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

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

2. **Move to approve proceedings from October** by consent (Page 1).

3. **Move to approve the Public Information Document for Draft Amendment 7 to the Striped Bass Fishery Management Plan for public comment as modified today** (Page 17). Motion by Tom Fote; second by Martin Gary. Motion approved by consensus (Page 17).

4. **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 in the striped bass management unit. Other states wishing to participate in a study on the tube rig fishery should submit a letter of intent to ASMFC within two weeks to ensure consistency in data collection** (Page 31). Motion by Megan Ware; second by Mike Armstrong. Motion carried (Page 39).

5. **Main Motion:**
   Move to create an ad hoc committee established by the chair to develop a definition of bait that would require the use of circle hooks. This committee will report back to the Striped Bass Board at a special meeting to take place early March 2021 (Page 41). Motion by Emerson Hasbrouck; second by Jason McNamee.

   Motion to Amend:
   Move to amend to add method of fishing that would require the use of circle hooks and how to handle incidental catch (Page 44). Motion by Joe Cimino; second by Justin Davis.

   Main Motion as Amended:
   Create an ad hoc committee established by the chair to develop a definition of bait that would require the use of circle hooks and method of fishing that would require the use of circle hooks and how to handle incidental catch. This committee will report back to the Striped Bass Board at a special Board meeting to take place early March 2021 or as soon as possible. Motion carried (Page 46).

6. **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** (Page 48). Motion by Marty Gary; second by David Sikorski. Motion carried (Page 48).

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
Kurt Blanchard, Law Enforcement Representative
Mike Celestino, Stock Assmnt. Subcommittee Chair

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)

August 2020

Update with corrections to text for caption of Figure 4.1
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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)

7 LITERATURE CITED

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.

Artedi, P., C.V. Linnaeus, and J.J. Walbaum. 1792. *Petri Artedi Sueci Genera piscium : in quibus systema totum ichthyologiae proponitur cum classibus, ordinibus, generum characteribus, specierum differentiis, observationibus plurimis : redactis speciebus* 242 *ad genera* 52: *Ichthyologiae*. Available (July 2020): https://www.biodiversitylibrary.org/bibliography/61537#/summary

Atlantic States Marine Fisheries Commission (ASMFC). 1998. Source document to amendment 5 to the interstate fisheries management plan for Atlantic Striped Bass. ASMFC, Fisheries Management Report No. 34, Arlington, Virginia. 117 p.

ASMFC. 2003. Amendment 6 to the interstate fishery management plan for Atlantic striped bass. ASMFC, Fisheries Management Report No. 41, Washington, DC.

ASMFC. 2007. Addendum 1 to Amendment 6 to the interstate fishery management plan for Atlantic striped bass. ASMFC, Fisheries Management Report No. 16, Washington, DC.

ASMFC. 2009. 2009 stock assessment report for Atlantic striped bass. A Report prepared by the Atlantic Striped Bass Technical Committee. Accepted for management use November 2009.

Benton, J.C. 1992. Atlantic migratory striped bass adult monitoring program - North Carolina and Virginia offshore mixed stocks, 1988–1992. U.S. Fish and Wildlife Service, South Atlantic Fisheries Coordination Office, Morehead City, North Carolina.

Berst, A.H. 1961. Selectivity and efficiency of experimental gill nets in South Bay and Georgian Bay of Lake Huron. Transactions of the American Fisheries Society 90(4):413–418.

Bigelow, H.B., and W.C. Schroeder. 1953. Fishes of the Gulf of Maine. U.S. Fish and Wildlife Service Fisheries Bulletin 53.

Boreman, J., and R.R. Lewis. 1987. Atlantic coastal migration of striped bass. American Fisheries Society, Symposium 1, Bethesda, Maryland.

Boyd, J.B. 2011. Maturation, fecundity, and spawning frequency of the Albemarle/Roanoke striped bass stock. Master's thesis. East Carolina University, Greenville, North Carolina. 132 p.

Buckler, D.R., P.M. Mehrle, L. Cleveland, and F.J. Dwyer. 1987. Influence of pH on the toxicity of aluminium and other inorganic contaminants to East Coast striped bass. Water, Air, and Soil Pollution 35:97–106. https://doi.org/10.1007/BF00183846

Buckmeier, D.L., and J.W. Schlechte. 2009. Capture efficiency and size selectivity of channel catfish and blue catfish sampling gears. North American Journal of Fisheries Management 29(2):404–416.

Cubillos, L.A. 2003. An approach to estimate the natural mortality rate in fish stocks. Naga, Worldfish Center Quarterly 26(1):17–19.

Callihan, J.L., C.H. Godwin, and J.A. Buckel. 2014. Effect of demography on spatial distribution: movement patterns of Albemarle Sound-Roanoke River striped bass (*Morone saxatilis*) in relation to their stock recovery. Fisheries Bulletin 112(2-3):131–143.

Carmichael, J.T. 1998. Status of the Albemarle Sound-Roanoke River stock of striped bass, 1982–1997. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Carmichael, J.T. 1999. Status of the Albemarle Sound-Roanoke River stock of striped bass, 1982–1998. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Carmichael, J.T. 2000. Status of the Albemarle Sound-Roanoke River stock of striped bass. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Carmichael, J.T. 2001. Status of the Albemarle Sound-Roanoke River stock of striped bass. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Carmichael, J.T. 2002. Status of the Albemarle Sound-Roanoke River stock of striped bass. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Carmichael, J.T. 2003. Status of the Albemarle Sound-Roanoke River stock of striped bass. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Cass-Calay, S.L., J.C. Tetzlaff, N.J. Cummings, and J.J. Isely. 2014. Model diagnostics for Stock Synthesis 3: examples from the 2012 assessment of cobia in the U.S. Gulf of Mexico. Collective Volume of Scientific Papers ICCAT 70(5):2069–2081.

Chapoton, R.B., and J.E. Sykes. 1961. Atlantic Coast migration of large striped bass as evidenced by fisheries and tagging. Transactions of the American Fisheries Society 90(1):13–20.

Cooper, J.E., R.A. Rulifson, J.J. Isely, and S.E. Winslow. 1998. Food habits and growth of juvenile striped bass, *Morone saxatilis*, in Albemarle Sound, North Carolina. Estuaries 21(2):307–317.

Darsee, S.P., T. Mathes and J. Facendola 2019. North Carolina Striped Bass monitoring. Federal Aid in Sport Fish Restoration, Project F-56 Segment 26, Independent Gill-Net Survey 2019 Technical Report. North Carolina Department of Environmental Quality, Division of Marine Fisheries. Morehead City, North Carolina. 61 p.

Daugherty, D.J., and T.M. Sutton. 2005. Use of a chase boat for increasing electrofishing efficiency for flathead catfish in lotic systems. North American Journal of Fisheries Management 25(4):1528–1532.

Davis, W.S., and J.E. Sykes. 1960. Commercial harvest and catch composition of striped bass in Albemarle Sound, North Carolina. National Marine Fisheries Service, Atlantic Estuarine Fisheries Center, Beaufort, North Carolina. 44 p.

Deriso, R.B., T.J. Quinn II, and P.R. Neal. 1985. Catch at age analysis with auxiliary information. Canadian Journal of Fisheries and Aquatic Sciences 42:815–824.

Dorazio, R.M. 1995. Mortality estimates of striped bass caught in the Albemarle Sound and Roanoke River, North Carolina. North American Journal of Fisheries Management 15(2): 290–299.

Diodati, P.J. 1991. Estimating mortality of hook and released striped bass. Project AFC-22, Final Report. Massachusetts Division of Marine Fisheries, Salem.

Dolan, C.R., and L.E. Miranda. 2003. Immobilization thresholds of electrofishing relative to fish size. Transactions of the American Fisheries Society 132(5):969–976.

Flowers, J., S. Darsee, L. Lee, and C. Godwin. 2016. Stock status of Albemarle Sound-Roanoke River striped bass: update 1982–2014. North Carolina Division of Marine Fisheries, NCDMF SAP-SAR-2016-01, Morehead City, NC. 87 p.

Francis, R.I.C.C. 2011. Data weighting in statistical fisheries stock assessment models. Canadian Journal of Fisheries and Aquatic Sciences 68(6):1124–1138.

Gibson, M.R. 1995. Status of the Albemarle Sound-Roanoke River striped bass stock in 1994. Rhode Island Division of Fish and Wildlife, Wickford, Rhode Island. 14 p.

Goodyear, C.P. 1993. Spawning stock biomass per recruit in fisheries management: foundation and current use. Pages 67–81 *In*: S.J. Smith, J.J. Hunt, D. Rivard (editors), Risk evaluation and biological reference points for fisheries management. Canadian Special Publication of Fisheries and Aquatic Sciences 120.

Grant, G.C. 1974. The age composition of striped bass catches in Virginia rivers, 1967–1971, and a description of the fishery. Fisheries Bulletin 72(1):193–199.

Greene, K.E., J.L. Zimmerman, R.W. Laney, and J.C. Thomas-Blate. 2009. Atlantic coast diadromous fish habitat: a review of utilization, threats, recommendations for conservation, and research needs. Atlantic States Marine Fisheries Commission, Habitat Management Series No. 9, Washington D.C. 464 p.

Grist, J. 2004. Stock status of Albemarle Sound-Roanoke River striped bass. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Grist, J. 2005. Stock status of Albemarle Sound-Roanoke River striped bass. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Hall, N.G. 2013. Report on the SEDAR 28 desk review of the stock assessments for Gulf of Mexico cobia and Spanish mackerel. 66 p. Available (November 2019): https://www.st.nmfs.noaa.gov/Assets/Quality-Assurance/documents/peer-review-reports/2013/2013_02_19%20Hall%20SEDAR%2028%20GM%20spanish%20mackerel%20cobia%20assessment%20report%20review%20report.pdf

Hall, L.W., S.E. Finger, and M.C. Ziegenfuss. 1993. A review of in situ and on-site striped bass contaminant and water-quality studies in Maryland waters of the Chesapeake Bay watershed. Pages 3–15 *In*: L.A. Fuiman (editor), Water quality and the early life stages of fishes. American Fisheries Society, Symposium 14, Bethesda, Maryland.

Hansson, S., and L.G. Rudstam. 1995. Gillnet catches as an estimate of fish abundance: a comparison between vertical gillnet catches and hydroacoustic abundance of Baltic Sea herring (*Clupea harengus*) and sprat (*Sprattus sprattus*). Canadian Journal of Fisheries and Aquatic Sciences 52(1):75–83.

Harrell, R.M. 1988. Catch and release mortality of striped bass caught with artificial lures and baits. Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 41(1987):70–75.

Harris Jr., R.C., and B.L. Burns. 1983. An investigation of size, age, and sex of North Carolina striped bass. Project AFC-18-2, Annual Progress Report. North Carolina Department of

Natural Resources and Community Development, Division of Marine Fisheries, Morehead City, North Carolina.

Harris Jr., R.C., B.L. Burns, and H.B. Johnson. 1985. An investigation of size, age, and sex of North Carolina striped bass. Project AFC-18, Completion Report. North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries, Morehead City, North Carolina. 136 p.

Harris, J.E., and J.E. Hightower. 2017. An integrated tagging model to estimate mortality rates of Albemarle Sound-Roanoke River striped bass. Canadian Journal of Fisheries and Aquatic Sciences 74(7):1061–1076.

Hassler, W.W., N.L. Hill, and J.T. Brown 1981. The status and abundance of striped bass, *Morone saxatilis*, in the Roanoke River and Albemarle Sound, North Carolina, 1956–1980. Report to the North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries. Special Scientific Report 38.

Hassler, W.W., and S.D. Taylor. 1984. The status, abundance, and exploitation of striped bass in the Roanoke River and Albemarle Sound, North Carolina, 1982, 1983. Project AFC-19, Completion Report. North Carolina Division of Marine Fisheries. NCDMF Publication No. 136.

Henry, L.T., S.D. Taylor, and S.E. Winslow. 1992. North Carolina striped bass. Project AFS-26, Completion Report. North Carolina Department of Environment, Health, and Natural Resources, Division of Marine Fisheries. Morehead City, North Carolina.

Hewitt, D.A., and J.M. Hoenig. 2005. Comparison of two approaches for estimating natural mortality based on longevity. Fishery Bulletin 103(2):433–437.

Hightower, J.E., A.M. Wicker, and K.M. Endres. 1996. Historical trends in abundance of American shad and river herring in Albemarle Sound, North Carolina. North American Journal of Fisheries Management 16(2):257–271.

Hill, J., J.W. Evans, and M.J. Van Den Avyle. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Atlantic)—striped bass. Biological Report 82(11.118), U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 35 p.

Hoenig, J.M. 1983. Empirical use of longevity data to estimate mortality rates. Fishery Bulletin 82(1):898–903.

Holland, B.F., and G.F. Yelverton. 1973. Distribution and biological studies of anadromous fishes offshore North Carolina. North Carolina Department of Natural and Economic Resources, Division of Commercial and Sport Fisheries. Morehead City, North Carolina. 156 p.

Humphries, M., and J.W. Kornegay. 1985. An evaluation of the use of bony structures for aging Albemarle Sound-Roanoke River striped bass (*Morone saxatilis*). Federal Aid in Sport Fish Restoration, Project F-22. North Carolina Wildlife Resources Commission, Raleigh.

Hutchinson, T. [1764] 1936. The history of the colony and province of Massachusetts-Bay, Volume I, with a memoir and additional notes by L. S. mayo. Harvard University Press, Cambridge, MA. 467 p.

Jensen, A.L. 1996. Beverton and Holt life history invariants result from optimal trade-off of reproduction and survival. Canadian Journal of Fisheries and Aquatic Sciences 53(4):820–822.

Lee, H-H., K.R. Piner, R.D. Methot Jr., and M.N. Maunder. 2014. Use of likelihood profiling over a global scaling parameter to structure the population dynamics model: an example using blue marlin in the Pacific Ocean. Fisheries Research 158:138–146.

Lee, L.M., and J.E. Rock. 2018. The forgotten need for spatial persistence in catch data from fixed station surveys. Fishery Bulletin 116(1):69–74.

Lewis, R.M., and R.R. Bonner, Jr. 1966. Fecundity of the striped bass, *Roccus saxatilis* (Walbaum). Transactions of the American Fisheries Society 95(3):328–331.

Limburg, K.E., and J.R. Waldman. 2009. Dramatic declines in north Atlantic diadromous fishes. BioScience 59(11):955–965.

Lorenzen, K. 1996. The relationship between body weight and natural mortality in juvenile and adult fish: a comparison of natural ecosystems and aquaculture. Journal of Fish Biology 49(4):627–647.

Lorenzen, K. 2005. Population dynamics and potential of fisheries stock enhancement: practical theory for assessment and policy analysis. Philosophical Transactions of the Royal Society of London, Series B 360(1453):171–189.

Lupton, B.Y., and P.S. Phalen. 1996. Designing and implementing a trip ticket program. North Carolina Division of Marine Fisheries, Morehead City, North Carolina. 32 p + appendices.

Manooch, C. 1973. Food habits of yearling and adult striped bass, *Morone saxatilis* (Walbaum) from Albemarle Sound, North Carolina. Chesapeake Science 14(2)73–86.

McFarland, R. 1911. History of New England fisheries. University of Pennsylvania Press, Philadelphia, PA. 455 p.

Maunder, M.N., and A.E. Punt. 2004. Standardizing catch and effort data: a review of recent approaches. Fisheries Research 70(2-3):141–159.

McInerny, M.C., and T.K. Cross. 2000. Effects of sampling time, intraspecific density, and environmental variables on electrofishing catch per effort of largemouth bass in Minnesota lakes. North American Journal of Fisheries Management 20(2):328–336.

Merriman, D. 1941. Studies on the striped bass (*Roccus saxatilis*) of the Atlantic Coast. U.S. Fish and Wildlife Service Fisheries Bulletin 50(1):1–77.

Methot, R.D. 1990. Synthesis model: an adaptable framework for analysis of diverse stock assessment data. International North Pacific Fisheries Commission Bulletin 50:259–277.

Methot, R.D. 2000. Technical description of the stock synthesis assessment program. NOAA Technical Memorandum NMFS-NWFSC-43. 46 p.

Methot Jr., R.D., and C.R. Wetzel. 2013. Stock synthesis: a biological and statistical framework for fish stock assessment and fishery management. Fisheries Research 142:86–99.

Methot Jr., R.D, C.R. Wetzel, I.G. Taylor, and K. Doering. 2019. Stock synthesis user manual, version 3.30.14. NOAA Fisheries, Seattle, WA. 212 p.

Moseley, A., W.B. Robertson, and M.G. Ellzey. 1877. Annual reports of the fish commissioners of the state of Virginia for the years 1875-6 and 1876-7, together with the laws relating to fish and game passed during the session of 1876-7. Printed by order of the Senate. R.F. Walker, Superintendent Public Printing, Richmond.

Mroch, R., and C. Godwin. 2014. Stock status of Albemarle Sound-Roanoke River striped bass. North Carolina Division of Marine Fisheries, Morehead City, North Carolina. 193 p.

National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). 2016. Roanoke River diadromous fishes restoration plan. Raleigh, North Carolina. May 2016.

Nichols, P.R., and R.P. Cheek. 1966. Tagging summary of American shad, *Alosa sapidissima* (Wilson) and striped bass, *Morone saxatilis* (Walbaum). Bureau of Commercial Fisheries, Biological Laboratory, Beaufort, North Carolina, 1950–1965. U.S. Fish and Wildlife Service, SSR No. 539. 8 p.

North Carolina Department of Environmental Quality (NCDEQ). 2016. North Carolina coastal habitat protection plan. North Carolina Division of Marine Fisheries, Morehead City, North Carolina. 33 p.

North Carolina Division of Marine Fisheries (NCDMF). 2004. North Carolina estuarine striped bass fishery management plan. North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, North Carolina. 374 p.

NCDMF. 2010. Stock status of Albemarle Sound-Roanoke River striped bass. North Carolina Division of Marine Fisheries, Morehead City, North Carolina. 128 p.

NCDMF. 2014. November 2014 Revision to amendment 1 to the North Carolina estuarine striped bass fishery management plan. North Carolina Department of Environmental and Natural Resources, Division of Marine Fisheries, Elizabeth City, North Carolina. 15 p.

NCDMF. 2019. 2019 License and Statistics annual report. North Carolina Department of Environmental Quality, Division of Marine Fisheries. Morehead City, North Carolina. 430 p.

N.C. Striped Bass Study Management Board. 1991. Report on the Albemarle Sound-Roanoke River stock of striped bass. N.C. Striped Bass Study Management Board, U.S. Fish and Wildlife Service, Atlanta, Georgia. 56 p. + appendices.

