.2%). Internal state and federal budget allocations for specific surveys and survey-related functions may vary significantly among participants and fiscal years. Thus, the individual state or federal share of the SEAMAP appropriation also may vary significantly from year to year, depending on budget needs to meet program objectives (budget history in Appendix B).

While SEAMAP's Congressional appropriation had increased since 2013, the amount available for collecting valuable fishery-independent data had up to 2018 actually decreased for a variety of reasons. Taxes and assessments on SEAMAP's budget constituted almost 16% of the total SEAMAP appropriation in FY2018, while taxes and assessments were only 5% in FY2014. In 2018 Headquarters administrative assessments were dropped. Regardless, SEAMAP has still had to secure other funding sources to help gather critical fishery-independent data. State partners have also contributed approximately $500,000 to SEAMAP data collection activities. These external funding sources cannot continue to support future SEAMAP sampling. With limited state budgets, state partners cannot continue to support SEAMAP in this way. These budget constraints have impacted days at sea, the number of stations sampled, and therefore the amount of fishery-independent data collected. In addition, with increasing vessel and personnel costs each year, even level funding leads to cuts in data collection.

2.5.2 Budget Policies

Federal SEAMAP funds are allocated, administered, and monitored in accordance with DOC, NOAA, and SERO policies, directives, and guidelines. The program manager, as designee of the

SEFSC Director, has approval authority for allocation of SEAMAP funds provided by NMFS. The program officer, as designee of the Southeast Regional Administrator, has administrative oversight responsibility for SEAMAP funds allocated to the states, commissions, councils, and others through cooperative agreements and contracts.

Every effort is made to ensure full and efficient utilization of SEAMAP funds. If for any reason allocated funds are determined to be in excess of the planned needs of a participant, the participant will immediately notify the program officer and manager of the projected excess. An attempt will be made to reallocate the excess funds to satisfy other program needs. SEAMAP may accept supplemental and reimbursable funds for specific activities and functions. Administration of these funds can be arranged through a number of mechanisms, such as contracts or cooperative agreements with NMFS, the interstate commissions, or the states.

2.5.3 Budget Priorities

SEAMAP funds may be used for surveys, including vessel and aircraft operations and charters, gear, supplies, personnel and travel; coordinator salaries; administrative support; staff, facilities, equipment, and supplies; communications; specimen archiving (including personnel, equipment, facilities, and supplies); publications; travel; meetings (committees, workgroups, workshops, and symposia); survey-related analyses; data management (hardware, software, operations, and personnel); program reviews; and other purposes designated by the committees and program manager.

SEAMAP budget priorities are as follows:

1. Long-term fishery-independent surveys;
2. Data management;
3. Coordination (coordinator salaries, meeting costs and coordination, and administration);
4. Calibration trials;
5. Sorted specimen archives (including ageing structures, gonads, and stomachs for diet);
6. Special surveys;
7. Unsorted specimen archives; and
8. Workshops, symposia, and special meetings.

Budget priorities 1-3 are considered by the committee to be essential for maintaining the integrity of the program. Priorities 4-8 are determined on a case-by-case basis in the context of each component's activities, SEAMAP's goals and objectives, and available funding.

2.5.4 Budget Planning

Budget planning is conducted in open meetings. The following annual procedure has been developed jointly by all three SEAMAP components:

1. The committees develop the activities and statement of work for the coming year in advance of the joint meeting.

2. Based on best available information, the program manager will provide a preliminary target budget for the program in mid-summer.
3. The program manager will meet with the chairpersons and coordinators from each program component collectively to develop preliminary budget targets for each program component.
4. A late summer joint SEAMAP meeting will be held soon after the meeting defined in step 3 to present budget needs and plans, to negotiate component budgets (based on the preliminary targets), and to arrive at a recommended budget allocation plan for the total program. This plan will include a budget breakdown by participant.
5. If agreement cannot be achieved during any step in the budget planning process, the program manager will develop a recommended budget allocation plan. Each program participant will use this recommended budget plan for subsequent planning until either a new plan is negotiated, or the program manager's plan is overruled by the SEFSC Director.
6. Individual component operations plans will be revised in accordance with the budget plan and submitted to the respective management body for review and approval.
7. Individual cooperative agreements will be developed based on the budget allocation plan and appropriate operations plan for submission to the program officer. These agreements normally will be submitted on or about the start of the new federal fiscal year.
8. If the budget allocation plan has to be changed for any reason (such as due to a change in the appropriated amount or in the amount made available to SEAMAP by NMFS), the program manager will immediately notify the committees and work with the committees in developing a modified allocation plan.

With the exception of NMFS, budget allocations to SEAMAP participants normally are made through individual cooperative agreements. This method, however, does not explicitly exclude the use of contracts by NMFS when cost effective and appropriate.

2.6 PROGRAM REVIEW AND EVALUATION

Program reviews and evaluations will be conducted to determine program effectiveness in meeting defined objectives and to improve data collection and standardization, data management (including specimen archives), and information dissemination. Program reviews may be classified into two categories: regional program evaluation and external review. Regional program evaluations serve as a summary of activities and are performed by each of the structural components of SEAMAP. External reviews can be designed to either evaluate the functional or technical aspects of SEAMAP.

2.6.1 Regional Program Evaluation

A review of each programmatic element, including administration, expenditures, survey operations, data management, and information dissemination will be conducted primarily through internal procedures within and among SEAMAP components each year. This review will be included in the annual report of program administration, data management, and

information dissemination prepared by the coordinators in accordance with approved policies and procedures. The report will be submitted to the appropriate committee and management body for review. Responsibility for the reviews resides with the committee. Portions of the review may be delegated to the coordinators, workgroups, data manager and curators. In addition, SERO's grant administration of SEAMAP amounts to an annual review, with acceptance of annual progress reports on the various grants under SEAMAP.

2.6.2 External Reviews

External reviews may be executed at the request of any management body in accordance with the collective direction of all management bodies. The program manager may request an external review of any aspect of program activities at any time. These requests will be coordinated with the appropriate committee and management body. External reviews will be written and documented and no such review will be released publicly without evaluation and comment by affected committees, management bodies, management agencies, and the program manager. When accepted by the affected committees and management bodies, actions recommended by an external or internal review will be executed within a reasonable time frame.

External technical reviews to evaluate specific operations and other aspects of the program can be called for and sponsored by any committee, with approval from the management bodies and program manager. These reviews are fully coordinated with all program components, and, whenever possible and appropriate, they are conducted jointly. The last comprehensive external review was conducted in FY 1987.

Prior to public release, technical publications produced by SEAMAP undergo peer review. Explicitly excluded from this requirement are data summary documents (e.g., atlases), reports to oversight bodies (e.g., annual reports), and reports from workshops and symposia, which represent collections of individual papers and abstracts.

3 SEAMAP ACCOMPLISHMENTS

SEAMAP has been functional since 1981 and has been collecting fishery-independent data since 1982. Program accomplishments can best be summarized when considered by activity type. Activity types include resource surveys, specimen archiving, data management, and information dissemination. The following also reviews the application of SEAMAP data by each resource survey.

It is ultimately the analysis and application of SEAMAP data, particularly to fisheries management, that demonstrates the vitality of the program. SEAMAP has developed a distinguished record for supporting stock assessments, and its role is almost certain to grow as survey/sampling time series lengthen and new surveys are brought online. A few of the most important applications to date are:

- Determining year-to-year trends in abundance
- Setting seasonal openings and allowable biological catch levels
- Evaluating existing management actions
- Evaluating proposed management actions
- Designating essential fish habitat and habitat areas of particular concern
- Estimating and monitoring bycatch
- Obtaining basic biological data
- Supporting marine spatial management
- Providing a baseline resource for damage assessment
- Providing baseline species and habitat distribution information for environmental assessments and impact statements
- Establishing and monitoring marine protected areas
- Establishing and monitoring Spawning Special Management Zones
- Analyzing multispecies temporal changes as a product for EBFM evaluations.

3.1 RESOURCE SURVEYS

Resource surveys encompass both short- and long-term surveys of fisheries resources and their environments. Although long-term databases form the foundation of SEAMAP, the program has flexibility to accommodate short-term data requests within the overall long-term program. For example, SEAMAP can provide data to address emergency resource information needs without impacting the program's long-term database. Surveys by each program component reflect distinct regional needs and priorities; however, survey operations in one geographic area often provide information useful to researchers in all three regions. For instance, the South Atlantic program's bottom mapping will be useful in SEAMAP-Gulf gear calibration efforts, while plankton and environmental surveys in the Gulf program have set the standards for the entire region's much-needed long-term database. Due to the diverse scope and target species involved in the SEAMAP's survey operations, activities are discussed here by geographic region.

Following each survey description, a chart of recent data uses is provided. This list is by no means intended to be exhaustive, but recent SEAMAP data applications are highlighted.

3.1.1 GULF OF MEXICO RESOURCE SURVEYS

3.1.1.1 Spring Plankton Survey

Objectives

The SEAMAP-Gulf Spring Plankton Survey began in 1982, with the objectives of collecting ichthyoplankton samples in offshore waters of the Gulf of Mexico for abundance and distribution estimates of Atlantic bluefin tuna larvae, and collecting environmental data at all ichthyoplankton stations.

Survey Design

Plankton samples are taken with standard SEAMAP-Gulf bongo and neuston samplers. The bongo sampler consists of two conical 61cm nets with 333-micron mesh. Tows are oblique, surface to near bottom (or 200m), and back to surface. A single or double 2x1m pipe frame neuston net, fitted with 0.947mm mesh netting, is towed at the surface with the frame half-submerged for 10 minutes. Samples are taken upon arrival on station regardless of time of day. At each station, either a bongo and/or neuston tow are made. In addition, hydrographic data (surface chlorophylls, salinity, temperature, and dissolved oxygen from surface, mid-water, and near bottom, and water color) are collected at all stations. Right bongo and neuston samples collected from SEAMAP-Gulf stations are transshipped to the Polish Sorting and Identification Center. Left bongo samples are archived at the SEAMAP-Gulf Invertebrate Plankton Archiving Center. The SEAMAP-Gulf Spring Plankton Survey usually samples approximately 150 stations every year during the April and May time period.

Optimization of Present Sampling

The Spring Plankton Survey can be optimized by sampling across oceanographic fronts and eddies associated with the Loop Current to sample for Atlantic bluefin tuna larvae, as they tend to congregate along these boundaries. The current Spring Plankton Survey design is based upon a grid system that may or may not coincide with an oceanographic front or eddy. Additional days to sample across fronts and eddies would allow directed sampling in areas where Atlantic bluefin tuna larvae are more likely to be encountered, therefore providing better data for stock assessments.

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
2020	Bluefin Tuna	X			ICCAT Stock Assessment	https://www.iccat.int/en/assess.html

3.1.1.2 Bottom Longline Survey

Objectives

The Bottom Longline Survey began in 2007, complementing an existing long-term fishery-independent longline survey currently conducted by NMFS. The Bottom Longline Survey targets coastal shark and finfish species within the shallow waters of the Gulf of Mexico. The objectives of the survey are to collect information on coastal shark and finfish abundances and distribution with a 1 mile longline and to collect environmental data.

Survey Design

Sampling occurs during three seasons: spring (April-May), summer (June-July), and fall (August-September). Sampling is conducted in waters defined by the 3-10m depth contour. Stations are proportionally allocated and randomly distributed within the 3-10m depth contour in each statistical zone based on the proportion of those depths present. Partners usually survey the stations that occur off their state boundaries for each season. All species are measured, tagged, and returned to the water alive when possible. The longline gear consists of 1 mile of 426kg test monofilament mainline with 100 baited (*Scomber scombrus*) #15/0 circle hooks with 3.7m gangions of 332kg test monofilament. A hydraulic longline reel is used for setting and retrieving the mainline. Radar high-flyers with bullet buoys are used to mark the longline locations. The mainline is weighted down at either end, as well as the midpoint, and set for 1 hour. The data are used in stock assessments for coastal sharks and finfish.

Optimization of Present Sampling

The Bottom Longline Survey can be optimized by extracting otoliths to age fish, performing dietary analysis to determine trophic interactions, and examining reproductive stage from fish currently captured in normal survey operations. This information would provide a wealth of data that could be used for current fisheries management, understanding predator/prey interactions, and support the development of ecosystem-based fisheries management.

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
2018	Blacktip Shark	X	X		SEDAR Stock Assessment	http://sedarweb.org/sedar-29u

3.1.1.3 Vertical Longline Survey

Objectives

The primary purpose of the SEAMAP-Gulf Vertical Longline Survey is to characterize the spatial and temporal distribution, indices of abundance, and age and size distribution of commercially and recreationally important reef fish species by habitat type and depth strata in the coastal waters of the Gulf of Mexico and the adjoining EEZ. Fishery-independent data characterizing population dynamics of fish assemblages on non-structured and structured bottom habitats (e.g. natural hard bottom and artificial structures) in offshore waters are also obtained.

Survey Design

Participating partners use three 22ft backbones containing ten 18in gangions outfitted with either an 8/0, 11/0 or 15/0 circle hook (each backbone has only one hook size), and terminating in a 10lb lead weight. Three bandit reels deploy the gear simultaneously on or near a reef structure and, once locked in at depth, are allowed to fish for 5 minutes. All bandit reels then retrieve the lines simultaneously. Catch data are collected once the lines are on board. Environmental data is collected upon completion of fishing at each station. Stations are randomly selected within three depth zones (10-20m, 20-40m, and from 40-150m) with effort allocated among five habitat types.

Optimization of Present Sampling

The Vertical Line Survey can be optimized by extracting otoliths to age fish, performing dietary analysis to determine trophic interactions, and examining reproductive stage from fish currently captured in normal survey operations. This information would provide a wealth of data that could be used for current fisheries management, understanding predator/prey interactions, and support the development of ecosystem-based fisheries management.

3.1.1.4 SEAMAP-Gulf Reef Fish Survey

Objectives

The primary purpose of the SEAMAP-Gulf Reef Fish Survey, which began in 1992, is to assess relative abundance and compute population estimates of reef fish found on natural habitat in the Gulf of Mexico.

Survey Design

The reef fish video survey was initiated by the NMFS Pascagoula lab in 1992 and targeted primarily high-relief reef habitats along the shelf break. These efforts were expanded in 2006 by surveys conducted by the NMFS Panama City lab targeting shallow reef habitats on the northeast Gulf of Mexico shelf, and in 2008 by surveys conducted by FWRI targeting shelf and shelf-break reef habitats across the West Florida Shelf. All surveys targeted natural reef habitats, and utilized stereo baited remote underwater video (S-BRUV) arrays to provide data on relative abundance, size, and habitat composition of reef fish, and associated habitats. Collection of fish for life history studies were conducted opportunistically as time and funding allowed.

In 2020, all three surveys were integrated into a new survey design under the Gulf Fishery Independent Survey of Habitat and Ecosystem Resources (G-FISHER). This new survey, which utilized S-BRUV arrays baited with a combination of squid and Atlantic mackerel, incorporated a stratified-random survey design where effort was allocated among eighteen spatial strata and eighteen habitat strata, including the addition of nine artificial reef habitat strata. All survey efforts were restricted to reef habitats that had been identified and characterized via side-scan or multibeam sonar and classified via habitat type (artificial or natural), relative relief (low, medium, or high relief), and scale of the individual reef feature (small, medium, or large). Approximately 2,000 stations are selected to be sampled annually. These efforts are supported

by additional funding beyond that provided by SEAMAP. Associated environmental data collected at each site typically includes salinity, temperature, depth, and dissolved oxygen, and may include measures of transmissivity and fluorescence.

Optimization of Present Sampling

The SEAMAP-Gulf Reef Fish Survey could be optimized through development of automated image analysis, which would the time required to provide data for assessment. In addition, funding to support fish collections for life history would enhance the collection of otoliths/spines for ageing, stomach contents for trophodynamics analysis, and reproductive histology. This information would provide a wealth of data that could be used for current fisheries management, understanding predator/prey interactions, and support the development of ecosystem-based fisheries management.

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
2016	Almaco Jack	X	X		SEDAR 49 Stock Assessment	http://sedarweb.org/sedar-49
2016	Lesser Amberjack	X	X		SEDAR 49 Stock Assessment	http://sedarweb.org/sedar-49
2016	Snowy Grouper	X	X		SEDAR 49 Stock Assessment	http://sedarweb.org/sedar-49
2016	Speckled Hind	X	X		SEDAR 49 Stock Assessment	http://sedarweb.org/sedar-49
2016	Yellowmouth Grouper	X	X		SEDAR 49 Stock Assessment	http://sedarweb.org/sedar-49
2018	Gray Snapper	X	X		SEDAR 51 Stock Assessment	http://sedarweb.org/sedar-51
2018	Red Snapper	X	X		SEDAR 52 Stock Assessment	http://sedarweb.org/sedar-52
2019	Red Grouper	X	X		SEDAR 61 Stock Assessment	http://sedarweb.org/sedar-61
2019	Yellowtail Snapper	X	X		SEDAR 64 Stock Assessment	http://sedarweb.org/sedar-64
2020	Vermilion Snapper	X	X		SEDAR 67 Stock Assessment	http://sedarweb.org/sedar-67

3.1.1.5 Summer Shrimp/Groundfish Survey

Objectives

The SEAMAP-Gulf Summer Shrimp/Groundfish Survey began in 1982, takes place during June and July every year, and samples approximately 360 stations from the U.S./Mexican border to south Florida. Data from the survey are used in evaluating the abundance and size distribution

of penaeid shrimp in federal and state waters to assist in determining opening and closing dates for commercial fisheries; evaluating and plotting the size of the hypoxic zone off of Louisiana; assessing shrimp and groundfish abundance and distribution and their relationship to such environmental parameters as temperature, salinity, and dissolved oxygen; and providing juvenile abundance indices for red snapper stock assessments. The Survey objectives are to monitor size and distribution of penaeid shrimp during or prior to migration of brown shrimp from bays to the open Gulf, aid in evaluating the "Texas Closure" management measure of the GMFMC Shrimp FMP, and provide information on shrimp and groundfish stocks across the northern Gulf of Mexico from inshore waters to 60fm.

Survey Design

The sampling sites are chosen using a random design with proportional allocation by bottom area within shrimp statistical zones throughout the Gulf of Mexico. Trawl stations sampled by NMFS, Florida, Alabama, Mississippi, and Louisiana are made with a standard SEAMAP-Gulf 42-ft trawl net. Trawls are towed perpendicularly to the depth contours for 30 minutes. Environmental data are also taken during the survey. All *Litopenaeus setiferus*, *Farfantepenaeus aztecus*, and *Farfantepenaeus duorarum* are separated from the trawl catch at each station. Total count and weight by species are recorded for each station. A sample of up to 50 shrimp of each species from every trawl is sexed and measured to obtain length-frequency information. Estimated total numbers are derived from the total weights of those processed. Other species of fishes and invertebrates are identified, enumerated, and weighed. Weights and individual measurements of selected species, other than commercial shrimp, are also recorded.

Optimization of Present Sampling

The Summer Shrimp/Groundfish Survey can be optimized by extracting otoliths to age fish, performing dietary analysis to determine trophic interactions, and examining reproductive stage from fish currently captured in normal survey operations. This information would provide a wealth of data that could be used in current fisheries management, understanding predator/prey interactions, and developing ecosystem-based fisheries management.

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
2018	Gray Snapper	X	X		SEDAR 51 Stock Assessment	http://sedarweb.org/sedar-51
2018	Red Snapper	X	X		SEDAR 52 Stock Assessment	http://sedarweb.org/sedar-52
2009-2019	White, Brown, and Pink	X	X		Shrimp Stock Assessment	http://www.galvestonlab.sefsc.noaa.gov/publications/
2019	Red Grouper	X	X		SEDAR 61 Stock Assessment	http://sedarweb.org/sedar-61
2020	Vermilion Snapper	X	X		SEDAR 67 Stock Assessment	http://sedarweb.org/sedar-67

Data have been incorporated into several Atlantis-GOM and Ecopath with Ecosim ecosystem models to determine the biomass of each species present in the model area.[4][5][6] Data has also been incorporated into a large monitoring database to develop fish and invertebrate spatial distributions to support ecosystem models.[7]

3.1.1.6 Fall Plankton Survey

Objectives

The SEAMAP-Gulf Fall Plankton Survey began in 1984 and takes place every August and September in waters of the northern Gulf of Mexico. Approximately 200 stations are sampled each year. The objective of the survey is to collect ichthyoplankton samples with bongo and neuston gear for the purpose of estimating abundance and defining the distribution of eggs, larvae, and small juveniles of Gulf of Mexico fishes, particularly king and Spanish mackerel, lutjanids, and sciaenids.

Survey Design

Plankton samples are taken with standard SEAMAP-Gulf bongo and neuston samplers. The bongo sampler consists of two conical 61cm nets with 333-micron mesh. Tows are oblique, surface to near bottom (or 200m) and back to surface. A single or double 2x1m pipe frame neuston net fitted with 0.947mm mesh netting is towed at the surface with the frame half-submerged for 10 minutes. Samples are taken upon arrival on station regardless of time of day. At each station, either a bongo and/or neuston tow are made depending on the specific survey. In addition, hydrographic data (surface chlorophylls, salinity, temperature, and dissolved oxygen from surface, midwater, and near bottom, and Forel-ule color) are collected at all stations.

Optimization of Present Sampling

The Fall Plankton Survey can be optimized by using a 1-meter Multiple Opening and Closing Net Environmental Sensing System (MOCNESS) to sample the vertical distribution of fish larvae by

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[4] Ainsworth, C.H., C.B. Paris, N. Perlin, L.N. Dornberger, W.F. Patterson III, E. Chancellor, S. Murawski, D. Hollander,K. Daly, I.C. Romero, F. Coleman, and H. Perryman. 2018. Impacts of the Deepwater Horizon oil spill evaluated using an end-to-end ecosystem model. PLOS One. https://doi.org/10.1371/journal.pone.0190840

[5] Chagaris, D.D., W.F. Patterson, and M.S. Allen. 2020. Relative Effects of Multiple Stressors on Reef Food Webs in the Northern Gulf of Mexico Revealed via Ecosystem Modeling. Frontiers in Marine Science. Vol. 7:Article 513. https://doi.org/10.3389/fmars.2020.00513

[6] de Mutsert, K. J. Steenbeek, K. Lewis, J. Buszowski, J.H. Cowan Jr., and V. Christensen. 2016. Exploring effects of hypoxia on fish and fisheries in the northern Gulf of Mexico using a dynamic spatially explicit ecosystem model. Ecological Modeling 331:142-150.

[7] Grűss, A., H.A. Perryman, E.A. Babcock, S.R. Sagarese, J.T. Thorson, C.H. Ainsworth, E.J. Anderson, K. Brennand, M.D. Campbell, M.C. Christman, S. Cross, M.D. Drexler, J.M. Drymon, C.L. Gardner, D.S. Hanisko, J. Hendon, C.C. Koening, M. Love, F. Martinez-Andrade, J. Morris, B.T. Noble, M.A. Nuttall, J. Osborne, C. Pattengill-Semmens, A.G. Pollack, T.T. Sutton and T.S. Switzer. 2018. Monitoring programs of the U.S. Gulf of Mexico: inventory, development and use of a large monitoring database to map fish and invertebrate spatial distributions. Reviews in Fish Biology and Fisheries. 2018. 25 pp.

sampling at discrete depths in the water column. A Methot fish trawl can also be used to sample the size fraction of fishes that are underrepresented in bongo and neuston samples.

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
2018	Red Snapper	X			SEDAR 52 Stock Assessment	http://sedarweb.org/sedar-52
2019	King Mackerel	X	X		SEDAR 38 Update King Mackerel Assessment	https://sedarweb.org/sedar-38
2020	Vermilion Snapper	X			SEDAR 67 Stock Assessment	http://sedarweb.org/sedar-67

3.1.1.7 Fall Shrimp/Groundfish Survey

Objectives

The SEAMAP-Gulf Fall Shrimp/Groundfish Survey began in 1985 and is currently conducted from South Florida to the U.S./Mexican border. Data from the survey are used in evaluating the abundance and size distribution of penaeid shrimp in federal and state waters to assist in determining opening and closing dates for commercial fisheries; assessing shrimp and groundfish abundance and distribution and their relationship to such environmental parameters as temperature, salinity, and dissolved oxygen; and providing juvenile abundance indices for red snapper stock assessments.

Survey Design

The survey collects samples at over 330 stations annually. Vessels sample waters out to 60ftm with trawls in addition to environmental sampling. The sampling sites are chosen using a random design with proportional allocation by bottom area within shrimp statistical zones throughout the Gulf of Mexico. Trawl stations sampled by NMFS, Florida, Alabama, Mississippi, and Louisiana are made with a standard SEAMAP-Gulf 42-ft trawl net. The objectives of the survey are to sample the northern Gulf of Mexico to determine abundance and distribution of demersal organisms from inshore waters to 60ftm; obtain length-frequency measurements for major finfish and shrimp species to determine population size structures; and collect environmental data to investigate potential relationships between abundance and distribution of organisms and environmental parameters.

Optimization of Present Sampling

The Fall Shrimp/Groundfish Survey can be optimized by extracting otoliths to age fish, performing dietary analysis to determine trophic interactions, and examining reproductive stage of captured fish.

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
2018	Red Snapper	X	X		SEDAR Stock Assessment	http://sedarweb.org/sedar-52
2009 - 2019	White, Brown, and Pink	X	X		Shrimp Stock Assessment	http://www.galvestonlab.sefsc.noaa.gov/publications/
2019	King Mackerel	X	X		SEDAR 38 Update King Mackerel Assessment	https://sedarweb.org/sedar-38

3.1.2 SOUTH ATLANTIC RESOURCE SURVEYS

3.1.2.1 Coastal Trawl Survey

Objectives

The objective of the Coastal Trawl Survey is to provide spatial and temporal data on resident and transient fish, crustaceans, and other species inhabiting shallow coastal ocean off the Southeastern US. Collected information includes community level data, relative abundance, length compositions, and life-history information for use in stock assessments and management.

Survey Design

Sampling cruises are conducted seasonally in April-May, July-August, and October-November between Cape Hatteras, North Carolina and Cape Canaveral, Florida. Between 102 and 112 stations (4.6 to 9.1m depth) are sampled each season. Sampling is done with a pair of 22.9m mongoose-type Falcon trawls, with tickler chains, and without TEDs or bycatch reduction devices (BRDs). Sampling is conducted during daylight hours and trawls are towed for 20 minutes. Contents of each net is processed independently. All finfish, elasmobranchs, crustaceans, and cephalopods are sorted to species or genus, counted, and weighed. Additional length and weight data are recorded, and age structures and reproductive tissues are collected from selected priority species. Note that due to stagnating or reduced funding there have been discussions about adjusting the sampling strategy, which may result in sampling two, rather than three seasons each year.

Optimization of Present Sampling

This survey currently uses the SCDNR owned Research Vessel *Lady Lisa* as its sole sampling platform. This vessel had been fully utilized by various surveys, but lack of funding has halted several studies in recent years. It may be possible to collect additional samples, such as water quality, algae, and bottom samples, at marginal additional cost.

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
2016	Bluefish	x	x	x	ASMFC Benchmark Assessment	http://www.asmfc.org/fisheries-science/stock-assessments
2016	Weakfish	x	x	x	ASMFC Benchmark Assessment	http://www.asmfc.org/fisheries-science/stock-assessments
2016-2020	Atlantic Menhaden	x	x	x	ASMFC Stock Assessments	http://www.asmfc.org/fisheries-science/stock-assessments
2016-2020	Penaeid Shrimp	x	x		SC-DNR Fisheries Management	
2016-2020	Atlantic Croaker and Spot	x	x		ASFMC Assessment Review and "Traffic Light" Analysis	http://www.asmfc.org
2016-2020	Bluefish, Weakfish, Atlantic Croaker, Spot, Spanish Mackerel, and Horseshoe Crab	x			ASMFC compliance Reports	http://www.asmfc.org
2017	Atlantic Croaker	x	x		ASMFC Benchmark Assessment	http://www.asmfc.org/fisheries-science/stock-assessments
2017	Southern Flounder	x	x		NCDMF Southern Flounder assessment	
2018	Horseshoe Crab	x	x	x	Horseshoe Crab Stock Assessment	http://www.asmfc.org/fisheries-science/stock-assessments
2018	Bluefish	x	x	x	NEFSC Bluefish Update Stock assessment	https://nefsc.noaa.gov/
2018-2019	Atlantic Menhaden	x	x	x	SEDAR 69 Atlantic Menhaden Benchmark Assessment	https://sedarweb.org/sedar-69
2019	King Mackerel	x	x	x	SEDAR 38 Update King Mackerel Assessment	https://sedarweb.org/sedar-38
2016-2020	Various species		x	x	Diet information for Ecopath/Ecosim modelling for SAFMC coordinated modeling efforts	https://safmc.net/fishery-ecosystem-plan-ii-south-atlantic-ecosystem/

Coastal Trawl Survey data are supporting continued development of South Atlantic Ecopath with Ecosim model.[8] An initial list of species where collection of diets will significantly enhance the model are provided in Section 2.1.5 of the Review Report for the 2019 South Atlantic Ecopath with Ecosim Model.