Ostrach, D.J., J.M. Low-Marchelli, K.J. Eder, S.J. Whiteman, and J.G. Zinkl. 2008. Maternal transfer of xenobiotics and effects on larval striped bass in the San Francisco Estuary. Proceedings of the National Academy of Sciences of the United States of America 105(49): 19354–19359.

Pine III, 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(4):901–909.

Pollock, K.H., C.M. Jones, and T.L. Brown. 1994. Angler survey methods and their applications in fisheries management. American Fisheries Society, Symposium 25, Bethesda, Maryland.

Ralston, S. 1987. Mortality rates of snappers and groupers. Pages 375–404 *In*: J.J. Polovina and S. Ralston (eds.), Tropical Snappers and Groupers: Biology and Fisheries Management. Westview Press, Boulder Colorado. 659 p.

Reynolds, J.B. 1996. Electrofishing. Pages 221–253 *In*: B.R. Murphy and D.W. Willis (editors), Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Rudershausen, P.J., J.E. Tuomikoski, J.A. Buckel, and J.E. Hightower. 2005. Prey selectivity and diet of striped bass in western Albemarle Sound, North Carolina. Transactions of the American Fisheries Society 134(5):1059–1074.

Ruetz III, C.R., D.G. Uzarski, D.M. Krueger, and E.S. Rutherford. 2007. Sampling a littoral fish assemblage: comparison of small-mesh fyke netting and boat electrofishing. North American Journal of Fisheries Management 27(3):825–831.

Rulifson, R.A. 1990. Abundance and viability of striped bass eggs spawned in the Roanoke River, North Carolina, in 1989. North Carolina Department of Environmental Management, Health and Natural Resources and U.S. Environmental Protection Agency, Albemarle-Pamlico Estuarine Study, Raleigh, NC. Project No. 90-11. 96 p.

Rulifson, R.A. 1991. Comparing the abundance and viability of striped bass eggs spawned in the Roanoke River, North Carolina, at two locations in 1991. Interim report to the North Carolina Striped Bass Study Management Board. Institute for Coastal and Marine Resources, and Department of Biology, East Carolina University, Greenville, NC.

Rulifson, R.A., and D. Bass. 1991. Food analyses of young-of-year. Page 217-219 in NOAA Technical Memorandum NMFS-SEFC-291.

Rulifson, R.A., M.T. Huish, and R.W. Thoesen. 1982. Anadromous fish in the Southeastern United States and recommendations for development of a management plan. U.S. Fish and Wildlife Service, Fisheries Resource, Region 4, Atlanta, Georgia. 525 p.

Rulifson, R.A., and C.S. Manooch III. 1990. Recruitment of juvenile striped bass in the Roanoke River, North Carolina, as related to reservoir discharge. North American Journal of Fisheries Management 10(4):397–407.

Schaaf, W. 1997. Status of the Albemarle Sound-Roanoke River striped bass stock in 1997. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Schoenebeck, C.W., and M.J. Hansen. 2005. Electrofishing catchability of walleyes, largemouth bass, smallmouth bass, northern pike, and muskellunge in Wisconsin lakes. North American Journal of Fisheries Management 25(4):1341–1352.

Secor, D.H. 2000. Longevity and resilience of Chesapeake Bay striped bass. ICES Journal of Marine Science 57(4):808–815.

Setzler, E.M., W.R. Boynton, K.V. Wood, H.H. Zion, L. Lubbers, N.K. Mountford, P. Frere, L. Tucker, and J.A. Mihursky. 1980. Synopsis of biological data on striped bass. NOAA Technical Report, NMFS Circular 443: FAO Synopsis No. 121. 69 p.

Signorell, A. et mult. al. 2019. DescTools: tools for descriptive statistics. R package version 0.99.30.

Smith, H.M. 1907. North Carolina geological and economic survey. Volume II. The fishes of North Carolina. E.M. Uzzell & Co., State Printers and Binders, Raleigh. 452 p.

Smith, D. 1996. Annual survival of Albemarle Sound striped bass: a report to the ASMFC Striped Bass Stock Assessment Committee. ASMFC, Washington, D.C.

Speas, D.W., C.J. Walters, D.L. Ward, and R.S. Rogers. 2004. Effects of intraspecific density and environmental variables on electrofishing catchability of brown and rainbow trout in the Colorado River. North American Journal of Fisheries Management 24(2):586–596.

Stevens, D.E. 1966. Food habits of striped bass, *Roccus saxatilis*, in the Sacramento-San Joaquin Delta. Pages 68–96 *In*: J.L. Turner and D.W. Kelley (compilers), Ecological studies of the Sacramento-San Joaquin Delta. Part H. Fishes of the delta. California Department Fish Game Fishery Bulletin 136.

Street, M.W., A.S. Deaton, W.S. Chappell, and P.D. Mooreside. 2005. North Carolina Coastal Habitat Protection Plan. North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, North Carolina. 656 p.

Street, M.W., and H.B Johnson. 1977. Striped bass in North Carolina. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Street, M.W., P.P. Pate, Jr., B.F. Holland, Jr., and A.B. Powell. 1975. Anadromous fisheries research program, northern coastal region. Project AFCS-8, Completion Report. North Carolina Division of Marine Fisheries. 193 + 62 p and Append.

Sullivan, C. 1956. The importance of size grouping in population estimates employing electric shockers. Progress Fish-Culturist 18(4):188–190.

Sykes, J.E. 1957. A method of determining the sex of the striped bass, *Roccus saxatilis* (Walbaum). Transactions of the American Fisheries Society 87(1):104–107.

Takade, H.M. 2006. Stock status of Albemarle Sound-Roanoke River striped bass. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Takade, H.M. 2010. Stock status of Albemarle Sound-Roanoke River striped bass. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

Taylor, I.G., I.J. Stewart, A.C. Hicks, T.M. Garrison, A.E. Punt, J.R. Wallace, C.R. Wetzel, JT. Thorson, Y. Takeuchi, K. Ono, C.C. Monnahan, C.C. Stawitz, Z.T. A'mar, A.R. Whitten, K.F. Johnson, R.L. Emmet, S.C. Anderson, G.I. Lambert, M.M. Stachura, A.B. Cooper, A. Stephens, N.L. Klaer, C.R. McGilliard, I. Mosqueira, W.M. Iwasaki, K. Doering, and A.M. Havron. 2019. r4ss: R code for stock synthesis. R package version 1.35.3. https://github.com/r4ss

Taylor, M.J., and K.R. White. 1992. A meta-analysis of hooking mortality of nonanadromous trout. North American Journal of Fisheries Management 12(4):760–767.

Then, A.Y., J.M. Hoenig, N.G. Hall, and D.A. Hewitt. 2015. Evaluating the predictive performance of empirical estimators of natural mortality rate using information on over 200 fish species. ICES Journal of Marine Science 72(1):82–92.

Trent, L., and W.W. Hassler. 1966. Feeding behavior of adult striped bass, *Roccus saxatilis*, in relation to stages of sexual maturity. Chesapeake Science 7(4):189–192.

Trent, L., and W.W. Hassler. 1968. Gill net selection, migration, size and age composition, sex ratio, harvest efficiency, and management of striped bass in the Roanoke River, North Carolina. Chesapeake Science 9(4):217–232.

Tuomikoski, J.E., P.J. Rudershausen, J.A. Buckel, and J.E. Hightower. 2008. Effects of age-1 striped bass predation on juvenile fish in western Albemarle Sound. Transactions of the American Fisheries Society 137(1):324–339.

Vladykov, V.D., and D.H. Wallace. 1952. Studies of the striped bass, *Roccus saxatilis* (Walbaum), with special reference to the Chesapeake Bay region during 1936–1938. Bulletin of the Bingham Oceanographic Collection (Yale University) 14(1):132–177.

Walters, C.J., and S.J.D. Martell. 2004. Fisheries ecology and management. Princeton University Press, Princeton, New Jersey. 448 p.

Warren, W.G. 1994. The potential of sampling with partial replacement for fisheries surveys. ICES Journal of Marine Science 51(3):315–324.

Warren, W.G. 1995. Juvenile abundance index workshop—consultant's report. Appendix 1 *In*: P.J. Rago, C.D. Stephen, and H.M. Austin (editors), Report of the juvenile abundances indices workshop. Atlantic States Marine Fisheries Commission, Special Report No. 48, Washington, D.C. 83 p.

Welch, T.J., M.J. van den Avyle, R.K. Betsill, and E.M. Driebe. 1993. Precision and relative accuracy of striped bass age estimates from otoliths, scales, and anal fin rays and spines. North American Journal of Fisheries Management 13(3):616–620.

Worth, S.G. 1904. Report on operations with the striped bass at the Weldon North Carolina sub-station in May 1904. Department of Commerce and Labor, Bureau of Fisheries.

Zincone, L.H., and R.A. Rulifson. 1991. Instream flow and striped bass recruitment in the lower Roanoke River, North Carolina. Rivers 2(2):125–137.

Zuur, A.F., E.N. Ieno, N.J. Walker, A.A. Saveliev, and G.M. Smith. 2009. Mixed effects models and extensions in ecology with R. Springer-Verlag, New York. 574 p.

Zuur, A.F., A.A. Saveliev, and E.N. Ieno. 2012. Zero inflated models and generalized linear mixed models with R. Highland Statistics Ltd, United Kingdom. 324 p.

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.

	Commercial Landings	Commercial Discards	Recreational Harvest		Recreational Discards	
	ASMA	ASMA	ASMA	RRMA	ASMA	RRMA
Year	**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.

Year	ASMA Commercial		ASMA Recreational		RRMA Recreational	
	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.

Year	Fishing Mortality	
	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

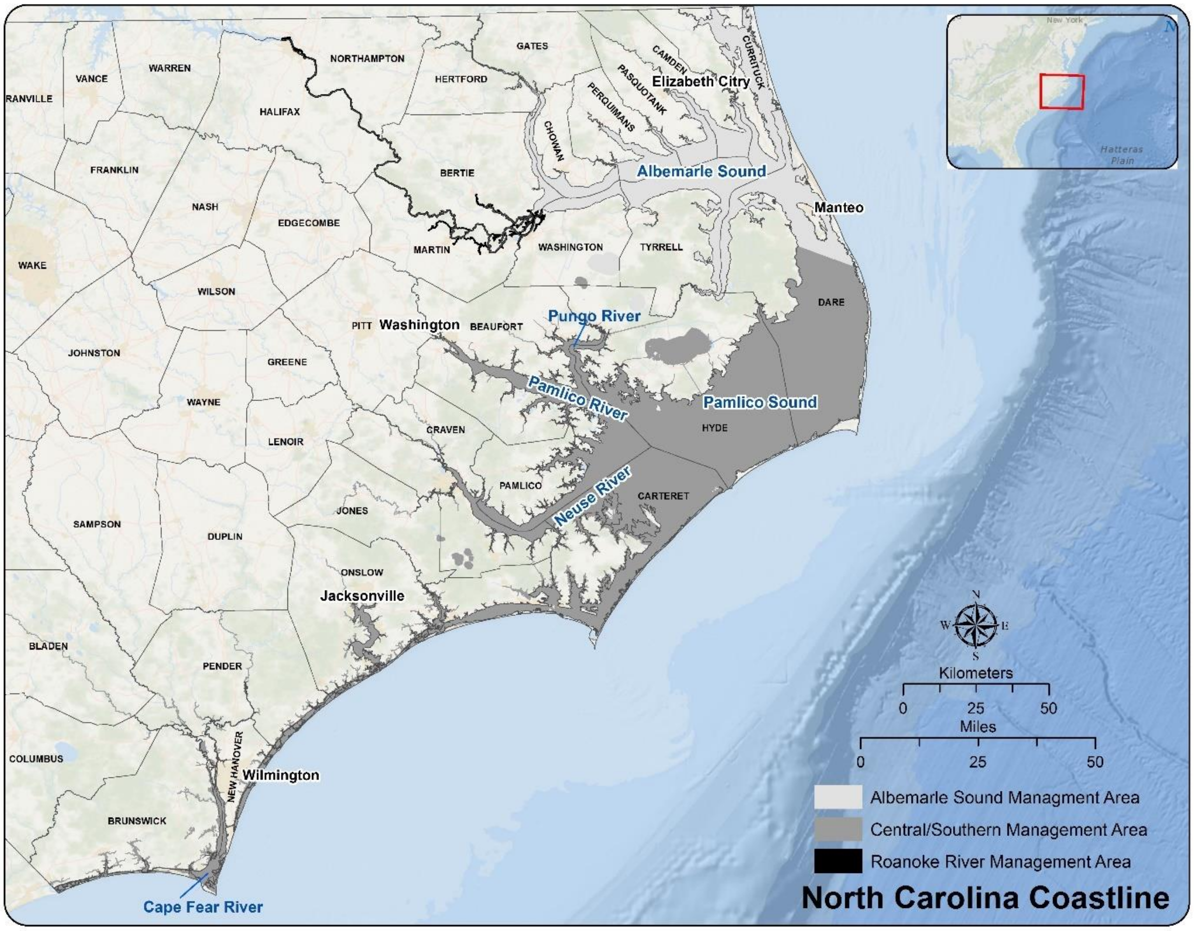


Figure 1.1. Boundary lines defining the Albemarle Sound Management Area, Central-Southern Management Area, and the Roanoke River Management Area.

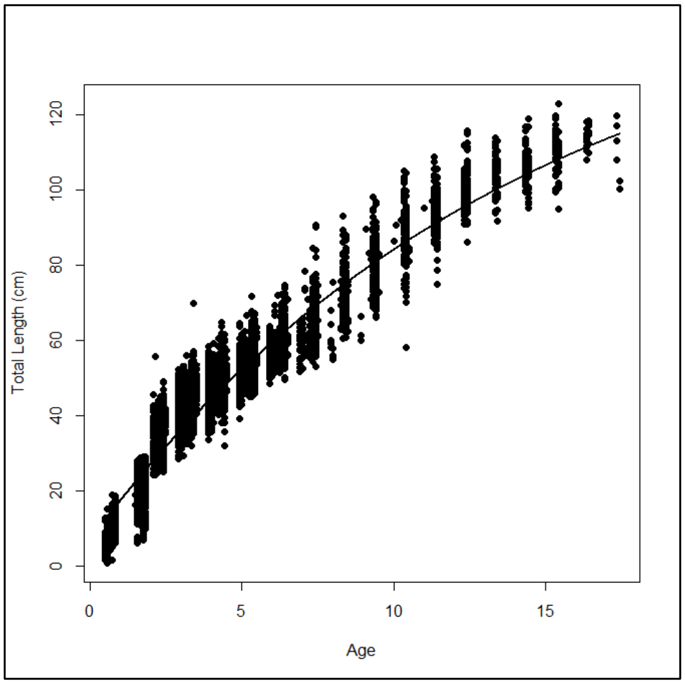


Figure 1.2. Fit of the age-length function to available age data for female striped bass.

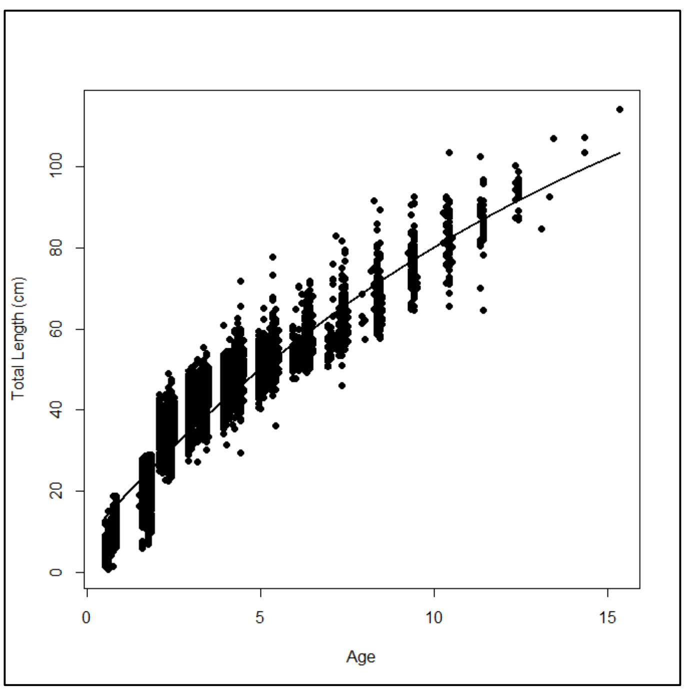


Figure 1.3. Fit of the age-length function to available age data for male striped bass.

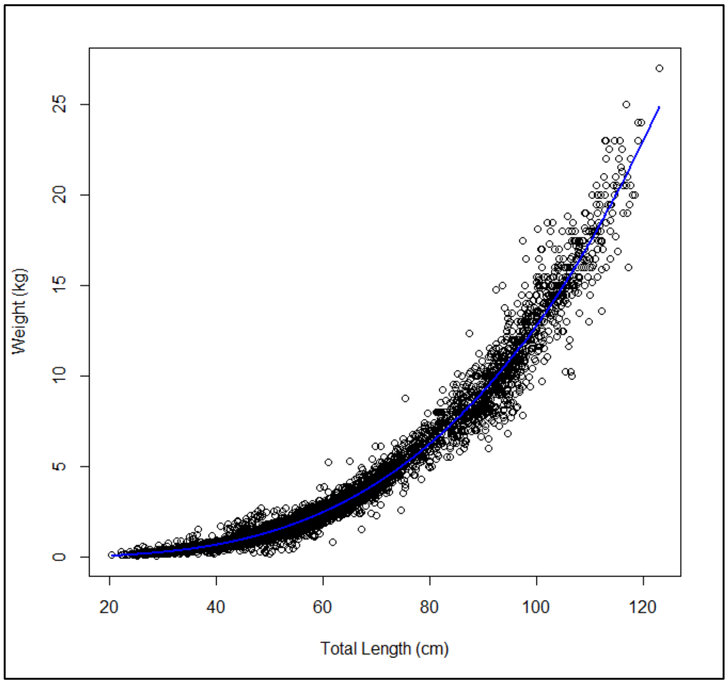


Figure 1.4. Fit of the length-weight function to available biological data for female striped bass.

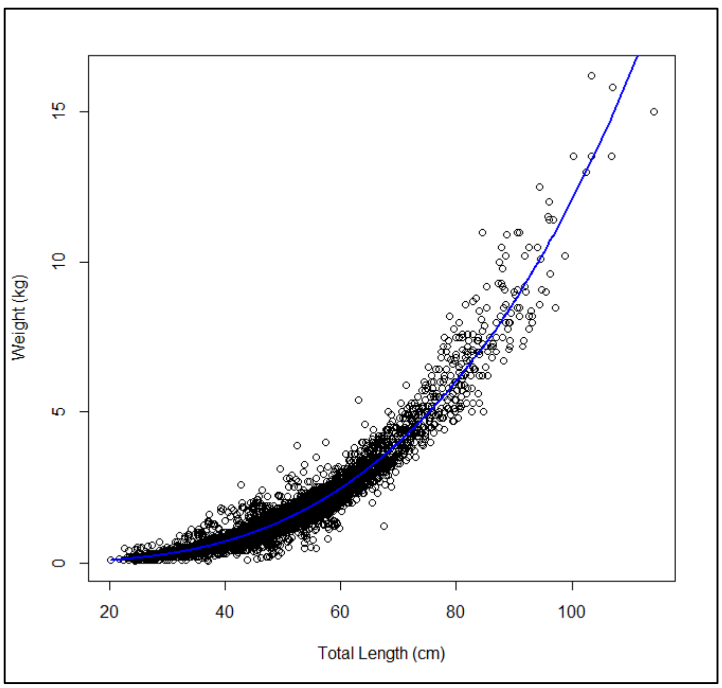


Figure 1.5. Fit of the length-weight function to available biological data for male striped bass.

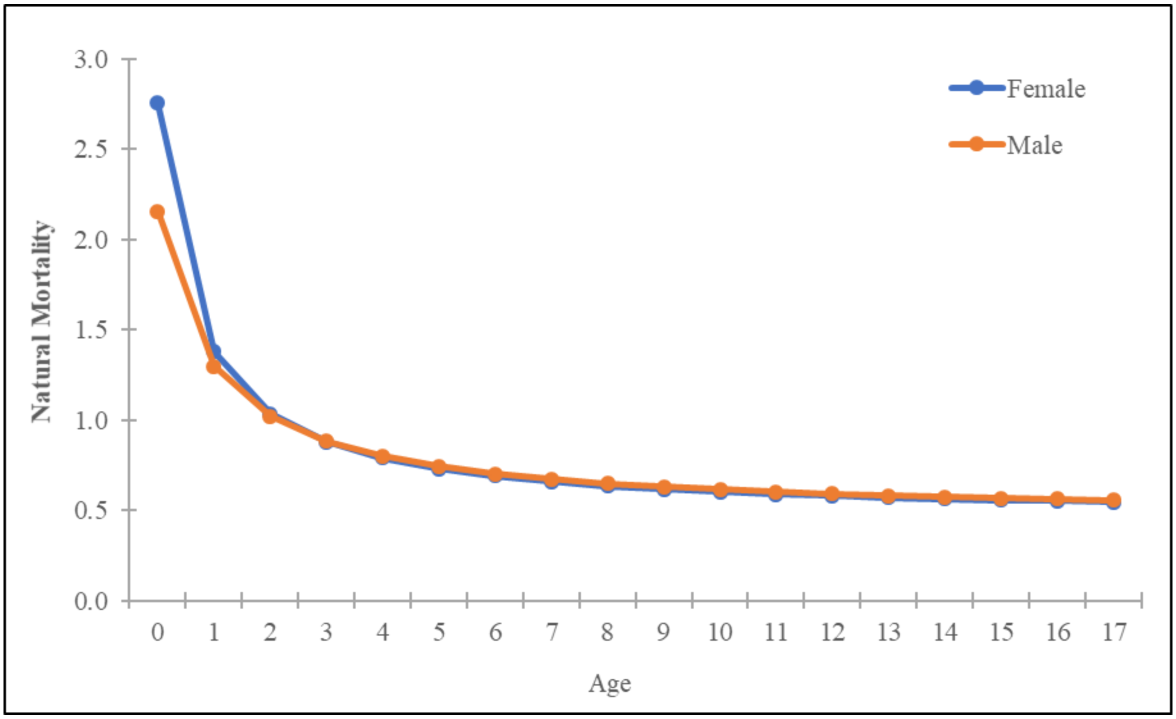


Figure 1.6. Estimates of natural mortality at age based on the method of Lorenzen (1996).

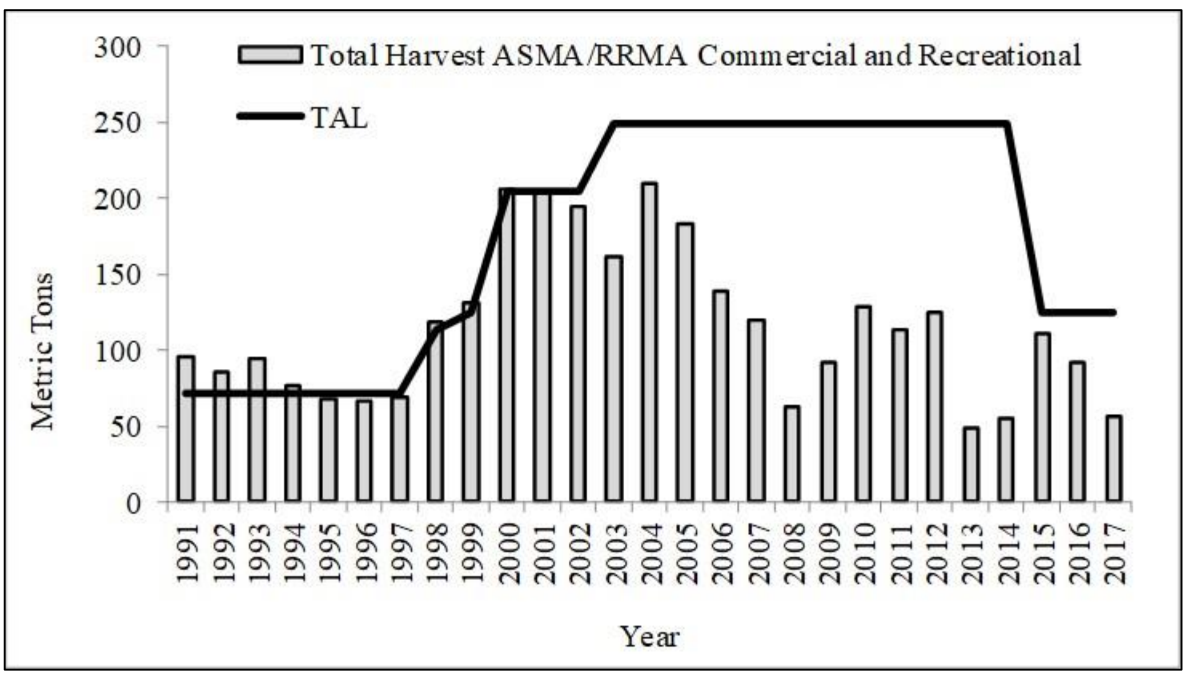


Figure 1.7. Annual total landings/harvest in metric tons of striped bass from the ASMA and RRMA commercial and recreational sectors combined compared to the TAL, 1991–2017.

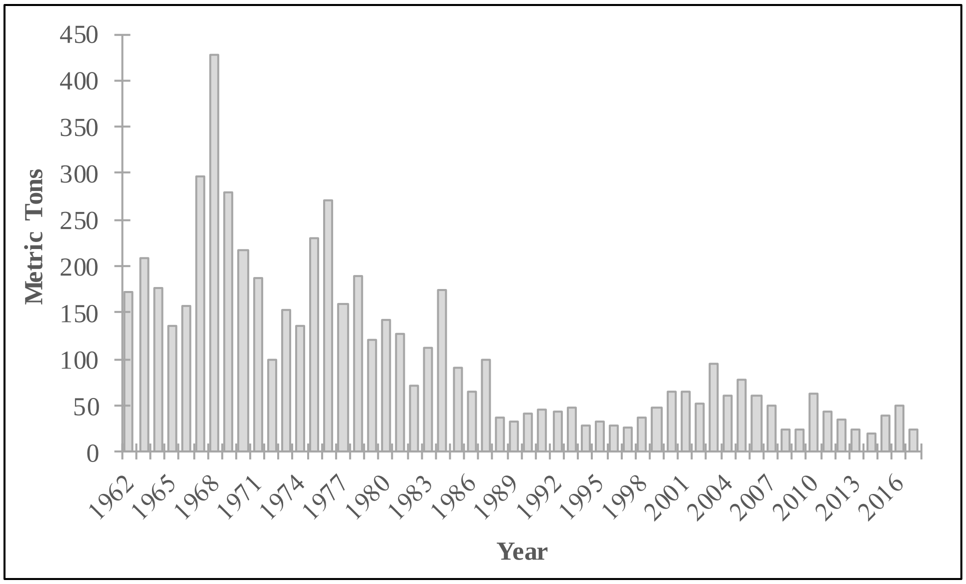


Figure 2.1. Annual commercial landings of striped bass in the ASMA-RRMA, 1962–2017.

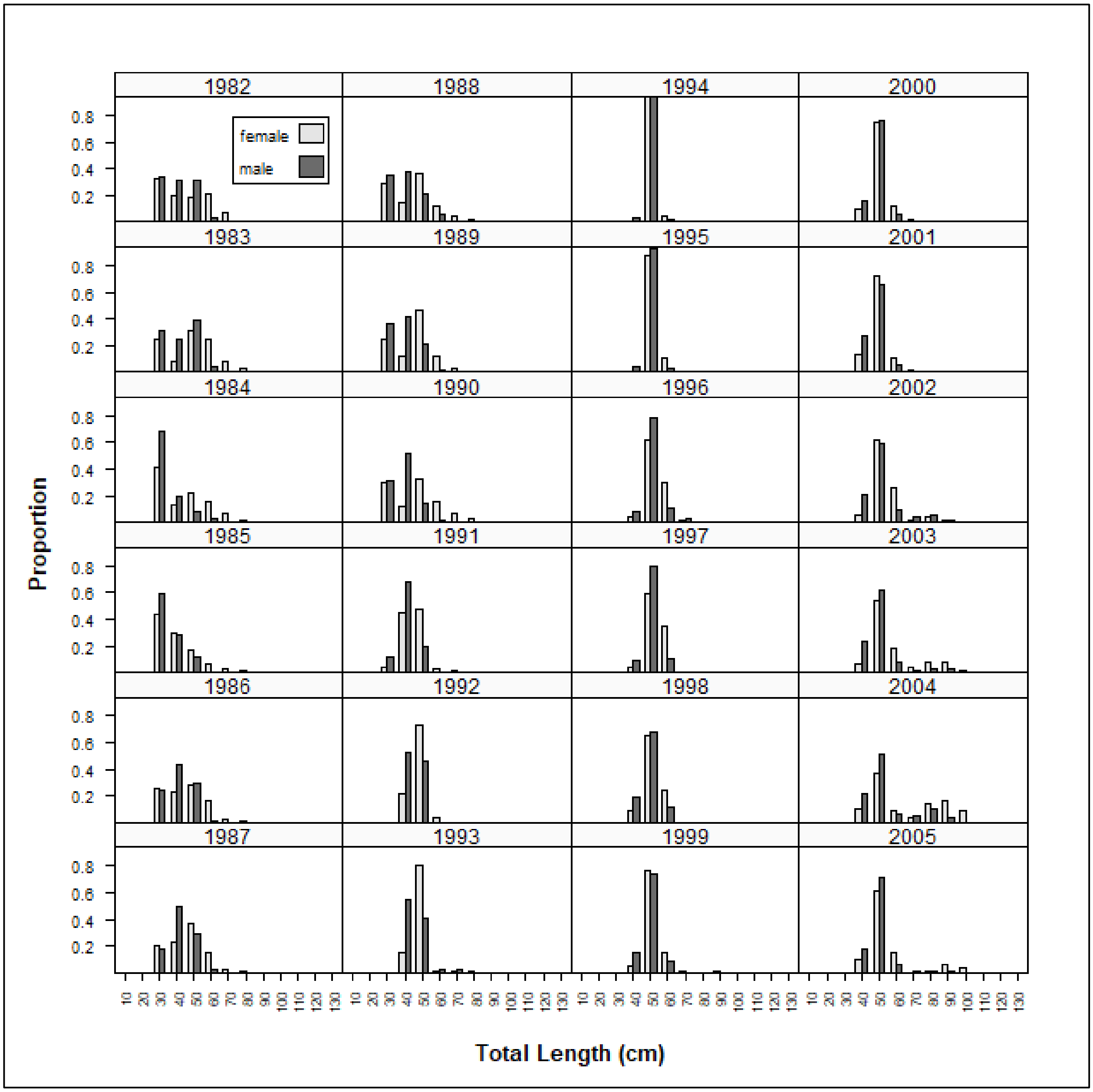


Figure 2.2. Annual length frequencies of striped bass commercial landings, 1982–2005.

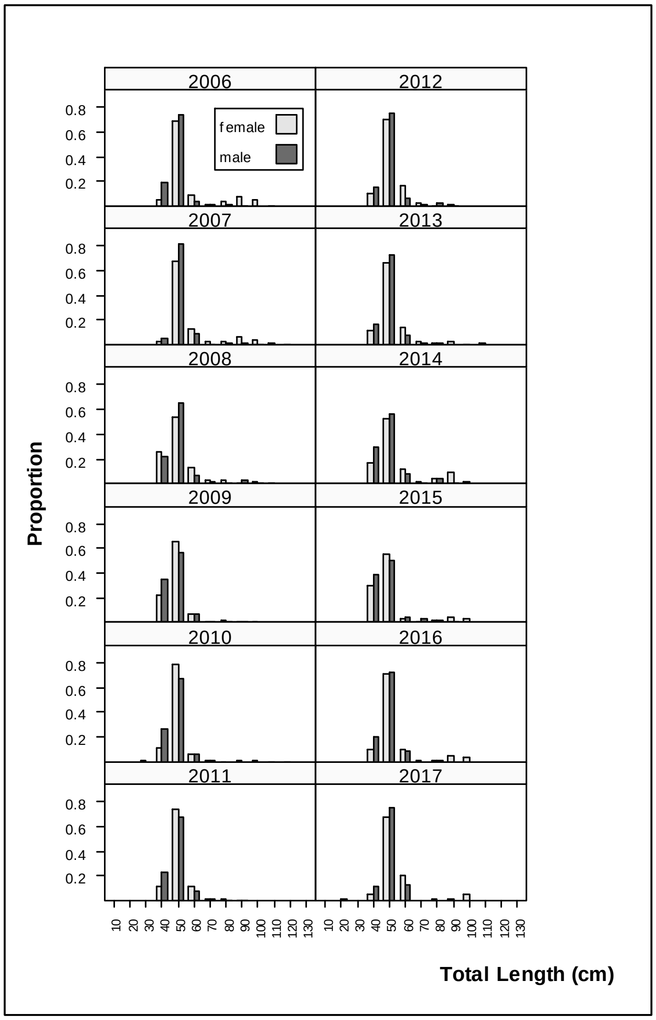


Figure 2.3. Annual length frequencies of striped bass commercial landings, 2006–2017.

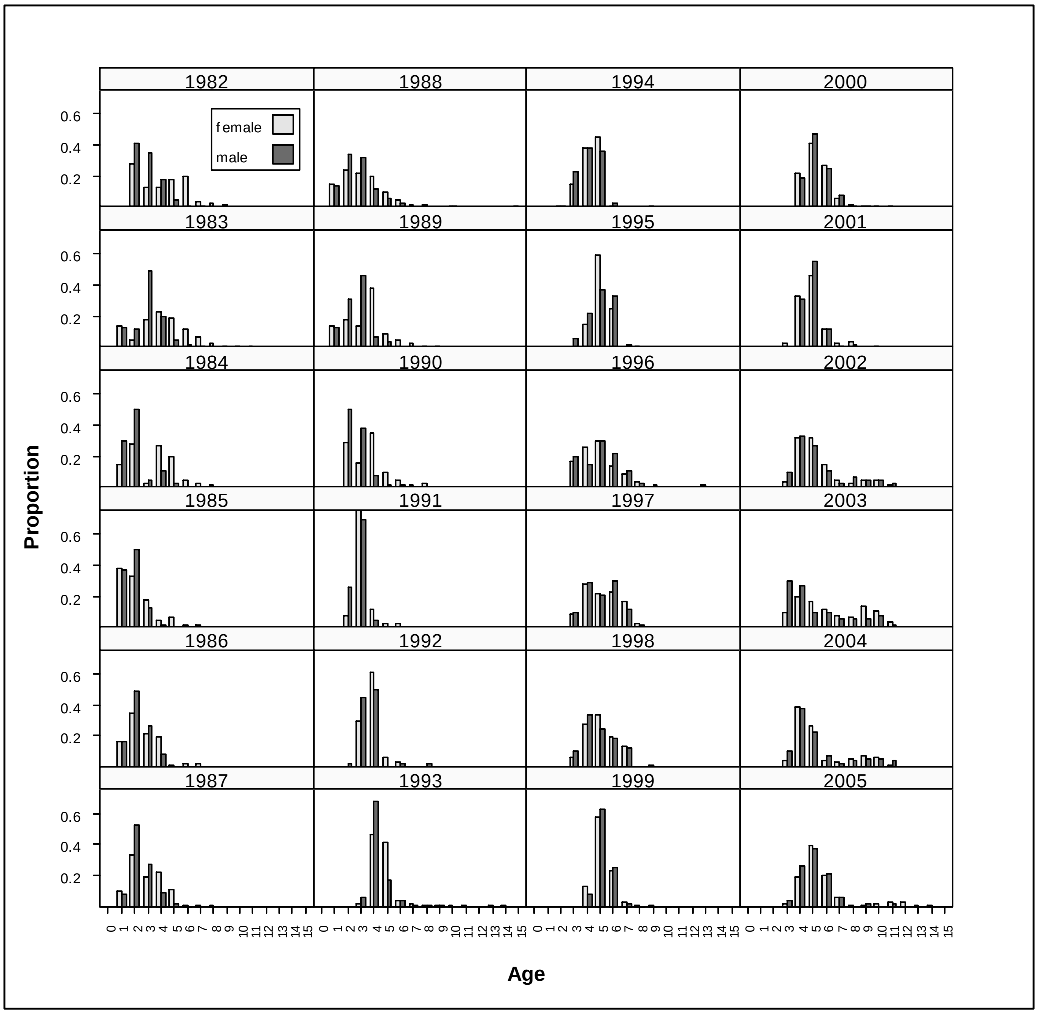


Figure 2.4. Annual age frequencies of striped bass commercial landings, 1982–2005. The age-15 bin represents a plus group.