3.1.2.2 North Carolina Pamlico Sound Trawl Survey

Objectives

The Pamlico Sound Trawl survey provides a long-term fishery-independent database for the waters of the Pamlico Sound and associated river systems. Data collected from the survey provide juvenile abundance indices and long-term population parameters for interstate and statewide stock assessments of recreationally and commercially important fish stocks. The primary objectives of the survey are to monitor the distribution, relative abundance, and size composition of fish, shrimp, and crabs in the survey area and how they vary temporally and spatially. This data is used to ascertain fishery-independent estimates population size and mortality, identify nursery areas, determine if catch rates are correlated with indices of juvenile abundance, and monitor movement out of nursery areas.

Survey Design

During June and September each year, 54 randomly selected stations (one-minute by one-minute grid system equivalent to one square nautical mile) are trawled for 20 minutes using double rigged 30 ft demersal mongoose trawls over a two-week period, usually the second and third week of each month. Stations sampled are randomly selected from the following strata: Pungo River, Neuse River, Pamlico River, Pamlico Sound east of Bluff Shoal (≥3.6m), Pamlico Sound east of Bluff Shoal (<3.6m), Pamlico Sound west of Bluff Shoal (≥3.6m), and Pamlico Sound west of Bluff Shoal (≥3.6m). The randomly drawn stations are optimally allocated among strata based upon all previous June or September sampling to provide the most accurate abundance estimates. Catches from both nets are combined to comprise a single sample to reduce variability. All captured species are sorted, enumerated, and weighed. Economically and environmentally important species are measured. Environmental data is recorded at each station.

Optimization of Present Sampling

The Pamlico Sound survey could be optimized to collect stomachs of sampled fish species during the survey. Diet analysis of sampled fish species could provide insight into predator-prey interactions, as well as an additional resource for multi-species and ecosystem management approaches for Pamlico Sound. Collection of information (e.g., life history, tagging) from other species captured in the survey could be used to address additional data needs.

[8] https://safmc.net/download/Briefing%20Book%20SSC%20Oct%202019/A12_Update_on_Construction_of_SA_Ecopath_Model_Diet_Matrix.pdf

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
2017	Spot	X	X		ASMFC 2017 Spot Stock Assessment Peer Review	http://www.asmfc.org/uploads/file/59c2b9edSpotAssessmentPeerReviewReport_May2017.pdf
2017	Atlantic Croaker	X	X		ASMFC 2017 Atlantic Croaker Stock Assessment Peer Review	http://www.asmfc.org/uploads/file/59c2ba88AtlCroakerAssessmentPeerReviewReport_May2017.pdf
2018	Blue Crab	X	X	X	NCDMF Stock Assessment of the North Carolina Blue Crab (Callinectes sapidus), 1995–2016	http://portal.ncdenr.org/c/document_library/get_file?uuid=0c228bdc-d11b-440e-b1e7-ef9cbf0cb249&groupId=38337
2019	Southern Flounder	X	X		NC Stock Assessment of Southern Flounder in the South Atlantic, 1989-2017	https://files.nc.gov/ncdeq/Coastal%20Management/4-StockAssessmentReportSouthernFlounder-2019-Jan-v3.pdf
2019	Weakfish	X	X		ASMFC Stock Assessment Overview	http://www.asmfc.org/uploads/file/5df29fd92019WeakfishAssessmentOverview_Nov2019.pdf

3.1.2.3 SEAMAP-SA Reef Fish Survey

Objectives

The objective of the SEAMAP-SA Reef Fish Survey, coordinated with MARMAP and SEFIS sampling efforts into the broader SERFS, is to collect and provide abundance and life-history information on reef fish species for use in stock assessments, research, and management decisions.

Survey Design

Sampling is aimed at monitoring populations of important species in some of the most heavily fished habitats off the southeastern US. Sampling locations are reef sites from 15m to about 300m, depths between Cape Hatteras, NC, and the area off St. Lucie Inlet, FL. The main gear types used are chevron traps, short bottom longline, and rod and reel, and oceanographic variables (mostly temperature, salinity, and depth) are measured using a CTD (see MARMAP 2009, SAFIMP 2010, Reichert et al. 2011 for gear details). Sampling occurs from late April to

early October using the SCDNR Research Vessel *Palmetto*. Sampling sites are randomly selected from a universe of confirmed live-bottom reef habitat locations.

The primary gear is the chevron trap, which are baited arrowhead shaped fish traps (1.5m x 1.7m x 0.6m). They are generally deployed at depths less than 100m and soaked for approximately 90 minutes. Each trap is equipped with two underwater video cameras located on top of the trap and facing opposite directions. The cameras provide information on habitat, visibility, trap behavior (e.g. movement), and relative abundance for species seen around the traps. Video data are provided to SEFIS for examination and analyses. Sampling in habitats at depths greater than ~ 75m in areas with considerable vertical relief is done primarily using short bottom longline gear. This gear consists of a 25.6m ground line with 20 gangions with non-offset circle hooks baited with whole squid, and the soak time is approximately 90 minutes. In addition, rod and reel gear with a variety of tackle and bait is used to collect samples for diet studies and additional life history information, particularly for species with low catches in traps and on longlines.

All fish caught during sampling are identified and measured on board and a total weight by species is determined. Additional samples, including otoliths and reproductive tissues, are taken from managed priority species, stored, and further processed in the SC DNR Reef Fish laboratory to determine age, reproductive parameters, diet, etc.

Optimization of Present Sampling

The survey has been optimized through direct collaboration within SERFS (between the SEAMAP-SA, MARMAP, and SEFIS programs) to complement and effectively cover depths including shallow, shelf, and deepwater habitats. All sampling activities are coordinated and planned in consultation with SC DNR and SEFSC partners, and annual planning meetings are held prior to each sampling season. SEAMAP-SA funding has resulted in increased annual reef fish sample sizes and sampling coverage and allowed longline surveys to resume after they were halted in 2014 due to a significant funding cut to the MARMAP program. All data are incorporated in the SEAMAP-SA database and available for online queries and data download. The data are also used for the SAFMC's mapping service (http://ocean.floridamarine.org/safmc_dashboard/), research by third parties, stock assessments, and management.

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
2014-2016	Gray Triggerfish	x	x	x	SEDAR 41	https://sedarweb.org/sedar-41
2014-2016	Red Snapper	x	x	x	SEDAR 41	https://sedarweb.org/sedar-41
2016-2020	Red Snapper	x	x		Updates to the Council	www.SAFMC.net
2016-2020	Various Reef Fish Species	x	x	x	SSC, Council, and Advisory Panel (Annual) Updates	www.SAFMC.net
2016-2020	Various Reef Fish Species	x	x	x	Updates to SAFMC SSC to assist with ABC recommendations	www.SAFMC.net
2016-2017	Blueline Tilefish	x	x	x	SEDAR 50	https://sedarweb.org/sedar-50
2016-2017	Red Grouper	x	x	x	SEDAR 53	https://sedarweb.org/sedar-53
2017-2018	Vermilion Snapper	x	x	x	SEDAR 55	https://sedarweb.org/sedar-55
2016-2018	Black Sea Bass	x	x	x	SEDAR 56	https://sedarweb.org/sedar-56
2018-2020	Greater Amberjack	x	x	x	SEDAR 59	https://sedarweb.org/sedar-59
2018-2020	Red Porgy	x	x	x	SEDAR 60	https://sedarweb.org/sedar-60
2020-2021	Golden Tilefish	x	x	x	SEDAR 66	https://sedarweb.org/sedar-66
2019-2021	Scamp	x	x	x	SEDAR 68	https://sedarweb.org/sedar-68
2020-2021	Red Snapper	x	x	x	SEDAR 73	https://sedarweb.org/sedar-73
2020-2021	Gag	x	x	x	SEDAR 71	https://sedarweb.org/sedar-71
2020-2021	Snowy Grouper	x	x	x	SEDAR 36 - Update	https://sedarweb.org/sedar-36
2016-2020	Various species		x	x	Diet information for Ecopath/Ecosim modelling for SAFMC coordinated modeling efforts	https://safmc.net/fishery-ecosystem-plan-ii-south-atlantic-ecosystem/

Data supporting continued development of South Atlantic Ecopath with Ecosim model.[9] An initial list of species where collection of diets will significantly enhance the model are provided in Section 2.1.5 of the Review Report for the 2019 South Atlantic Ecopath with Ecosim Model.

3.1.2.4 State Coastal Longline Surveys

South Carolina Coastal Longline Survey

Objectives

The objective of this project is to conduct a multi-species (target species adult red drum and coastal sharks) survey in the Southeast region. Adult red drum (otoliths, reproductive tissues, and genetic samples) as well as coastal shark (depending on external funding: genetics, life history, guts and muscle) samples are collected and processed to describe the population in the Southeast. Regional collaboration is aimed at efforts to optimize planning and survey design in the Southeast region with GA DNR and NC DMF partners.

Survey Design

The coastal longline survey is conducted following a stratified random design in Winyah Bay, Charleston Harbor, St. Helena Sound and Port Royal Sound, all in SC. Sampling in each of the four strata is conducted during August 1 – September 15, September 16 – October 31, and November 1 – December 15. Locations within each stratum are randomly selected resulting in approximately 30 stations per time period, per stratum. The sampling gear is a bottom longline deployed from the SC DNR owned R/V *Silver Crescent*. It consists of a 617m long 272 kg test monofilament mainline. Forty clip-on, monofilament gangions with baited hooks are placed at 15.2m intervals. Hooks are baited with striped mullet, Atlantic mackerel, or other readily obtainable baitfish. The sets are anchored and buoyed at each end. Gear soak times are 30 minutes and the collected fish are measured, sexed (sharks), and tagged (selected species) before release. Red drum are tagged with external dart tags and internal PIT tags. Fin clip are collected from all red drum and some other species to identify stocked fish and determine population structure. Coastal sharks of all life stages are tagged with external tags provide by the NMFS Apex Predator Program. Red drum are randomly sacrificed (30 - 50 fish per stratum/season) and various samples are taken for multiple investigations, including otoliths, reproductive tissues, and DNA.

Optimization of Present Sampling

In early survey years, catch per unit effort (CPUE) data were analyzed to maximize potential encounters with target species (red drum and coastal sharks). Areas with low CPUE of these species were eliminated, and productive areas were expanded to include more sampling locations. We have continued discussions with technical monitors to attempt to standardize the SCDNR and GADNR longline surveys.

[9] https://safmc.net/download/Briefing%20Book%20SSC%20Oct%202019/A12_Update_on_Construction_of_SA_Ecopath_Model_Diet_Matrix.pdf

North Carolina Coastal Longline Survey

Objectives

The North Carolina Coastal Longline survey provides necessary information to develop fishery-independent index of abundance for adult red drum to be used in future stock assessments. Tagging of red drum captured during the survey allows for additional information on migratory behavior and stock identification. Collection of biological information and age structures provides information on size at age, recruitment, genetic composition, age structures of stock, and much more. Fishery-independent surveys allow determination of CPUE, which is necessary to determine population size and trends in abundance.

Survey Design

The study occurs within the Pamlico Sound, divided into twelve regions ranging from Gull Island to the mouth of the Neuse River. A stratified-random sampling design based on prior NC DMF red drum sampling is used to select 72 random samples between mid-July and mid-October annually. Additional non-random exploratory samples may be made during the study period in Pamlico Sound and also in the nearshore waters of the Atlantic Ocean from Ocracoke to Cape Hatteras. All captured individuals are recorded at the species level and measured. Red drum are tagged with internal and external tags and released to identify migratory patterns, while a subset of red drum taken are processed for sex, maturity, stomach contents, and age data. Coastal shark species are identified by species and sex and are measured and tagged according to Cooperative Atlantic States Shark Pupping and Nursery (COASTSPAN) survey procedures.

Sampling is conducted using bottom longline gear during nighttime hours starting no earlier than an hour before sunset. Samples are conducted with a 1,500m mainline with gangions placed at 15m intervals (100 hooks/set). Terminal gear are clip-on, monofilament gangions consisting of a 2.5mm diameter stainless steel longline clip with a 4/0 swivel. Leaders on gangions are 0.7m in length and consist of 91kg (200lb) monofilament rigged with a 15/0 Mustad tuna circle hook. Hooks are baited with readily available baitfish. All soak times are standardized to 30 minutes. In order to maintain consistency, all samples are made in the vicinity of the 1.8m depth contour with sample depths ranging from 1.2 to 4.6m.

Optimization of Present Sampling

The NC Coastal Longline survey could be optimized by providing additional life history information on red drum. Collecting diet data as part of the survey could provide needed information which is largely nonexistent, including information on predator-prey relationships to enhance available data for the development of multi-species and ecosystem management. Collection of information (e.g., life history, tagging) from other species captured in the survey could be used to address additional data needs.

Georgia Coastal Longline Survey

Objectives

The primary objective of the Georgia Coastal Longline Survey is to provide a fishery-independent index of abundance for adult red drum and coastal shark species.

Survey Design

Sampling consists of a stratified random sampling design based on spatial strata: inshore (sounds, estuaries), nearshore (0-3 nm) and offshore (3-12 nm). From June through December, 35 longline sets are conducted during each four 6-week sampling period (Jun 16-Jul 31, Aug 1-Sep 15, Sep 16-Oct 31, Nov 1-Dec 15) in southern Georgia waters. Strata weights are adjusted during the sampling season (more heavily inshore and nearshore Jun 15-Sep 15; more heavily offshore Sep 16-Dec 15) to account for the distributional shift of adult red drum. Sampling gear consists of an ~926 m long, 2.5 mm monofilament main line supporting 60 branchlines. Branchlines are 0.7 m long, 1.6 mm monofilament, equipped with a single 15/0 depressed barb circle hook, baited with cut mullet. Soak times are 30 minutes measured from second anchor deployed to first anchor retrieved. All catch is processed to the species level. Red drum are landed, processed for standard morphometrics and, if viable, tagged with dart and PIT tags and released. Sharks are processed for sex, life stage, and morphometric data. Sharks > 1.5 m remain in the water to ensured safe handling and therefore are not weighed. Sharks < 1.5 m are tagged with Roto tags on the first dorsal, while those > 1.5 m are tagged with stainless steel dart tags, when possible. Shark tags are supplied by National Marine Fisheries Service's Apex Predator Program and the tagging data are managed as part of their cooperative tagging database.

Optimization of Present Sampling

Species encountered by this survey will be checked for telemetry and conventional tags released by GADNR and other researchers. Red drum may be opportunistically implanted with acoustic tags in conjunction with ongoing state research projects. Information from tagging encounters and efforts can provide information about mortality and movement for management plans and stock assessments. GADNR is in the process of purchasing a new vessel to perform the longline survey. The new vessel will potentially improve the efficiency of survey operations.

Recent Data Uses (for all Coastal Longline Surveys, NC, SC, GA)

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Envir./ Habitat		
2016-2020	Red Drum	x	x	x	SCDNR red drum management	
2017	Red Drum	x	x	x	State Specific Assessment	
2017	Red Drum				ASMFC 2017 Red Drum Stock Assessment	http://www.asmfc.org/uploads/file/58b5c1eaRedDrumAssessmentOverview_Feb2017.pdf
2017-2019	Sandbar Shark	x	x	x	SEDAR 54 HMS Sandbar Shark	https://sedarweb.org/sedar-54
2019-2020	Blacktip Shark	x	x	x	SEDAR 65 Blacktip Shark Benchmark	https://sedarweb.org/sedar-65
2020	Coastal sharks		X		Tagging life history	https://www.nefsc.noaa.gov/nefsc/Narragansett/sharks/tagging.html

3.1.3 CARIBBEAN RESOURCE SURVEYS

3.1.3.1 SEAMAP-C Reef Fish Survey

Objectives

The objective of the SEAMAP-C Reef Fish Survey is to collect and provide abundance and life-history information on reef fish species for use in stock assessments, research, and management decisions. As part of the life history information, high definition videos are analyzed and gonads samples of species are collected, from the reef fish surveys at insular platform of Puerto Rico and the USVI to provide information on the reproduction**.** In addition, data from reef fish surveys have been used to analyze multispecies trends of fish assemblages associated with coral reef. This information is key for the construction of ecosystem-based models, which in turn are the foundational stones for an effective EBFM.

Survey Design

The SEAMAP-C Reef Fish Survey officially began in 1992 as a SEAMAP survey in Puerto Rico. Until 2004, sampling was conducted using two gears: hook-and-line and fish traps. The use of fish traps ceased in 2006, and hook-and-line is now the primary gear used for this survey. In 2016, the reef fish survey was revamped and expanded to include video and bottom longline to complement the hook-and-line gear.

For each five-year funding cycle, reef fish survey sampling usually occurs in years 1, 2, 4, and 5. Reef fish survey sample site selection includes a two-factor random stratified sampling design based on depth and benthic habitat type within the 50 ftm contour of Puerto Rico and the U.S. Virgin Islands (St. Thomas/St. John and St. Croix). A total of 200 stations are conducted by Puerto Rico, about 100 off each the east and west coasts, and 140 stations will be sampled off the U.S. Virgins Islands, about 70 stations off each of the St. Thomas/St. John and St. Croix islands.

Sample collection has been conducted using three sampling gear types at each station: A) video camera (a 2 GoPro Hero4 Silver camera array), B) a 100ft bottom longline (50 #9 circle hooks) and C) a 2-hook handline (one #9 “J” and one #9 circle hook). Each sample gear has been deployed at the same station area, but at least 50 m apart to avoid interaction of different gear types. For all samples, all pertinent station data is recorded, and fish length, sex, and gonadal condition is determined from each specimen collected. Most of the data is entered in real-time into NOAA Fisheries’ SEAMAP-C Data Management System. The software SCS and Sellit will be used, once they become available and functional to enter the data collected in PR and the USVI.

In all reef fish surveys, data on sexual maturation of each individual is recorded and used to determine spawning season and size of 50% population maturation. Samples are also provided for the reproduction program established at the Fisheries Research Laboratory (FRL) for some of the species under study by this program. Data is also being used to compare the relative precision of macroscopic and microscopic/histological sexing. All individuals are

macroscopically sexed. In Puerto Rico all gonads are photographed, removed, and preserved for histological sexual determination. Comparison between macroscopic and microscopic sex is performed. This information is used as a guide to determine the sexual maturation for different species, and to increase the precision of sexing individuals.

Optimization of Present Sampling

In addition to the reproductive data already collected during this survey, the SEAMAP-C Reef Fish Survey has been optimized by extracting otoliths to age fish and performing dietary analysis to determine trophic interactions. This information would provide a wealth of data that could be used for current fisheries management, understanding predator/prey interactions, and supporting development of ecosystem-based fisheries management. Otoliths are sent to Dr. Shervette at the College of Charleston, University of South Carolina.

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
2019	Tropical Reef Fisheries Systems	X			Ecosystem Based Quantitative Models	https://www.lenfestocean.org/en/research-projects/new-effort-to-inform-an-ecosystem-approach-to-managing-us-caribbean-fisheries
1999 - 2019	Entire Fish Assemblage	X			Integrative analyses and visualization of SEAMAP-C data in Puerto Rico and the US Virgin Islands	In Progress
1999 - 2019	Fish Communities	X		X	EBFM FEP	In Progress

3.1.3.2 Queen Conch Survey

Objectives

The objective of the SEAMAP-C Queen Conch Survey is to determine the spatial and temporal variations in stock abundance within the territorial seas of Puerto Rico, the USVI, and respective EEZs for use in stock assessments, research, and management decisions. The survey is also of great importance to evaluate catch quotas implemented in USVI. Lately, the objective of collecting this information has gained importance, since the PRDNER/FRL data indicates that,

after Hurricane María, apparently this species has been less reported in recent landings. In Puerto Rico, data collected through this survey was used to implement management measures that include minimum size, catch quota, and a closed season.

Survey Design

The survey has been conducted every five years in Puerto Rico and USVI starting in 1995. This survey is the only source of monitoring, since the queen conch (*Lobatus gigas*) is restricted in federal waters, and can only be harvested within the EEZ of the USVI, so long as it meets the minimum size limit of 9" length or 3/8" lip thickness, does not exceed the ACL of 50,000 pounds per district, and is not harvested during its annual closed season, July 1 to September 30.

Originally, a visual census survey that utilizes a transect survey methodology was used, as designed by Freidlander *et al*. (1994). New pilot method designed by Appeldoorn and Cruz-Motta, discussed and accepted in the 2019 Seamap-C Committee Meeting will be in use for the next surveys. The survey is conducted in state and federal waters around Puerto Rico, including the Islands of Culebra, Vieques, and Mona. In the USVI, it is conducted in St. Thomas, St. John, and St. Croix. Most of the work will be performed in Puerto Rico and USVI during the queen conch closed season (July 1-September 30). The divers estimate conch abundance and density along the transect line for a maximum survey time of 45 minutes. A differential Global Positioning System (GPS) unit will be tied to the divers' safety buoy, towed by one of the divers. The other diver will carry the compass to follow a fixed direction for a set period. A camera (GoPro) will be set on each scooter to record the entire transect surveyed with a resolution of 720 p and 30 frames per second. This design and associated sampling is considered a pilot survey and it is expected that the resulting data will be used to propose a complete conch survey the following year.

In addition to counting all conch, depth, habitat type (e.g. sand, coral, hard ground, gorgonians, seagrass, and algal plains), start and end time, and time at each habitat change is recorded. The length of each individual conch is measured to the nearest millimeter and adult age is estimated to one of the four relative age classes (newly mature, adult, old adult, and very old adult).

Lastly, to account for queen conch aggregations, a sampling design such as manta tow could be used to identify aggregation location. Then the standard transect survey, or a density assessment based on Stoner and Waite, 1990 could be conducted upon the aggregations.

Optimization of Present Sampling

The SEAMAP-C Queen Conch Survey can be optimized by also recording the number of other important species such as spiny lobster, snappers, and groupers. This information would provide a wealth of data that could be used for current fisheries stock assessments. Additionally, the SEAMAP-C Queen Conch survey design will be re-evaluated this cycle to ensure the best data is being collected for future stock assessments. Anecdotal evidence of conch spawning aggregations known locally as 'conch volcanos' occur throughout the region,

and efforts to identify these areas would be critical to properly managing this species.

Known issues with assessing queen conch populations are their burrowing behavior, and unknown habitat of their first year class. There is not a clear methodology description on sampling burrowed conch, however, sample sites should be expanded beyond the standard transect sites surveyed each period so that additional sites are surveyed, which may include those associated with age class one. Additionally, preferred habitat for queen conch is seagrass meadows. These habitats could be sampled more heavily than others. More so, the non-native species, *Halophila stipulacea*, may be displacing native seagrasses and associated queen conch. Better understanding the interaction between this non-native seagrass and queen conch could be studied.

Lastly, to account for queen conch aggregations, a sampling design such as manta tow could be used to identify aggregation location. Then the standard transect survey or a density assessment based on Stoner and Waite, 1990 could be conducted upon the aggregations.

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
1999 - 2019	Queen Conch	X	X	X	Management Plan	https://caribbeanfmc.com/fishery- management/fishery-management-plans

3.1.3.3 Spiny Lobster Survey

Objectives

The spiny lobster constitutes the most economically important commercial fishery species in Puerto Rico and the USVI, since lobsters sell for much more per pound than fish, which drives the economic importance. The objective of the SEAMAP-C Spiny Lobster Survey is to determine the spatial and temporal variations in stock abundance. It was done for pueruli and juvenile spiny lobsters. Currently this methodology plans to focus on the adult lobster population, within the territorial seas of Puerto Rico, the USVI, and respective EEZs for use in stock assessments, research, and management decisions.

Survey Design

The first SEAMAP-C Spiny Lobster Survey was conducted in 1996 using pueruli settlement collectors and occurs every five years. Starting in 2003, juvenile spiny lobsters were also monitored using artificial shelters, called “casitas,” and the modified Witham model pueruli collectors were constructed to monitor pueruli settlement. The lobsters’ casitas were sampled once every month between the full and new moons. Aiming to study reef recruitment of juveniles and adults, a new methodology was designed to be used during the next years.

To provide additional information on Spiny Lobster's life history, the ageing will be included in the surveys by using the technique of growth readings on the 'ossicles' hard parts.

Optimization of Present Sampling

The SEAMAP-C Spiny Lobster survey could be optimized by providing additional information on other fishery important species that are collected on the pueruli settlement collectors or in the casitas. To provide additional optimization on future Spiny Lobsters studies, the ageing will be included in the surveys by using the technique of growth readings on the 'ossicles' hard parts.

Recent Data Uses

Year	Species/ Complex	Data Used			Product Type/Name	Reference or Link
		Abundance /Biomass	Life History	Environmental /Habitat		
1999 - 2019	Spiny Lobster	X	X	X	Management Plan	https://caribbeanfmc.com/fishery-management/fishery-management-plans

3.1.4 SPECIMEN ARCHIVING

3.1.4.1 Gulf

The SEAMAP-Gulf Ichthyoplankton Archiving Center houses SEAMAP-Gulf collected specimens of fish eggs and larvae that have been identified by the Polish Sorting and Identification Center. All data are managed in an Access database system, which minimizes mistakes, eliminates coding errors, and allows for much faster data entry.

The SEAMAP-Gulf Invertebrate Plankton Archiving Center manages planktonic invertebrates from sorted sample collections and backup plankton collections obtained during SEAMAP-Gulf surveys.

Just as SEAMAP-Gulf provides a level of consistency in sampling within Gulf waters, individual states can provide a framework for the expansion of SEAMAP-Gulf surveys through procedures and protocols established for long-term monitoring efforts. For instance, Florida currently processes otoliths and stomach contents for fish collected through its inshore monitoring program and has developed sound methodologies to collect and process those samples. As fishery management needs continue to grow, age estimates determined from otolith annular counts and trophic dynamics data obtained from gut content and stable isotope analyses will be vital to assess factors affecting managed fish stocks and associated ecological conditions. As SEAMAP-Gulf progresses and expands to include more ecosystem-based components in its data collection process, coordination with Florida and other knowledgeable entities would be advisable in developing procedures to address those needs.

3.1.4.2 South Atlantic

Collection, cataloguing, and archiving voucher specimens from surveys is important and SEAMAP-SA funds used to support Southeastern Regional Taxonomic Center (SERTC), which has been largely responsible for these reference collections in the South Atlantic. SERTC is located in the Marine Resources Research Institute (SC DNR) in Charleston, South Carolina. This facility developed a curated collection of marine and estuarine animals from the South Atlantic Bight and is maintaining a searchable library based on taxonomic peer-reviewed literature. Through collaborations with other labs and museums, SERTC collected and preserved representative specimens from numerous habitats throughout the Southeast, documenting several range extensions for Atlantic species. Since many specimens are too large to be stored whole, SERTC has an image library containing photographs of fresh or frozen specimens of species collected by SEAMAP-SA Surveys. SERTC can also play a role in preparing graphical and informational content for webpages that describe the biodiversity of fauna collected during the SEAMAP-SA Surveys.

Given the limited available funding, SERTC support was been reduce to minimal levels to maintains the existing collections only. It is expected that direct funding to SERTC will cease in this 5-year period and the archiving of specimens is likely to be folded into the individual survey program activities.

Archiving and storing otoliths and gonadal tissues has proven to be essential for high quality fish stock assessments. For example, some stock assessments required re-examination of otoliths or spines as a result of calibration studies (e.g. red porgy, vermillion snapper, and gray triggerfish) or to provide additional information such as edge types to determine the calendar age of fish (e.g., vermillion snapper, red snapper, and black sea bass). In addition, these samples provide material for laboratory calibrations and training. Genetic techniques are increasingly becoming available that can utilize material obtained from stored otoliths to address important population issues such as changes in life history parameters and dynamics as a result of fishing pressure and other factors affecting fish populations. Otolith and gonad samples collected by the SEAMAP-SA Reef Fish Survey (and MARMAP and SEFIS) and the SEAMAP-SA Coastal Trawl Survey provide a unique historical sample archive that has increasingly been utilized for such studies.

3.1.4.3 Caribbean

In 2009, Puerto Rico began collecting and processing gonads of all captured reef fish to determine the sexual maturation of each individual. The data are used to determine spawning season and size of 50% population maturation. Also, samples are provided to the reproduction program established at the FRL for some species under study there. The FRL performs histological analysis to provide much needed information on reproduction of fisheries resources.

The relative precision between macroscopic and microscopic/histological sexing is also being explored. All individuals are macroscopically sexed and gonads are photographed, removed, and preserved for histological sexual determination. The macroscopic and microscopic sex

determination is then compared, which may increase the precision of sexing the individuals macroscopically. Providing samples to other programs within the FRL helps improve the data needed to evaluate important species, and reduces costs of obtaining samples and processing gonads.

In sampling conducted in the early 1990's, otoliths were collected and archived. A number of species' otoliths were aged and these data are available to interested parties. Some samples are provided to external researchers at the national level for various purposes, such as genetics studies, age and growth, and reproduction.

See Appendix C for more details on specimen archiving in the different SEAMAP regions.

3.1.5 DATA MANAGEMENT AND INFORMATION DISSEMINATION

Biological and environmental data from SEAMAP surveys are managed at the regional level. Data may be obtained from each region's data manager by specific request. Information on data may be obtained from SEAMAP participants, published reports, and through the internet at www.seamap.org and www.gsmfc.org/seamap.html. More detailed information on data management in each region is also available at these websites. Investigators who use SEAMAP data may publish their results with the understanding that SEAMAP is acknowledged for supplying the data. A bibliography of these publications along with documents published by SEAMAP may be found on www.seamap.org and www.gsmfc.org/seamap.html.

In order to promote participation in SEAMAP and utilization of the program database, SEAMAP information is distributed in the form of reports and data summaries to interested parties. Products resulting from SEAMAP activities may be divided into two basic categories: datasets and program information. Datasets include both digital and analog data, as well as directories of specimen collections. Program information is defined as communications released to current and prospective participants, cooperators, investigators, or other interested agencies or persons. This information may be produced in a number of document types, described in Appendix D.

While each regional component's data management system currently operates independently, the long-term goal is to develop an overall SEAMAP Information System that crosses the regional component boundaries. NMFS could provide an important coordination function in this regard. Activities that should be addressed when resources are available include data management aspects of specimen and image archiving.

3.1.5.1 SEAMAP-Gulf Data Management System

Biological and environmental data from all SEAMAP-Gulf surveys are included in the SEAMAP Information System, managed by GSMFC in conjunction with NMFS. Raw data are edited by the collecting agency and verified by the SEAMAP-Gulf Data Manager prior to entry into the system. Verified SEAMAP-Gulf data are available conditionally to all requesters, although the highest

priority is assigned to SEAMAP-Gulf participants. More information about SEAMAP-Gulf data can be found at www.gsmfc.org/seamap.html.

SEAMAP-Gulf data are maintained in relational databases. The GSMFC has developed several tools that allow users to visualize and map SEAMAP-Gulf data from the Gulf of Mexico over the Internet, and users are able to download the entire SEAMAP-Gulf dataset. Verification of new data and detection of invalid legacy data has improved significantly, and standardized methods of data submission have improved reliability and turnaround time of data availability.

Data summaries distributed to interested parties include real-time data reports during the Summer Shrimp/Groundfish Surveys, SEAMAP-Gulf biological and environmental atlases, and SEAMAP-Gulf directories. Cruise reports, quarterly reports, and annual reports are also distributed and are available online.

3.1.5.2 SEAMAP-South Atlantic Data Management System

Data management duties and funding for the SEAMAP-SA have been administered through the SC DNR since 2007, with support from NC DMF, GA DNR, and FWRI. The SEAMAP-SA Data Management Workgroup was formed to oversee the SEAMAP-SA Data Management System, a web-based information system that facilitates data entry, error checking, data extraction, dissemination, and summary of fishery-independent data and information for all ongoing SEAMAP-SA surveys and special studies. The full version of the SEAMAP-SA Oracle Database came online in 2014. Since then, the system has been improved and data are accessible through customizable data queries to end-users. Data from the Coastal Trawl Survey, the Pamlico Sound Survey, the Coastal Longline Surveys, and the Reef Fish Survey can now be accessed through the online data portal. In 2015, three ichthyoplankton datasets were added to the system. In the future, additional datasets such as the Cooperative Winter Tagging Cruise will be considered for inclusion. Analysts from several stock assessments, managers, and researchers have accessed the online data for queries that were used directly in stock assessments, for management, and in research projects.

In 2018, SCDNR data management staff began collaborating with the Southeast Coastal Ocean Observing Regional Association (SECOORA) and Axiom Data Science to test the feasibility of migrating the SEAMAP-SA online database to the SECOORA Data Portal. The SECOORA portal historically housed oceanographic and meteorological data and limited biological data sets. Their portal, however, has much more advanced end-user capabilities to explore and summarize and combine data sets across surveys and programs that is not feasible in the current SEAMAP-SA Oracle system. Based on a pilot project funded by SECOORA using SEAMAP-SA Reef Fish Survey data, Axiom Data Science was able to recreate the functionality of the current Oracle system and increase the quality of the end-user experience using their pre-existing data processing tools. In addition, this pilot improved on the structure of the SEAMAP-SA database with the addition of several fields not available before, but was not able to address the addition of all data and code tables. Based on the structure of the pilot, all SEAMAP-SA surveys currently available through the Oracle database can be incorporated into the SECOORA portal. Survey metadata has been

standardized to Darwin Core as part of the pilot and updates and tutorials for the SECOORA portal will be added to seamap.org. Once the SECOORA portal for SEAMAP-SA data is fully operational and the migration is complete, the SCDNR portal will be disabled.

The SEAMAP-SA Data Management System includes a website (SEAMAP.org) to view cruise reports and state contacts and to access summarized datasets and appropriate project metadata. The SEAMAP-SA Data Management Guidance Plan was morphed into a User Guide, a Data Manager Guide, a Data Provider Guide, and a Metadata Guide. The website is hosted and supported by SC DNR through an agreement with SEAMAP-SA and ASMFC. Input from the other SEAMAP-SA partners (NCDMF, GADNR, and FWRI) is incorporated in the form of annual survey data transmission to SC DNR, annual cruise reports and other related documents as well as assistance with website enhancements to ASMFC. Data will continue to be updated and improvements to the data provision workflow will be made under the guidance of the Data Management Workgroup. FWC-FWRI is using ArcGIS for Server to visualize the SEAMAP-SA GIS data via a web map service. The map service provides details for the map layers, spatial reference, geographic extent, and other supporting information. The map service is accessible through a variety of clients, including ArcMap, ArcExplorer, Google Earth, and web mapping applications.

The SAFMC Fisheries (http://ocean.floridamarine.org/sa_fisheries/) application provides an enhanced suite of online tools to support the surveys of the SEAMAP-SA database. This application will help achieve the goal of providing users access to view, query, and download GIS data in a user-friendly, web-enabled environment. The primary benefits of this approach include:

- Provide access to information through one location, allowing managers and researchers to search, view, and acquire SEAMAP-SA GIS data from across the region.
- Facilitate the sharing of information by consolidating research efforts and making data easily accessible online.
- Store information geographically so scientists and managers can identify gaps for planning future research efforts.

3.1.5.3 SEAMAP-Caribbean Data Management System

The data collected by each Caribbean component is handled by the respective island and sent to the SEAMAP-C Database Manager at NMFS. A new database format was provided in 2009. All the information gathered by SEAMAP-C is distributed in the form of reports and data summaries to interested parties. The data is also provided in digital form to managers and researchers.

4 APPENDICES

A. SEAMAP Committees Membership 2020

(check www.seamap.org for current membership)

SEAMAP-Gulf of Mexico Committee

CHLOE DEAN, Louisiana Department of Wildlife and Fisheries
JOHN FROESCHE, Gulf of Mexico Fishery Management Council
JILL HENDON, Mississippi Department of Marine Resources/Gulf Coast Research Lab,
JOHN MARESKA, Alabama Department of Conservation and Natural Resources, *Chair*
FERNANDO MARTINEZ-ANDRADE, Texas Parks and Wildlife Department
TED SWITZER, Florida Fish and Wildlife Conservation Commission
ADAM POLLACK, National Marine Fisheries Service, Pascagoula Laboratory, MS
JEFF RESTER, Gulf States Marine Fisheries Commission, *Coordinator*

SEAMAP-South Atlantic Committee

PATRICK CAMPFIELD, Atlantic States Marine Fisheries Commission
JARED FLOWERS, Georgia Department of Natural Resources, Coastal Resources Division
SARAH MURRAY, Atlantic States Marine Fisheries Commission, *Coordinator*
ROGER PUGLIESE, South Atlantic Fishery Management Council, *Chair*
TINA UDOUJ, Fish and Wildlife Research Institute, FL
TODD KELLISON, National Marine Fisheries Service, Beaufort Laboratory, NC
MARCEL REICHERT, South Carolina Department of Natural Resources
KATY WEST, North Carolina Department of Environment and Natural Resources

SEAMAP-Caribbean Committee

NICOLE ANGELI, Virgin Islands Department of Planning and Natural Resources/Division of Fish and Wildlife
MATTHEW KAMMANN, Virgin Islands Department of Planning and Natural Resources Division of Fish and Wildlife. *Chair*
JUAN JOSE CRUZ-MOTTA, Puerto Rico Sea Grant College Program / University of Puerto Rico Department of Marine Sciences
RICHARD S. APPELDOORN, Independent consultant
GRACIELA GARCÍA-MOLINER, Caribbean Fishery Management Council
MIGUEL ROLON, Caribbean Fishery Management Council
RICARDO LOPEZ, Puerto Rico Department of Natural and Environmental Resources
VERONICA SEDA, Puerto Rico Department of Natural and Environmental Resources
AIDA ROSARIO, Emeritus Puerto Rico Department of Natural and Environmental Resources contractor
EDWIN MUÑIZ, U.S. Fish and Wildlife Service
EDGARDO OJEDA SERRANO, University of Puerto Rico/Sea Grant College Program, *Coordinator*
RUPERTO CHAPARRO, University of Puerto Rico Sea Grant College Program

B. SEAMAP History

Birth of the Five-Year Management Plan

The first SEAMAP Strategic Plan was published in January 1981, and provided a conceptual framework for planning the program by outlining and considering goals, objectives, requirements, priorities, approaches, and guidelines for consistent actions by state and federal agencies, as well as other NOAA components. Along with input from regional fishery management councils, state marine fisheries agencies, interstate fishery commissions, appropriate federal agencies, and other interested parties, the SEAMAP Strategic Plan served as a basis for the development of subsequent operational plans, including the SEAMAP Gulf of Mexico Operations Plan: 1985-1990 and the SEAMAP South Atlantic Operations Plan: 1986-1990. The five-year SEAMAP Management Plans (1990-1995, 1996-2000, 2001-2005, 2006-2010, 2011-2015, and 2016-2020) provide conceptual framework for all three SEAMAP components.

Budget

For the first three operational years (FY 1982-1984), SEAMAP received no federal programmatic funding and was supported only through existing state and federal resources. Dedicated federal programmatic funding for SEAMAP began in FY 1985 at approximately $1 million. For most of its history, SEAMAP has been level-funded with small periodic increases, though a notable increase was observed in response to Hurricane Katrina in FY 2007. This event served to boost funding considerably in the following years, to over $5 million by FY 2009.

Fishing Year	Federal Funding	Fishing Year	Federal Funding
FY 1982-1984	None	FY 2001-2003	$1.4 million
FY 1985-1991	$1 million	FY 2004	$1.67 million*
FY 1992	$1.4 million	FY 2005-2006	$1.385 million
FY 1993	$1.37 million	FY 2007	$4.37 million**
FY 1994	$1.32 million	FY 2008	$4.39 million
FY 1995	$1.34 million	FY 2009-2010	$5.09 million
FY 1996-2000	$1.2 million		

*The budget in FY 2004 was initially set at $1.75 million, but was reduced to $1.67 million by rescission.
**SEAMAP-Gulf and NMFS were allocated additional funding in FY 2007 in response to Hurricane Katrina, while the SEAMAP-SA and SEAMAP-C remained level-funded.

Joint Activities

The Gulf and South Atlantic components met jointly for the first time in October 1984. The components decided to meet annually and publish a joint annual program report, beginning in FY 1985, in order to review and document their activities.

In FY 1985, the Gulf and South Atlantic data management workgroups held a joint workshop, where they approved the development of a new data management system design in FY 1986. By FY 1987, the requirements report for the new data management system, Data Management

System Requirements Document for Gulf and South Atlantic, 1987, was published, and the new system was integrated in FY 1988.

In FY 1987, SEAMAP and the UPRSGCP sponsored a passive gear assessment workshop to investigate gear alternatives in areas where trawling is not suitable or may not be preferred.

An external program review was completed in FY 1988, conducted by a four-member review panel including representatives from NMFS, the National Sea Grant College Program Office, the New Jersey Marine Science Consortium, and Auburn University. The review consisted of a comprehensive evaluation of SEAMAP relative to goals and objectives outlined in the operations plans of the Gulf and South Atlantic components. The review panel completed a written report of their findings and recommendations on October 1, 1987. The recommendations were discussed at the SEAMAP joint meeting in January 1988, and a final slate of recommendations for the program was endorsed. Preparation of the 1990-1995 joint five-year plan for all three SEAMAP components was an important recommendation of the review report.

SEAMAP-Gulf

The first SEAMAP component, SEAMAP-Gulf, was implemented in the Gulf of Mexico region in December 1981 under guidelines formulated by the GSMFC-TCC. Initial operations were designed to coordinate, standardize collection, manage, and disseminate data from fishery-independent surveys conducted in the Gulf of Mexico during the summer of 1982. These initial activities established the basic framework for the current program in the Gulf of Mexico, South Atlantic, and Caribbean regions. A table of SEAMAP-Gulf surveys is included below.

Survey	Initial Year of Operation
Summer Shrimp/Groundfish Survey	FY 1982
Spring Plankton Survey	FY 1982
Winter Plankton Survey	FY 1983
Fall Plankton Survey	FY 1984
Fall Shrimp/Groundfish Survey	FY 1985
SEAMAP-Gulf Reef Fish Survey	FY 1992
Bottom Longline Survey	FY 2007
Vertical Longline Survey	FY 2010

With the onset of data collection in 1982, staff began compiling data for annually produced documents such as SEAMAP marine directories (regional listings of fisheries research facilities and survey plans in the Gulf of Mexico) and SEAMAP atlases (summaries of survey results and data). Distribution of "near real-time data" was initiated, and weekly computer plots and data listings were produced for managers, researchers, industry, and the general public. Additionally, expert workgroups drawn from state research agencies, universities, NMFS, and other research centers were established to accomplish specific tasks, including planning and coordinating surveys, data reports, and other SEAMAP functions.

The Summer Shrimp/Groundfish Survey began in FY 1982, sampling offshore waters from the Florida/Alabama state line to the U.S./Mexican border. With increased funding in subsequent years, Florida was able to begin participating in this survey, and it now extends down into south Florida waters. The Spring Plankton Survey also began in FY 1982 to target larval Atlantic bluefin tuna, but the initial survey design did not maximize likelihood of capture due to the concentration of Atlantic bluefin tuna larvae along oceanographic fronts and eddies. Increased funding in later years allowed additional sampling to directly target larvae across these areas, resulting in improved data on bluefin tuna in the Gulf of Mexico.

FY 1983 marked the second operational year of SEAMAP-Gulf, and the establishment of the SEAMAP Information System and SEAMAP Ichthyoplankton Archiving Center. The SEAMAP Information System was established at the Stennis Space Center in Stennis Space Center Station, Mississippi, as the primary management system for all SEAMAP generated data. The SEAMAP Ichthyoplankton Archiving Center was established at the Florida Fish and Wildlife Research Institute in St. Petersburg, Florida, to archive all sorted SEAMAP-collected ichthyoplankton. specimens archived from SEAMAP cruises, which were made available for use by interested agencies and researchers. In FY 1985, the SEAMAP Ichthyoplankton Archiving Center acquired a computer system, and a second archiving center was added. Both marked advances in data management and specimen archiving. The second center, the SEAMAP Invertebrate Plankton Archiving Center, was established at the Gulf Coast Research Laboratory (GCRL) in Ocean Springs, Mississippi. This archiving center maintains the unsorted bongo samples that are not sent to the Polish sorting center. Additionally, the sorted and identified invertebrates (shrimp, crab, lobster and cephalopods) from the Poland assessed samples, are returned to GCRL for long-term archiving. A database was created to manage and track the archived data stored in this location.

The Winter Plankton Survey also began in FY 1983, and occurred five times until 2006 (FY 1984, 1985, 1993 and 1996) in the open Gulf of Mexico. An abbreviated survey took place in 2007, and full surveys were conducted in 2008, 2009, 2012, 2013, and 2015. The Winter Plankton Survey is now scheduled as a biannual survey for the northern Gulf of Mexico.

During FY 1983, the Gulf component conducted a plankton survey of coastal and continental shelf waters in August, targeting king mackerel larvae and collecting data on ichthyoplankton during a winter plankton survey. Also in FY 1984, the Gulf component established an annual fall plankton survey of coastal shelf waters targeting the larvae of king and Spanish mackerel and red drum.

In FY 1985, the Gulf component began three special studies, including (1) an evaluation of shipboard weighing procedures, (2) gear investigations for a squid/butterfish fishery and a coastal herring fishery, and (3) location of trawlable concentrations of these species. A trawl survey of outer continental and shelf edge waters was conducted to assess stocks of squid and butterfish in the Gulf of Mexico during FY 1985 (July and August) and FY 1986 (May and June).

In addition to its annual Summer Shrimp/Groundfish Survey, SEAMAP-Gulf began a Fall Shrimp/Groundfish Survey in FY 1985, which mainly targeted groundfish. This activity was built on the NMFS Fall Groundfish Survey, conducted since 1972. In addition, the declining status of red drum in the Gulf of Mexico prompted the red drum workgroup and other scientists to collaboratively produce a cooperative three-year plan for red drum research in the Gulf. Reporting of planning, progress, results, and evaluation of red drum research have continued to be managed by SEAMAP-Gulf. A short-term special study on the distribution of shortfin squid was added to the activities of FY 1987. A spring SEAMAP-Gulf Reef Fish Survey was initiated in FY 1992 to assess the relative abundance and compute population estimates of reef fish in their natural habitat in the Gulf of Mexico.

Funding for SEAMAP has seen a considerable increase beginning in FY 2007 and FY 2008, allowing SEAMAP-Gulf to expand several existing surveys and start new fishery-independent surveys. New surveys include the Bottom Longline Survey, initiated in 2007 to collect coastal shark and finfish abundances and distribution in Gulf of Mexico shallow waters. The SEAMAP Vertical Longline Survey is another recent addition, initiated in FY 2010 by Alabama to complement the SEAMAP Bottom Longline Survey and the NMFS Bottom Longline Survey. Where the longlines of these surveys are too long to adequately sample around hard bottom, coral reefs, or artificial reef areas, the Vertical Longline Survey better assesses reef fish abundance. Louisiana began vertical line sampling around oil and gas platforms and artificial reefs in 2011.

International Activities

SEAMAP has frequently interacted with Mexico's National Institute of Fisheries, which is the research agency of SEPESCA, the country's Ministry of Fisheries. SEAMAP and SEPESCA met for a major cooperative event in Mexico City in August 1986. The meeting was attended by representatives of SEAMAP-Gulf and SEAMAP-SA as well as SEPESCA scientists and administrators. Participants presented information on research and data collection activities of common interest, such as king mackerel, red drum, shrimp, and ichthyoplankton.

SEAMAP and SEPESCA have also worked closely under the NMFS MEXUS-Gulf Program for cooperative Mexican-U.S. research, especially in assessing the abundance and distribution of Gulf of Mexico ichthyoplankton. The SEAMAP-Gulf of Mexico Ichthyoplankton Atlases display results of these surveys, with collected samples identified cooperatively by both U.S. and Mexican personnel. Mexican scientists have also participated in SEAMAP shrimp surveys and gear technology cruises in order to establish standardized methodologies for monitoring and assessing Gulf of Mexico resources.

Workshops

To coordinate surveys and information exchange among participants and other involved organizations, SEAMAP periodically sponsors workshops and symposia. In FY 1983, a calibration workshop on trawling gear was sponsored by SEAMAP. This workshop was intended to assist in

coordinating and standardizing data collection. Results were published as workshop proceedings.

In September 2010, SEAMAP-Gulf held a fishery-independent data needs workshop. Items discussed at the workshop included potential sampling gears, statistical and survey design, and potential costs associated with proposed surveys. Attendees were from agencies and universities along the Gulf of Mexico that had experience in managed species stock assessments, ecosystem-based management, and designing and implementing fishery-independent sampling programs. Workshop outcomes are used to guide SEAMAP sampling in the Gulf of Mexico.

SEAMAP-Gulf held a trawl workshop in March 2019 where state and federal SEAMAP partners reviewed trawling protocols, discussed gear specifications, reviewed data entry and QA/QC procedures, and reviewed species identifications. The group also discussed recent taxonomic changes and how to handle historical species identifications when taxonomists have now determined that what we thought was one species could actually be two to three species that look very similar. SEAMAP partners have been conducting crew exchanges the past few years to assure that all SEAMAP trawling operations were being conducted consistently amongst all partners. The workshop continued those efforts to make consistency in trawling operations a top priority.

In March 2020, a Reef Fish Survey workshop was conducted to discuss the transition of the reef fish survey to a unified design where effort is allocated among spatial and habitat strata. As part of these efforts, recommendations were also developed to transition to a common set of video annotation protocols among all survey partners.

SEAMAP-South Atlantic

SEAMAP-SA was formally established in October 1983 under the auspices of its management body, the ASMFC SAB. An operations plan was developed and published in FY 1984, entitled SEAMAP South Atlantic Operations Plan: 1986-1990. A table of SEAMAP-SA surveys is included below.

Survey	Initial Year of Operation
North Carolina Pamlico Sound Trawl Survey	FY 1987
Coastal Trawl Survey	FY 1989
SEAMAP-SA Reef Fish Survey	FY 2009
State Coastal Longline Surveys (NC, SC, GA)	FY 2006

Operations for SEAMAP-SA began in FY 1985, including a spring benthic resources survey, development of objectives and procedures for a bottom mapping project, and development of a calibration protocol for shallow water trawling procedures in the South Atlantic.

In FY 1986, a pilot project for the Coastal Trawl Survey began with preliminary investigations on gear and calibration. The three-year preliminary study continued during FY 1987 and was

completed in FY 1988. The Coastal Trawl Survey sampling strategy was finalized and implemented in 1989, standardized in 1990, and an external program review in 2001 led to changes in the sampling design. This project continues today as a long-term survey and constitutes the largest component and highest priority activity in the South Atlantic program. The research vessel used by the SEAMAP–SA Coastal Survey is the R/V *Lady Lisa*. The R/V *Lady Lisa* is a cypress planked vessel that is no longer being built due to the downturn in the shrimp trawling industry. Therefore, options for the future include the repair and refit of the R/V *Lady Lisa* or the purchase of a different style of vessel, either fiberglass or steel hulled. The R/V *Lady Lisa* has undergone a considerable amount of rework and the replacement of beams and planks and at an annual cost of $30,000 or more. This work is ongoing and expensive, necessitating increases in vessel charges. Irrespective of the maintenance the age of the vessel will require vessel replacement in the near future at an expected cost of well over $1,000,000.

The Pamlico Sound Survey has been carried out annually since FY 1987. The survey was initially designed to provide a long-term fishery-independent database for the waters of the Pamlico Sound, eastern Albemarle Sound, and the lower Neuse and Pamlico Rivers. However, in 1990, the Albemarle Sound component was eliminated from the sampling area.

In FY 1995, the SEAMAP-SA Committee was asked by NMFS to coordinate development of finfish bycatch estimates in the South Atlantic shrimp fishery. The SEAMAP-SA Committee formed the Shrimp Bycatch Workgroup, which consisted of sixteen members from appropriate state and federal agencies with expertise in shrimp bycatch research and management. The workgroup guided data identification and summarization, evaluated estimation methods, and reviewed final estimates of bycatch removals by the South Atlantic shrimp fisheries. Technical support was provided by NMFS in conducting the specific analyses requested by the workgroup. A final report was completed in April 1996.

FY 1999 concluded ten years of standardized data collection for the shallow water trawl program, marking the maturity of the dataset and solidly establishing its utility in fisheries stock assessments. The Shallow Water Trawl Workgroup produced a 10-year summary report in FY 2000.

In FY 2003, the SEAMAP Data Management Workgroup developed a plan to update the NMFS data structures to contain the full extent of data collected by the Coastal Trawl Survey. The SEAMAP data management system underwent updates throughout 2004 and 2005 in collaboration with NMFS, and the Data Management Committee concurrently developed the SEAMAP.org website. A new SEAMAP logo was produced and the SEAMAP.org website went online in FY 2005. The SEAMAP website also includes general links, information, and documentation (surveys, reports, metadata, and special studies) for SEAMAP-SA programs. In 2008, development of an Oracle database for public access of SEAMAP-SA data began. The Oracle database is constructed to provide access to “normalized data” for a number of fishery independent programs including, but not limited to, SEAMAP Coastal Survey, the NCDMF Pamlico Sound trawl survey, the Coastal Longline Surveys, and the SEAMAP-SA Reef Fish Survey. In 2013, the SEAMAP-SA database became publicly available for data exploration and

extraction via the ASMFC maintained www.seamap.org site and the SCDNR maintained based Oracle relational database (www.dnr.sc.gov/seamap).

ASMFC's SAB initiated a Coastal Longline Survey in 2006 to gather information on adult red drum populations emigrating from estuaries, using ACFCMA funding. The project was designed to sample from North Carolina to Florida to develop a better understanding of abundance, distribution, and age composition of the stock and allow for more effective and responsible management. Derived information is also used for coastal shark assessments in the South Atlantic. Collaborating partners are North Carolina DMF, South Carolina DNR, and Georgia DNR.

SEAMAP-SA received increased funding in FY 2008. That summer, SEAMAP-SA used some of these funds to complement and expand MARMAP reef fish sampling. This addressed high-priority needs for overfished species in the snapper-grouper complex. The primary objective was to enhance the fishery-independent reef fish data collected by MARMAP by increasing sampling in underrepresented regions of the sampled area, particularly in shallow and offshore areas. The increased funding also helped to support reef fish life history studies not consistently supported in previous years. These include a monitoring program developed between 1995 and 1998 by MARMAP to provide an annual index of juvenile gag abundance in estuaries. Future year class strength can be predicted by surveying for juvenile gag ingress to estuaries. That study employed Witham collectors, which are an effective method for sampling ingressing reef fish larvae and postlarvae. Additionally, samples are taken for diet studies targeting several reef fishes. As a result of declining funding, the Gag ingress study was halted after the 2015 sampling season. The SEAMAP-SA Reef Fish Survey conducts research in the field primarily aboard the R/V *Palmetto*, which is over a decade past her projected life expectancy. Issues related to the advancing age of this research vessel has been documented extensively in SEAMAP management plans and reports, and various other documents over the years. In the fall of 2015, SCDNR invested significant funds (close to $1,000,000) on a major renovation of the R/V *Palmetto*. Given the age of the vessel, this renovation was well overdue and was critical for the safe and efficient functioning of the vessel. The renovation included replacing the engines, generators, shafts and propellers, and repairing external and internal hull plating and structures. The renovation was completed in the spring of 2016 and the vessel is operating more fuel efficient and at a slightly faster vessel speed. Above all, it is expected that sampling operations will be significantly more efficient as reduction in lost sea days due to vessel maintenance and equipment failure issues are expected to be diminished.

Bottom Mapping Study

Objectives and procedures for a bottom mapping project were formulated in FY 1985, and by FY 1986, a pilot study focusing on hard bottom areas and reefs in the South Atlantic was completed. Although a full study was scheduled to begin in FY 1988, lack of funding prevented implementation of the first element in this study until FY 1992. When funding resumed in FY 1992, the SEAMAP-SA Bottom Mapping Workgroup developed a database format designed for easy incorporation into GIS or other mapping software. The regional database includes the location and characteristics of hard bottom resources throughout the South Atlantic Bight.

In FY 1993, the workgroup initiated a search for existing data sources, and captured more than 8,000 records in the first year. By FY 1995, several bottom mapping reports were completed off the coasts of South Carolina, Georgia, and North Carolina. Florida was funded in FY 1996 to create a hardbottom mapping report by FY 1997. By FY 1998, the Florida Marine Research institute received enough data to create a GIS formatted Bottom Mapping Report encompassing North Carolina through Florida on a distributable CD. During FY 1999, the Bottom Mapping Workgroup revised the CD to produce version 1.1, and began discussing improved data access and interactive mapping on the Internet. A cooperative effort with the Coastal Sciences Center (CSC) allowed posting of that data as an information layer on the CSC website. In FY 2000, the Bottom Mapping Workgroup developed a summary hardcopy document to accompany the CD. The report was completed in FY 2001.The CD has been broadly distributed to scientists, natural resource managers, fishermen, consultants, environmental groups, and others.