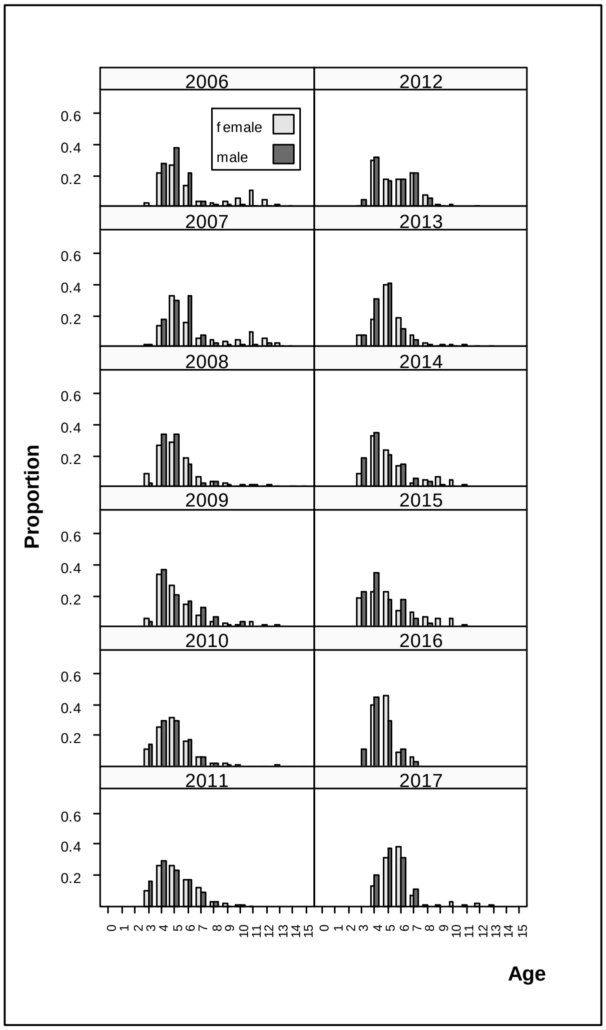


Figure 2.5. Annual age frequencies of striped bass commercial landings, 2006–2017. The age-15 bin represents a plus group.

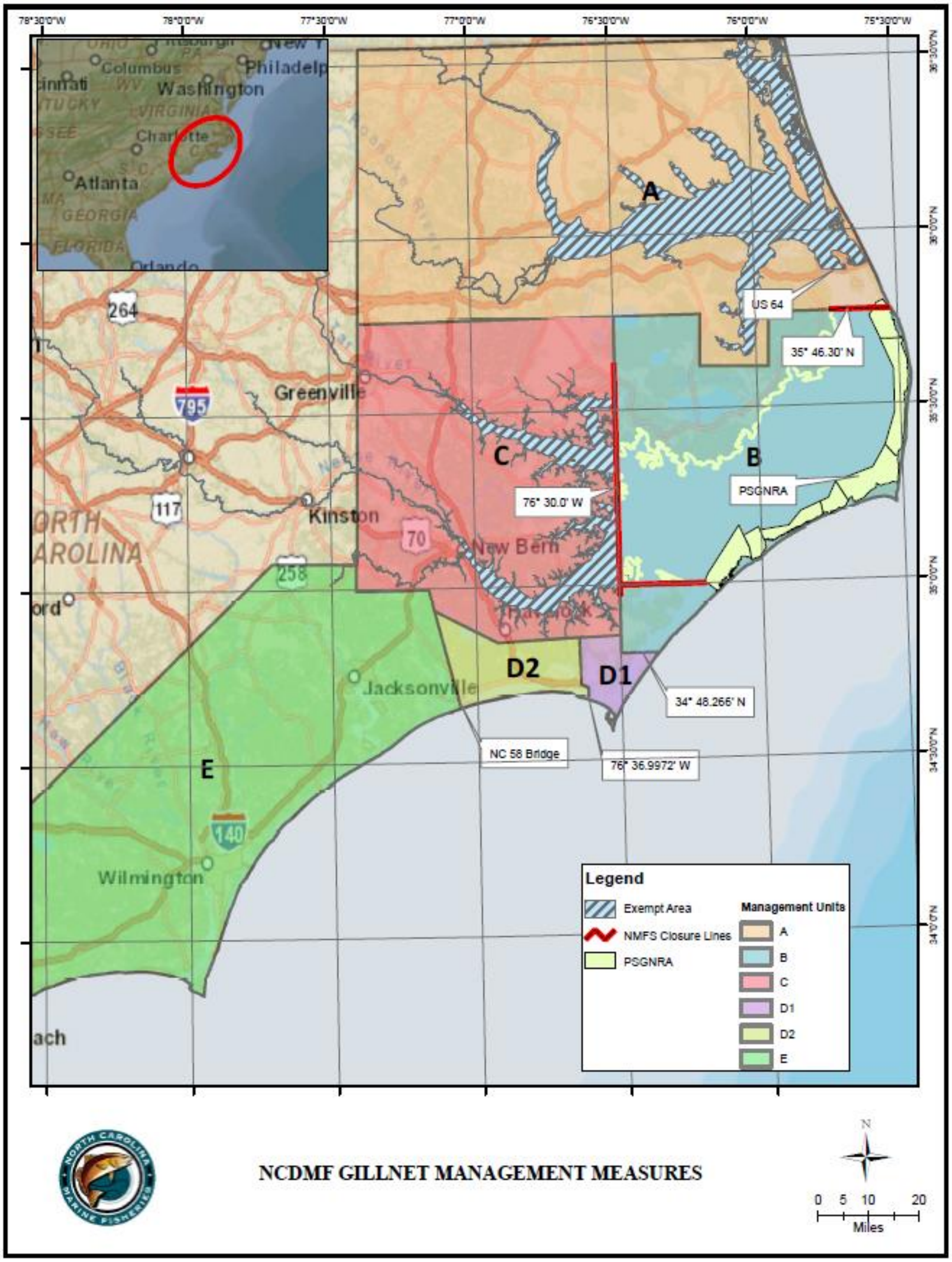


Figure 2.6. Management areas used in development of GLM for commercial gill-net discards.

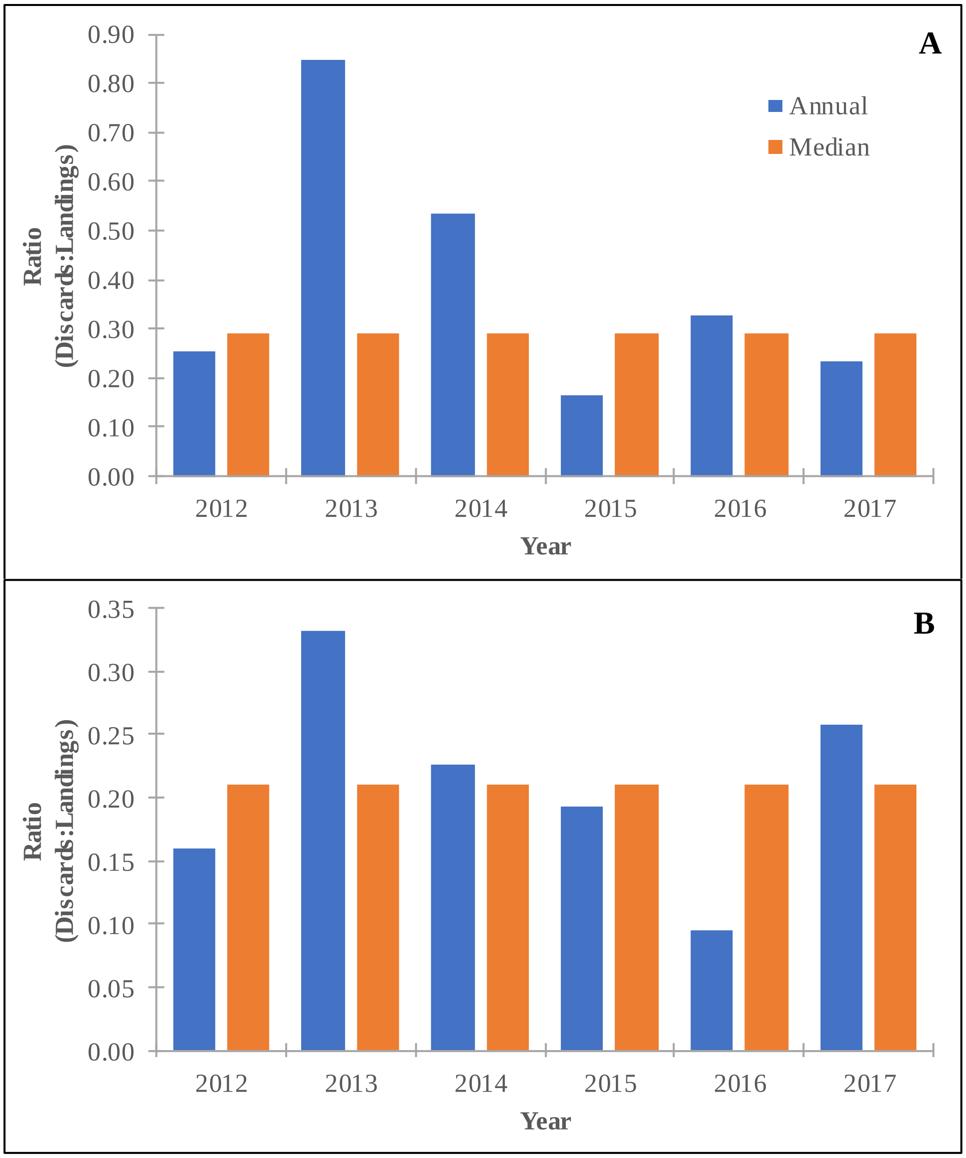


Figure 2.7. Ratio of commercial (A) live and (B) dead discards to commercial landings, 2012–2017.

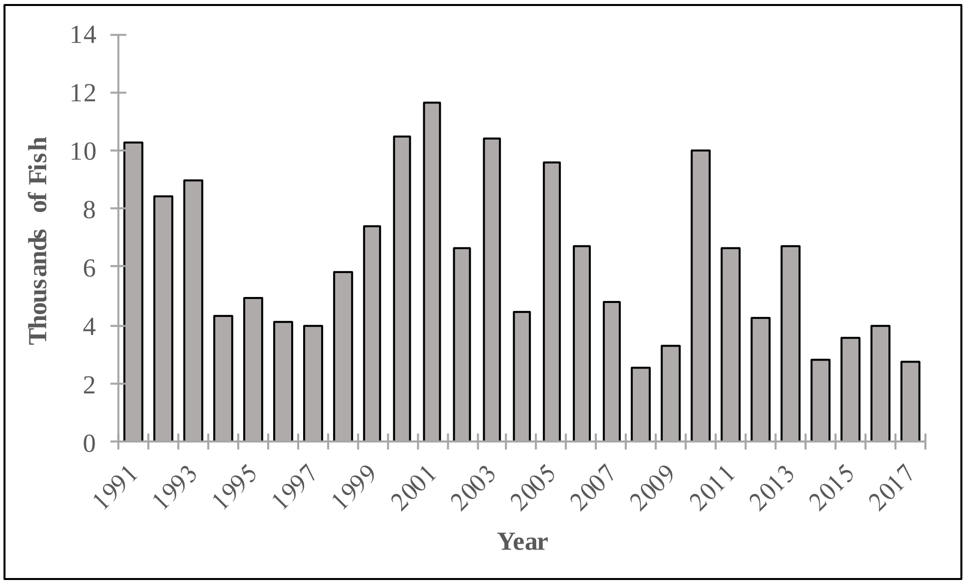


Figure 2.8. Annual estimates of commercial gill-net discards, 1991–2017. Note that values prior to 2012 were estimated using a hindcasting approach.

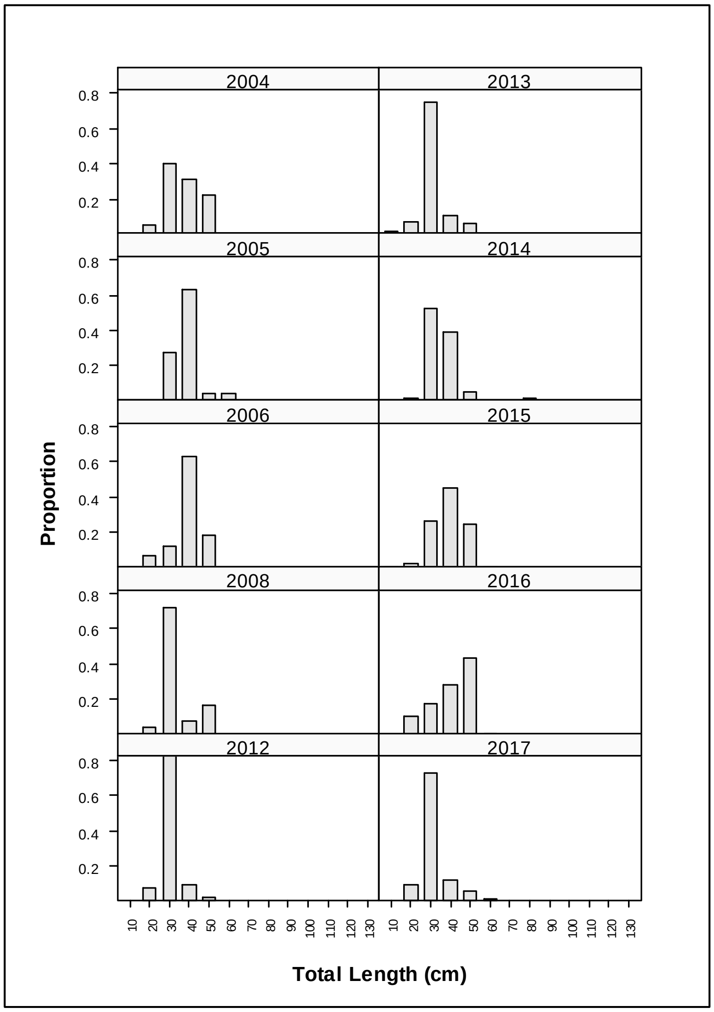


Figure 2.9. Annual length frequencies of striped bass commercial gill-net discards, 2004–2017.

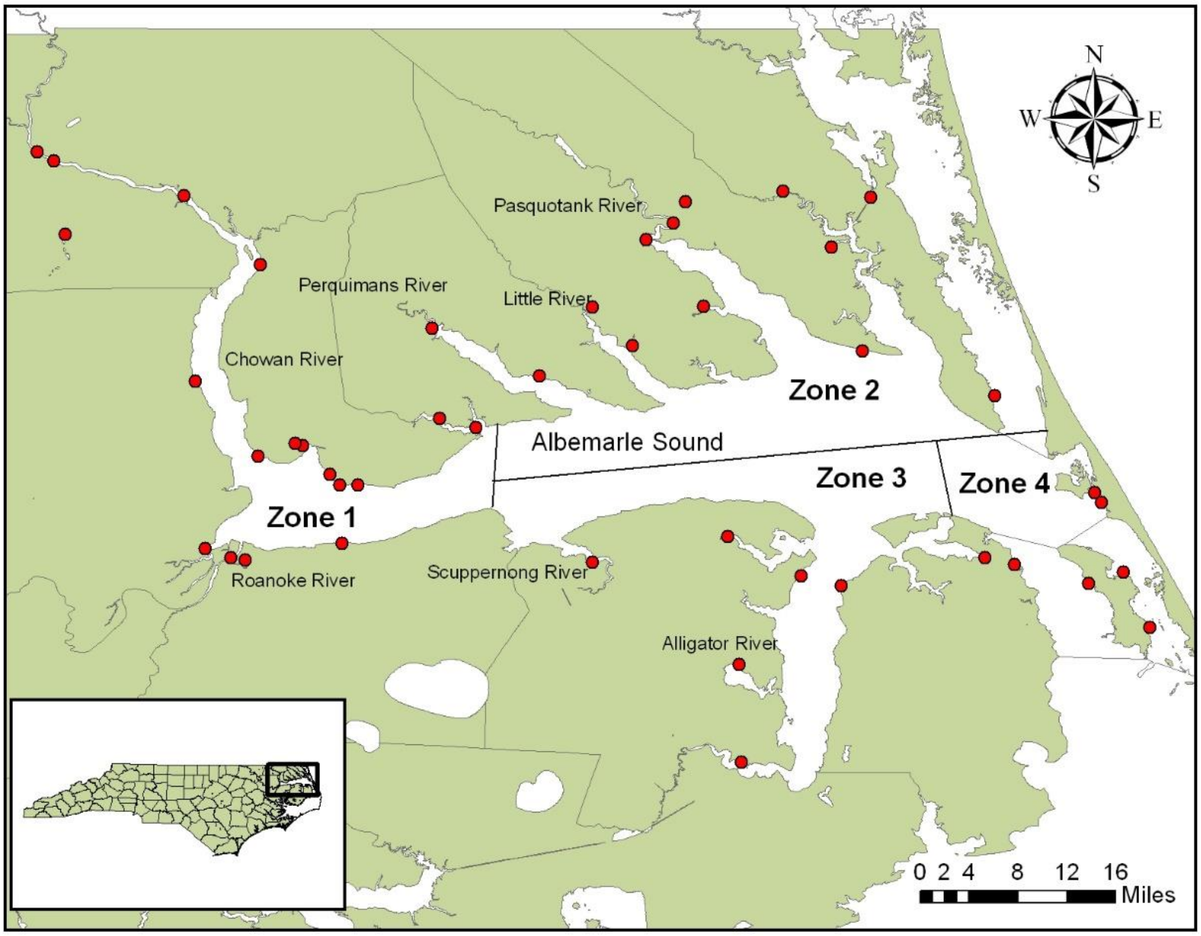


Figure 2.10. Sampling zones and access sites of the striped bass recreational creel survey in the ASMA.

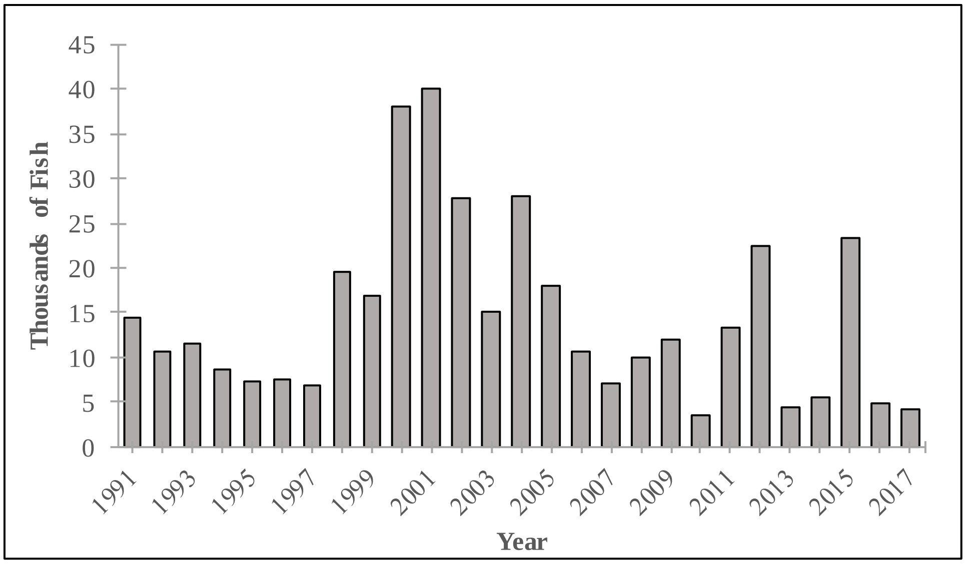


Figure 2.11. Annual estimates of recreational harvest for the Albemarle Sound, 1991–2017.

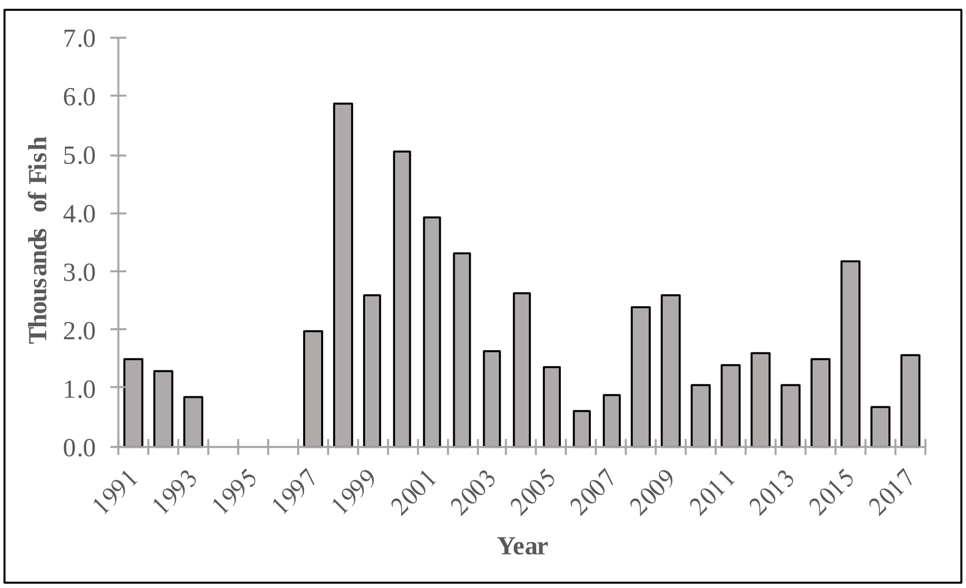


Figure 2.12. Annual estimates of recreational dead discards for the Albemarle Sound, 1991–2017.

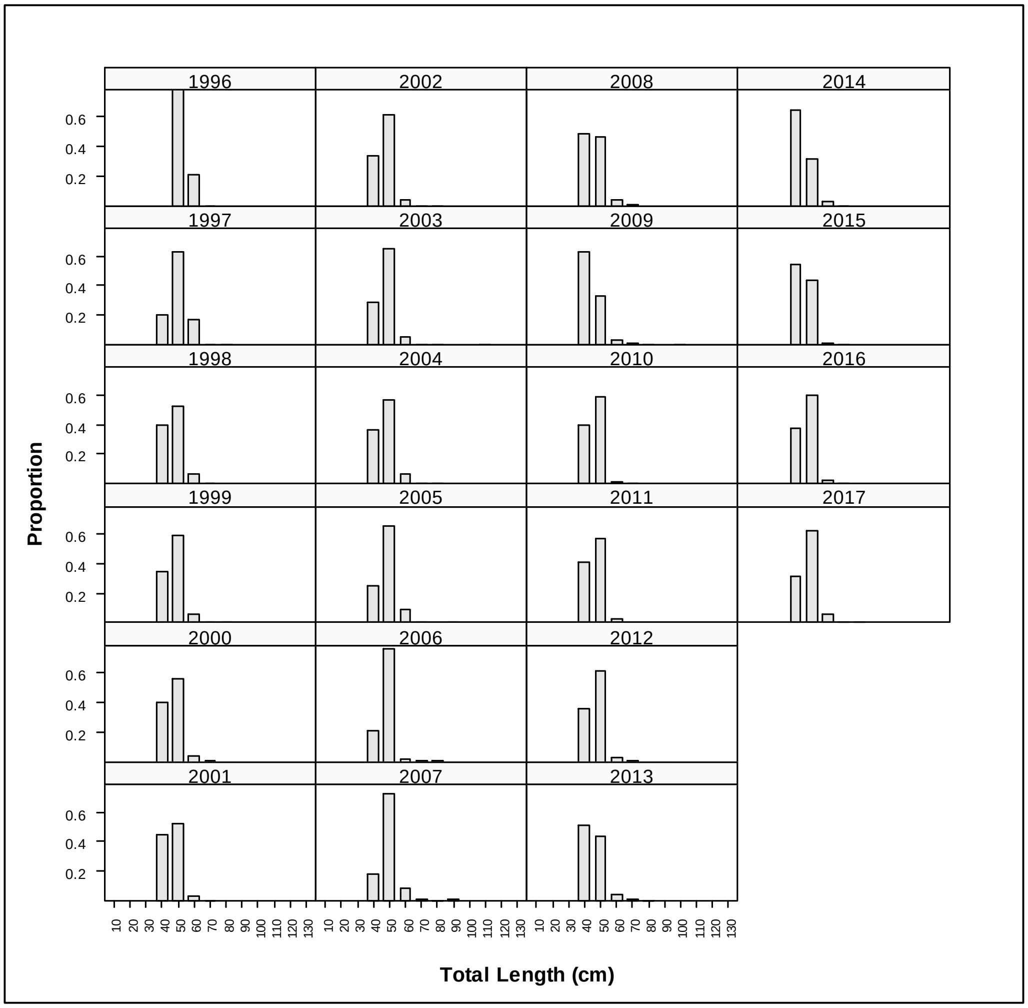


Figure 2.13. Annual length frequencies of striped bass recreational harvest in the Albemarle Sound, 1996–2017.

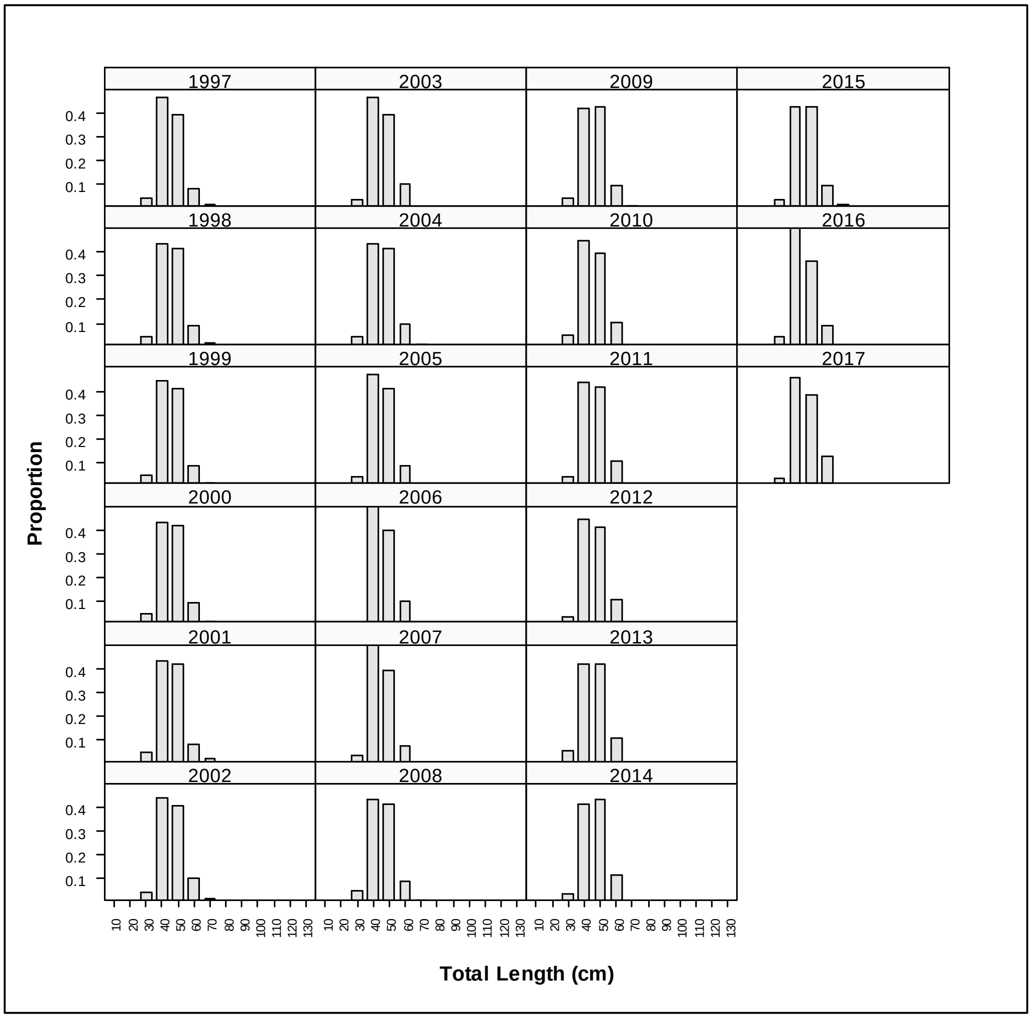


Figure 2.14. Annual length frequencies of striped bass recreational discards in the Albemarle Sound, 1997–2017.

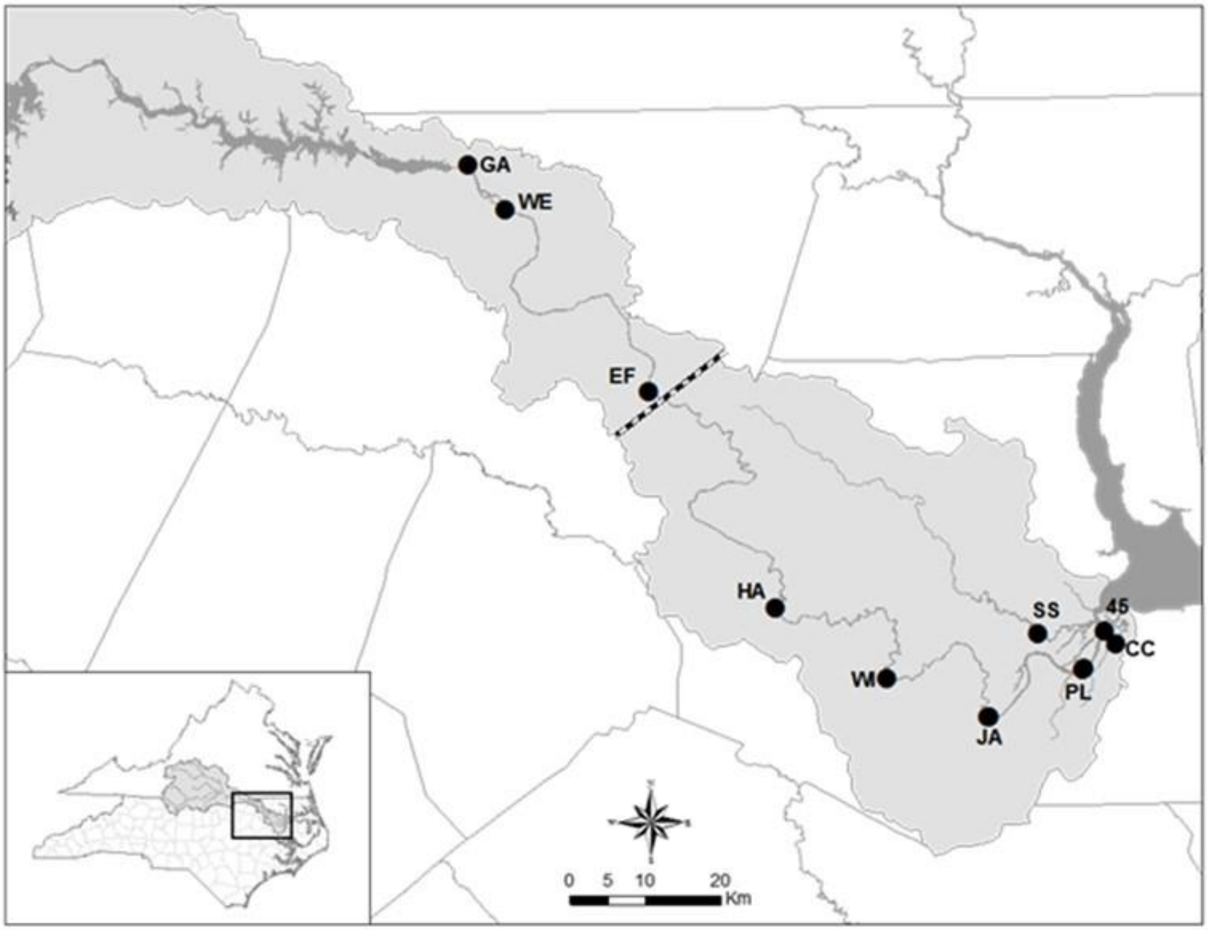


Figure 2.15. Map of angler creel survey interview locations in the RRMA, NC. The dashed line indicates the demarcation point between the upper and lower zones. Zone 1 access areas include (GA) Gaston (US HWY 48), (WE) Weldon, and (EF) Scotland Neck (Edwards Ferry US HWY 258). Zone 2 access areas include (HA) Hamilton, (WI) Williamston, (JA) Jamesville, (PL) Plymouth, (45) US HWY 45, (CC) Conaby Creek, and (SS) Sans Souci (Cashie River).

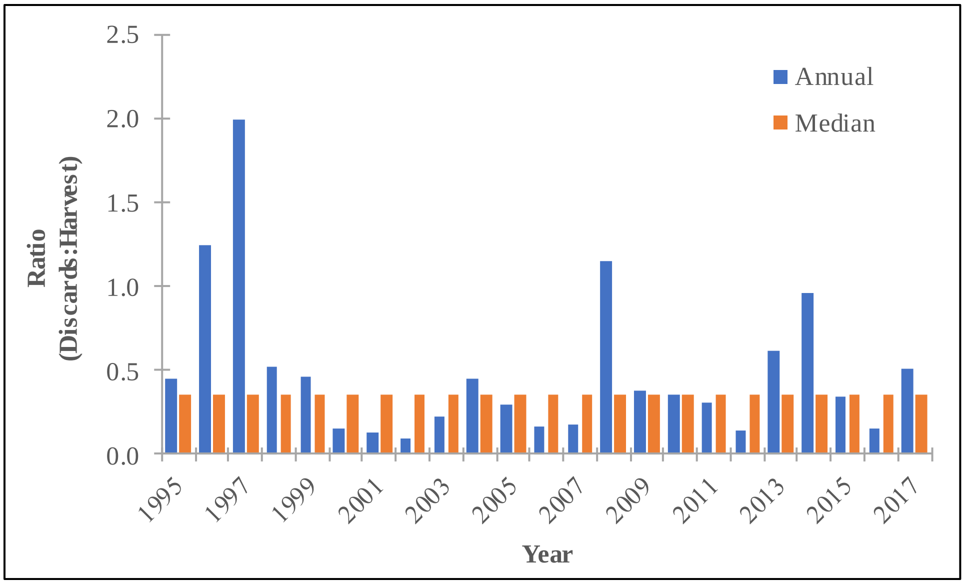


Figure 2.16. Ratio of recreational dead discards to recreational harvest in the Roanoke River, 1995–2017.

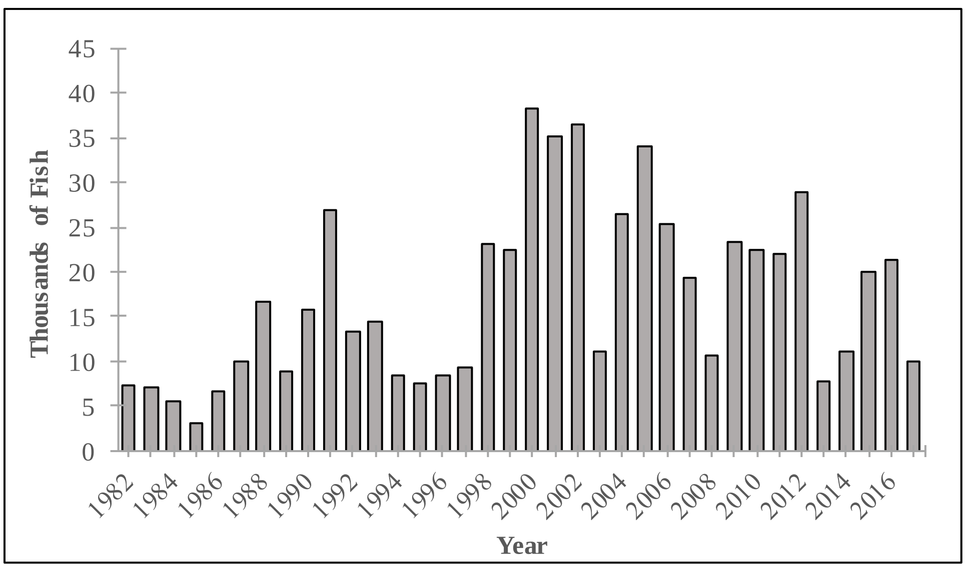


Figure 2.17. Annual estimates of recreational harvest for the Roanoke River, 1982–2017.

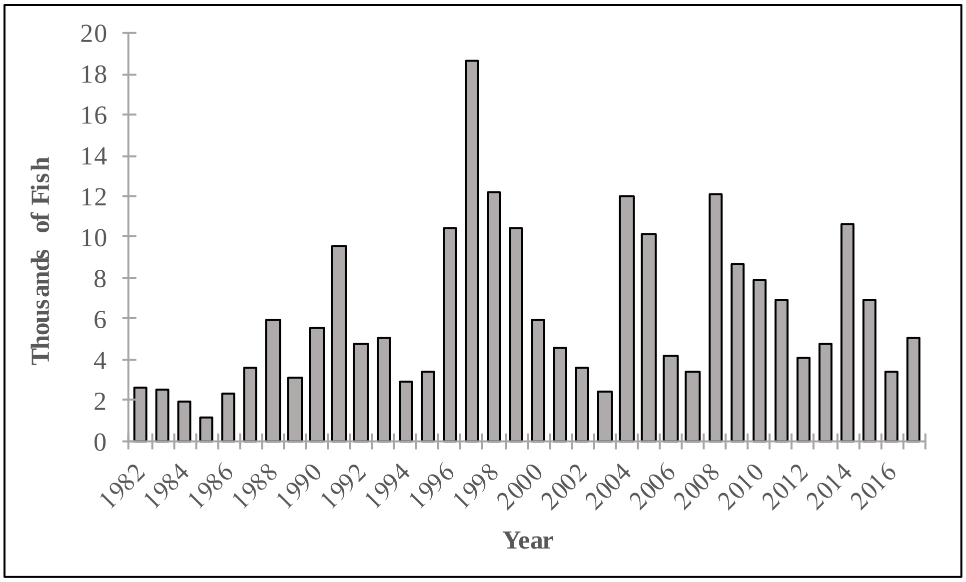


Figure 2.18. Annual estimates of recreational dead discards for the Roanoke River, 1982–2017. Note that discard values prior to 1995 were estimated using a hindcasting approach.