In FY 2001, the Bottom Mapping Workgroup developed a list of issues necessary to create deepwater protocols and future workgroup priorities. They developed a three-phase approach to compile existing deepwater (200-2000m) bottom characterization data from existing datasets and extend the bottom mapping GIS product from the 200 to 2,000m depth contour. Phase 1 began in FY 2002; in order to convert existing data on deepwater bottom habitats into standard format, the Bottom Mapping Workgroup and Deepwater Subcommittee defined deepwater habitat characterization and the types of data for which transformation protocols would need to be developed. The subcommittee also approved the completion of a data source compilation document of deepwater bottom type data sources, titled "Summary of Seafloor Mapping and Benthic Sampling Conducted in 200-2000m, from North Carolina through Florida" (Phase II). In FY 2004, the Bottom Mapping Workgroup began work on Phase III of the deep-water habitat mapping project, working with the SAFMC to map bottom habitat in deepwater regions (200-2000m).

SEAMAP-SA received increased funding in FY 2008. With these funds, the Bottom Mapping Workgroup was restructured to include habitat considerations and fish characterization. The new Habitat Characterization and Fish Assessment Workgroup helped identify and develop new survey priorities to address high priority management needs.

The Florida Fish and Wildlife Research Institute (FWRI-previously FMRI), SC DNR, University of North Carolina – Wilmington, and Harbor Branch Oceanographic Institute collaborated to synthesize data on habitat distributions for water depths between 200 and 2000m within the U.S. EEZ, extending from just south of the Virginia/North Carolina border to the Florida Keys. SEAMAP bottom mapping data and associated GIS information have been incorporated into the South Atlantic Habitat and Ecosystem Atlas[10] and the South Atlantic Fisheries map viewer[11]. In addition, the SAFMC has highlighted SEAMAP's role in supporting the move to ecosystem-based

[10] http://ocean.floridamarine.org/safmc_atlas

[11] http://ocean.floridamarine.org/sa_fisheries/

management in the region through the South Atlantic Habitat and Ecosystem Homepage[12]. These tools support the development of a Fishery Ecosystem Plan for the South Atlantic Region and convey the importance of SEAMAP involvement and expansion in order to move toward ecosystem management.

Workshops

During FY 1994, the ASMFC convened a Workshop on the Collection and Use of Trawl Survey Data for Fisheries Management. SEAMAP-SA provided partial funding for the workshop, and its members participated. A report of the proceedings was published in December 1994.

During FY 2002, the Crustacean Workgroup held a symposium in conjunction with the Southeast Estuarine Research Society (SEERS). The symposium focused on "Management, Monitoring, and Habitat Considerations for Crustacean Fisheries in the Southeastern United States". The meeting provided a means for technical information exchange between scientists working for both academic and management purposes.

In FY 2003, the SEAMAP Data Management Workgroup met jointly with the Northeast Area Monitoring and Assessment Program (NEAMAP) Data Management Workgroup to share information on data structures and various methods to build a fishery-independent data warehouse.

Also in FY 2003, the Crustacean Workgroup met to discuss state harvest information on shrimp. They sponsored a shrimp symposium at the Crustacean Society Meeting (June 2-5, 2003 in Williamsburg, Virginia), focusing on disease, transport, genetic variability, and population status.

Finally, in FY 2003, the Crustacean Society convened a Blue Crab Symposium, and the ASMFC's SEAMAP Crustacean Workgroup convened a Blue Crab Workshop. A report entitled "The Status of the Blue Crab (*Callinectes sapidus*) on the Atlantic Coast" was produced in FY 2004 as a result of these meetings.

The South Atlantic Fishery Independent Monitoring Workshop was held in November 2009 to develop recommendations for the design of one or more multispecies fishery-independent surveys focused on species in the South Atlantic snapper grouper complex (see Carmichael et al, 2010 for details). The workshop was sponsored by the SAFMC and NOAA Fisheries and held at the SEFSC in Beaufort, North Carolina.

In January 2015, SEAMAP-SA survey leads met with NEAMAP and other Atlantic coast state survey leads at a Catch Processing Workshop. The goals of this workshop were to facilitate communication and collaboration among Atlantic coast fishery-independent surveys, discuss

[12] http://safmc.net/ecosystem-management/mapping-and-gis-data

methodologies surrounding catch-processing for each individual survey, identify areas where further standardization among surveys could be feasible, and identify future sampling needs.

SEAMAP-Caribbean

In FY 1988, a SEAMAP Caribbean Committee was established under the administrative guidance and supervision of the CFMC. Initial efforts toward establishing a long term SEAMAP-C monitoring program in this area were oriented towards environmental monitoring and ichthyoplankton and pelagic longline fishery studies. A table of SEAMAP-C surveys is included below.

Survey	Initial Year of Operation
Queen Conch Survey	FY 1990
SEAMAP-C Reef Fish Survey	FY 1992
Spiny Lobster Survey	FY 1996
Habitat Surveys	FY 2017

The operational phase of SEAMAP-C began in 1988 with plankton sampling, a cooperative venture involving the NOAA vessel DELAWARE II, SEAMAP-C members, and representatives of the British Virgin Islands. During FY 1989, a cruise of the NOAA vessel R/V *OREGON* to the Caribbean monitored longline catches around the U.S. Virgin Islands (USVI).

The SEAMAP-C committee recognized long-term monitoring of reef resources as its most important priority. Over FY 1989-1992, procedures were developed for a Reef Resource Survey, but efforts toward implementation were inhibited by a lack of funding for SEAMAP-C operations. In FY 1991, a three-year sampling cycle of a Reef Resources Survey was initiated, using funding sources external to SEAMAP, including sampling by hand line and fish traps in waters off Puerto Rico and the USVI. This extended to St. Croix in FY 1994 and 2000 and to St. John, USVI in FY 1999. Some data for the Reef Resources Survey have also been collected by the U.S. Virgin Islands Division of Fish and Wildlife using underwater cameras.

In FY 2004, SEAMAP-C began another cycle of reef fish surveys. Puerto Rico began trap and hook-and-line surveys that continued into FY 2005, enabled by supplemental SEAMAP funds received in FY 2004. These funds also supported the investigation and completion of the SEAMAP-C USVI trap and hook-and-line database. The USVI delayed these surveys until a new research vessel could be purchased; funding was approved in FY 2005, and a new vessel arrived in May 2007. In FY 2007, trap and hook-and-line surveys were once again conducted in St. Thomas/St. John and St. Croix. In 2015, a new vessel for Puerto Rico was approved and is in the process of procurement.

In FY 1990, SEAMAP-C conducted its first survey to determine the relative abundance of the queen conch (*Lobatus gigas*) resource around the USVI. Its methodology is modified from previous surveys undertaken in the USVI (Woods and Olsen, 1983 and Boulon, 1987). Since

then, this survey has been conducted in FY 1995, 2001, 2003, 2007 and 2013 as a joint venture between the USVI Division of Fish and Wildlife, the National Park Service (which supported the St. Thomas portion of the study), the PR-DNER, and the University of Puerto Rico, Mayagüez Campus. The survey covers all of Puerto Rico and the three main islands of the USVI. The most recent FY 2013 queen conch survey in Puerto Rico included 46 sites sampled for a total of 37.45 hectares (ha; transect areas ranged from 0.3ha at site 5 to 3.97ha at site 11). Survey areas included the west and southwest coasts of Puerto Rico. In FY 2008 and 2010, 144 underwater scooter transect surveys were completed for St. Thomas and St. Croix to assess queen conch resources around the USVI, and the final report was submitted in December 2010.

In FY 1996, 1997, 2004, 2009 and 2015, SEAMAP-C examined the spatial and temporal variation of spiny lobster pueruli settlement in coastal waters adjacent to St. Thomas, USVI. Puerto Rico completed a similar study in 1998. In FY 2004, 2009, and 2015, pueruli lobster settlement and juvenile lobster attractor surveys were conducted in the US Caribbean.

In FY 2003, six sets of ten artificial shelters, or “casitas,” made of concrete blocks were deployed at various sites on the west coast platform of Puerto Rico. These casitas are used to monitor the settlement of juvenile spiny lobsters.

Spiny lobster pueruli surveys were completed in FY 2008 and 2009 in St. Thomas and St. Croix and in FY 2009 in Puerto Rico. In FY 2008, Puerto Rico deployed seven spiny lobster larvae collectors, conducting an additional component to this study. Off the west coast of Puerto Rico, twenty-four modified Witham collectors are used as artificial habitat for pueruli settlement at six stations. The collectors are deployed at different depths, at mid-water and close to the bottom. Once this monitoring project is completed, the Witham collectors will be removed to avoid interaction with boaters and protected species.

In FY 1998, SEAMAP-C began benthic mapping studies of the USVI and Puerto Rico shelf using side-scan sonar. In FY 2003, whelk surveys were conducted around Puerto Rico and on all three islands of the USVI.

In FY 2006, a five-year cycle started in Puerto Rico and the USVI in which the queen conch, lobster, reef fish, parrotfish, yellowtail snapper, and lane snapper surveys were undertaken for one year each, using the standardized methodology established in the early years of the SEAMAP-C Program. The studies were conducted to provide information requested by the SEDAR stock assessment evaluation. Collected data has also been used in evaluating any proposed fishing regulations for US Caribbean waters.

In FY 2008, within the first five-year cycle, SEAMAP received increased funding which allowed expansion of some of these surveys. In Puerto Rico, the shallow water reef fish, yellowtail, and lane snapper surveys were expanded to include the east and south coasts, and in the USVI, sampling was expanded include St. Croix. Several special projects were included, regarding gonad collection of three important parrotfish species in the USVI, and data collection on

spawning aggregations in Puerto Rico. Also in Puerto Rico, gonad samples were collected and evaluated histologically for all samples of reef fish, yellowtail, and lane snapper. Histological analysis of species is an ongoing part of the SEAMAP-C Reef Fish Survey in Puerto Rico and the continued collaboration between the Puerto Rico FRL Reproduction Program and SEAMAP-C.

In FY 2009, fishery-independent hook-and-line surveys were conducted for reef fish and yellowtail snapper in Puerto Rico off the west coast. Similar surveys were conducted in FY 2010 for reef fish and yellowtail snapper in St. Thomas/St. John. Due to staff shortages, an 18-month no-cost extension was requested and granted for the SEAMAP-C project cycle, allowing St. Croix to complete their hook-and-line surveys in 2011. The final component of this five-year study used the gonads collected from three parrotfish species to study their reproductive cycles. During FY 2010, parrotfish sampling was conducted in St. Thomas/St. John and St. Croix.

In FY 2011, the next five-year funding cycle began in Puerto Rico and USVI, repeating the same species rotation and methodology used in the previous cycle. In the USVI, a new survey was included for monitoring deepwater snapper species. Though the FY 2011 five-year funding cycle was initiated in Puerto Rico and the USVI, little was accomplished in the USVI between FY 2011 and 2016 as a result of severe staff shortages due to the retirement of several senior staff, high turn-over of biologists, and the need for a deep seafaring vessel in St. Croix. Regardless of these limitations, several studies initiated and continued during a 12-month no-cost extension that was requested and granted for completing all studies ending March 31, 2017.

The five-years sampling cycle 2016 – 2021 originally proposed to have Reef Fish Monitoring surveys on years 1, 2, 4 and 5, while the conch and lobster surveys would be conducted in the third year. Reef Fish surveys encompassed the use of: 1) hand lines, 2) longline fishing and 3) videos recording for habitat description and reef fish abundance estimations. Posteriorly, the Caribbean Committee decided to modify the Statement of Work (SOW) for the 3rd year (FY 18-19) to conduct Reef fish sampling instead of conch & lobster, which was moved to the fourth year. New sampling protocols for reef fish, conch and lobster surveys have been improved for this period to increase the data quality acquisition for management use. During this five-year cycle (2016 – 2021), several environmental events affected the continuity of the proposed surveys. Hurricanes Irma and María (September/2017) affected the normal life including all samplings in Puerto Rico and in the USVI. This situation was worsened with the occurrence of a series of earthquakes in PR which started in January 2020, followed by a worldwide Pandemic with the Coronavirus, causing a total lock down on both districts, Puerto Rico and the US Virgin Islands

Special Studies: Highlights

- Histology of specimens collected in reef fish, four parrotfish species, and yellowtail and lane snapper surveys have provided vital biological information needed for fisheries management from FY 2003 to present in Puerto Rico.
- Gonad collection of four parrotfish species were macroscopically sexed and staged for reproductive condition in FY 2008 and 2016 in the USVI.

- Reef fish spawning aggregations were characterized using DSG hydroacoustic dataloggers in the USVI and Puerto Rico.

International Activities

The SEAMAP-C component has established close working relationships with other Caribbean nations in an effort to assess recruitment patterns common to the entire Caribbean Basin. Information has been exchanged to develop the SEAMAP-C Directory of Fishery-Independent Activities, cooperative surveys may be conducted in association with the British Virgin Islands and the Dominican Republic in the near future.

To facilitate survey coordination and information exchange among participants and other involved organizations, SEAMAP-C periodically sponsors workshops and symposia. In 1995, the Caribbean Community Secretariat (CARICOM) sponsored a workshop on spiny lobsters and queen conch in Jamaica (CFRAMP 1997). Resulting recommendation included establishment of pueruli collectors and juvenile artificial shelters (Cruz and Auil-Marshalleck 1997).

C. SEAMAP Specimen Archiving

Curators

The SEAMAP curators are responsible for the maintenance of selected collections of ichthyoplankton, invertebrate organisms, unsorted plankton samples, and stomach contents, gonads, or otoliths collected during SEAMAP survey operations. The SEAMAP-Gulf Ichthyoplankton Archiving Center stores sorted ichthyoplankton samples and is located at the Florida Fish and Wildlife Research Institute, St. Petersburg, Florida. The SEAMAP-Gulf Ichthyoplankton Archiving Center curator and curatorial assistant are Florida state employees whose positions are supported by SEAMAP funds. The curator and curatorial assistant receive administrative support from the Florida Fish and Wildlife Research and direction from the joint committees. The SEAMAP Invertebrate Plankton Archiving Center is located at the University of Southern Mississippi Gulf Coast Research Laboratory in Ocean Springs, MS. This center houses the identified invertebrates (shrimp, crab, lobster and cephalopods) from the Poland assessed samples that have been returned to GCRL for long-term archiving, as well as the unsorted "backup" station samples and sorted larval invertebrate specimens. The Invertebrate Plankton Archiving Center curator and curatorial assistant are employees of Gulf Coast Research Laboratory, whose positions are partially supported by SEAMAP funds. Administrative support and supervision are received from the Gulf Coast Research laboratory and joint committees. The SERTC stores sorted post-larval (non-planktonic) invertebrate samples and is located at the Marine Resources Research Institute in Charleston, South Carolina. SEAMAP Coastal Survey staff maintain the stomach sample collection with assistance from the SERTC. SERTC staff are all state of South Carolina employees supported in whole or in part by SEAMAP funds.

The SEAMAP curators maintain SEAMAP specimens and samples in the most efficient and effective manner, processing specimen requests and insuring archiving and loans are carried out in accordance with the approved policies and procedures outlined in the SEAMAP Shipboard Operations Manual. Specific responsibilities of the curators include:

- Maintain collections in a manner consistent with approved policies and procedures,
- Receive authorized specimens and their accompanying information, and catalog these materials,
- Process user requests and provide specimens and/or information in accordance with the approved policies and procedures,
- Maintain information on specimen requests, and
- Assist coordinators in the preparation of each annual report and reviews of the specimen archiving component of SEAMAP.

Archiving Procedure

Specimen collectors are classified in the same categories as data collectors, which include SEAMAP participant and SEAMAP cooperator. Collected specimens are classified as

ichthyoplankton, invertebrate zooplankton, or phytoplankton. Collections are preserved and processed aboard ship in accordance with the SEAMAP Operations Manual for Collection of Data. Primary collections are shipped to the NMFS Miami Laboratory where data sheets are completed and reviewed. The samples are then packaged and forwarded to the Polish sorting center. Backup collections are shipped to the Invertebrate Plankton Archiving Center where they are stored.

Specimens sent to the Plankton Sorting and Identification Center in Sczcecin, Poland are separated to ichthyoplankton and other plankton fractions. Ichthyoplankton fractions are sorted to at least the family level and returned to the SEAMAP Ichthyoplankton Archiving Center, where they are catalogued and stored. Currently, all ichthyoplankton archiving information is maintained on a local database at the SEAMAP Ichthyoplankton Archiving Center. The sorted and unsorted invertebrate fractions are returned to the Invertebrate Plankton Archiving Center and accessioned. All invertebrates are archived and data maintained in a computerized data management system.

A collection of invertebrate (excluding zooplankton) and fish specimens, including those collected by SEAMAP-SA surveys, is maintained by the SERTC. With the exception of some cnidarians and a number of formalin-fixed specimens that were collected prior to the inception of the SERTC program, the samples in the SERTC invertebrate collection are preserved in 95% ethanol, an acceptable procedure for storing tissues that are expected to be useful for DNA extraction. Through this preservation process, SERTC provides material to molecular systematists upon request. A software package called Specify, which was developed by the Informatics Biodiversity Research Center at the University of Kansas, is used to manage a database of the catalogued collections of the SERTC program. The Specify software allows modification to the taxonomic hierarchy of the Integrated Taxonomic Information System, providing SERTC the ability to incorporate up-to-date taxonomic information into the database. Currently, 67% of the SERTC invertebrate database is accessible through a portal of the Global Biodiversity Information Facility. Queries of the database can provide detailed collection for each lot of specimens contained in the SERTC collection. To date, 2050 records of occurrence (520 species and 49 additional taxa that are identified at a level higher than species) can be viewed at the Global Biodiversity Information Facility website.

Implementation of the SEAMAP Data Management System improves information management for both archiving centers by allowing user site access to the entire SEAMAP database at each archiving center. All station information is readily available to the curators. Specimen data is entered directly to the SEAMAP database at the archiving centers, and all archiving information stored on the Data Management System is readily available to SEAMAP participants.

All specimen requests are directed to the SEAMAP curators to be processed in accordance with the annual SEAMAP operations plan. The curator sends a Specimen Loan Agreement Form to the requestor, requiring the following information:

1. Name of requestor and associate investigators using specimens;
2. Affiliation and address of requestor;
3. Required date of receiving loan and probable length of use;
4. Purpose of specimen use, including identification of contracts or grants associated with such use;
5. Intended publication format (journal, report, etc.) for project; and
6. Copy of grant, grant proposal, or contract indicating proposed use of SEAMAP data or specimens, if applicable.

This form also contains notification of charges associated with processing and handling the specimen loan. In most cases, the archiving center will cover cost of shipping to the loan recipient, whereas the requesters cover the cost of return shipping. This form also notifies the requestor of the procedure to be used in referencing SEAMAP as the source of specimens in any presentation, report, or publication resulting from their use. Procedures for handling and maintaining loan specimens are included on this form. Normally, all sorted, unmodified, or modified (unless fully destroyed) specimens are returned to the archiving center. When examination of SEAMAP specimens by a recognized expert in marine fish taxonomy leads to re-identification of larval specimens, these changes are incorporated into the SEAMAP Data Management System. The curator must advise the requestor to provide the appropriate SEAMAP coordinator with eight copies of each report and publication which relied on SEAMAP specimens. A bibliography of reports generated from SEAMAP data are published in the SEAMAP Annual Report. The requestor is advised to treat all received specimens in a professional manner, precluding redistribution of the specimens to other parties without prior approval by the committee.

Specimen requests are normally handled in the order received, but in the event of personnel or funding limitations, priorities for specimen requests are assigned as follows: SEAMAP participant, SEAMAP cooperator, SEAMAP investigator, and non-SEAMAP investigator. Questions relating to adjustments in priorities, costs, and use of specimens should be forwarded to the coordinators and committees for resolution.

D. Documents Produced by SEAMAP

A bibliography of SEAMAP reports, as well as reports utilizing SEAMAP data, may be found on www.seamap.org and www.gsmfc.org/seamap.html. SEAMAP information may be produced in a number of different types and formats:

Annual Reports — Prepared by the coordinators and committees. These reports summarize and, to some extent, evaluate survey operations, data management, administration, and information dissemination activities. Annual reports also offer a financial statement, listing of official SEAMAP publications, listing of data requests and publications that relied on SEAMAP data, a proposed budget, and recommendations for SEAMAP activities to be conducted the following year. Annual reports are distributed to management bodies and funding agencies to be used in evaluating the performance of SEAMAP.

Cruise Plans — Provide agencies and organizations with advance notice of intended surveys. These brief notices detail scheduled sampling activities and describe itineraries of vessels participating in the surveys. Cruise plans are distributed upon approval by the appropriate committee.

Cruise Reports — Provide an overview of cruise activities (time at sea, staff at sea, gear used), collection information (sampling locations, number of gear deployments, number and species of organisms collected, specimens kept for analysis), and data (summaries, CPUE, etc.).

Public Relations Communications — Newspaper and journal articles and interagency reports that may be helpful in fulfilling the program's goals and objectives.

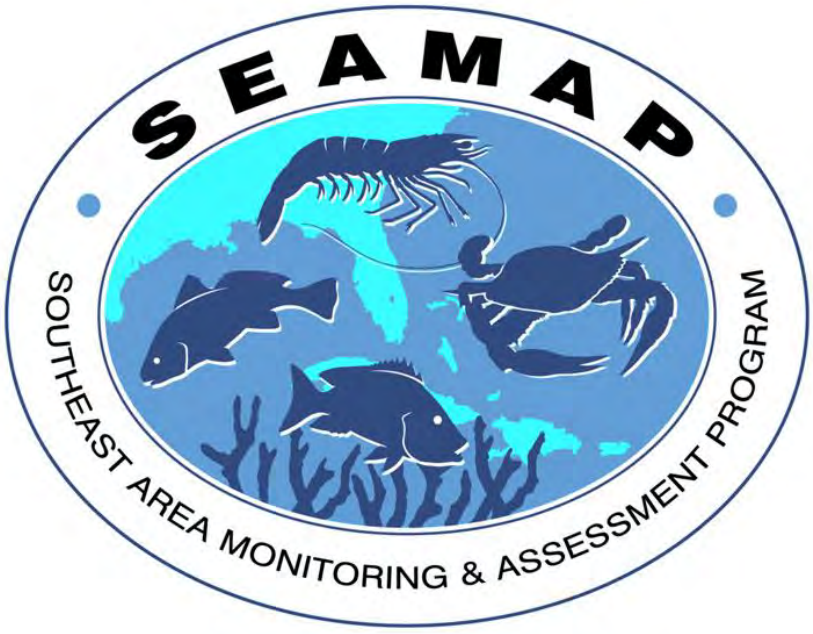
Newsletters — Provide agencies and organizations with advance notice of intended SEAMAP surveys. These brief notices detail scheduled sampling sites and activities, and describe the itineraries of vessels participating in the surveys.

Quick Reports — Issued periodically during survey operations. The reports contain information such as shrimp catch rate, satellite transmission of chlorophyll concentrations, and surface temperatures that may be useful to scientists, management agencies, and the fishing industry. The reports are prepared for the committee under the supervision of the SEAMAP data manager and are distributed by the coordinator to persons responding to periodic SEAMAP data summary use questionnaires and others expressing a desire to receive these reports.

SEAMAP Atlas — Summarizes annual ichthyological, shrimp/groundfish, and environmental data collected on cruises. Atlases are joint products of two

	or more workgroups under the supervision of the coordinator, and are distributed to participants, cooperators, investigators, and interested fisheries research organizations.
SEAMAP Marine	Summarizes information on fisheries research survey activities, personnel, facilities, and gear, and is updated annually for distribution to regional fisheries organizations.
Directory	The directory was previously prepared for SEAMAP by NMFS personnel, but is now be under the supervision of the SEAMAP coordinator.
Special Reports	Supervised by the committee and prepared to provide timely information that fulfills the program's goals and objectives. These may include descriptions of standard sampling protocols and gears, results of gear comparisons, workshop proceedings, etc. Special reports will be available to state agencies, universities, and other researchers concerned with collecting data that will be compatible with those of SEAMAP organizations.

2021-2025 SEAMAP Strategic Plan



Collection, Management, and Dissemination of
Fishery-independent Data from the Waters of the Southeastern United States

Prepared by
Sarah Murray, Atlantic States Marine Fisheries Commission
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Caribbean SEAMAP Committee

Prepared for
Caribbean SEAMAP Committee
South Atlantic State-Federal Fisheries Management Board,
Atlantic States Marine Fisheries Commission
Technical Coordinating Committee, Gulf States Marine Fisheries Commission

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PREFACE

Fisheries are a vital part of the nation's economy and, more specifically, the coastal communities and states of the South Atlantic, Gulf of Mexico, and Caribbean. In the region in which the Southeast Area Monitoring and Assessment Program (SEAMAP) is conducted, fisheries resources support valuable commercial and recreational fishing industries. In 2015, in the South Atlantic and Gulf region alone, commercial fishers landed over 2.9 billion pounds of seafood worth almost $1.7 billion[1]. In the same year, recreational anglers across all three regions landed at least 213 million pounds of fish[2]. Recreational fishing is a growing industry in the SEAMAP region, where over 130 million angler trips were taken in 2018[3].

Fishing and tourism industries contribute significantly to the economies of the nation's coastal communities by generating employment opportunities and associated revenues. As such, these industries directly improve quality of life and contribute to community diversity by maintaining traditional fisheries. Sustainable recreational and commercial fisheries are dependent on responsible resource management, which, in turn, requires accurate and timely data as a basis for management decisions. SEAMAP plays an integral role in providing fishery-independent data critically needed for effective fisheries management throughout the Southeastern United States, including the Atlantic, Gulf of Mexico, and Caribbean regions.

As the focus of fisheries management expands from single species management to ecosystem-based fisheries management, the need for basic information has also increased significantly. For example, in addition to the ongoing baseline data required for effective management of recreational and commercial fisheries, improved information is needed on prey and predator species life histories and interactions, essential fish habitat, and the effects of changing environmental conditions.

Long-term fishery-independent databases provide information essential to evaluating the status of the nation's fisheries, including population abundances, mortalities, recruitment, and ecological relationships. These fundamental parameters, combined with long-term assessments and monitoring, constitute the backbone of effective fisheries management. Only with this basic information can fisheries managers ascertain trends, determine potential causes of changes, and react responsibly to address these changes. Ongoing, regional fishery-independent efforts, such as those undertaken by SEAMAP, can generate data critically needed by fisheries management to address these issues.

Adequate funding continues to be a challenge in fisheries science and management. Federal and state government funding for fisheries activities will likely decrease over the coming years in order to meet the fiscal objectives of balanced budgets and reduced spending. Concomitantly, survey costs continue to increase, especially given the need for new data to

[1] Fisheries of the US 2018
[2] Fisheries of the US 2018 (excludes Texas and Louisiana).
[3] Fisheries of the US 2018.

assess the status of emerging fisheries and transition to ecosystem-based fishery management. This could significantly impact the nation's capability to manage its valuable fisheries resources. However, by building partnerships, the federal and state governments can combine their limited resources to address issues of common interest. In particular, cooperative programs for collecting essential fisheries data would benefit all partners, providing valuable scientific information for management at the state, federal, and regional levels.

SEAMAP is a model partnership for cooperative federal and state data collection. SEAMAP is truly collaborative; fiscal, physical, and personnel resources are shared among participants and decisions are made by consensus. The experience and success of SEAMAP over the last 35 years illustrate its effectiveness. SEAMAP has great potential to increase and improve its usefulness for fisheries management by expanding its fishery-independent data collection programs, provided additional funding is made available. We strongly support this worthwhile program and its expansion to collect more fishery-independent data for purposes of fishery management.