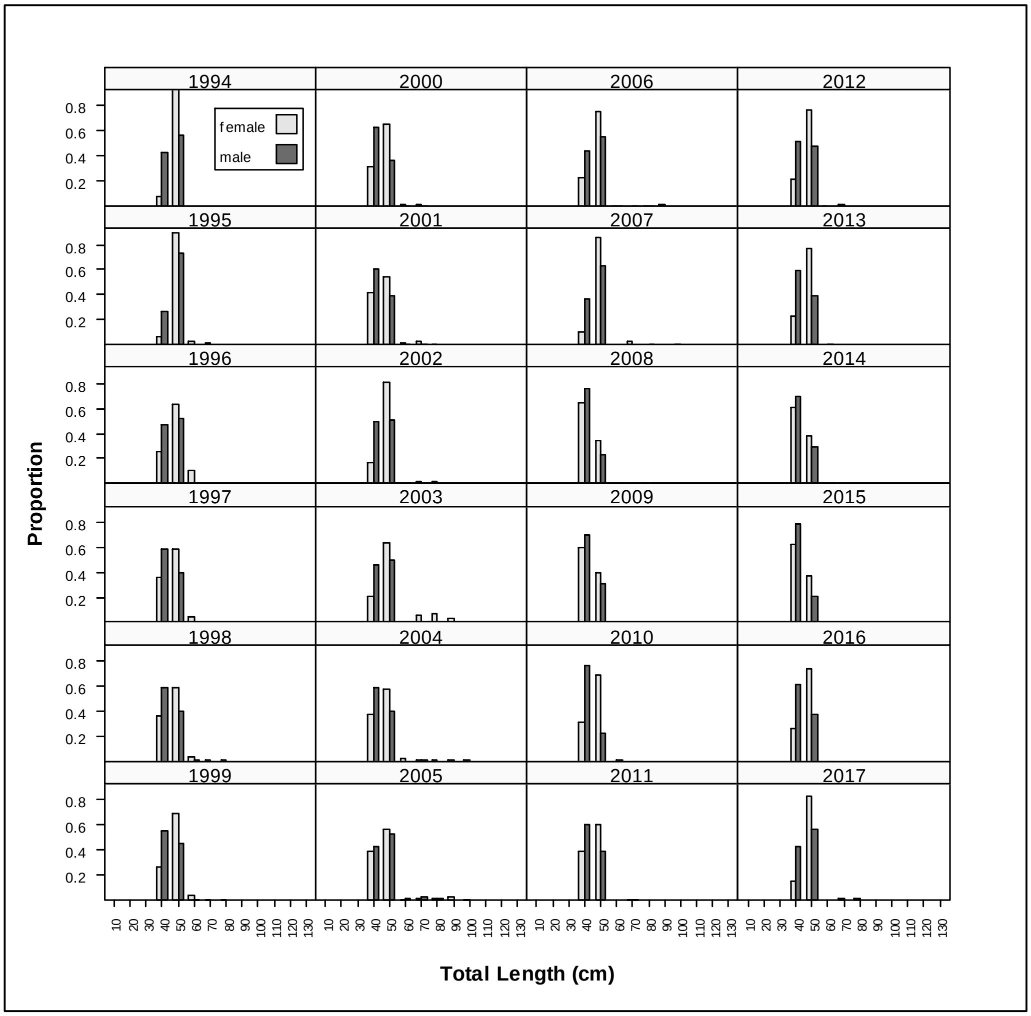


Figure 2.19. Annual length frequencies of striped bass recreational harvest in the Roanoke River, 1994–2017.

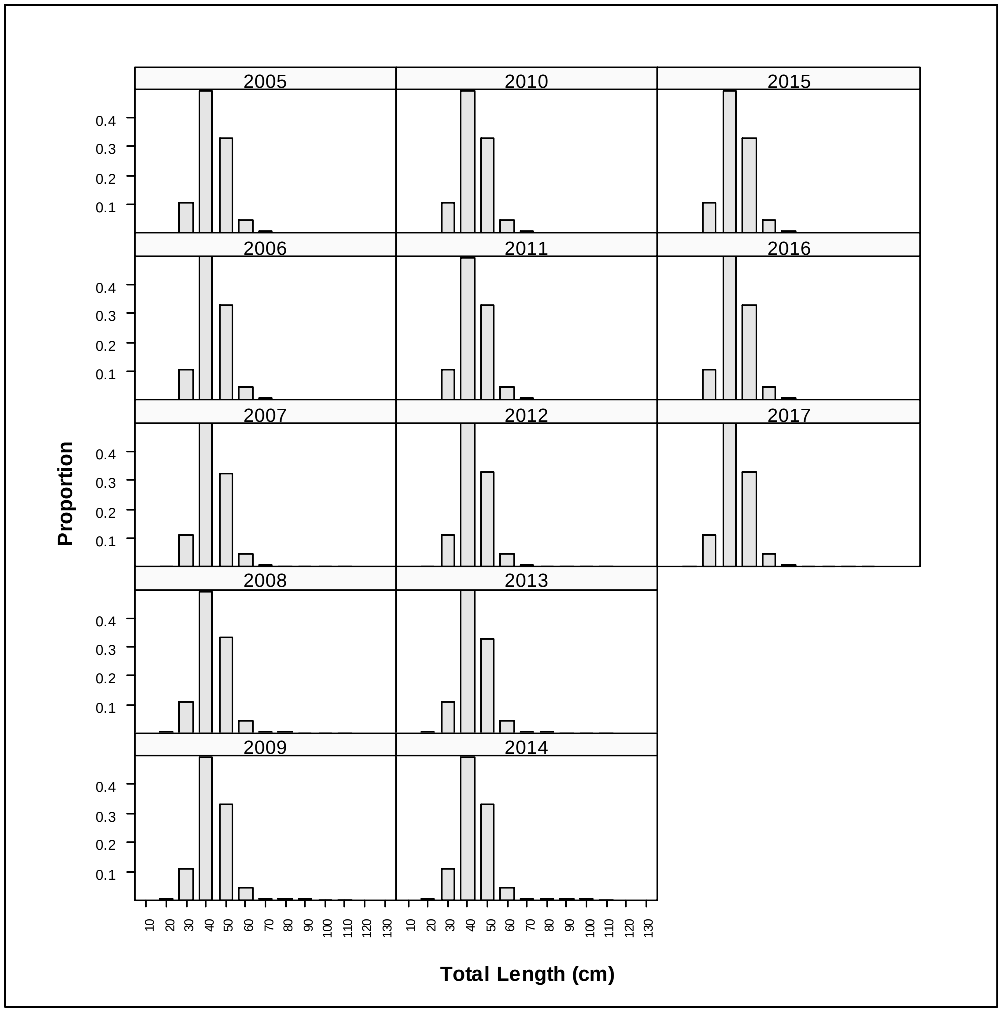


Figure 2.20. Annual length frequencies of striped bass recreational discards in the Roanoke River, 2005–2017.

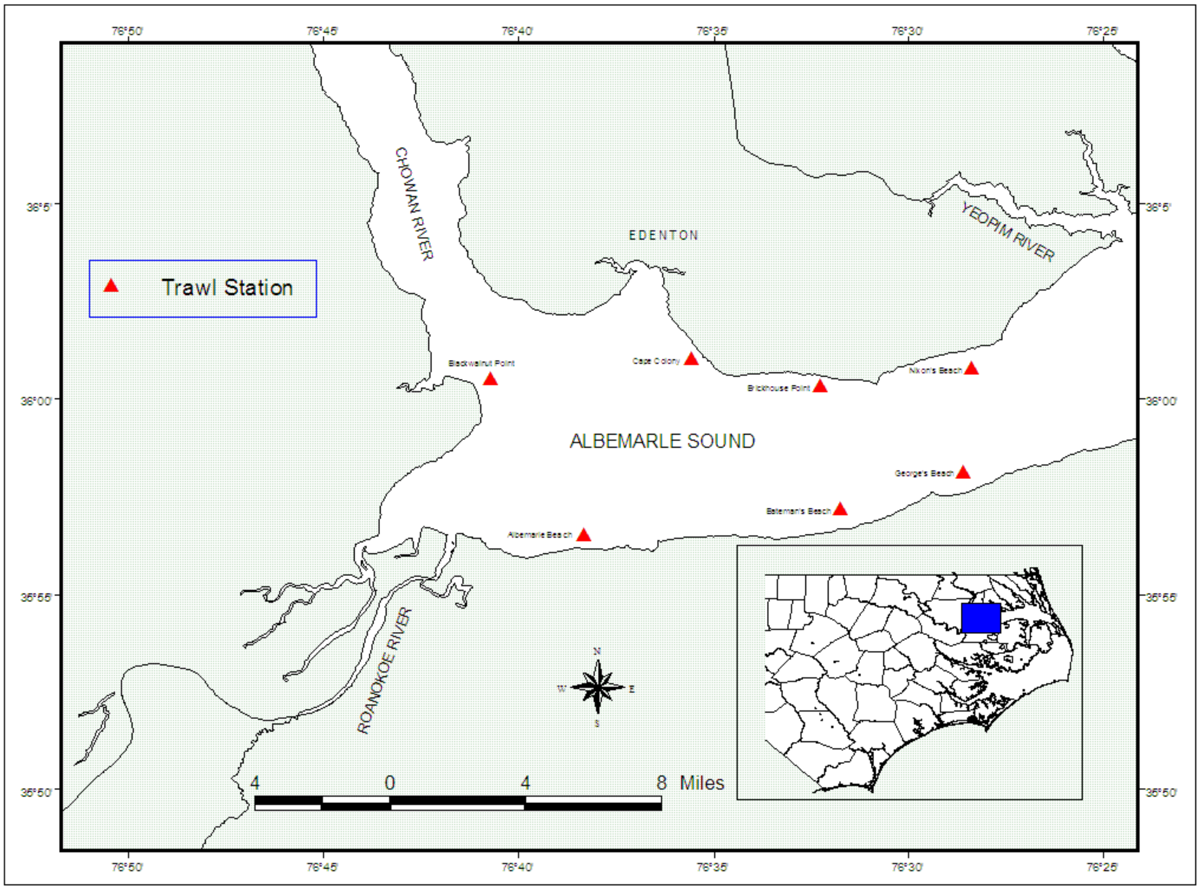


Figure 2.21. Map of NCDMF Juvenile Abundance Survey (Program 100) sampling sites.

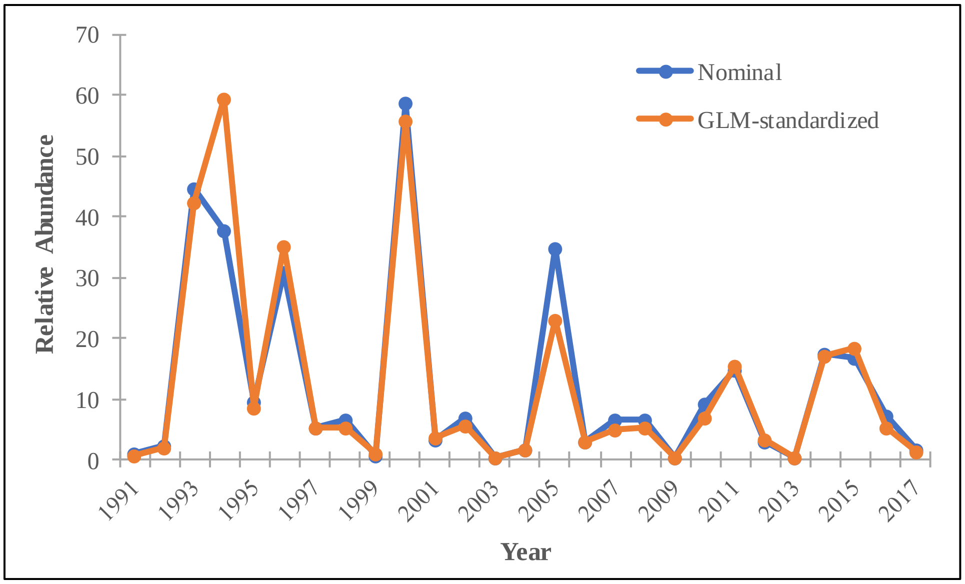


Figure 2.22. Nominal and GLM-standardized indices of relative age-0 abundance derived from the Juvenile Abundance Survey (P100), 1991–2017.

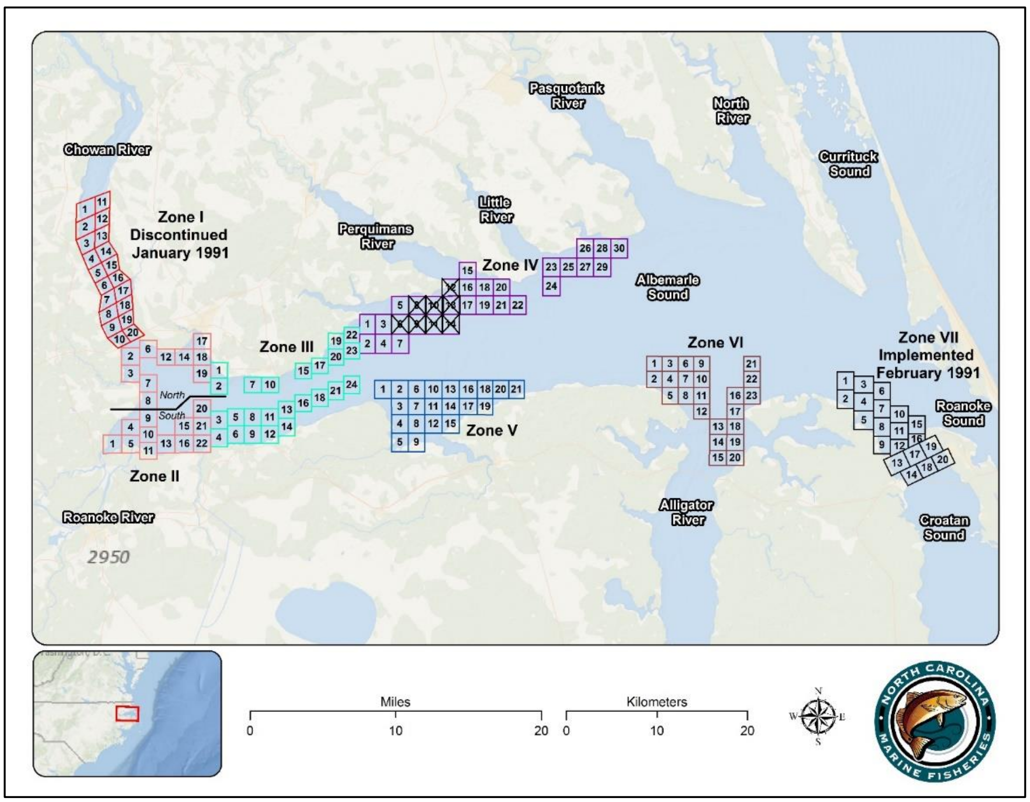


Figure 2.23. Map of sampling grids and zones for the NCDMF Independent Gill-Net Survey (Program 135).

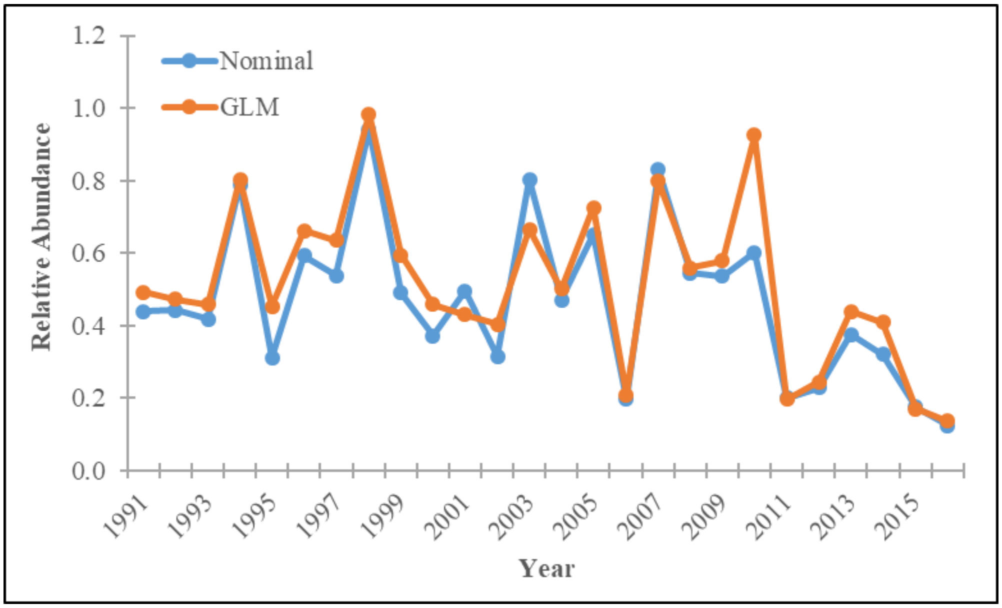


Figure 2.24. Nominal and GLM-standardized indices of relative abundance derived from the fall/winter component of the NCDMF Independent Gill-Net Survey (P135), 1991–2016.