Ted Switzer	Roger Pugliese	Matthew Kammann
Chair	*Chair*	*Chair*
SEAMAP-Gulf of Mexico	SEAMAP-South Atlantic	SEAMAP-Caribbean

ACKNOWLEDGMENTS

The SEAMAP Gulf, South Atlantic, and Caribbean Committees (Appendix A) would like to acknowledge those who have helped make SEAMAP such a successful program. Many individuals from various federal, state, and academic organizations provided their expertise to SEAMAP projects by serving as members of workgroups. The committees would like to thank all of the workgroup members for their efforts. In addition, the committees would like to thank the following: Jeff Rester (GSMFC), Sarah Murray (ASMFC), and Edgardo Ojeda (UPRSGCP) for their work as coordinators; Dr. Roy Crabtree and Dr. Clay Porch NMFS Regional Administrator and Regional Science Director, respectively, for their support of SEAMAP projects, including strategic planning; and the Atlantic States Marine Fisheries Commission staff for administrative support of this project. The committees also acknowledge Dr. Eric Hoffmayer for his efforts and support as SEAMAP's Program Manager at NMFS. Contributing to the success of the program are many other persons who assisted with the resource surveys and projects by providing equipment and donating their time and expertise.

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Gulf Coast Research Laboratory (GCRL)
Gulf of Mexico Fishery Management Council (GMFMC)
Louisiana Department of Wildlife and Fisheries (LDWF)
Mississippi Department of Marine Resources (MDMR)
NOAA Fisheries
North Carolina Division of Marine Fisheries (NC DMF)
South Atlantic Fishery Management Council (SAFMC)
South Carolina Department of Natural Resources (SC DNR)
Texas Parks and Wildlife Department (TPWD)
US Fish and Wildlife Service (USFWS)
Puerto Rico Department of Natural and Environmental Resources (PR-DNER)
U.S. Virgin Islands Department of Planning and Natural Resources (USVI-DPNR)
Caribbean Fishery Management Council (CFMC)
University of Puerto Rico, Sea Grant College Program (UPRSGCP)

SEAMAP COLLABORATIONS

Marine Resources Monitoring, Assessment and Prediction Program (MARMAP)
NOAA - Beaufort, NC Laboratory
Southeast Coastal Ocean Observing Regional Association (SECOORA)
Southeast Fisheries Science Center Southeast Fishery-Independent Survey (SEFIS) group

ABBREVIATIONS AND ACRONYMS

ACL	annual catch limits
AM	accountability measures
ASMFC	Atlantic States Marine Fisheries Commission
BRD	bycatch reduction device
CFMC	Caribbean Fishery Management Council
COASTSPAN	Cooperative Atlantic States Shark Pupping and Nursery
CPUE	catch per unit effort
CSC	Coastal Sciences Center
DOC	Department of Commerce
EEZ	exclusive economic zone
EFH	essential fish habitat
FMP	fishery management plan
FSCS	Fisheries Scientific Computer System
FRL	Fisheries Research Laboratory (Caribbean)
FWRI	Florida Wildlife Research Institute
GA DNR	Georgia Department of Natural Resources
GIS	Geographic Information System
GMFMC	Gulf of Mexico Fishery Management Council
GSMFC	Gulf States Marine Fisheries Commission
GSMFC-TCC	Gulf States Marine Fisheries Commission-Technical Coordinating Committee
HMS	highly migratory species
LNG	liquefied natural gas
MARFIN	Marine Fisheries Initiative Program
MARMAP	Marine Resources Monitoring, Assessment and Prediction Program
MSRA	Magnuson-Steven Fishery Conservation and Management Reauthorization Act
NC DMF	North Carolina Division of Marine Fisheries
NCRMP	National Coral Reef Monitoring Program
NMFS	National Marine Fisheries Service (also referred to as NOAA Fisheries)
NOAA	National Oceanic and Atmospheric Administration
PR	Puerto Rico
PRCRMP	Puerto Rico Coral Reef Monitoring Program
PR-DNER	Puerto Rico Department of Natural and Environmental Resources
SAB	South Atlantic State-Federal Fisheries Management Board
SAFIMP	South Atlantic Fishery-Independent Monitoring Program workshop
SAFMC	South Atlantic Fishery Management Council
SC DNR	South Carolina Department of Natural Resources
SEAMAP	Southeast Area Monitoring and Assessment Program
SEAMAP-C	Southeast Area Monitoring and Assessment Program-Caribbean
SEAMAP-Gulf	Southeast Area Monitoring and Assessment Program-Gulf of Mexico
SEAMAP-SA	Southeast Area Monitoring and Assessment Program-South Atlantic
SECOORA	Southeast Coastal Ocean Observing Regional Association
SEDAR	Southeast Data, Assessment, and Review
SEFIS	SEFSC Southeast Fishery-Independent Survey (SEFIS)
SEFSC	Southeast Fisheries Science Center
SERFS	Southeast Reef Fish Survey
SERO	Southeast Regional Office (NOAA Fisheries)
SERTC	Southeastern Regional Taxonomic Center
USFWS	U.S. Fish and Wildlife Service
USVICRMP	USVI Coral Reef Monitoring Program
USVI-DPNR	U.S. Virgin Islands Department of Planning and Natural Resources
UPRSGCP	University of Puerto Rico Sea Grant College Program

INTRODUCTION

The SEAMAP 2021-2025 Strategic Plan provides a prioritized list of future project activities for each of the SEAMAP components. The Strategic Plan complements the SEAMAP 2021-2025 Management Plan, which provides a statement of current goals (Chapter 1), management policies and procedures (Chapter 2), and current activities and accomplishments (Chapter 3). The Management Plan also serves as a reference on SEAMAP history (Appendix B).

SEAMAP is a cooperative state/federal/university program for the collection, management, and dissemination of fishery-independent data and information in the Southeastern U.S. and Caribbean. Representatives from Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, Puerto Rico, the U.S. Virgin Islands, the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) jointly plan and conduct surveys of economically important fish and shellfish species and the critical habitats that support them.

SEAMAP's mission, detailed in Chapter 1 of the Management Plan, is to provide an integrated and cooperative program to facilitate the collection and dissemination of fishery-independent information for use by fisheries managers, government agencies, recreational and commercial fishing industries, researchers, and others to enhance knowledge of marine fisheries and their associated ecosystems. SEAMAP is intended to maximize the capability of fishery-independent and associated survey activities to satisfy data and information needs of living marine resource management and research organizations in the region. The primary means of performing that task is to optimize coordination and deployment of sampling platforms used in the region to obtain regional, synoptic surveys and to provide access to the collected data through documents and accessible databases. Additional roles of SEAMAP are to document long- and short-term needs for fishery-independent data to meet critical management and research needs, and to establish compatible and consistent databases for holistic ecosystem and predictive modeling applications. SEAMAP promotes coordination among data collection, processing, management, and analysis activities emphasizing those specifically concerned with living marine resource management and habitat protection, and provides a forum for coordination of other fishery-related activities.

The SEAMAP Joint Committee has developed a list of future project activities. They are prioritized in three broad categories that maintain and expand upon existing SEAMAP data collection activities and propose new data collection efforts, dependent on the availability of additional funding (Chapter 1). Funding provided in FY2020 for SEAMAP was $4,797,738 which allows for the dissemination of readily available regional fish and habitat data for use in stock assessments of state and federally managed species. Enhancement and expansion of the program will directly improve the ability of scientists to refine existing assessments with better data, as well as perform more assessments of overfished resources, eventually leading to more effective management in the Southeast region.

I. **Operate existing programs at full utilization:** In recent years, SEAMAP activities have been impacted by stagnating and declining funding to the core surveys. SEAMAP activities have been reduced across sea days and stations while entire survey components have been eliminated. Additionally, survey costs will continue to increase over time. In order to bring SEAMAP activities back to full utilization, funding will need to be restored and increased.

II. **Expand current projects to collect additional data on existing platforms:** Several additional data collection activities could be performed as low-cost expansions of current surveys. As fisheries management moves to age-based assessments, there is a greater need to collect age, growth, and reproductive data and expand the geographical scope and capabilities of existing program trawl, plankton, lobster, conch, and bottom mapping surveys. Furthermore, with increasing focus on ecosystem management, there is a critical need for data on stomach contents and environmental variables that can be collected during existing surveys.

III. **Develop new fishery-independent data collection programs:** Additional identified priorities include fishery-independent surveys targeting adult finfish, plankton, crustaceans, identification/mapping of existing live bottom and other essential fish habitat (EFH), pelagic fish monitoring, and assessments of deepwater reef fish, including snapper and grouper stocks.

The most compelling argument to continue funding is SEAMAP's ability to respond to recent and ongoing critical demands for data and information that only the program can provide (see the SEAMAP 2021-2025 for further details on SEAMAP data uses and accomplishments). Accurate population assessments and informed resource decisions are impossible without basic annual data. Data collection and distribution activities, such as those performed by SEAMAP, are the foundation of resource assessments and responsible fisheries management. In turn, sustainable fisheries promote a continued source of recreation and employment for coastal communities. This 2021-2025 Management Plan sets the guidelines and priorities for fishery-independent data collection efforts that most appropriately use SEAMAP resources and address the needs of fisheries management in the Southeast and Caribbean regions.

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1 EXPANDING AND MAINTAINING SEAMAP ACTIVITIES

In the stock assessment process, SEAMAP-based abundance indices now are used routinely both as stand-alone indices of abundance and as criteria for "tuning" stock assessment models. Key applications in the stock assessment process have been Atlantic menhaden (South Atlantic Trawl Surveys), bluefin tuna (Gulf Plankton Surveys), bluefish (South Atlantic Trawl Surveys), cobia (Gulf Trawl Surveys), king mackerel (Gulf and South Atlantic Trawl Surveys and Gulf Plankton Surveys), Spanish mackerel (Gulf and South Atlantic Trawl Surveys), red snapper (Gulf Trawl and Plankton Surveys), red drum (Gulf Plankton Surveys and Coastal Longline Surveys), red hind (Caribbean Reef Resources Surveys), shrimp (Gulf and South Atlantic Trawl Surveys), striped bass, kingfish, weakfish, spot, and croaker (South Atlantic Coastal Trawl Survey). In addition, there is great potential for expanding SEAMAP to collect data on stocks that are not well covered by current surveys (example, cannonball jellyfish - *Stomolophus meleagris* in the South Atlantic), expanding life history sample collection for species currently encountered, or adding other survey methods to existing surveys. As fish stocks fluctuate in response to natural conditions and human actions (i.e., changes in fish abundance, survival, and recruitment), scientific information regarding marine fish populations is continually needed by managers.

There is potential for increased use of ongoing SEAMAP data collection for fisheries management, especially as the SEAMAP resource surveys continue to grow into longer time series of fishery-independent data. In addition to providing regional, long-term, fishery-independent data, SEAMAP datasets also provide valuable baseline trends of fishery stocks. These long-term baseline trends can be used to assess the impacts of a tragedy such as the Deepwater Horizon oil spill in the Gulf of Mexico or other environmental perturbations.

The South Atlantic Coastal Trawl Survey and Reef Fish Survey provide immediate feedback regarding the effectiveness of fisheries management regulations. SEAMAP trawl survey data are used by Texas, South Carolina, and Georgia to set seasonal openings for the shrimp fisheries. SEAMAP-Gulf trap videos have been used to judge the effectiveness of various types of artificial reef materials for their structural and geographical stability, biofouling community succession, and fish biomass and diversity. Where catch is limited and fishing is restricted, making catch data unavailable, fishery-independent data are of even greater importance and may be the only source of information for characterizing stocks. Expanding SEAMAP activities can provide for even greater application for evaluating management actions.

More recently, data from the Caribbean Reef Fish Survey has provided data for an ecosystem-based evaluation of temporal trends of fish assemblages (abundance and biomass) associated with coral reefs in the region. These trend analyses, together with analyses of other databases, will feed into a more general quantitative model aimed at describing the structure and composition of these fish assemblages and identifying potential drivers of their temporal change.

The demand for adequate scientific information will likely increase in the future as management moves towards alternative approaches, such as property-rights-based management (including individual transferable quotas or catch shares), habitat-based management, multi-species management, and ecosystem management.

SEAMAP surveys record data on the distribution of fish both geographically and within environmental variables such as temperature and salinity, which is the first step in defining environmental limits in essential habitats utilized by each species. For example, SEAMAP data are used to identify the bottom habitat distribution in the South Atlantic region to adopt management measures to protect coral and allow rock shrimp trawling to continue. Using SEAMAP data, SAFMC has developed alternative management options to protect coral areas from rock shrimp trawling, define EFH, and investigate marine protected areas. The nearshore trawl surveys may have a new use in the realm of coastal wind farm development for identifying low and high impact areas when citing farms.

The three SEAMAP committees regularly discuss future SEAMAP activities, and each developed a list of activities that would implement changes according to the following priorities:

1. **Operate existing programs at full utilization**
2. **Expand current projects to collect additional data on existing platforms**
3. **Develop new fishery-independent data collection programs**

The SEAMAP Joint Committee supports priorities that restore and maximize ongoing program activities over the implementation of any new fishery-independent data collection efforts. Lack of adequate funding is the major impediment for maintaining and expanding surveys. In recent years, the level funding and loss of funding has led many of the components to reduce sampling and these reductions are reflected within Tier I of this list. The Committee notes that surveys not included in Tier I currently are at risk of being added in the near future should funding remain level or decrease further. The projects below are designed specifically to rebuild and expand upon existing SEAMAP data collection activities and as such, will continue to have a high benefit to cost ratio and all cost estimates are based on current rates (August 2016).

1.1 OPERATE EXISTING PROGRAMS AT FULL UTILIZATION

In recent years, SEAMAP activities have been impacted by stagnating and declining funding to the core surveys. The following items and funding are required to maintain these baseline survey activities or bring SEAMAP to full utilization.

1.1.1 Gulf of Mexico

(Increase of $600,000/year)

Trawl Surveys on the West Florida Shelf

In 2008, Florida began participating in the SEAMAP-Gulf Summer and Fall Shrimp/Groundfish Surveys. Its sampling coverage ranged from just south of Tampa Bay to Pensacola on the west Florida continental shelf. Due to limited funds in 2011, this survey was cut back to once a year. Funding is needed to continue the survey twice a year. This will allow additional information to be collected on shrimp and fish stocks where they have historically not been sampled on a regular basis. ($350,000 annually)

Bottom Longline Survey

The SEAMAP-Gulf Bottom Longline Survey is currently conducted in water depths of 3 to 10m from statistical 10 in northern Florida to statistical zone 21 at the U.S./Mexican border. Funding limitations do not allow sampling in statistical zones 1-9 off Florida. Additional funds would allow the survey to sample the entire Gulf of Mexico during the Spring, Summer, and Fall time periods. ($250,000 annually)

1.1.2 South Atlantic

(Increase of $745,910 annually)

Coastal Trawl Survey

Due to reduced funding and increased cost of the SEAMAP-SA Coastal Trawl Survey (see Section 2.5.1 of the Management Plan), current funding levels will not allow the continuation of three sampling seasons each year. We considered reducing the number of stations, but unless this reduction is in the northernmost and southernmost area, the cost reduction would be marginal, relative to the large loss in data and geographic coverage. We are currently investigating the effect of dropping one of the sampling seasons on data and analyses for assessments etc., which can be considerable. Maintaining the current sampling efforts (3 seasons, 102 stations per season) would require additional funding of ≈$80,000 annually.

Pamlico Sound Survey

Due to funding limitations, staff salaries are currently supplemented with outside funding sources. In particular, 25% of the NC Biologist salary is no longer covered under SEAMAP-SA. An additional $9,950 is required to fully fund the NC Biologist.

SEAMAP-SA Reef Fish Survey and Bottom Mapping

SEAMAP-SA contributes 40% to 45% to the SC DNR Reef Fish Survey efforts (SEAMAP-SA and MARMAP), and about 20% of total current funding for the regional Reef Fish Survey (SERFS). The SC DNR Reef Fish Survey has seen considerable funding reductions over the years, most significantly through reduced funding for MARMAP and SEFIS funding to MARMAP. Increases in vessel cost per sea day, as well as personnel and other costs, have led to a reduction in sea days, suspension of the bottom long-line surveys in 2012 and the gag ingress study in 2015. Due to incidental funding, mostly as a result of the need for data

on deep water snapper/grouper species, the long line surveys were, partially resumed in 2014.

A full utilization of the SEAMAP-SA Reef Fish Survey will require:

1. Restoring sampling effort to at least 50 sea day per year (25 each for MARMAP and SEAMAP-SA). Required funding: $ 66,500 annually (~7 seadays). It's important to realize that the current reef fish survey can only be conducted in collaboration with MARMAP (funding between $600K and $750K annually in recent years), SEAMAP-SA Reef Fish, and the NMFS SEFIS program (funding variable).
2. Restoring the longline surveys as laid out in the SAFIMP and Longline Workshop Reports (See Carmichael et al. 2009, Carmichael et al. 2016, and Kellison et al. in prep). Participants in these workshops, have recognized the importance of a comprehensive fisheries independent deep-water snapper grouper survey. Data for these species are lacking and funding reductions over time have reduced or eliminated sea days for the longline surveys. This would require 10 additional sea days for the R/V *Palmetto* and 15 sea days for the R/V *Lady Lisa.* Required funding: $ 146,000 annually.
3. Note that in 2020, a cooperative-with-industry, regional-scale (northern NC to FL Keys) South Atlantic deepwater longline survey was initiated. The survey, coordinated cooperatively by SCDNR and NMFS, utilizes longline sampling from contracted commercial vessels, targeting predominantly deepwater grouper species and tilefish (golden and blueline) in depths ranging from ~ 75 - 365 m. The main objective of the survey, which is anticipated to continue in subsequent years, is to generate abundance indices and life-history information for focal species, for use in stock assessments.
4. Funding to process all life history samples (in particular the otoliths and reproductive tissues) within one year after collection. This will allow the survey to respond to the frequent and unexpected changes in the stock assessment schedules and continue to provide critical information to all assessments. Required funding: $50,000 annually.
5. The gag ingress study was halted in 2015 as a result of funding cuts. Evaluation of the cost/benefits of resuming this study is needed, and if resumption is considered, this study should become part of a comprehensive larval and juvenile fish survey plan. Full restoration of a multi-state juvenile ingress study at the level of the 2015 efforts is expected to require $150,000 annually.

Coastal Longline Surveys

The SEAMAP-SA Coastal Longline Surveys are designed to provide a long-term fishery independent database on the distribution, relative abundance, catch per unit effort, size distribution and age composition of red drum along the South Atlantic coast. Additionally, the surveys provide information on the relative abundance, size distribution, sex, and maturity of multiple species of small and large coastal sharks.

North Carolina: Unless additional funding is available, there will be a reduction in the number of North Carolina longline days and a reduction of an equivalent amount of data for stock assessments. This means that there is no support to sample the full number of sampling sites per week (72 samples). One week of sampling (8 samples) would need to be

omitted and precision in estimates would be reduced. The survey needs restoration of $6,500 annually to maintain current sampling efforts. ($6,500 annually)

South Carolina: To return to the historical breakdown of funding to this survey (75% federal, 25% state funded) the survey would require a restoration of $39,000 (based on FY17 levels). Increases in staff salary, as well as daily vessel charges have resulted in a higher proportion of outside funding, with current funding sources (xx% SEAMAP and xx% other). As funding for state agencies has also stagnated, we will likely be forced to reduce sampling if additional funds are not available. ($39,000 annually)

Georgia: SEAMAP-SA presently covers 55% the costs to fund this survey May to December (8 months, 44 sea days). GADNR has offset the annual costs for years with a combination of state and other federal fund sources to cover personnel services and vessel maintenance. However, these funds continue to be cut and during the FY2016-2020 cycle we reduced our number of sampling days and discontinued sampling in northeast Florida due to these constraints. The total FY20 cost for this survey was $156,291 (SEAMAP-SA portion was $85,960).

Data Management

To maintain the current level of data management, which would include uploading new survey data annually and minimum maintenance of the data base, an increase in operating costs of $10,000 is needed to cover increases in staff and other costs. Additional funds are also essential for standard database maintenance, application refinements, additional queries, bug correction or programming errors that have been discovered within the structure of the database or associated extraction reports. Furthermore, for other partner data management staff, reduced SEAMAP funding has been temporarily offset by outside funding sources. All SEAMAP-SA partners (including NCDMF, GADNR, and FWRI), which are important contributors to the database and the position accountable for data quality and transferring each individual survey's data to SEAMAP, has experienced reduced funding to support data management. Fully restored funding is necessary to ensure the crucial database support for these critical database aspects. ($30,000 annually)

SERTC

SERTC funding has been severely reduced in recent years. This has significantly affected the support for diet studies in the SEAMAP-SA surveys at SCDNR. To restore SERTC support for the surveys would require a minimum of $82,000 annually, which is roughly the FY14 requested funding level for SERTC through SEAMAP-SA. Note that this would restore activities to fully support for SEAMAP-SA activities, in particular the Coastal Trawl Survey and the SEAMAP-SA Reef Fish Survey. Specifically, this will allow SERTC to once again support the diet studies, curating the SEAMAP-SA biological reference collection, maintain and expand the computerized and searchable literature, and some minor outreach activities (such as publishing diet and other identification guides, etc.). ($82,000 annually)

1.1.3 Caribbean

(Increase of $790,000/year, once every five years)

Sampling efforts have been scaled back significantly for all SEAMAP-C surveys. Level funding over the last several years, coupled with inflation and rising project costs, have resulted in dramatic reductions in overall sampling effort. Maximum effort is needed to increase funding so that initial sampling efforts can be maintained. The last review of the program by the program manager includes the recommendation to conduct all the surveys, reef fish, queen conch and lobster, every year. Other recommendations are to increase the number of sample stations. In order to fully implement these recommendations, an increase in funding is necessary.

Conch Surveys

The level of effort for conch surveys has decreased over the last few decades. Without an adequate sample size, results may not be statistically valid. Funding should be increased so that adequate sampling can be completed to be statistically valid. The proposed budget is $120,000/year, once every five years (USVI) and $120,000/year once every five years (Puerto Rico).

Lobster Surveys

The level of effort for lobster pueruli surveys has decreased over the last few decades. Without an adequate sample size, results may not be statistically valid. Funding should be increased so that adequate sampling can be completed to be statistically valid. Proposed budget is $120,000/year, once every five years (USVI) and $120,000/year, once every five years (Puerto Rico).

Video Cameras, and Hook and Line Surveys

The level of effort for fishery-independent hook and line surveys have decreased over the last few decades. Without an adequate sample size, results may not be statistically valid. Funding should be increased so that adequate sampling can be completed to be statistically valid. Proposed budget is $150,000/year, once every five years (USVI) and $160,000/year, once every five years (Puerto Rico).

1.2 EXPAND CURRENT PROJECTS TO COLLECT ADDITIONAL DATA ON EXISTING PLATFORMS

1.2.1 Gulf of Mexico

(Increase of $6,150,000/year)

Hooked-Gear Survey of Reef Fish

The SEAMAP-Gulf Reef Fish video camera survey, which has recently been expanded through supplementary grant funding, provides valuable data on the relative abundance, size composition, and habitat associations of reef fish assemblages on natural and artificial reefs

throughout the U.S. Gulf of Mexico. While data from this survey are critical to most reef fish stock assessments in the Gulf, periodic supplementary life history information (primarily size/age, fecundity, sex and sex ratio) is necessary to translate size-based information provided by the non-extractive video survey into age-based information for age-based stock assessments. Existing sampling programs initially relied on the use of chevron traps and, more recently, vertical longline sampling to provide both measures of relative abundance and size composition data. However, both approaches are limited by notable issues of species and size selectivity. Accordingly, a complementary hooked gear approach is required to provide biologic samples in support of the reef fish camera survey. Because of the diversity of managed reef fishes for which life history data are necessary, it is likely that a set of species- or guild-specific survey methods may be required; however, because estimated life history parameters are unlikely to change quickly, only periodic (e.g., every 5 years) synoptic sampling should be required. Target species or guilds would be determined based on upcoming stock assessment schedules and most critical life history data needs. ($1,000,000 annually)

Expanded Reef Fish Video and Vertical Line Sampling

SEAMAP-Gulf surveys of reef fish using stationary camera arrays have been conducted on natural hard bottom habitat along the shelf break since the 1990s and long-term funding is in place. Additional surveys of shallow hard bottom reef habitat in the Panama City region began in 2004 and in mid-peninsular Florida in 2008. Additional funding is required to continue these existing surveys, expand these surveys into regions where fishery-independent surveys of managed reef fish are lacking, and target critical habitat types that are excluded from current surveys (e.g., artificial reefs). Current funding only allows vertical line sampling off Alabama, Louisiana, and Texas during the Vertical Line Survey. The Vertical Line Survey collects much needed information on red snapper and other reef fish. Additional funds are needed to expand the Vertical Line Survey across the Gulf of Mexico. ($3,300,000 annually)

Otolith Processing

Age and growth data are invaluable when conducting stock assessments for managed fish, especially those data collected from fishery-independent surveys that target a much broader size-range than fishery-dependent surveys. In addition, the emerging field of otolith microchemistry has exhibited increasing utility in recent years to examine connectivity among various life history stages as well as discern the relative contribution of presumed estuarine and nearshore nurseries to the fishery. Most fishery-independent surveys have the ability to provide a large quantity of material for the examination of age/growth and otolith microchemistry; however, any substantial increase in the amount of material collected would rapidly exceed processing capabilities of existing age and growth facilities. Funds are requested to support expansion of one or two otolith processing laboratories in the Gulf of Mexico. This will ensure that collected otoliths and spines are sectioned and aged in a timely manner, as well as foster the application of otolith microchemistry techniques in assessing recruitment dynamics and connectivity of spatially explicit life history stages for managed fish. ($500,000 annually)

Dietary Analysis

Though management is moving toward an ecosystem-based approach, its utility has been severely compromised by the lack of sufficient trophodynamic data. To better understand predator/prey dynamics, trophic interactions, and to support the development of ecosystem-based fisheries management, gut contents analysis is essential. As with age and growth analyses, gut contents can readily be collected from existing fishery-independent surveys at little to no additional cost. Identifying and quantifying gut contents is a time intensive process that requires specialized skills, so funds are requested to establish a diet analysis lab in the Gulf of Mexico. This lab would focus on integration of traditional gut content analyses with genetic barcode identification of unidentifiable prey items to the lowest possible taxonomic level, as well as the addition of stable isotope analyses to more broadly define predator-prey relationships. Inclusion of genetic barcoding techniques for more discrete prey identification allows for finer resolution of specific trophic interactions, thereby enhancing the utility for ecosystem-based models. Stable isotope analysis offers an alternative to gut content analysis and involves using a mass spectrophotometer to identify the isotopic signature from fish tissue. Variations in isotopic concentrations can be applied to the food web to draw direct inferences regarding diet and trophic level. ($1,000,000 annually)

Reproductive Histology

Reproductive data (e.g., fecundity, size/age at maturity, spawning frequency, and periodicity) are essential when conducting stock assessments for managed fish. As with age, growth, and dietary analyses, biological material can be readily obtained from fishery-independent surveys. Reproductive analyses, which include the preparation and interpretation of histology slides, require specialized skills, so funds are requested for the establishment of a reproductive biology lab in the Gulf of Mexico. ($350,000 annually)

1.2.2 South Atlantic

(Increase of $649,000 annually and $410,000 once)

Coastal Trawl Survey

After an initial increase in life history study activities in 2009/2010, these studies have gradually been reduced as a result of available funding. However, age information, reproductive parameters, and other data such as diet composition in fish and black gill disease in shrimp, are critical for stock assessment and management decisions. As the samples are being collected as part of the ongoing survey, the cost of obtaining this important information is mostly in processing on-board and in the laboratory. The additional cost to the Coastal Trawl Survey of collecting and processing of relevant life history information for key managed species is expected to be $50,000, mostly in staff cost and some supplies.

SEAMAP-SA Reef Fish Survey

If activities under "Tier I" are realized, the R/V *Palmetto* will be fully utilized and further expansion of activities may require additional vessels. However, life history studies (in particular diet studies) and additional data acquisition equipment are expansions that can be made without additional vessel time and will greatly enhance data collection, especially in the areas of oceanographic and bottom habitat characterization and ecosystem-based assessment and management. Reef Fish diet studies were mostly halted in 2015 due to reduced funding. Resuming these studies would require minimal field effort. Costs would mostly be in supporting staff to examine the sample and analyze the data and some supplies. One biologist would allow processing and samples of 2-6 species each year, depending on the number of samples collected for each species, each year. The collected species would rotate on a set schedule to collect and update diet composition for most managed species over time (estimated costs $80,000 annually, including fringe, overhead, and supplies). Note: many species of management interest (snappers, groups) require DNA barcoding to adequately characterize the diet, which would require additional funding for processing and sequencing.

An Acoustic Doppler Current Profiler will allow estimates of the current speed and direction (corrected for vessel speed and direction) throughout the water column. This ocean current data can be used in the survey and provided to other (SEAMAP) programs and researchers to improve sampling efficiency and enhancement and ground-truthing of oceanographic modeling efforts in the region (e.g., SECOORA efforts). It is also important in decisions for safe gear deployment and reducing the risk of losing gear. The cost of purchase and installation of an ADCP is $60,000)

Multi-beam equipment can provide information on bottom relief and habitat type. Various vessels utilized by SEAMAP-SA surveys cross the southeast region on a regular basis. During transit (or during sampling, depending on the survey) multibeam equipment (either towed or on independently operated under water vehicles) could be used to obtain bottom habitat information that would otherwise not become available unless additional targeted cruises are conducted. Besides the cost of the equipment, a possible additional crew member on the research cruises is needed to operate and maintain the equipment and assure proper data collection and potentially extra sea days to augment the reductions in vessel speed during transit that would be required to produced accurate data in deeper water. Extra costs would be associated with post sampling data analysis, but this can be done in collaboration with academic or federal partners. The advantage of integrating the field activities is that there is no need for additional cruises, which would otherwise come at a considerable additional cost. (The cost of a multibeam unit is dependent on the type of gear/vehicle, estimated $350,000; one full-time trained technician and analyst, including fringe, estimated $65,000-$110,000 annually; the cost of indirect, and sea days would be $19,000 annually)

Bottom Mapping

Managed areas offshore of South Atlantic states, of specific concern to fishery managers, include Marine Protected Areas (MPAs), deepwater coral HAPCs, Spawning Special Management Zones and other bathymetric features or unique benthic habitats that warrant specific characterization due in part to their unique habitat characteristics or importance as essential fish habitats for managed species (see Appendix B, Figures 1-7 for existing managed areas). Bottom mapping priorities and objectives vary at both the state and management council levels (at least 20 managed areas are identified in the South Atlantic Habitat and Ecosystem Atlas[4]). Bottom mapping initiatives conducted under SEAMAP would build from previous efforts to expand coverage of known benthic habitats to essentially begin filling the gaps along depth contours (current coverage is shown in Figure 7. in Appendix B). Offshore habitat has been subdivided into 10 depth strata to capture target species and significant habitat distribution evaluate mapped and characterization accomplished to date and focus future mapping on priority needs for management. These areas were identified for a baseline of the South Atlantic Mapping Strategy being developed as a supporting tool for the SAFMC Fishery Ecosystem Plan II. Further review of existing habitat and mapping information and species associated will provide the opportunity to direct sampling to expand and complete mapping habitat north and south between known habitats and in managed areas.

Bottom mapping can be accomplished with use of side-scan (generally for shallower depths) or multi-beam sonar systems (generally for deeper depths). For areas within 200 m bottom depths and utilizing a multi-beam system on a vessel moving at 10 knots, during a 24-hour period of survey operations with a bottom resolution swath width of 200 m, 24 n. mi.^{2} of bottom can be mapped.

Using SEAMAP-SA/MARMAP vessels of opportunity, SCDNR/SAFMC is developing regional partnerships investigating purchase or lease new technology such as an AUV (e.g., Submarine by Ocean Areo) to be used in conjunction with existing operations. For bottom mapping costs, 25 sea days of bottom mapping could be accomplished for $300,000 and would provide approximately 600 n. mi^2 of bottom mapping coverage. In general, the final data product would include raw and processed multibeam sonar data in ArcVIEW and ASCII formats, metadata describing survey methods, and processed image files. ($300,000 annually)

The newer NOAA fisheries research vessels (NOAA Ships *Pisces* and *Henry Bigelow* in the Atlantic) are equipped with the Simrad ME70 multibeam sonar capable of mapping the bottom. The NMFS SEFSC Southeast Fishery-Independent Survey (SEFIS) group typically has ~ 30 days at sea each year in the South Atlantic region on the NOAA ship *Pisces*, during which mapping efforts occur at night (trap-video surveys occur during the day). SEFIS mapping efforts typically result in ~ 250 km^2 of newly mapped areas each year.

[4] http://safmc.net/habitat-and-ecosystems/safmc-habitat-and-ecosystem-atlas/

Pamlico Sound Survey

The Pamlico Sound Survey began in March 1997 and initially covered the months of March, June, September, and December. The December, leg of the cruise was discontinued in 1990, and the March portion was discontinued in 1991. This decision was made because it was felt that limited data was being collected during winter months and effort would be better allocated towards other projects. However, recent Pamlico Sound Survey annual reports have recommended adding an additional leg of the cruise at the end of July/beginning of August to increase temporal coverage. Adding additional cruises would increase the amount, and temporal distribution of biological data collected including length frequency and age data. Expanded sampling may also be useful in producing more accurate indices of abundance for target species and potentially for species not currently targeted. In addition, reinitiating sampling during the winter would begin a baseline of winter estuarine habitat use by species as ranges shift due to environmental changes. Approximately $25,000 are budgeted each year to cover expenses for the June and September cruises. Adding two additional months would double this figure while adding one would require an additional $12,500. ($25,000 annually)

Coastal Longline Surveys

The longline surveys were initiated in 2006 as part of ACFCMA supplemental funding with the primary objective to monitor the adult population of red drum as they move offshore in the fall. However, the surveys have also proven to be successful at monitoring coastal shark species with SEAMAP-SA data from SC and GA being used in multiple shark stock assessments. Biological samples (fin clips, reproductive tracts, stomachs and vertebrae) are currently only taken from sharks when outside funding is available, additional funds would allow these samples to be taken opportunistically (from moribund individuals) as well as under a sampling regime. These samples could then be archived and available when life history updates are requested for these species. ($15,000 annually)

Data Management

The SEAMAP-SA data management system would require expansion to address new data sets or analytical needs that arise with expanded SEAMAP-SA surveys. There is a likelihood of the need to take advantage of technological advances, as well as expanding to include database aspects such as diet study data, an image library of sampled species, the winter tagging cruise, and bottom habitat information into the comprehensive SEAMAP-South Atlantic data management system. These things can be accomplished in a cost-reasonable manner in the new SECOORA data system, but would require data management staff time and Axiom Data Science programmer time. An estimated budget increase of $50,000 for SEAMAP-SA data management would be needed to accommodate these expansions. ($50,000 annually)

1.2.3 Caribbean

(Increase of $835,000/year, plus $540,000/once every two years)

Lobster Surveys

Pueruli lobster studies have been ongoing for several decades. More recently, scientists associated with the program have recommended that greater emphasis be given to study the stages of individuals present in the coral reef system (juveniles and adults). These studies would not only offer information on potential existing juvenile stocks, but help tie in the larval settlement data USVI and Puerto Rico have collected over the past decade (settlement-recruitment relationship studies). Proposed additional budget is $120,000/year, once every two years (USVI) and $150,000/year, once every two years (Puerto Rico) to include other coasts around Puerto Rico.

Conch Surveys

Diver surveys of conch have been ongoing for several decades. However, during recent CFMC meetings, the validity of the protocol used was raised. It would be appropriate to assess the current protocol and refine it as necessary so that statistically valid data are collected that can be used as the basis for stock assessment and management. For this reason, a new methodology was developed with technological innovations in the use of cameras and GPSs. Here also a budget is required to be able to work considering the prevention of infectious diseases. Proposed additional budget is $120,000/year, once every two years (USVI) and $150,000/year, once every two years (Puerto Rico).

Video Cameras, and Hook-and-Line Surveys

At the SEDAR 8 meeting, the limitations of the SEAMAP-C trap and hook-and-line survey data were revealed as stock assessment scientists attempted to assess key stocks of fish. It would be appropriate to assess the current protocols and refine them as necessary so that statistically valid data are collected that can be used as the basis for stock assessment and management use. Video Cameras and hook-and-line surveys have been geographically limited due to personnel and budget constraints. Surveys need to be expanded to the whole of the U.S. Caribbean. Proposed additional budget is $150,000 annually (USVI) and $175,000 annually (Puerto Rico).

Reproductive Histology

Reproductive data (e.g., fecundity, size/age at maturity, spawning frequency, and periodicity) are essential when conducting stock assessments for managed fish. As with age and growth and dietary analyses, biological material can be readily obtained from fishery-independent surveys. Reproductive analyses, which include the preparation and interpretation of histology requires specialized skills, so funds are requested for the expansion of activities undertaken by the reproductive biology lab in Puerto Rico to process the samples gathered at the USVI at $175,000 annually, and for samples gathered at Puerto Rico $335,000 annually.

1.3 DEVELOP NEW FISHERY INDEPENDENT DATA COLLECTION PROGRAMS

These items include new fishery-independent surveys for data that is needed on a regional basis and is not sufficiently collected now. Specific survey methodology will be determined at the time of survey design with known funding.

1.3.1 Gulf of Mexico

(Increase of $3,000,000/year and $3,000,000 once)

Synoptic Life History Surveys

The accurate assessment of managed fisheries stocks often requires life history data that cannot be provided from ongoing fishery-independent surveys alone. Of particular importance are size- or age-specific estimates of fecundity and fraction of the population capable of spawning through time, which can be used to improve the accuracy of estimated annual stock reproductive potential, and sex ratios of hermaphroditic species such as groupers. To be most useful, these life history data require systematic (e.g., monthly) synoptic sampling covering the full spatial distribution and spawning season of the species of interest. Species vary with respect to both spawning season and susceptibility to various fishing techniques, so sample collection will likely require species- or guild-specific survey methods; however, because estimated life history parameters are unlikely to change quickly, only periodic (e.g., every 5 – 10 years) sampling would be required. Target species or guilds would be determined based on upcoming stock assessment schedules and most critical life history data needs. ($1,000,000 annually)

Habitat Mapping

Managed offshore areas of concern to fishery managers include MPAs, deepwater coral, HAPCs, and other bathymetric features or unique habitats that warrant characterization due in part to their importance as EFH for managed species. Habitat mapping surveys utilize remote sensing technologies to identify and describe features of the sea floor and habitats that reside on it. Mapping used in conjunction with fishery-independent surveys will allow ecosystem models to describe the interactions of species or multi-species complexes with a variety of habitats or bottom types. Mapping is best accomplished with use of side-scan in shallower depths or multi-beam sonar systems in deeper waters. ($1,000,000 annually for approximately 700 km^2 mapped)

Fisheries Acoustics Surveys

Several ongoing Gulf-wide surveys (groundfish trawling, bottom longline, plankton, reef fish video) are conducted at various times throughout the year. Because of this, there is tremendous potential for adding value to these surveys and providing important information through no additional vessel costs. One component that has tremendous potential is the incorporation of fisheries acoustics to existing surveys. Active fisheries acoustics can provide valuable information on the distribution, abundance, and size/biomass of nekton throughout the water column. Pairing fisheries acoustics surveys with ongoing survey operations provides insight into the catchability, selectivity, and overall effectiveness of existing surveys, which will

aid in the development of more accurate estimates of population-level abundance. Additionally, data provided by these surveys would be extremely useful in support of ecosystem modeling efforts by providing estimates of overall system productivity, especially in terms of baitfish for which effective surveys are somewhat lacking. Estimated costs are an initial cost of $3,000,000 for equipment, software, and training, and approximately $300,000 - $1,000,000 annually thereafter.

1.3.2 South Atlantic

(Increase of $2,394,000/year and $320,000 once)

Pelagic Survey

Currently, there is no fishery-independent survey to monitor pelagic fish such as mackerels, dolphin, wahoo, cobia, and other species in the Southeast region, all of which are of considerable importance for commercial and recreational fisheries. Several pelagic species have undergone SEDAR stock assessments and the need for fishery-independent survey data was clearly identified in research recommendations A pelagic survey would require initiating a new monitoring effort since it would require gear specific to the pelagic environment (pelagic long line and acoustic equipment). This cannot be done in a consistent manner during any of the current SEAMAP-SA monitoring efforts, and a new survey would require new funding. The level of funding would depend on the level of effort and geographic area covered, but is estimated to be between $500,000-$750,000/year if an appropriate survey vessel is available. This new survey could potentially be done in collaboration with the fishing industry. (750,000 annually)

Cobia Survey

No coast wide index of abundance is available for the Atlantic Migratory Group of cobia. Reliable regional indices of abundance cannot be generated due to the lack of targeted monitoring programs and low incidental catch of cobia in most existing surveys. In particular, few surveys consistently encounter and sample adult fish due to their size and gear avoidance in primary survey methods, such as trawls. The Fishery Management Plan and SEDAR stock assessments for cobia outline multiple research recommendations that a new fishery-independent survey could address:

- Develop fishery-independent survey methods to monitor adult abundances
- Continue to collect and analyze current life history data from fishery independent and dependent programs, including full size, age, maturity, histology samples and information on spawning season timing and duration; increase spatial and temporal coverage of age samples collected regularly in all states.

Cobia at times co-occur with Spanish mackerel (fall) and sharks (summer). A nearshore, cooperative research survey with fishermen, using hook and line or gillnet gear, targeting multiple species groups could be achieved at relatively low cost aboard recreational or commercial vessels. ($180,000 annually)

Regional (Ichthyo) Plankton Surveys

The initial concept for SEAMAP-SA included a plankton survey. Larval distribution of fish and crustacean species remains largely unknown. Such a survey, which was recommended as part of an optimal fishery-independent sampling strategy in South Atlantic waters (SAFIMP)[5], might be run as a stand-alone project standardized among researchers regionally or associated with the trawl survey. The lower tiers (phyto- and non-ichthyo-zooplankton) should also be considered. ($500,000/yr.).

Early Life Stage Sampling; Support Collaborator Subregional Ichthyoplankton Surveys

Long-term ichthyoplankton surveys are operated out of the NOAA Beaufort, North Carolina Laboratory and the Belle W. Baruch Institute for Marine and Coastal Sciences in Georgetown, South Carolina. In combination with a long-term ichthyoplankton survey in New Jersey operated by Rutgers University, these fixed-site collection programs offer the potential for combined, large-scale assessments of changes in larval recruitment patterns over space and time, with implications ranging from fishery applications (developing recruitment indices for use in stock assessments) to assessing impacts of climate change.

The NOAA Beaufort Bridgenet Ichthyoplankton Sampling Program

Initiated in 1986, the Beaufort Bridgenet Ichthyoplankton Sampling Program (BBISP) at the NOAA Beaufort Laboratory represents a multi-decade time series of larval fish ingress through Beaufort Inlet, North Carolina. Fall/winter spawned larvae are sampled weekly from mid-November through April/May at the Pivers Island Bridge. As of 2016, more than 868,000 larval fish from > 100 taxa have been identified from BBISP samples, including multiple species of recreational and management importance [e.g., Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), summer and southern flounder (*Paralichthys dentatus* and *lethostigma*, respectively), American eel (*Anguilla rostrata*), Atlantic menhaden (*Brevoortia tyrannus*) and striped mullet (*Mugil cephalus*)]. Research efforts using these data include examining the link between estuarine ingress, juvenile abundance, adult abundance, and climate variability for a variety of estuarine-dependent fish species along the U.S. East Coast. Operational indices of larval abundance have been used as tuning indices for stock assessments of southern flounder (NC DMF 2008). Ingress densities for other species could serve similar needs in stock assessments (American eel, Atlantic croaker, striped mullet, spot, summer flounder) or as fish community indicators of climate variability or anthropogenic impacts. Catch and densities are available for 1986-2013. The sampling is ongoing and performed by volunteers, but sample processing from 2013-present is currently unfunded. ($29,000 annually including data uploads to SEAMAP database)

North Inlet-Winyah Bay, SC Ichthyoplankton Survey

Collections of larval fishes and more that 45 zooplankton (invertebrate) taxa have been made in North Inlet estuary, South Carolina since the survey's inception in 1981. Based out

[5] SAFIMP. 2009. Final report: South Atlantic fishery independent monitoring program workshop. In: Willams EH, Carmichael J (eds), Beaufort, NC, 85 pp.

of the Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina in Georgetown, the survey samples biweekly and year-round. Replicated collections with 365- and 153-micron nets have provided insights into seasonal and interannual patterns of occurrence for fishes and crustaceans of economic importance. The collections have also provided an understanding of the factors that influence early life stages of fishes and other planktonic species. Impacts of climate variability on the timing of larval production of resident species and the timing of ingress of ocean-spawned larvae have been demonstrated. This program appears to be the longest, comprehensive zooplankton time series from Atlantic and Gulf estuaries. Along with other multi-decadal time series from North Carolina and New Jersey, South Carolina ichthyoplankton data through 2013 are now available at http://www.seamap.org/seamapDatabase.html . The survey and associated short-term studies have been supported by multiple, non-permanent sources over the decades including the North Inlet- Winyah Bay NERR. Additional funds are necessary to sustain the collection program and sample processing. ($35,000 annually including data uploads to SEAMAP-SA database)

Develop Nearshore Live Bottom Surveys

Most studies of "live bottom" habitats have been conducted seaward of the ten-fathom line off the Carolinas and Georgia. Biologists acknowledge that substantial live bottom areas exist inside of ten fathoms and are important fishing grounds for recreational fishermen. These areas provide habitat for black sea bass, red drum, weakfish, and others. A combined live-bottom mapping and finfish trapping program could identify and categorize these poorly-known habitats. These nearshore habitats are at risk to channel-deepening projects, dredge material disposal, and heavy fishing pressure. Include purchase of passive mapping system, e.g., towfish. ($475,000/yr.)

Stock Structure Studies

Several state fisheries agencies and university researchers in the South Atlantic region conduct tagging studies of fish, sea turtles, and marine mammals to better understand movements, migrations, and geographic population structure. A variety of acoustic and conventional physical tags have been deployed on species ranging from red drum, cobia, striped bass, and sturgeon. Applying tagging study results to stock identification, stock assessments, and other products for fisheries management can be challenging because individual studies are often 1) limited in temporal and geographic scale, and 2) inhibited by inconsistencies between research groups in data storage and sharing capabilities. Presently, the southeast has several acoustic arrays located off the Georgia, South Carolina, and Florida coast extending from the shoreline out to approximately 12 miles. These arrays have proven effective at capturing the migratory behavior of many species including Atlantic Sturgeon, Lemon Sharks, Bull Sharks, White Sharks, Red Drum, Black Drum, and Tripletail. Expansion of these arrays could include additional array transacts to fill in gaps off north Georgia (Savannah region), north Florida (Jacksonville region) and North Carolina, in addition to providing funding for maintenance and tagging supplies. SEAMAP, in conjunction with the ASMFC Interstate Tagging Committee, could expand evaluations of tag

types and protocols in conjunction with ongoing SEAMAP surveys. Funds could be allocated to complete and maintain strategically placed ocean acoustic gates in order to track migration across states. Given its experience with developing the SEAMAP_SA database in Oracle, its Data Management Work Group could evaluate the various tagging projects data schemas and databases and recommend best data processes, and data sharing considerations in order to enhance the use of tagging study results to answer stock structure and other fisheries management questions. ($300,000 initially, divided between the three states and $225,000 divided between each state annually for subsequent maintenance)

Cooperation of the SE Regional Estuarine Trawl Surveys

There are several trawl surveys conducted in the southeast that SEAMAP has identified as partners or potential partners. These surveys all have a long time-series that can provide information for Commission managed species. Additionally, SEAMAP's Crustacean Committee would greatly benefit from data sharing from many of these surveys. Ultimately, these data can be shared within the SEAMAP data portal for broader use. Costs per survey (or state) would be similar to that for the Pamlico Sound Trawl Survey ($50,000) to provide QA/QC, management, and uploading of the data to the portal. Surveys may include:

State	Agency and Survey
NC	NCDMF Anadromous Trawl Survey (Program 100)
	NCDMF Estuarine Trawl Survey (Program 120)
SC	SCDNR Crustacean Monitoring Trawl Sampling
FL	FWC Fishery Independent Monitoring (FIMS)
GA	GADNR Ecological Monitoring Trawl Survey (EMTS)
	GADNR Juvenile Trawl Survey (JTS)

Crustacean Assessments

A regional crustacean stock assessment would improve management coordination between states and inform crustacean status throughout the region. If there is an issue in one state, it may be an indication of an issue in the larger population as a whole. SEAMAP SA proposes to coordinate a regional South Atlantic blue crab and/or shrimp stock assessment, incorporating fisheries-dependent and independent data as well as environmental data ($10,000 per species for one data workshop and assessment workshop, $20,000 total). The SEAMAP Crustacean Workgroup recommends investigating the feasibility of a comprehensive fishery independent golden crab survey, possibly in collaborations with the industry ($150,000/year) to monitor this species which has only a limited entry trap fishery, operating off the coast of Florida. ($150,000 annually, $20,000 once)

1.3.3 Caribbean

(Increase of $270,000/once every three years; $400,000 annually; and $100,000/once every two years)

Whelk – In 2003-2004, whelk surveys were substituted for one of the St. Croix and Puerto Rico trap and hook-and-line survey years, providing the first U.S. Caribbean-wide information on this species. These surveys should be continued on a periodic basis. Recommended additional studies on whelk should include conducting reproduction and maturity studies. The capture of specimens at two to four-week intervals over a calendar year can help determine the period of maximal spawning activity, in which some type of gonadal index to examine this can be used. Data should also be collected on shell length, height, total weight, and tissue/ weight relationships. Proposed additional budget is $120,000/year, once every three years (USVI) and $150,000/year, once every three years (Puerto Rico).

Priority Fish Species – At the recent CFMC meeting, priority fish species (yellowtail snapper, lane snapper, and parrotfish in the USVI) were identified for seasonal closures. In PR predator reef species (barracudas, moray eels) and commercially important species (parrotfishes, mutton snapper, hogfish, queen triggerfish, trunkfishes and deep-water snappers) are of concern. Information on these fish species is extremely limited, and it would be appropriate to develop fishery-independent data collection programs so that future management can be based on data, rather than subjective opinions. Other species under management by the CFMC through annual catch quotas and data is needed to evaluate those resources. Proposed additional budget is $180,000 annually (USVI), and $220,000 annually (Puerto Rico).

2 APPENDICES

A. SEAMAP Committees Membership 2020

(check www.seamap.org for current membership)

SEAMAP-Gulf of Mexico Committee

CHLOE DEAN, Louisiana Department of Wildlife and Fisheries
JOHN FROESCHE, Gulf of Mexico Fishery Management Council
JILL HENDON, Mississippi Department of Marine Resources/Gulf Coast Research Lab,
JOHN MARESKA, Alabama Department of Conservation and Natural Resources, *Chair*
FERNANDO MARTINEZ-ANDRADE, Texas Parks and Wildlife Department
TED SWITZER, Florida Fish and Wildlife Conservation Commission
ADAM POLLACK, National Marine Fisheries Service, Pascagoula Laboratory, MS
JEFF RESTER, Gulf States Marine Fisheries Commission, *Coordinator*

SEAMAP-South Atlantic Committee

PATRICK CAMPFIELD, Atlantic States Marine Fisheries Commission
JARED FLOWERS, Georgia Department of Natural Resources, Coastal Resources Division
SARAH MURRAY, Atlantic States Marine Fisheries Commission, *Coordinator*
ROGER PUGLIESE, South Atlantic Fishery Management Council, *Chair*
TINA UDOUJ, Fish and Wildlife Research Institute, FL
TODD KELLISON, National Marine Fisheries Service, Beaufort Laboratory, NC
MARCEL REICHERT, South Carolina Department of Natural Resources
KATY WEST, North Carolina Department of Environment and Natural Resources

SEAMAP-Caribbean Committee

NICOLE ANGELI, Virgin Islands Department of Planning and Natural Resources/Division of Fish and Wildlife
MATTHEW KAMMANN, Virgin Islands Department of Planning and Natural Resources Division of Fish and Wildlife. *Chair*
JUAN JOSE CRUZ-MOTTA, Puerto Rico Sea Grant College Program / University of Puerto Rico Department of Marine Sciences
RICHARD S. APPELDOORN, Independent consultant
GRACIELA GARCÍA-MOLINER, Caribbean Fishery Management Council
MIGUEL ROLON, Caribbean Fishery Management Council
RICARDO LOPEZ, Puerto Rico Department of Natural and Environmental Resources
VERONICA SEDA, Puerto Rico Department of Natural and Environmental Resources
AIDA ROSARIO, Emeritus Puerto Rico Department of Natural and Environmental Resources contractor
EDWIN MUÑIZ, U.S. Fish and Wildlife Service
EDGARDO OJEDA SERRANO, University of Puerto Rico/Sea Grant College Program, *Coordinator*
RUPERTO CHAPARRO, University of Puerto Rico Sea Grant College Program

B. Bottom Mapping Priority Areas

Source for spatial layers presented in Appendix B: SAFMC Digital Dashboard– (http://ocean.floridamarine.org/safmc_dashboard/)

Figure 1. Existing Managed Areas- Deepwater Snapper Grouper Marine Protected Areas

Figure 2. Existing Managed Areas- Oculina Bank Coral Habitat Area of Particular Concern and Oculina Experimental Closed Area.

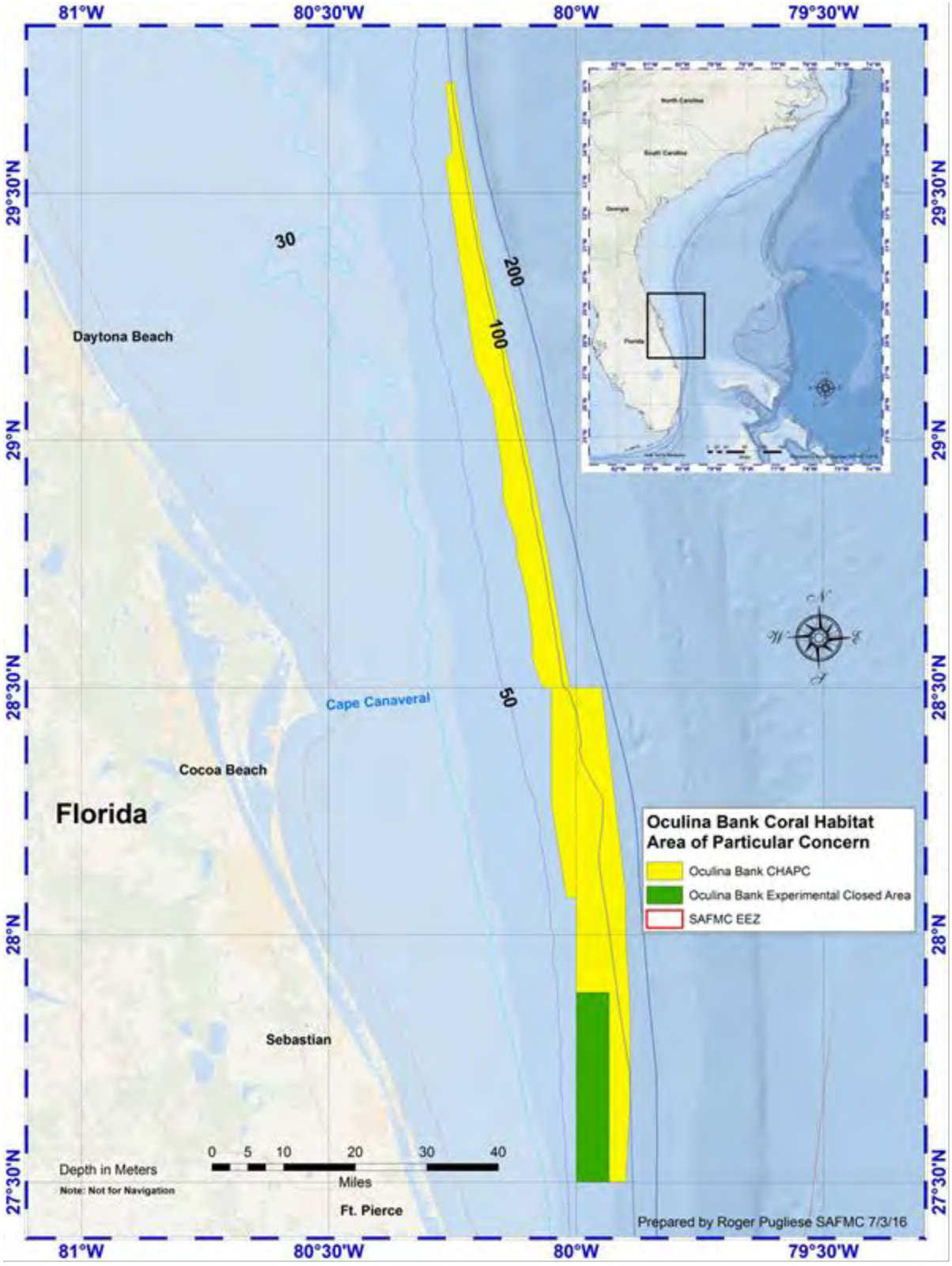


Figure 3. Existing Managed Areas- Deepwater Coral Habitat Area of Particular Concern.