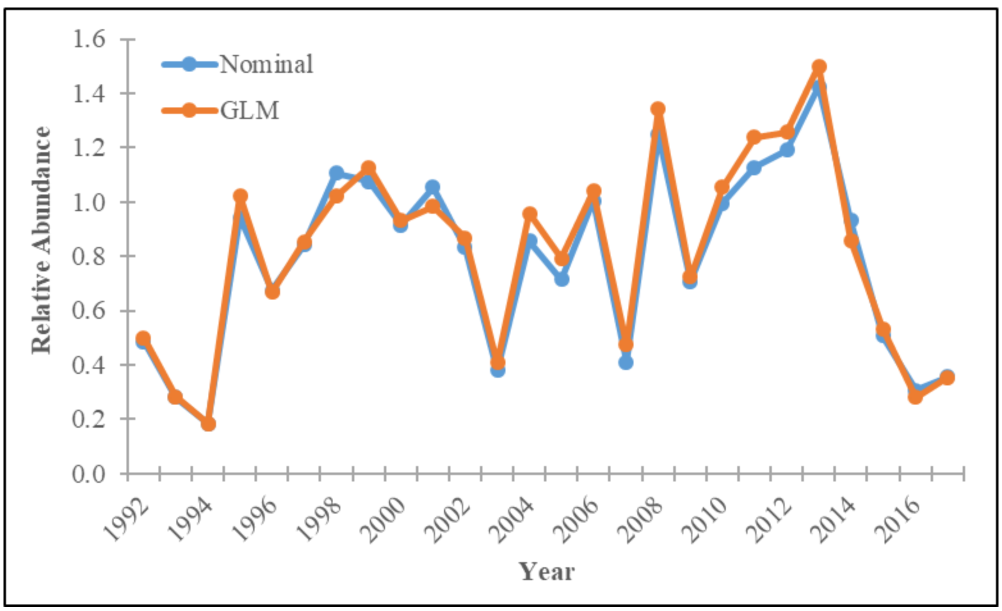


Figure 2.25. Nominal and GLM-standardized indices of relative abundance derived from the spring component of the NCDMF Independent Gill-Net Survey (P135), 1992–2017.

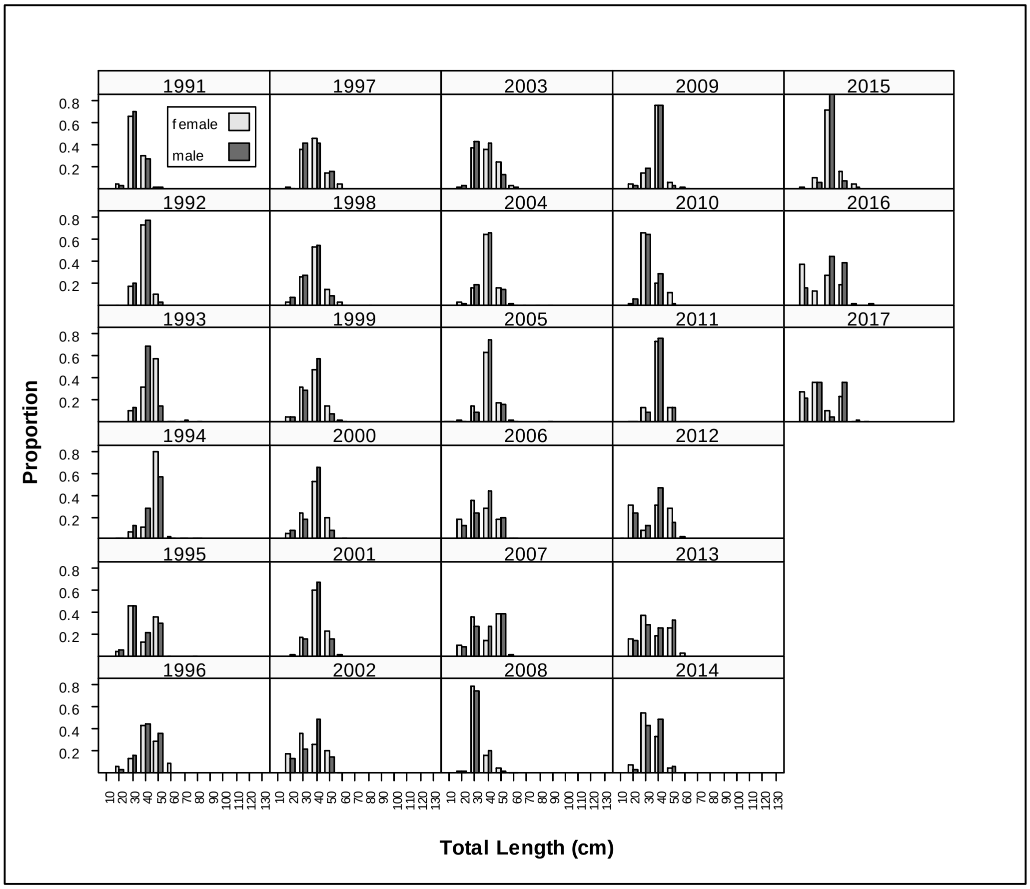


Figure 2.26. Annual length frequencies of striped bass sampled from the fall/winter component of the NCDMF Independent Gill-Net Survey (P135), 1991–2017.

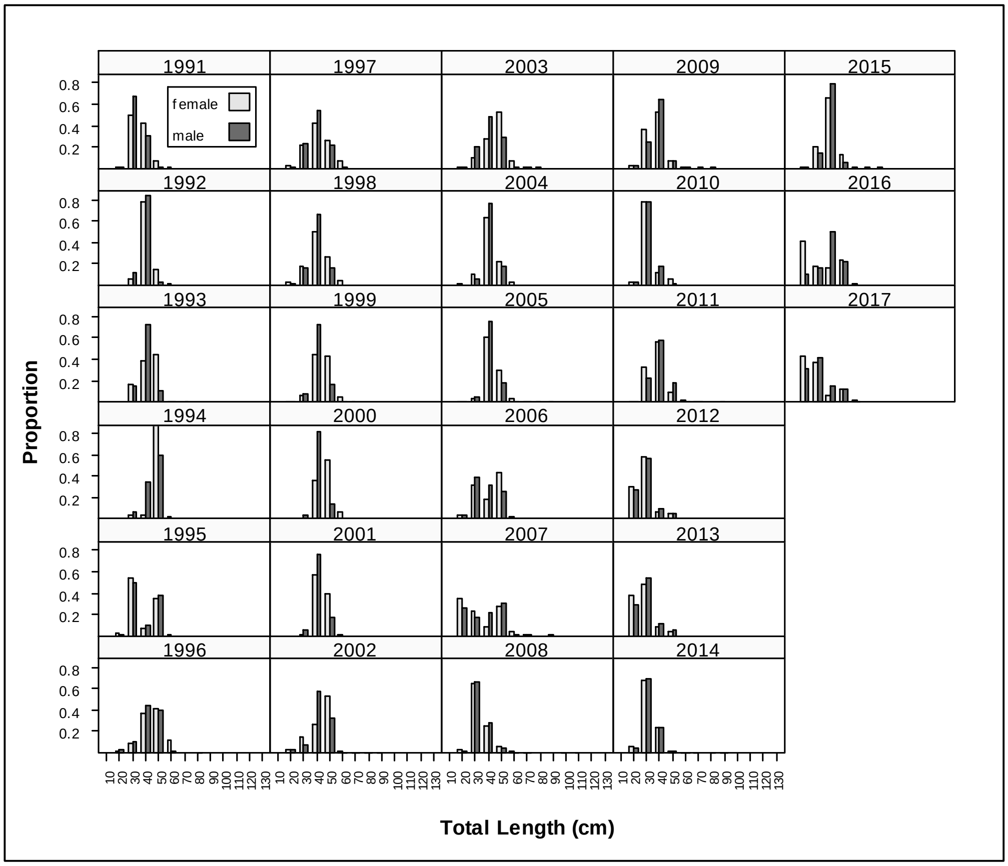


Figure 2.27. Annual length frequencies of striped bass sampled from the spring component of the NCDMF Independent Gill-Net Survey (P135), 1991–2017.

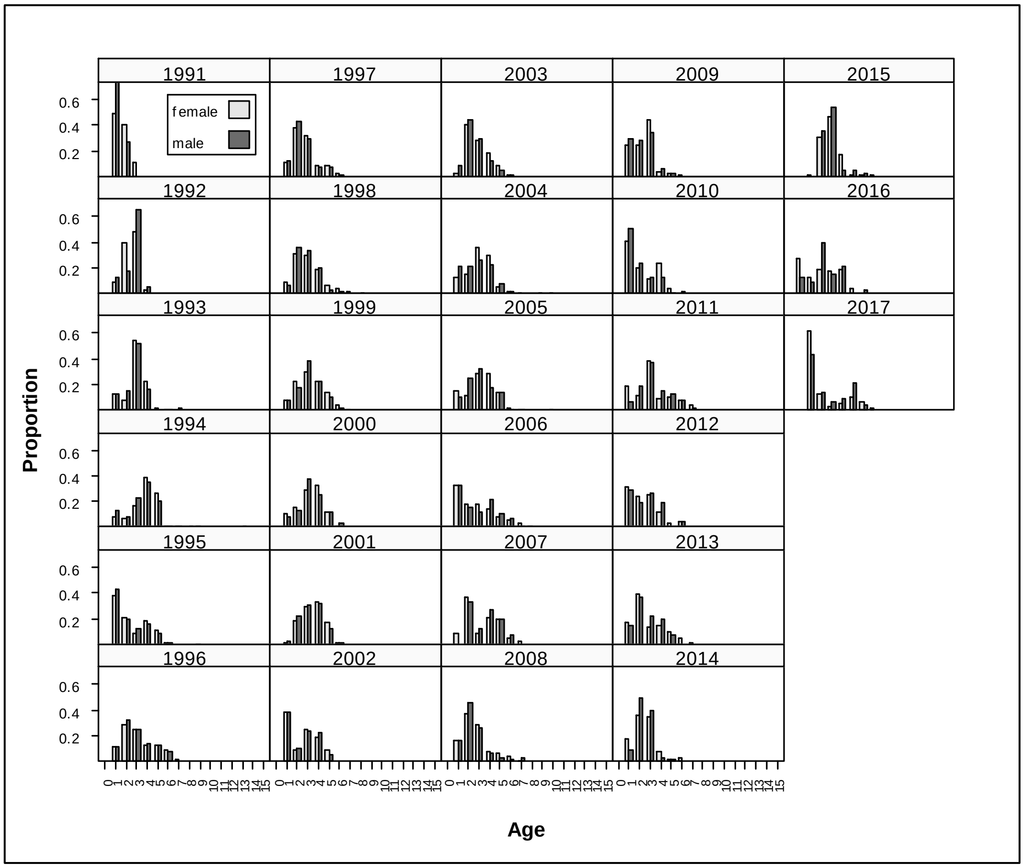


Figure 2.28. Annual age frequencies of striped bass sampled from the fall/winter component of the NCDMF Independent Gill-Net Survey (P135), 1991–2017. Thea age-15 bin represents a plus group.

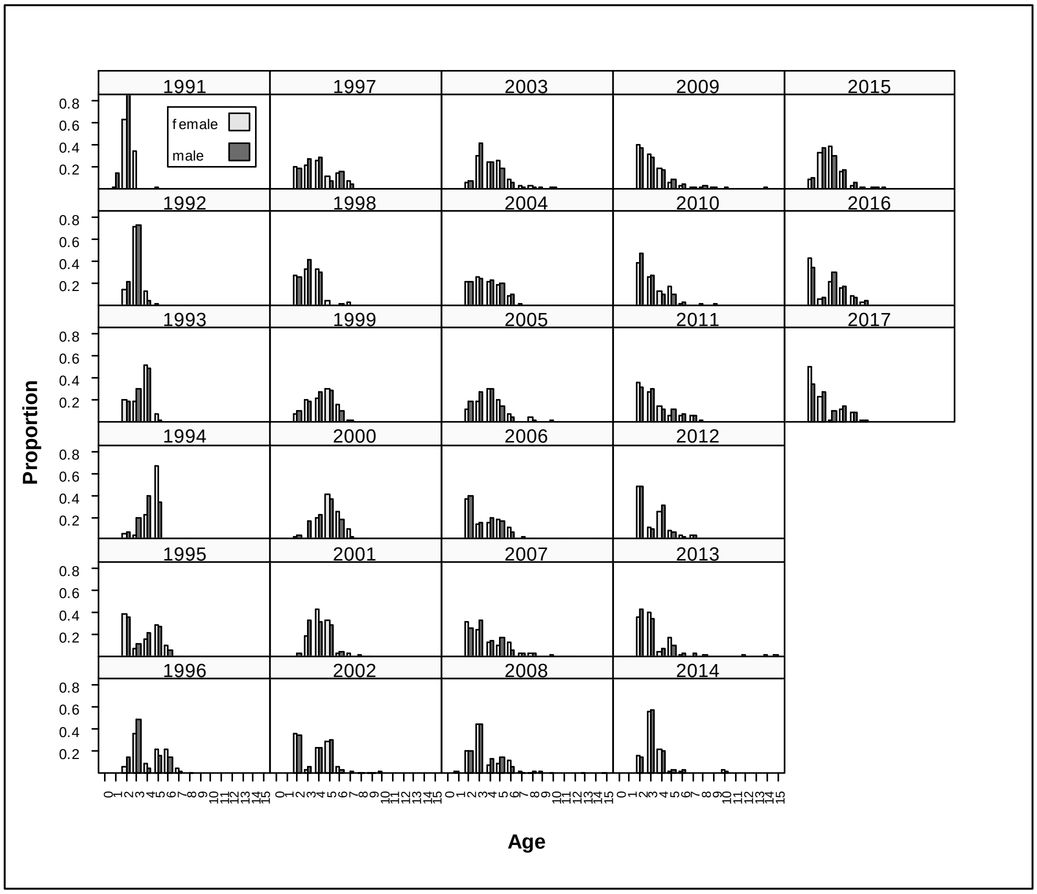


Figure 2.29. Annual age frequencies of striped bass sampled from the spring component of the NCDMF Independent Gill-Net Survey (P135), 1991–2017. The age-15 bin represents a plus group.

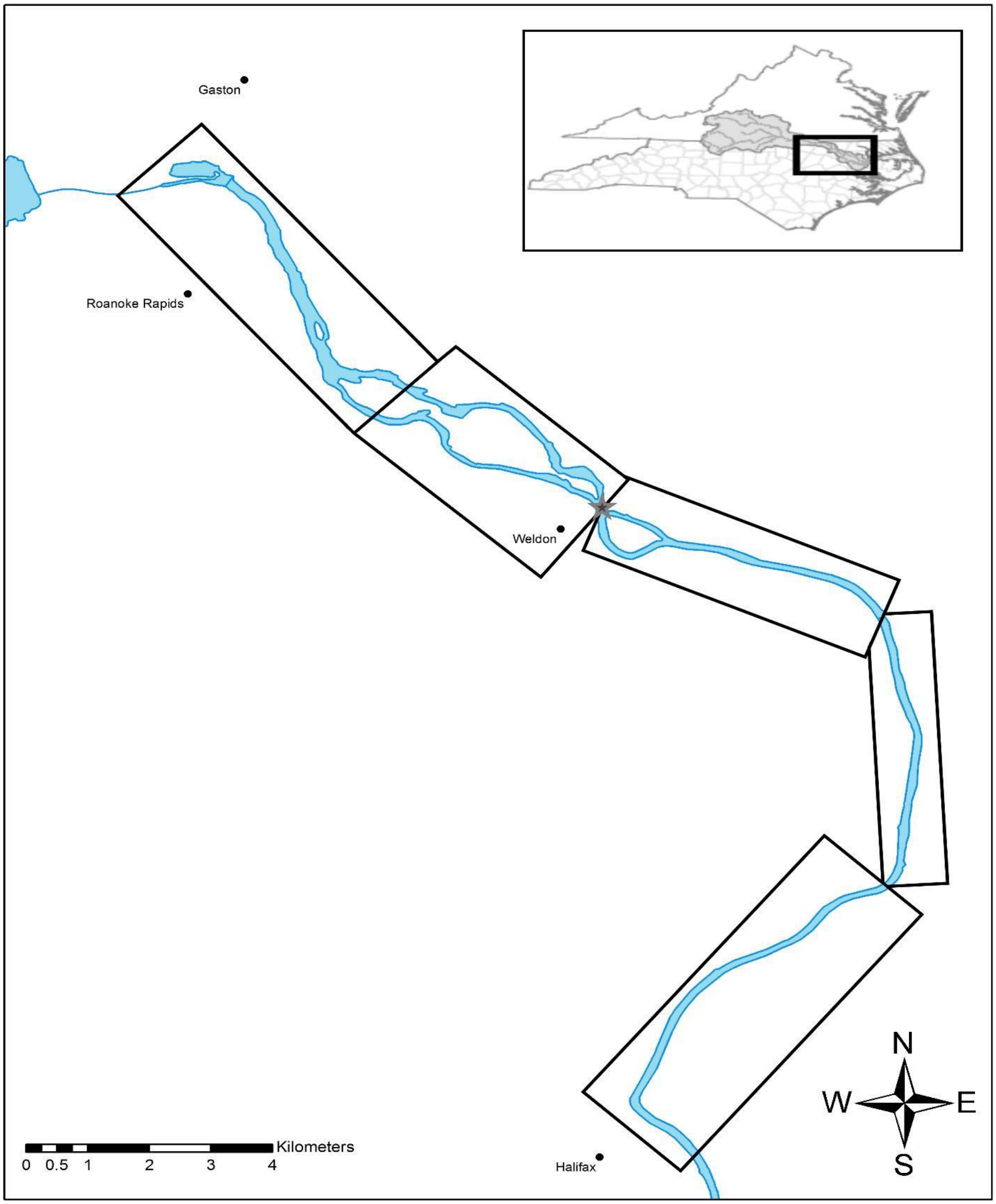


Figure 2.30. Striped Bass spawning grounds on the Roanoke River, near the vicinity of Weldon, North Carolina. Black boxes represent relative locations of river strata. The gray star indicates location of rapids near the Weldon boating access area; flows less than 7,000 cfs restrict access to the strata above this location.

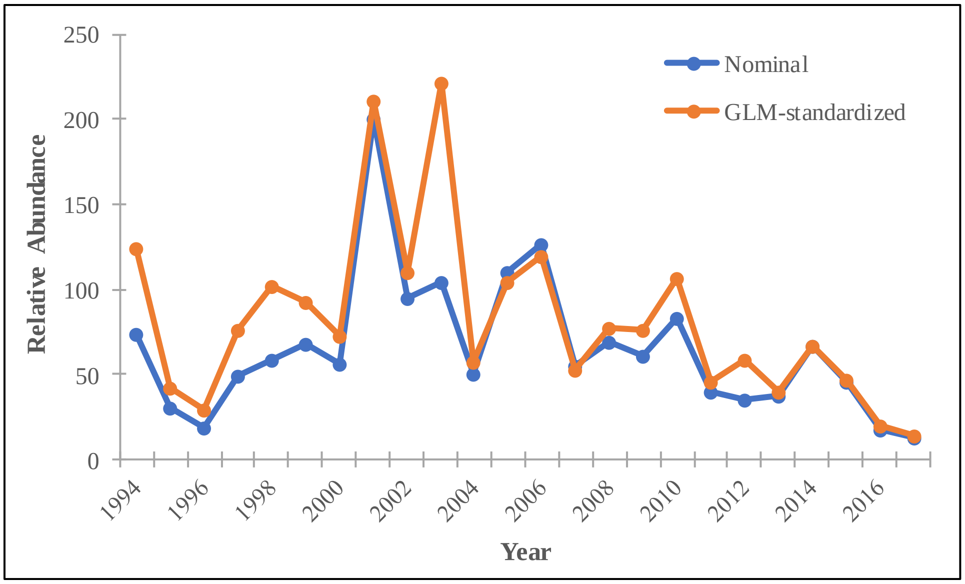


Figure 2.31. Nominal and GLM-standardized indices of relative abundance derived from the NCWRC Roanoke River Electrofishing Survey, 1994–2017.