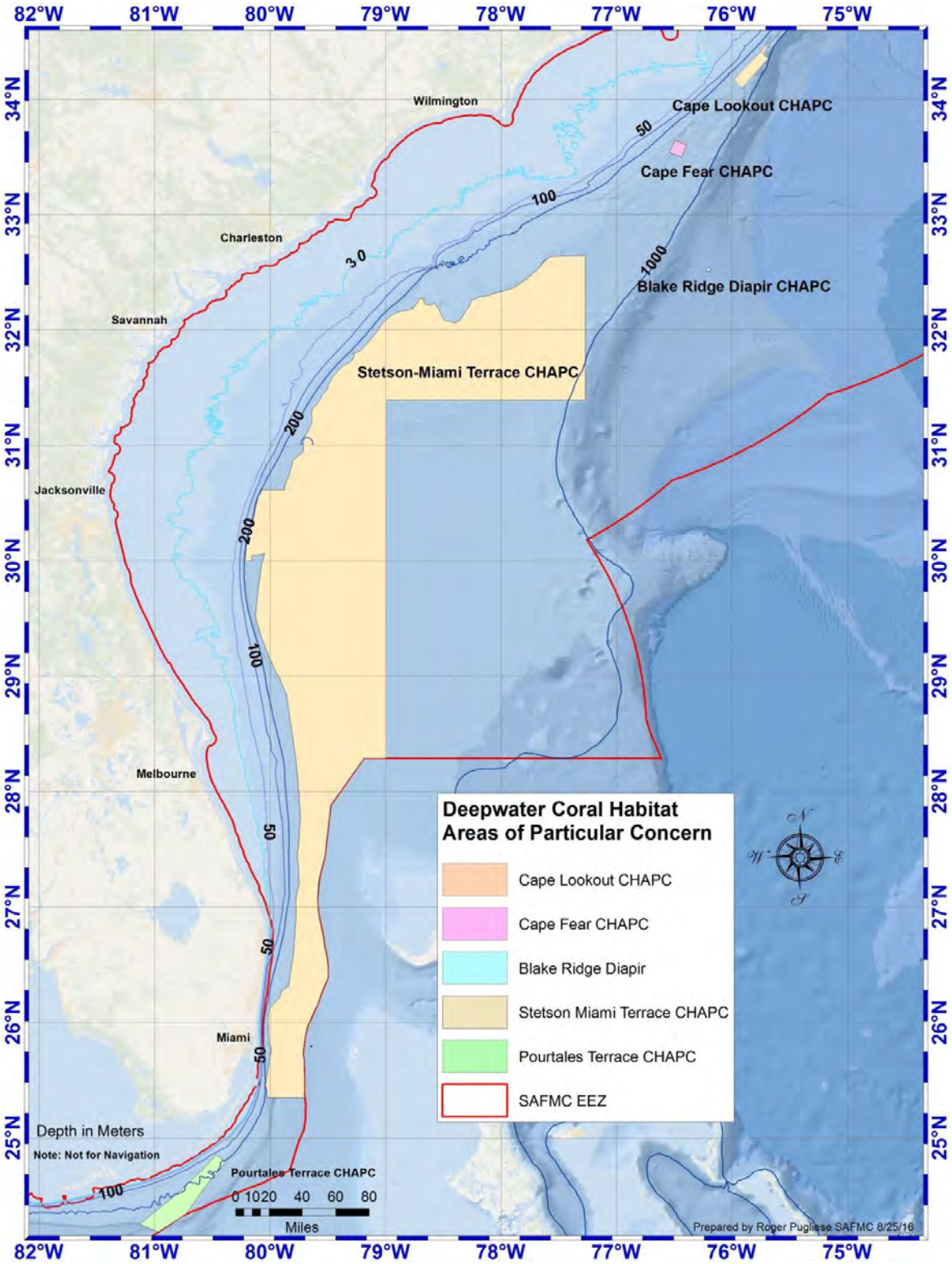

82°W
81°W
80°W
79°W
78°W
77°W
76°W
75°W
34°N
33°N
32°N
31°N
30°N
29°N
28°N
27°N
26°N
25°N
Wilmington
Charleston
Savannah
Jacksonville
Melbourne
Miami
Cape Lookout CHAPC
Cape Fear CHAPC
Blake Ridge Diapir CHAPC
Stetson-Miami Terrace CHAPC
Pourtales Terrace CHAPC
50
100
30
1000
200
200
100
50
50
50
100
Deepwater Coral Habitat
Areas of Particular Concern
Cape Lookout CHAPC
Cape Fear CHAPC
Blake Ridge Diapir
Stetson Miami Terrace CHAPC
Pourtales Terrace CHAPC
SAFMC EEZ
N
W
E
S
Depth in Meters
Note: Not for Navigation
0 1020 40 60 80
Miles
Prepared by Roger Pugliese SAFMC 8/25/16

Figure 4. Snapper Grouper Spawning Special Management Zones (SMZs) off South Carolina.

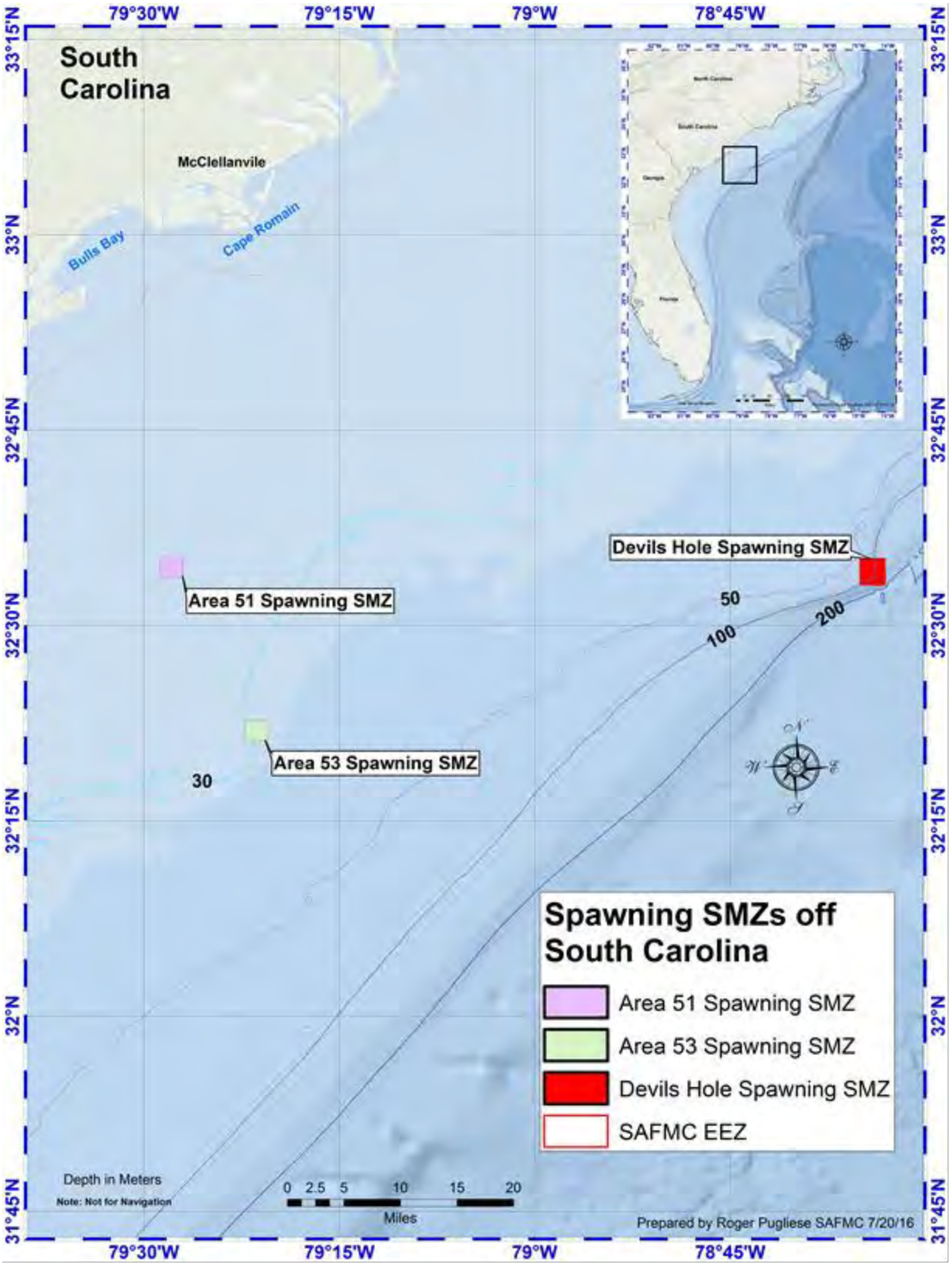


Figure 5. Snapper Grouper Spawning Special Management Zones (SMZs) off North Carolina.

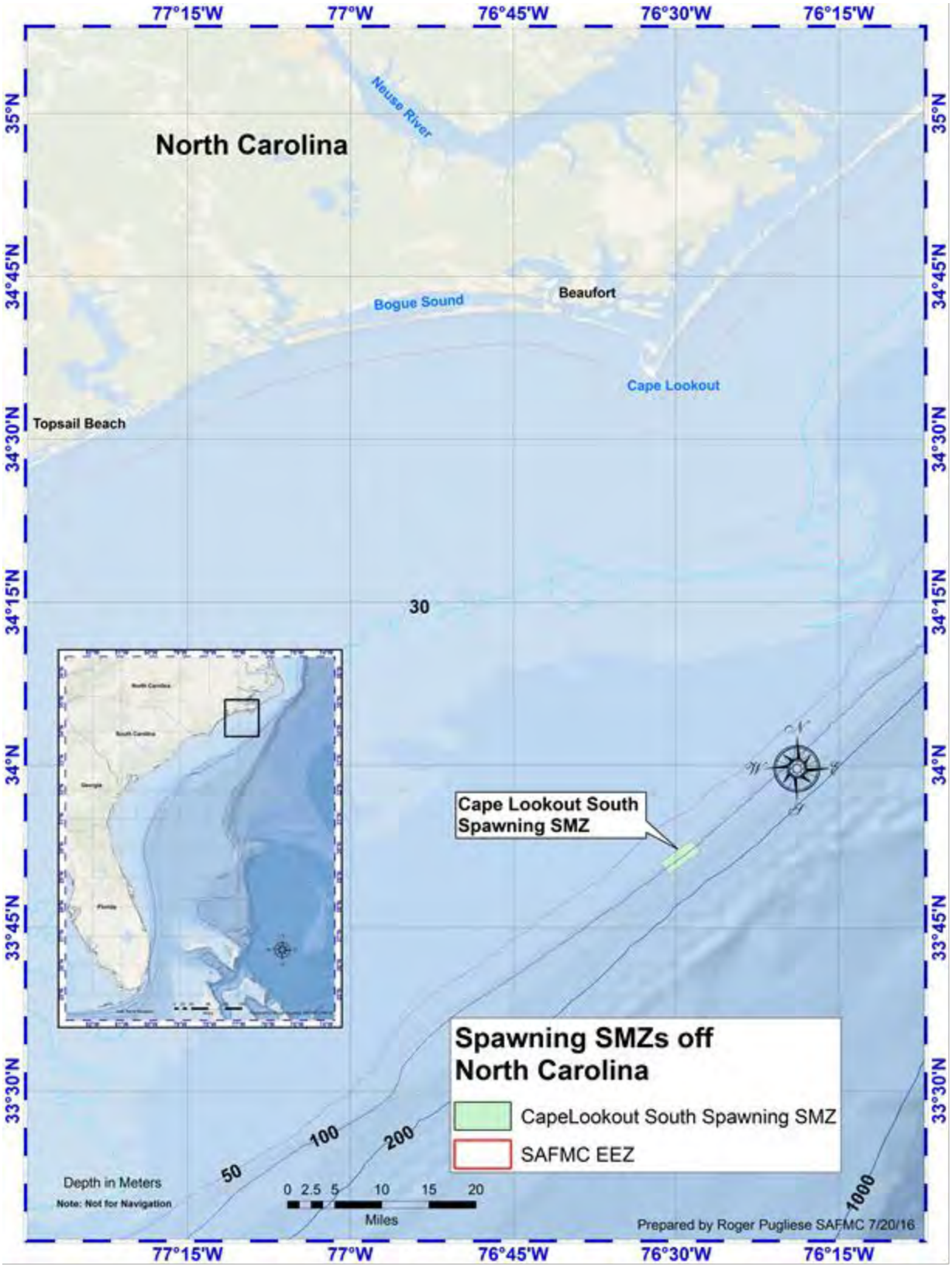


Figure 6. Snapper Grouper Spawning Special Management Zones (SMZs) off Florida East Coast.

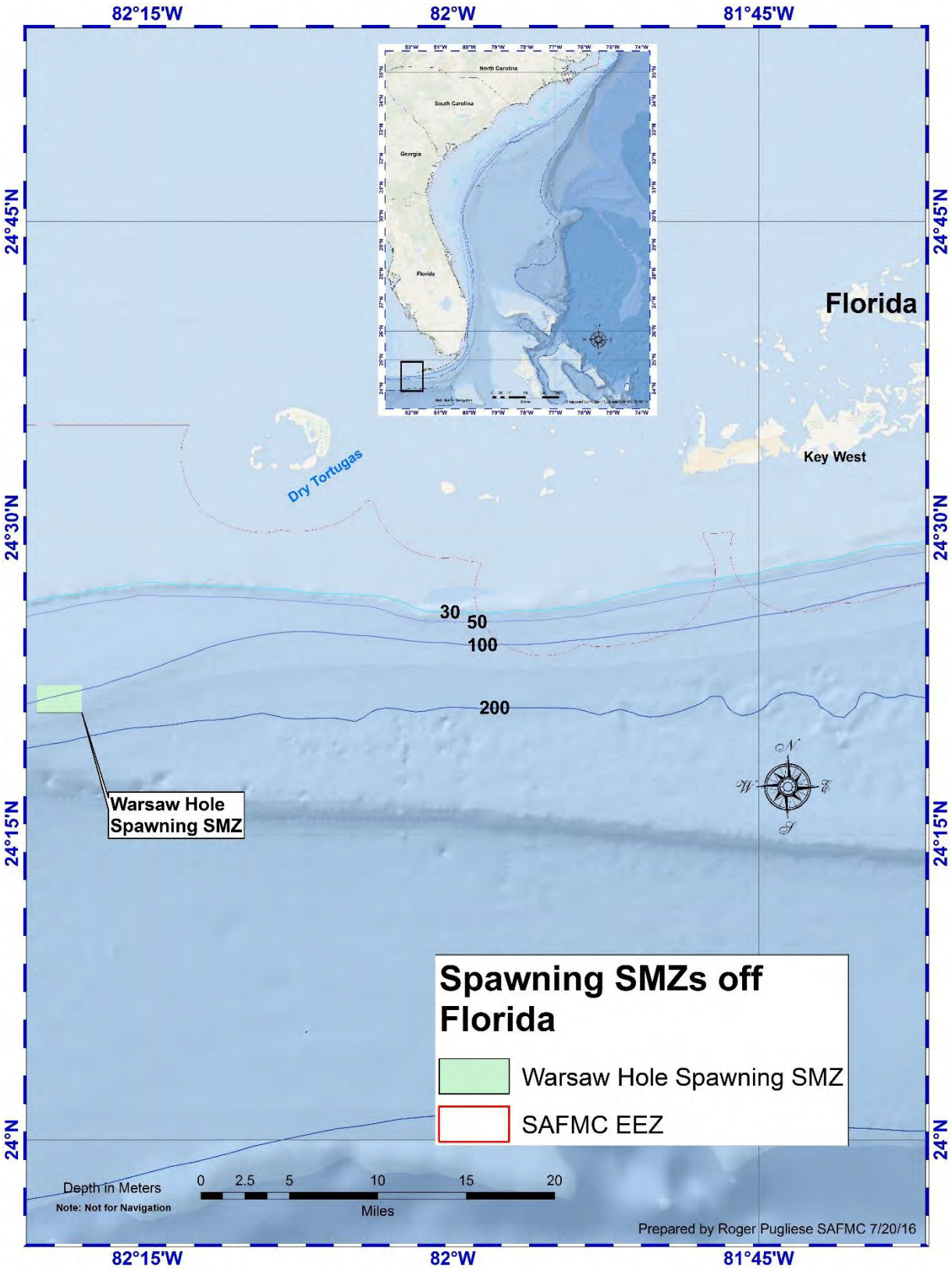
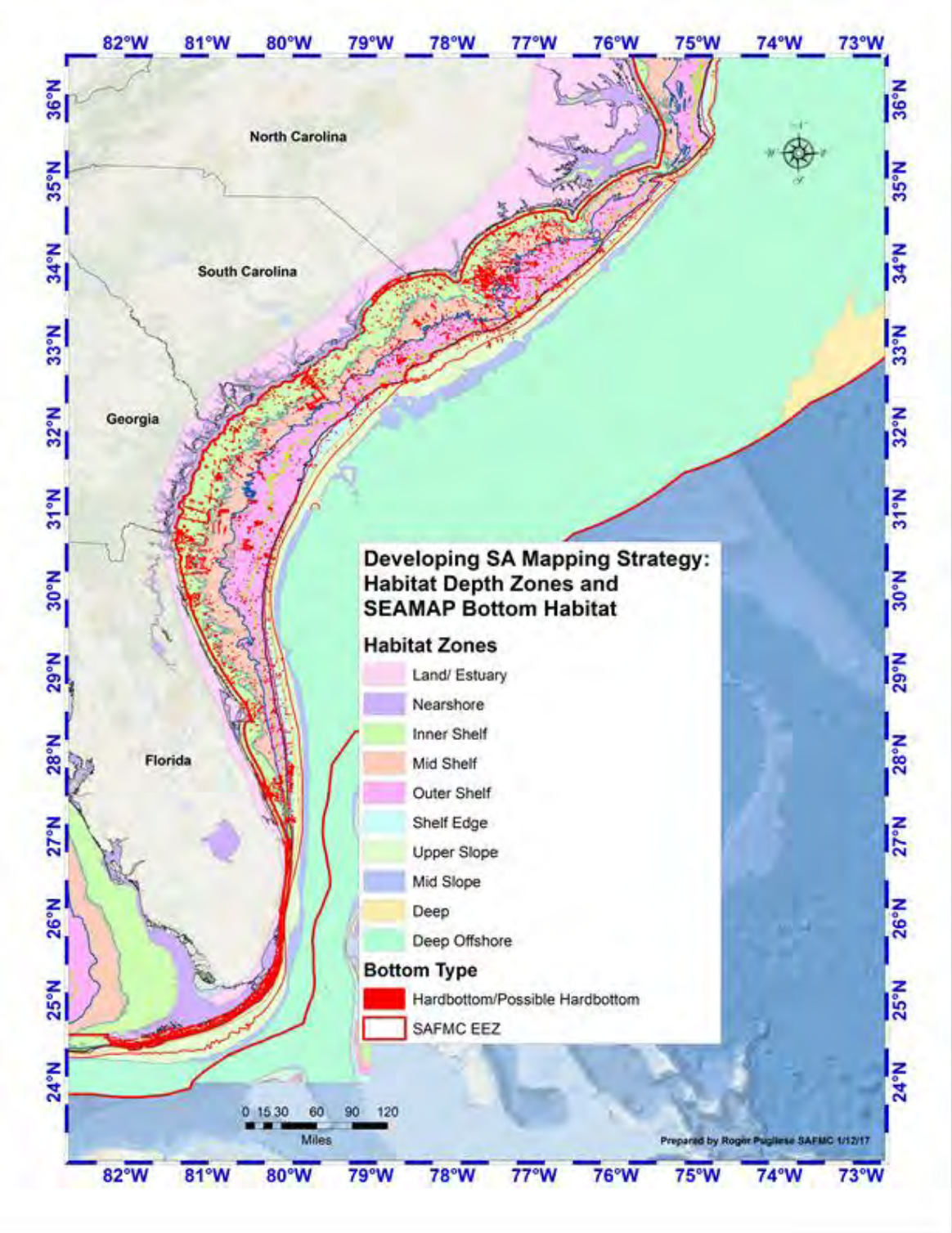


Figure 7. Habitat Zones and SEAMAP Bottom mapping data - Developing SA Mapping Strategy SAFMC FEP II.



Atlantic States Marine Fisheries Commission

Business Session

Thursday, May 6, 2021
Noon – 12:30 p.m.
Webinar

Draft Agenda

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

1.	Welcome/Introductions (*P. Keliher*)	Noon
2.	Committee Consent • Approval of Agenda • Approval of Proceedings from October 2020	12:05 p.m.
3.	Public Comment	12:10 p.m.
4.	Consider Noncompliance Findings (if Necessary)	12:15 p.m.
5.	Other Business	12:20 p.m.
6.	Adjourn	12:30 p.m.

The meeting will be held via webinar, click here for details.
Sustainable and Cooperative Management of Atlantic Coastal Fisheries

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

BUSINESS SESSION

Webinar
October 22, 2020

These minutes are draft and subject to approval.
The Board will review the minutes during its next meeting.

Draft Proceedings of the Business Session
October 2020

TABLE OF CONTENTS

INDEX OF MOTIONS

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)
Justin Davis, CT (AA)
Bill Hyatt, CT (GA)
Jim Gilmore, NY (AA)
Emerson Hasbrouck, NY (GA)
Joe Cimino, NJ (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)
John Clark, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Lynn Fegley, MD, proxy for B. Anderson (AA)
Russell Dize, MD (GA)
Phil Langley, MD, proxy for Del. Stein (LA)
Steve Bowman, VA (AA)
Sen. Monty Mason, VA (LA)
Bill Gorham, NC, prosy for Sen. Steinberg (LA)
Mel Bell, SC, proxy for P. Maier (AA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Jim Estes, FL, proxy for J. McCawley (AA)
Marty Gary, PRFC
Derek Orner, NMFS
Sherry White, USFWS

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

Staff

Robert Beal
Toni Kerns
Kristen Anstead
Max Appelman
Lindsey Aubart
Pat Campfield
Maya Drzewicki
Dustin Colson Leaning
Chris Jacobs
Jeff Kipp
Heather Konell
Laura Leach
Savannah Lewis
Sarah Murray
Joe Myers
Marisa Powell
Mike Rinaldi
Julie Defilippi Simpson
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Bill Anderson, MD (AA)
Pat Augustine, Coram, NY
Joey Ballenger, SC DNR
Chris Batsavage, NC DENR
Alan Bianchi, NC DENR
Jeff Brust, NJ DEP
Mike Celestino, NJ DEP
Jamie Darrow, NJ DEP
Jessica Daher, NJ DEP
Maureen Davidson, NYS DEC
Peter Fallon, Maine Stripers
Cynthia Ferrio, NOAA
Dawn Franco, GA DNR
Tony Friedrich, SGA
Pat Geer, VMRC
Lewis Gillingham, VMRC
Angela Giuliano, MD DNR
Carol Hoffman, NYS DEC
Mike Luisi, MD DNR
Dee Lupton, NC DENR

These minutes are draft and subject to approval.
The Board will review the minutes during its next meeting.

Guests (continued)

Chip Lynch, NOAA
John Maniscalco, NYS DEC
Nicola Meserve, MA DMF
Allison Murphy, NOAA
Ken Neill
Gerry O'Neill, CapeSeafoods
Michael Pierdinock, CPF Charters
Jeff Rose
Andrew Sinchuk, NYS DEC
Melissa Smith, ME DMF
Helen Takade-Heumacher, EDF
Beth Versak, MD DNR
Megan Ware, ME DMF
Chris Wright, NOAA
Erik Zlokovitz, MD DNR
Renee Zobel, NH F&G

The Business Session of the Atlantic States Marine Fisheries Commission convened via webinar; Thursday, October 22, 2020, and was called to order at 10:00 a.m. by Chair Patrick C. Keliher.

CALL TO ORDER

CHAIR PATRICK C. KELIHER: Welcome everybody to the Annual Meeting's Business Session.

APPROVAL OF AGENDA

CHAIR KELIHER: I'm going to roll right into the agenda items. First up is Committee consent on Approval of the Agenda. Does anybody have any additions or deletions or questions around the agenda? Seeing no hands, the agenda is approved by consensus.

APPROVAL OF PROCEEDINGS

CHAIR KELIHER: Then, the approval of the proceedings from the August 2020 meeting. Does anybody have any questions, additions, deletions for those proceedings? Seeing no hands, they are approved by consensus.

PUBLIC COMMENT

CHAIR KELIHER: Item Number 3 is Public Comment. Is there any member of the public that has comments for the Business Committee, the full Commission?

Not hearing anybody chime in, no hands.

REVIEW AND CONSIDER APPROVAL OF THE 2021 ACTION PLAN

CHAIR KELIHER: Great, we're going to move right on to Item Number 4, which is Review and Consider the Approval of the 2021 Action Plan. We have a big chunk of time scheduled for this. I want to make sure that we are able to do a good review, but if we could just hit the highlights, and then if we need to get any details somebody can please raise your hand as the presentations are being made. I'll turn it right over to Bob Beal.

EXECUTIVE DIRECTOR ROBERT E. BEAL: Thanks, Pat, I think we'll go through our kind of regular format where each staff person will go through their section, and as you said just hit the highlights, and we'll pause after each goal to see if there are any questions, additions, deletions, that sort of thing. Toni Kerns is the first one with Goal 1, Fishery Management Section, if you're ready to go, Pat.

CHAIR KELIHER: Yes, please proceed.

FISHERIES MANAGEMENT

MS. TONI KERNS: Maya, if you'll just pull up and do your best to scroll through with me the Action Plan that will be great. We're going to start off. In bold are the new items that are coming through for each of the species, and as you recall we've split the species groupings into high priority and medium low priority, in terms of staff workload and focus for Commissioners.

For American eel we're going to continue on with the American eel benchmark stock assessment and peer review, which will be completed in 2022, as well as monitor the international action on the Convention of International Trade for Endangered Species, through communications with Fish and Wildlife Service. For lobster we will work on management actions to the benchmark stock assessment, as well as the resiliency document for Gulf of Maine. In addition, the Board added a white paper on the use of trackers, in particular for the focus for lobster vessels fishing in federal waters, and we'll need to add that bullet into the document specifically. For Atlantic Herring, we will finalize and implement Addendum III once the Amendment 8 has been finalized. If we need to, we will respond to that Amendment that NOAA Fisheries is working to do a final rule for.

We'll also follow the work of New England Fishery Management Council for Framework 7, which is spawning protections in Georges Bank and North Nantucket Shoals, as well as Framework 8, which is the specifications and incidental catch limit, and respond if necessary. For Atlantic menhaden, we'll review the Amendment 3 quota allocations and initiate a management action if necessary, as well as initiate the benchmark assessment to be completed in 2022.

For striped bass we will work on Draft Amendment 7, to ensure stock rebuilding and address all of the current fishery management issues as talked about earlier this week, and complete the 2021 stock assessment and address the findings, most likely Amendment 7 if necessary. The Board will need to discuss, once we know what kind of recreational catch estimates we will have to determine if this stock assessment will be completed or not.

For black sea bass, we'll work with the Council on this. Some of the items here will also apply to summer flounder and scup, and I'll know which ones. But we will work with the Mid-Atlantic Council on finalizing an addendum or an amendment for commercial recreational allocation, kicking into our addendum their amendment on the commercial recreational allocation, taking into account calibrated recreational estimates.

We will also develop in coordination with the Council an action to address recreational reform, and this will also apply to summer flounder and scup. We will finalize the commercial state allocations through Addendum XXXIII, and contribute data for the 2021 management track assessment, and the 2022 research track assessment.

For bluefish, we will finalize the amendment that is looking at the commercial and recreational allocation that we are working on with the Mid-Atlantic Council. This includes the calibrated MRIP estimates, and goals and objectives quota transfers and rebuilding programs. The recreational reform addendum also applies to bluefish. I don't think I said that before.

We will also review the effectiveness of the current fishery independent data requirement and evaluate an optimal range in sample size for age data that is required and necessary for the stock assessment. Bluefish will also undergo a management track assessment in '21, and a research track in 2022. Horseshoe crab will continue the ARM revisions.

For scup both of these actions have already been addressed under the black sea bass, and for summer flounder, the only additional thing that I haven't mentioned is developing in coordination with the Mid-Atlantic Council's management action, a management strategy evaluation regarding the benefits of minimizing discards, and turning discards into landings in the recreational sector. For tautog, we'll work on the 2021 stock assessment update, and consider any management responses if necessary in the fall. Then moving on to the medium-low priority species. For both Atlantic croaker and spot, we'll be implementing the measures triggered from the 2020 traffic light analysis, as outlined in Addendum III, and discussed earlier in this week. Coastal sharks there will be a SEDAR for the blacktip shark stock assessment, and we'll consider management response if necessary, and work closely with HMS for that.

We'll also monitor the activities of HMS, specifically with regards to HMS Amendment 14, which is looking at annual catch limit and accountability measures. If there is anything that we need to respond to for this, we will take those up. For cobia, we'll be implementing the Addendum that got approved today, which is a provision to the allocations and some of the de minimis rule measures.

For Jonah crab we'll be implementing all of the data elements to improve the data collection

and characterization of the fishery, and continue to work with all of our partners, to make sure that these data elements are incorporated. We will also identify the data that is available, it's limitations, the uncertainties around it, and make recommendations for stock assessment approaches for this fishery. We have yet to have a coastwide stock for Jonah crab.

The northern shrimp will conduct a stock assessment update and set specifications. The moratorium that has been in place for the last three years sunsets at the end of 2021. We'll also continue to explore long term management options given the environmental changes in the Gulf of Maine, and it's that shrimp has depleted stock status.

Red drum will continue to work on the simulations for future use of stock assessment models. For shad and river herring we'll continue to move on to the 2020 American shad benchmark stock assessment. Through this response we'll identify improvements to the fishery management plan, with regards to recreational catch.

For recreational management systems with low harvest and high abundance indexes looking at sustainable fishery management plan alternatives, as well as incorporation as assessment information in this SFMP. We'll also work on completing the shad updates to the shad habitat plan. These are just updates, not entire new habitat plans.

For spiny dogfish we'll be contributing data and participating in the 2022 research stock assessment. For winter flounder we'll work cooperatively with the New England Fishery Management Council to respond to the management track assessment. Things that are cross-cutting between multiple departments at the Commission include raising awareness of COVID-19 impacts to MRIPs availability to produce catch estimates.

We'll also raise awareness to MRIPs data standards, and impacts to the Commission's FMP and stock assessments. We'll be working to seek ways within our existing management structure to address the concerns of the recreational community, with regard to Commission managed and jointly managed species.

We'll also be participating in and provide administrative support for scenario planning activities to address changes in stocks and fisheries due to climate and fisheries governance. This is a collaborative effort along the coast with all three of the councils as well as GARFO and the Science Center. Then lastly, we'll evaluate COVID impacts on the 2020 fishery dependent and fishery independent data collection, and develop strategies to mitigate impacts to the stock assessment, as well as the FMP. That's all I have, Mr. Chair.

CHAIR KELIHER: Thanks, Toni. I see Tom Fote, you have your hand up, Tom.

MR. THOMAS P. FOTE: Yes, just by mistake.

CHAIR KELIHER: Anybody have any questions for Toni? Seeing none, we'll go right on to the next portion.

MS. KERNS: Before you go on. Maya, if there is a way to try to fill the whole screen. I think it's hard for some people to read the text. Maybe one more hit? Perfect, thanks.

MR. PATRICK A. CAMPFIELD: Good morning everyone, this is Pat Campfield. Can you hear me okay?

CHAIR KELIHER: Yes, go ahead, Pat.

SCIENCE

MR. CAMPFIELD: Goal 2 covers all of our fisheries research; surveys and stock assessment activities for 2021. First up under the Scientific Committee activities, we plan to evaluate and pursue expansion of coastwide

stock assessment capacity through either a new hire, or strengthening capacity at the Northeast Fisheries Science Center to work on ASMFC assessments.

The second highlight is to continue incorporating socioeconomic information in the management documents through the work of our CESS Committee on economics and social sciences. Under data collection and the regional surveys. Under SEAMAP, a program that has been in place for almost four years, just one minor change to collaborate with the Southeast Coastal Ocean Observing Association, to potentially host the SEAMAP South Atlantic Survey data.

Under NEAMAP, a few new additions. The first is to develop common methodology and protocols for NEAMAP surveys, so that we are promoting consistent data collection across the various trawl surveys in the northeast area. In early 2020, before the travel restrictions and the pandemic hit, we conducted our first Maturity Staging Workshop.

If and when travel resumes in 2021, I would hope to build on that success, and host a second Maturity Staging Workshop through the NEAMAP partners. An additional workshop that would be valuable for the NEAMAP trawl survey community is a calibration workshop to develop common methods for how to conduct calibration, if and when changes in vessels are needed.

We have initiated a project to develop a genetic sampling and analysis repository for shad and river herring, in close collaboration with the U.S. Geological Survey. We highlight this project, but it's one of many new projects that we have collaborated on with USGS over the past few years, and look to further expand that partnership. Scrolling down to fisheries research, just one quick hit on stock assessment modeling. We just completed the 2020 American lobster stock assessment. One of the major recommendations for future assessments was to add time-varying thermal habitat affects, and growth to the catch-at-length model. We will continue to work with the group at the University of Maine and our Stock Assessment Subcommittee to develop the model further.

Scrolling down to ecosystem-based management and changing ocean conditions, we'll highlight a task from the Executive Committee to develop criteria for adding or subtracting states for fishery management boards if and when an individual stock's distribution changes. This is something that the Management and Science Committee will take up.

Then finally, under competing ocean uses, we added as task to explore opportunities to characterize the geographic extent of fisheries using trackers as a tool. I will stop there. Those are the highlights for our fisheries science program.

CHAIR KELIHER: Thanks, Pat, does anybody have any questions for Pat? John Clark.

MR. JOHN CLARK: I just want to get back to one of the first comments you made about incorporating the socioeconomic data into assessments. When might we start seeing that? I mean a good example just the other day was the menhaden vote for the issue about changing the TAC there.

We heard a big concern from the Advisory Panel about the economic impacts of lowering the TAC, yet during the material I saw and during the conversation, we didn't have anything concrete about that, as to what lowering the TAC levels would do to the economics of our fishing public here. Just curious as to when we might start seeing more input into these documents from the Economic and Social Sciences Committee.

MR. CAMPFIELD: It's really a multi-pronged approach. The first is through the members of the CESS, the Committee on Economics and

Social Sciences. Our coordinator, Sarah Murray has done an excellent job of getting the various Committee members assigned to different species. They have had a longstanding goal to participate in PDT meetings, some TC meetings where there are management regulations discussions with socioeconomic aspects.

That is one of the most direct ways to have the socioeconomic experts involved in this Committee and team discussions to provide input and advice. I guess the second aspect is the Risk and Uncertainty Policy that has been in development, and we hope to finalize soon, as was raised earlier this week.

But again, Sarah and the CESS Committee have been working pretty hard on developing criteria and scoring ranges for socioeconomic questions and elements of that Risk and Uncertainty Policy. The intent is to have that be a more formal type of input on socioeconomics for your decision making. The third piece is that the FMPs have had socioeconomic information, but we can probably do a better job of rounding that out.

Often, we're limited by the socioeconomic data that are available coastwide. We've worked closely in the ACCSP to make use of what they have in their databases, but we often run into the hurdle of that type of data being fairly limited. But we are spending a fair amount of time on it through the CESS Committee the last couple of years.

MR. CLARK: Thanks, Pat, but menhaden in particular, to me this was a pretty glaring example where the science that we're using for the single species is excellent for the assessment there. But, here I would say it was more speculative and yet we didn't have any. There could have been, to me, pretty simply done what the cost might be.

You know even just a ballpark range as to what we would be looking at for our, for example our fisheries that use menhaden for bait. What reducing the TAC to a certain level, how it might impact that. I mean, it doesn't seem like it would be that difficult. If we can manage this species now, and set a TAC based on some fairly speculative science. It seems like we could have some kind of numbers there.

CHAIR KELIHER: Great, thanks, John. Jason McNamee.

DR. JASON McNAMEE: Pat, thanks for the presentation, Pat. The very last thing you brought up. I was just wondering if you could give a little more detail on that. I hadn't heard about at least the tracker one. Just curious as to what that is.

MR. CAMPFIELD: Sure, I think there are a couple of purposes, and Toni alluded to it under Goal 1, and perhaps our Chairman can speak to it too. It was a task that was raised during the initial review of the action plan through the Administrative Oversight Committee. But my understanding is it relates to understanding where lobster fishing is taking place, as it may relate to offshore wind development, and perhaps for other purposes. But that's as much as I can say about it.

DR. McNAMEE: Okay, thanks.

MS. KERNS: I was just going to say, the Board came up with a more specific task and workgroup at the meeting, and so that is why I brought it up under lobster before. Here we were sort of thinking, trying to think towards the future of trackers, and how they could improve in a more timely fashion information related to fisheries that we don't have good data for, Jay.

DR. McNAMEE: Trackers on boats is what they're talking about, I got you, thanks.

MS. KERNS: Yes.

CHAIR KELIHER: Yes, great. Any other questions for Pat? Seeing no hands, why don't we go on to the next presenter?

ACCSP

MR. GEOFF WHITE: Thank you, Pat, this is Geoff White covering Goal 3 for ACCSP. The top parts are about the same. The sold item on a continuing basis that we've highlighted there is we've moved it from last year FISMA is the Internet Security Act. We moved it from its own item to moving up to some ongoing activity. Really this is a significant ongoing staff time and cost for software tools, and annual external reviews of our security status. Part of having our FISMA authority connects the six different federal systems that we work with. That is why it's moved up into our continuing items. Under Program Management, these are some updated items here that are not vastly different of things that you've heard before, immigrating with the Commission's communications plan, of course selecting and monitoring that ranked proposal project.

The uptick to the Atlantic recreational implementation plan is really on about a five-year cycle. We're four years in at the moment, and this is to include coastal priorities for projects and direction. It is then used by APAIS in input by the states and the Councils and used by MRIP to address their kind of long-term activities and funding privacy. That is a big item for us, the Rec Tech group and ACCSP (broke up).

Really, we'll continue our support for partner implementation of the tools that we have out there. The middle sector here is really changing the focus from the redesign, prioritizing not as much on the trip aspects of the dealer landings reporting. That is moving the SAFIS management system, the switchboard is a tool that we use to make that more flexible, and updating the end use for tools to be able to have some really visible components of what the SAFIS redesign of the database and props and samplings are doing for the end users in those flexibility tools.

Electronic dealer reporting will be our focus for improving those tools next year, and also some of the items below support that in terms of the participant and permit data base design, and the trip management system, having a unique by dealers, it's shared and coordinates things such as the actual trip reports, the dealer report, potentially there will be biological information as well.

The title of this one did change, we added the word standards in here, along with distribution and use. In the data warehouse there is continued focus to incorporate these data elements, redesign the user interface there, improve the content on biological data, and recreational estimates. That means better align tools with what MRIP is showing on their website, as well as finding ways to support our partners in the presentation of those data fields.

Under recreational fisheries, the big points there are really to begin evaluating the utility and standards for private angler solitary mobile applications. That is a very wordy bullet item, but focuses on finding out where those private angler apps are best utilized for their data, and what are the common data fields that could be recommended.

That's defining the appropriate uses to guide stakeholder expectations, so are these apps going to provide supplementary information? How might it be used relative to MRIP relative to the assessment process relative to other processes? That is really trying to capture the best guidance there, is what the bullet is about.

Of course, that involves developing the core fields for data collection, the things that would be consistent and useful across the source application. The last item under recreational fisheries is really to continue an ongoing path, which was the ability to more fully incorporate

for-hire logbooks into the catch statistics. With the additional federal for-hire logbook and HMS regulations, sorry not regulations, important incorporation of some of these tools. How does that factor in to the way the for-hire estimates are being created? That is a methodology that is really part of the implementation plan, it's also part of something that Rec-Tech is developing. With that I will stop, and ask for any questions.

CHAIR KELIHER: Thank you, Geoff, any questions for Geoff? Seeing none, I think you're off the hook, Geoff, so we can move on to Goal 4.

LAW ENFORCEMENT

MS. KERNS: Goal 4 is the Commission's Law Enforcement Committee goal. You'll see that we don't have any folded tasks really for the Law Enforcement Committee. Most of the work that they do is looking at our FMPs and new management measures to those FMPs, and revealing and providing input to the Board on enforcement for those measures.

While those are new every, well we are proposing plans every year, the specifics are unknown until it comes up. We'll continue on with that, and note that the Law Enforcement Committee will continue to engage with the Lobster Board on offshore enforcement activities, as well as engage with real enforcement activities. That's all I've got.

CHAIR KELIHER: Any questions on that goal? Seeing no hands, we'll move on to Goal 5.

HABITAT AND ATLANTIC COASTAL FISH HABITAT PARTNERSHIP

MR. CAMPFIELD: Goal 5 covers all the activities for our habitat program, and the Atlantic Coastal Fish Habitat Partnership. Just a couple of highlights for 2021. Under the integrate category to complete the fish habitats of concern descriptions to be considered for integration into the Commission's fishery management plans.

Secondly, under ACFHP, there have been a number of projects since the partnership started over a decade ago, and we want to collect information on the long-term success of ACFHPs on the ground conservation projects, to understand improvements to habitat after the projects are completed. That's all under Goal 5.

CHAIR KELIHER: Great, thank you, Pat, any questions on Goal 5? Seeing no hands, we'll move on to the next goal.

STAKEHOLDER AND PUBLIC SUPPORT

MS. TINA L. BERGER: Thanks, Pat, this goal is regarding stakeholder and public support for the Commission**,** under increasing public understanding support. We are going to be building upon our Fisheries Management 101 webpage, if you all haven't seen it, be sure to check it out under our Fisheries Management Program page.

We'll be turning that into a primer for folks to use and distribute to their stakeholders as needed. We are going to look at a couple of different ways of highlighting our current status of the stocks. We currently have the stock status package, but we'll see if we can refine that a bit more. On our plate as well is to update the Guide to Fisheries Science and Stock Assessments.

That was first developed in 2009, and it's pretty dated in some areas, so we're going to work on bringing that up to speed. For 2021 we identified a couple of issues that we are going to focus increased outreach on, and these include development of the Striped Bass Amendment, implementation of the circle hooks requirement as part of that amendment, or as part of Addendum VI, as well as continue to work on outreach on the use of ERPs. Regarding stock assessments upcoming for 2021, we will put together some outreach materials on the upcoming horseshoe crab ARM

benchmark assessment, and will do as time allows, do updates and overviews for management track assessments for striped bass, bluefish, black sea bass, and summer flounder.

Under new technologies, we're going to do some upgrading and updating of our website, make it HTTPS compliant, find ways to increase accessibility and user friendliness, and add new pages for ERPs as well as climate change effects on managed species. We're going to continue to focus on using webinars, videos, and story maps to engage and inform the public about current activities for all our programs.

Under media relations and networking, I have been working on an implementation, I've been working on a communications plan to fully integrate all our departments and coordinate outreach activities. Part of that plan will be to develop a baseline, so we will be conducting a survey of all our products and tools, and to get a sense of how effective they are, and where we can make further progress in the future.

The only last thing is we do coordinate this Atlantic Coast Fisheries Communication Group, which is outreach folks from all the states and the Councils and the federal agencies we work with. We hope to have a meeting in 2021 to talk about some shared communications issues, and how we can move forward on joint messaging. That's it for Goal 6.

CHAIR KELIHER: Thank you, Tina, any questions for Tina? John Clark.

MR. CLARK: Thank you, Tina. The Management 101 webpage is really nice. I just was curious as to whether ASMFC has worked with MRIP at all about getting the public to understand the new MRIP better, because there is a ton of dissatisfaction among anglers with the recreational data that is coming in.

You know obviously the new MRIP is supposed to be an improvement, but because of the impact it's had on several assessments, I think there is a lot of distrust of it in the angling public, and a lot of it comes out of hearings how little people think of MRIP. I'm just curious as to whether you had any plans to explain that data on the ASMFC website.

MS. BERGER: It is in part captured under Goal 1, in terms of increasing awareness on cross-cutting issues regarding MRIP. I know the Mid-Atlantic Council has developed an MRIP page. We haven't discussed it at the staff level, although both Geoff and I and Toni and Bob were all involved in MRIP communications at some level. But that is certainly something we could discuss, and potentially address, if that is the desire of the Board or the Business Session.

CHAIR KELIHER: John, does that answer your question?

MR. CLARK: That's fine. Like I said, I was just curious, and you know as I said, I just think the more avenues to get the information out to the public, hopefully the better understanding and eventual acceptance of it. Like I said, as of right now there is a lot of distrust of that data.

CHAIR KELIHER: Yes, I think those type of conversations is certainly going to play out over time with several species' management boards, but I appreciate that question. Tom Fote.

MR. FOTE: We offered virtual meetings for the last eight months, nine months, and we should basically look at how we could use this tool to better interact with the public. Maybe have like a Commission open house one day, where we have different presentations on different species, and we share things about the species, and have people ask questions and things like that.

Usually when we basically reach out to the public, rather than have a public hearing we're going to have this. Maybe we should have an open house to get acquainted, in a more-

friendlier atmosphere when we're not cutting back quota or doing something else.

CHAIR KELIHER: Thanks, Tom. John, your hand is still up. Do you have a comment, or is that an old hand? Nope, must have been an old hand. Any other questions for Tina? Seeing none, let's move on to Goal 7.

LEGISLATIVE

EXECUTIVE DIRECTOR BEAL: I'll take that one. Goal 7 is our legislative activities, and it's really most of it is the ongoing activities that Deke and I engage in, you know working with Congressional offices and working with a number of you guys to bring you up to Capitol Hill, and a lot of you do it independently, interacting with your Congressional offices.

There are a couple bullet items, if you scroll down a teeny bit, Maya. The first one is that there is an election coming up, apparently, and we're going to react to that. No one knows the outcome of the election, but we'll see who we need to react to and who we need to start interacting with after that election.

The Legislative Committee has been revamped, and is up and running and doing well this year, and we've got a number of activities there that that group is contemplating working on. The idea is to continue their momentum into 2021. One of the big items that is being talked about is when should we seek reauthorization of the Atlantic Striped Bass Act and Atlantic Coastal Act?

I don't think anyone, I haven't heard of any significant changes that anybody wants to those Acts but they haven't been reauthorized for a while, and the authorization level could be increased, and I think that would benefit the states as we try to seek more funds to support Commission activities. We also want to seek federal appropriations for a number of surveys that are important to the member states in the Commission, as well as the horseshoe crab activities.

Those are the highlights of our legislative activities, and we'll continue to monitor bills and special legislation on Capitol Hill, and share all that information with you. If any one of you want to go up to Capitol Hill, or interact with your state delegations, let us know and we're happy to do that. Happy to answer any questions, Pat.

CHAIR KELIHER: Great, Bob, thanks for that. Tom Fote.

MR. FOTE: After the last Congressional election I asked Bob Beal and Congressman (broke up) to host (broke up) because we had a lot of new delegation. We had, I think it was five members of the New Jersey Congressional delegation. David asked Congressman Small, because the Congress Committee had a big office that could host a whole delegation with resights, Bob Beal, and a few other people on fisheries and how it went. I don't know how Bob felt.

But I thought it was important, that this is how you reach out to the whole delegation like from New Jersey, and we do this with other states. I mean once you figure out the Congressional (broke up) and your state that can basically help somebody like this, and bring all those delegations to at least inform, not just the one person or two persons of fisheries, but all the delegation that you can fit in a room.

CHAIR KELIHER: Thank you, Tom. Ritchie White.

MR. G. RITCHIE WHITE: If the Commission makes the decision that the Commission is in good shape financially, separate from the surveys that need funding. I think that that, and I don't know if that would be something that there would be a decision made for that. My thinking is, when we go to the delegations, we almost always go asking for money.

It would be great to go and say the Commission is okay for now. You know outside the individual issues, surveys that we need money

for. Anyway, that is my sense. I don't know if there is a decision made that we are in that situation, and if so then I think that is a message we should put forward.

CHAIR KELIHER: I think as we get into late fall early winter, we'll certainly be having more conversations about appropriations, that Council and Commission line has been one that I think all of our individual states have focused on, as far as continuing to support. It certainly helps when you say, we're in pretty good shape on this line.

But we're obviously going to have more areas we're going to have to refocus on, especially considering all of the impacts to the individual state budgets. I think your point is well taken. Any other questions on this topic? Not seeing any other hands, Bob, are there any more goals? Do we have one more to go?

EXECUTIVE DIRECTOR BEAL: Yes, one more, the Finance Administration. Laura's got it.

CHAIR KELIHER: Laura, you're up.

FINANCE ADMINISTRATION

MS. LAURA C. LEACH: Thank you very much, Mr. Chairman. I will try to make up time, because basically a majority of the goals are tasked under Goal 8 are ongoing, making sure the Commission is run well, runs smoothly. That involves our grants and budgets and all that. The one area that we did put a lot of new tasks in this year was due to the pandemic, and what we're learning from the whole teleworking situation, and where we need to bolster our ability to do that.

I'm not going to read through all of these, because I think you all can read them very well. The thing that I would point out under Human Resources is that I'm going to work on pursuing hiring a Finance Administration Deputy Director next year. I think that the rest of the tasks are pretty clearly outlined. May I answer any questions?

CHAIR KELIHER: Any questions for Laura? Seeing no hands going up, I think the fact that Ritchie brought up the issues around finance and that the Commission continues to be doing very well financially remains a direct link back to you, Laura, and the work that you're doing with your team. It certainly probably reflects the fact that we're not getting a lot of questions. With that I'm going to turn it back over to Toni. This is a final action item, so we will need a **motion to approve the 2021 Action Plan**. Maybe I should be turning it back over to Bob.

EXECUTIVE DIRECTOR BEAL: I think, Pat, if anyone is willing to make that motion, we can get it up, and then the group can vote.

CHAIR KELIHER: Bill Anderson, are you making a motion?

MR. BILL ANDERSON: I am, Mr. Chairman, thank you.

CHAIR KELIHER: I also got a second from Tom Fote.

MR. FOTE: Yes.

CHAIR KELIHER: We'll let them get it on the screen for everybody. The motion is pretty self-evident here. Is there any discussion on the motion?

MS. KERNS: Pat, I just want to let Maya know that the motion was by Bill Anderson and seconded by Tom Fote.

CHAIR KELIHER: Seeing no hands going up, is there any objections to the motion? Hearing no objection, the motion passes. Thank you very much.

ELECTION OF CHAIR AND VICE-CHAIR

CHAIR KELIHER: The Item Number 5 is the Election of a Chair and a Vice-Chair. I'll turn it over to Bob Beal.

EXECUTIVE DIRECTOR BEAL: Just a quick reminder. Each year the Commission elects a Chair and Vice-Chair from its member ranks. However, our tradition has been to have Chairs and Vice-Chairs serve two-year terms. We're at the end of the first year for Mr. Keliher as Chair and Mr. Woodward as Vice-Chair, but we do need to go through the election process to verify their second year. There is a Nominations Committee, and Jim Gilmore is the Chair of that Committee, so I will go ahead and call on Jim for nominations for the Chair of the Commission, please.

MR. JAMES J. GILMORE: Just for everyone, the Nomination Committee considered myself, Cheri Patterson, and Jim Estes. Our normal process actually has been to reach out to you the last couple of weeks to see if there were additional nominations. However, I was out of commission the last couple of weeks, so that didn't happen, completely my fault.

But we do want to have an opportunity to see if there are any nominations from the floor. My only comment on my last two weeks is if you haven't gotten the shingles vaccine, do it on the way home today. First essentially, we have good news in that both Pat and Spud are both willing to continue on, so their names are up for nomination. I was thinking, Bob, that we would take these one at a time. I'll offer to the floor anyone who would like to make a nomination for Chairman for the upcoming year. If you want to make a nomination, please raise your hand, and Bob I think can inspect to see if there are any hands raised.

EXECUTIVE DIRECTOR BEAL: Actually, Toni, are there any hands up?

MS. KERNS: No one has their hand up.

EXECUTIVE DIRECTOR BEAL: Okay, so Jim, it sounds like there is no additional nominations, so do you want to go ahead and nominate Mr. Keliher for reelection for a second year?

MR. GILMORE: Yes, on behalf of the Nominating Committee, I nominate Pat Keliher as Chair of the ASMFC, effective at the end of the Annual Meeting.

EXECUTIVE DIRECTOR BEAL: Thank you, Jim, and since that is on behalf of the Committee there is no need for a second. We'll try to do this the efficient way. Are there any objections to having Mr. Keliher serve a second year as Chair of the ASMFC?
MS. KERNS: No hands are raised.

EXECUTIVE DIRECTOR BEAL: No hands. Well, congratulations, Pat! It appears you have been unanimously elected as Chair for a second year.

CHAIR KELIHER: Thank you very much everybody, appreciate that.

EXECUTIVE DIRECTOR BEAL: Jim, do you want to follow up to see if there are any other nominations for Vice-Chair, or if not nominate Mr. Woodward for a second term?

MR. GILMORE: Yes, so back to the Board. Are there any additional nominations beyond Spud for Vice-Chairman of the ASMFC for the upcoming year, please raise your hand and let Toni know?

MS. KERNS: I see no additional hands raised, Jim.

MR. GILMORE: Okay then, on behalf of the Nominating Committee, I nominate Spud Woodward as Vice-Chair of the ASMFC, effective at the end of the Annual Meeting.

EXECUTIVE DIRECTOR BEAL: Excellent, thank you, and again, it's a motion on behalf of a Committee, therefore no need for a second, and we'll try the same voting technique. Are there any objections to having Mr. Woodward serve as the Vice-Chair for a second year?

MS. KERNS: I see no hands raised.

EXECUTIVE DIRECTOR BEAL: Excellent, thank you, Toni. **Again, by unanimous vote or unanimous consent, Spud, you are the Vice-Chair for a second term.** It's been really great working with Pat and Spud. There are no two greater leadership guys to go through a pandemic with than both these guys, so thank you for everything. Jim, I hope your shingles, I hope you continue to recover from those. It sounds like it's been a rough grind for you for the last couple weeks. Hang in there, we hope you get better. With that, Mr. Chairman, I think it's all yours.

MR. GILMORE: Well, thank you, Bob.

CHAIR KELIHER: I want to thank everybody again for the vote of confidence for Spud and I. We may have secretly been wishing for a coup, it has been quite a year with the pandemic. Frankly, I think the fact that we're getting together, at least from the Administrative Commissioners perspective, nearly weekly.

It allows us all to kind of have these broader conversations, and help get through this together. Again, I appreciate the vote of support. Let's finalize the Business Session here. Is there any other, I'm sorry, Tom Fote's hand just went up. Tom.

MR. FOTE: Yes, I sent an e-mail to you and Bob. I just wanted to mention that this Sunday we lost one of our past Commissioners. Some of you will remember, it was George Harris, Director of Fish and Wildlife for the state of New Jersey. He basically worked for the Agency for 40 years. George was one of my mentors when I first got involved, as a matter of fact.

One of the reasons I'm here is because he talked me into doing a lot of these jobs. He also pointed out the fact that we need to work with other groups, like in New Jersey the hunters and the fishermen all needed to work together. When he retired at 65, he did not quit. He actually would become president of the Federation and brought all these groups together, the New Jersey State Federation of Sportsmen Club and reorganized it.

If you look at deer management and how it's being done nowadays, it was really up to George, because when George was appointed and got involved with managing deer he basically allowed for a doe hunt, back before in the ancient times, you didn't shoot female deer. He changed that in New Jersey, and before he was finished it was all over the country.

He also trained the other directors that you've known from New Jersey, Bob Labelle, Dave Chanda, Matty Lafleur. He's got a long legacy of people he's trained in the Division, and some are still around. I just figured I would let you know, as I said he was one of my mentors also back then.

CHAIR KELIHER: Thank you, Tom, for that. I think we're all following the footsteps of a lot of different people, and many of them before us certainly created some big shoes to fill. Thanks for bringing that forward.

MR. FOTE: One more point, Pat. He was also part of the greatest generation, and it was interesting, because (breaking up) those directors that are going on back there. A lot of them from the federal agencies like Dick ? and Dick ? and ? (broke up) They all served in World War II. George was a marine, right in the beaches in the South Pacific. Pete Mahoney is the other Vice-Chairman of New Jersey; he was a bomber pilot over in England. They learned how to work together, and they kept at it when they basically became directors (broke up). I'll try to get past all the differences and our arguments, and I took direction from him when I was younger.

CHAIR KELIHER: Thanks for that, Tom. We're going to move on. Is there any other business to be brought before the full Commission? I'm not seeing any hands go up. We were to go into recess, and then consider noncompliance

findings after the Policy Board, but seeing there are thankfully no noncompliance findings.

ADJOURNMENT

CHAIR KELIHER: I think a motion to adjourn would be a good thing to hear right now, and then we can move back on to the Policy Board. Doug Haymans, motion to adjourn. Is there a second? Second by Cheri. Any objections to adjourning? Seeing no hands, thank you very much, I appreciate everybody.

(Whereupon the meeting adjourned at 10:57 on October 22, 2020.)