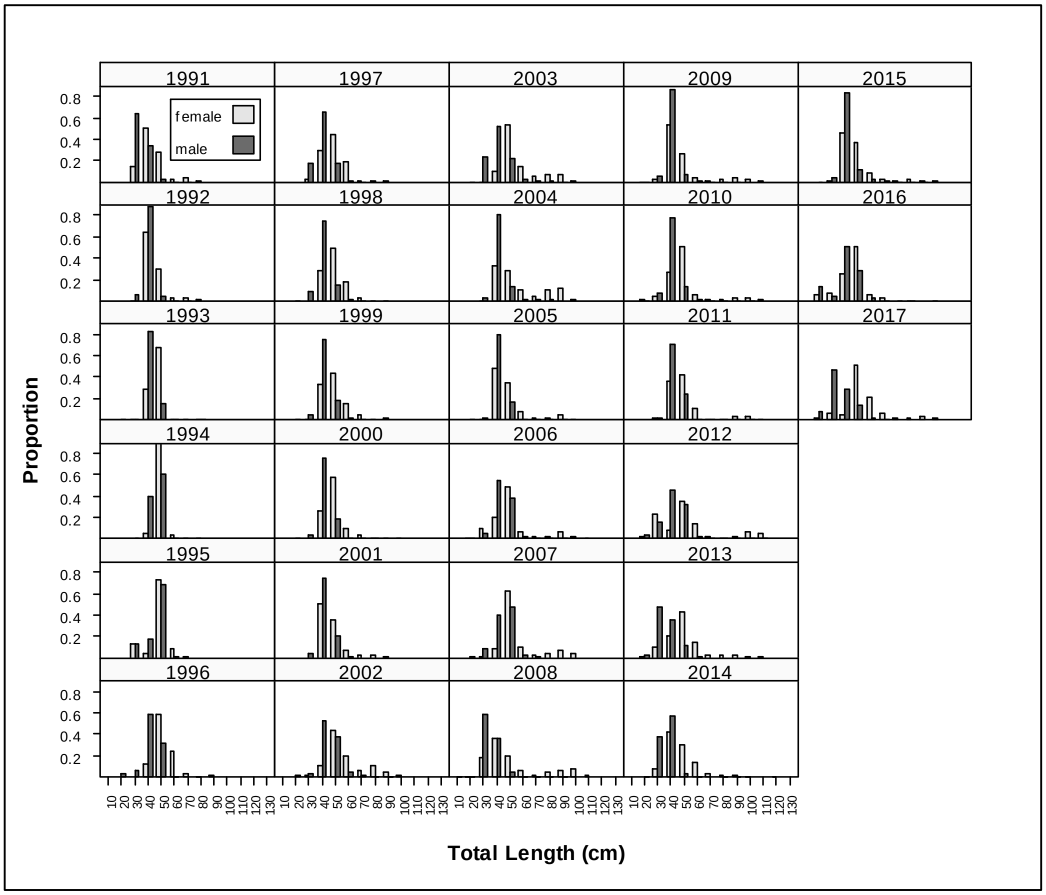


Figure 2.32. Annual length frequencies of striped bass sampled from the NCWRC Roanoke River Electrofishing Survey, 1991–2017.

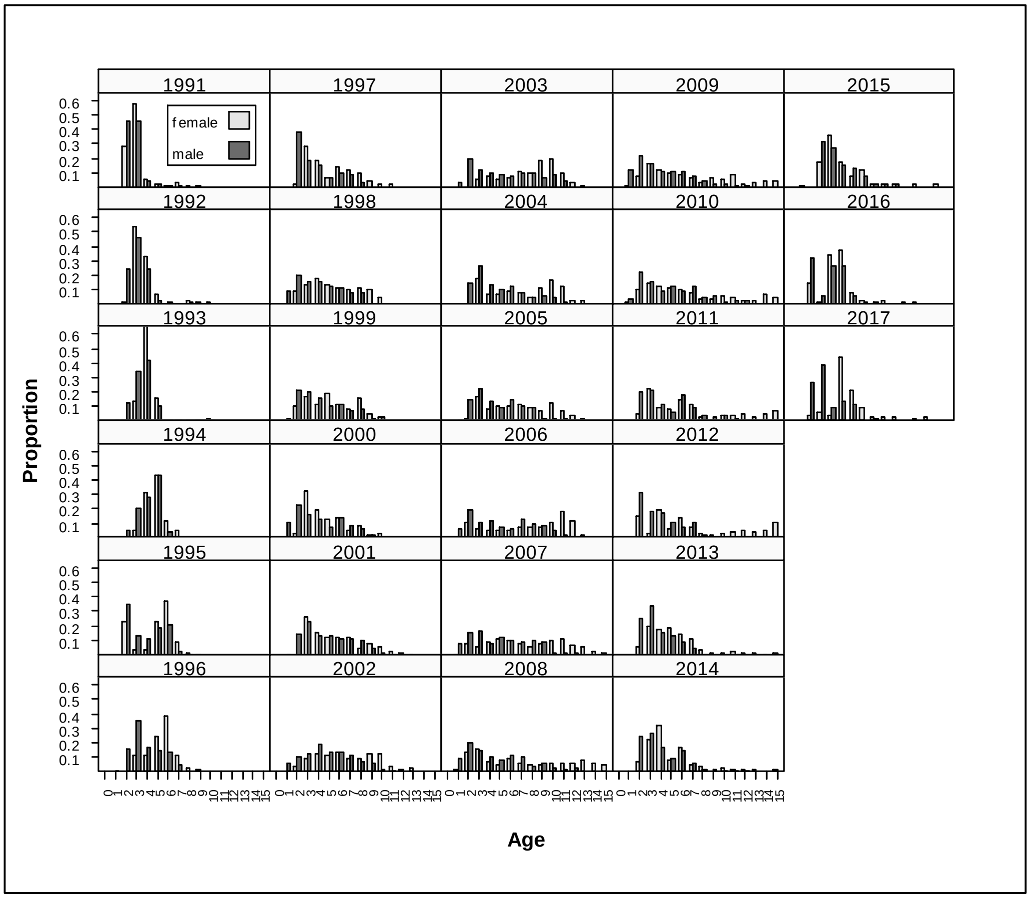


Figure 2.33. Annual age frequencies of striped bass sampled from the NCWRC Roanoke River Electrofishing Survey, 1991–2017. The age-15 bin represents a plus group.

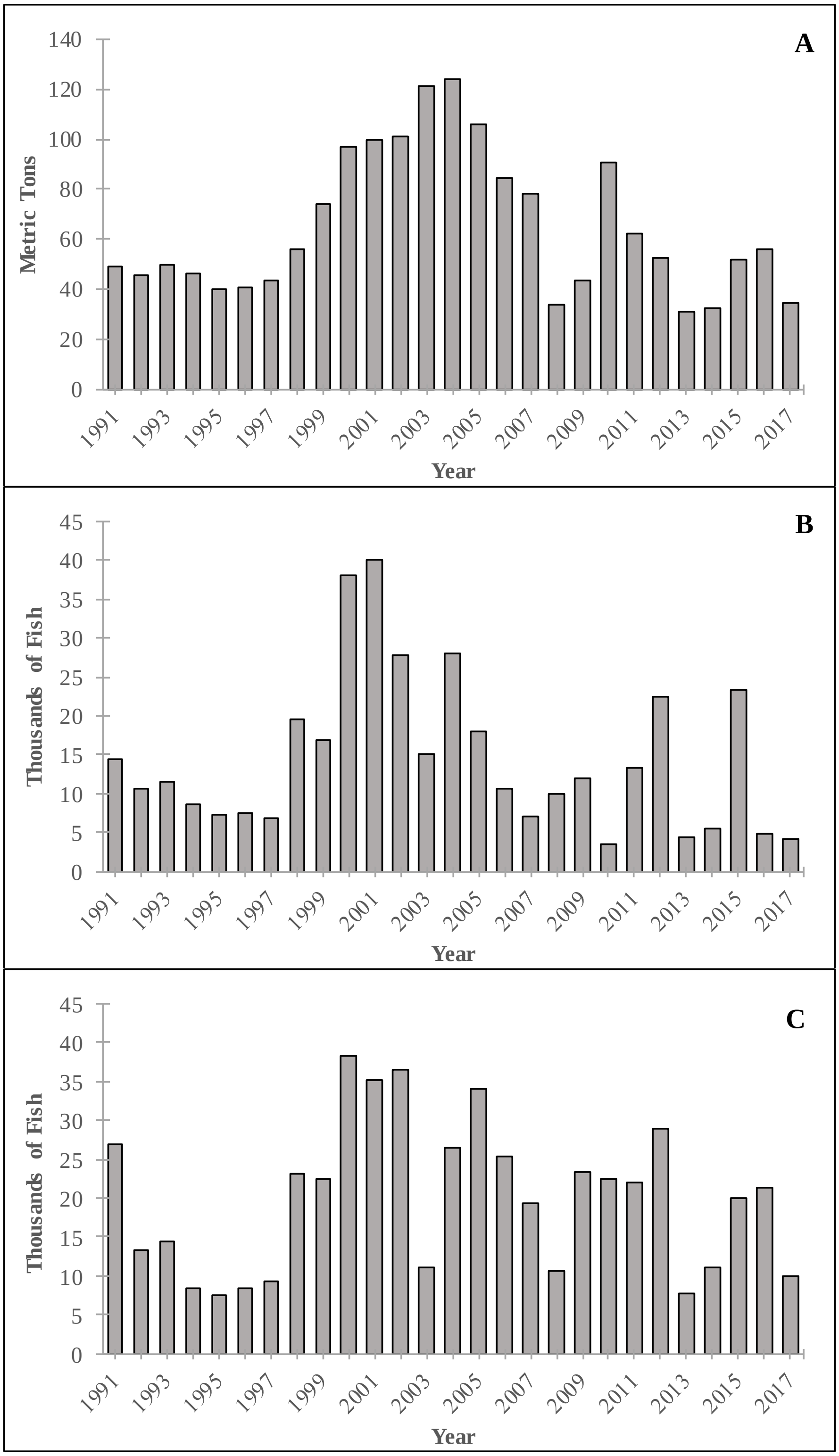


Figure 3.1. Annual (A) ARcomm landings, (B) ASrec harvest, and (C) RRrec harvest values that were input into the SS model, 1991–2017.

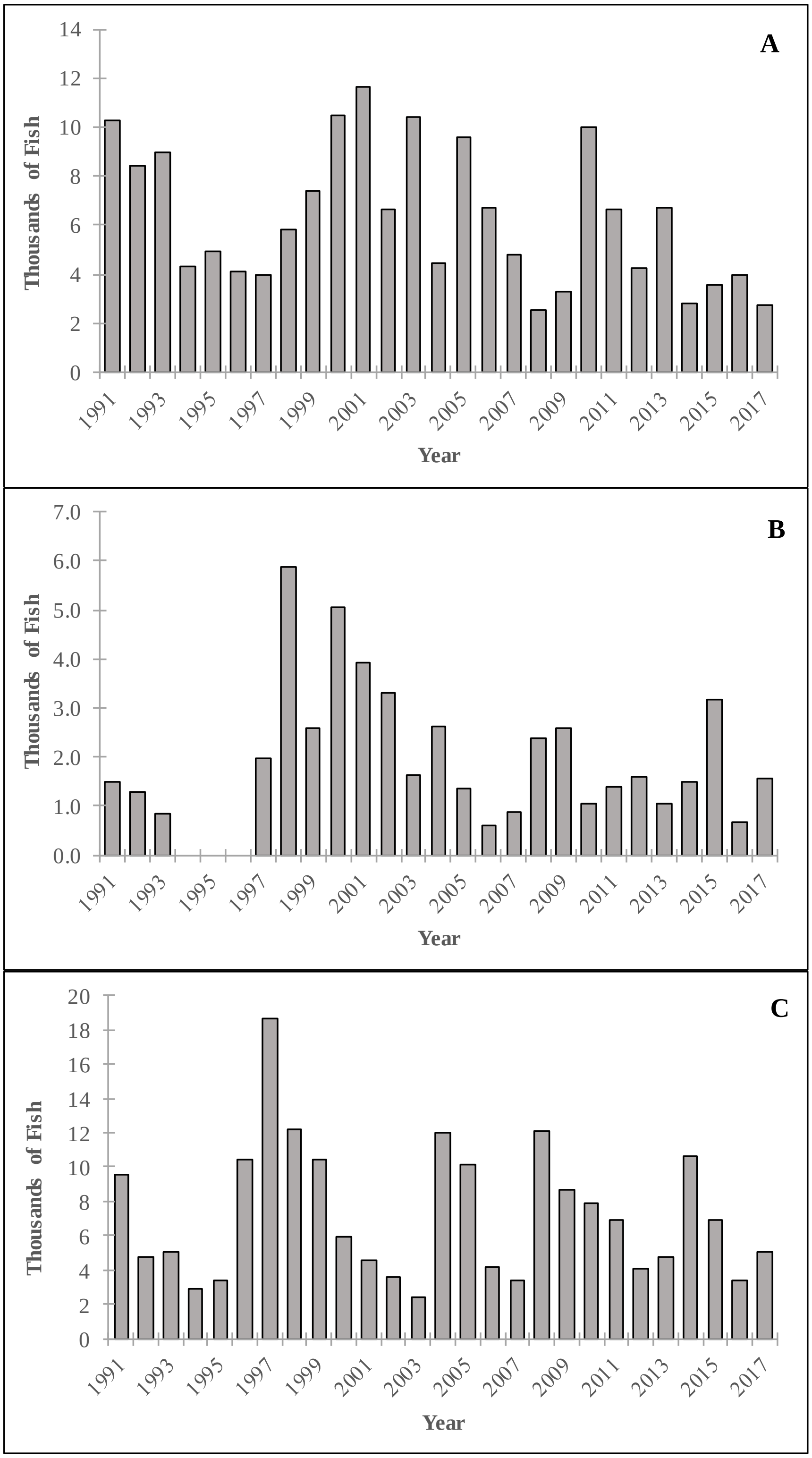


Figure 3.2. Annual (A) ARcomm, (B) ASrec, and (C) RRrec dead discards that were input into the SS model, 1991–2017.

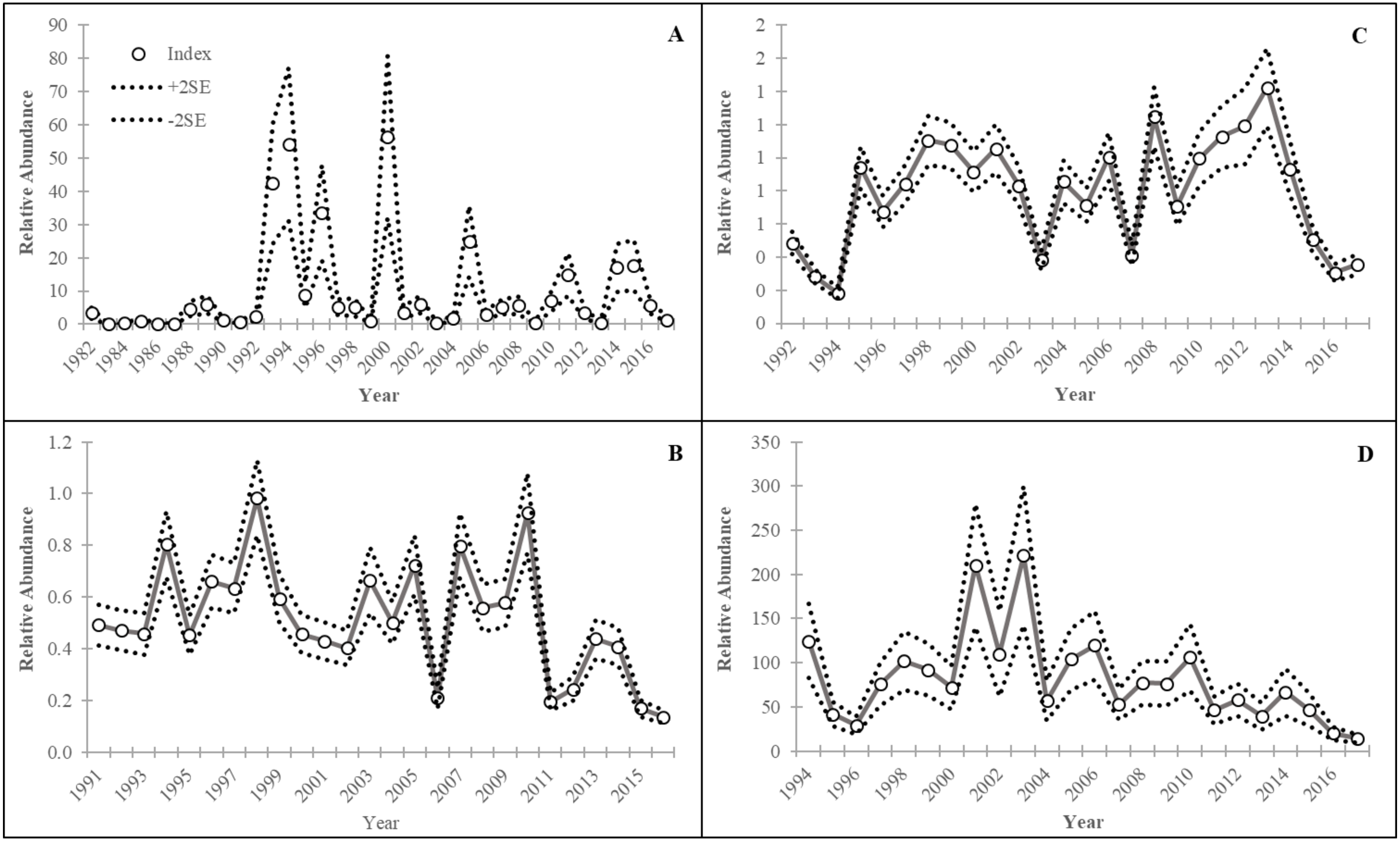


Figure 3.3. GLM-standardized indices of abundance derived from the (A) P100juv, (B) P135fw, (C) P135spr, and (D) RRef surveys that were input into the SS model, 1991–2017.

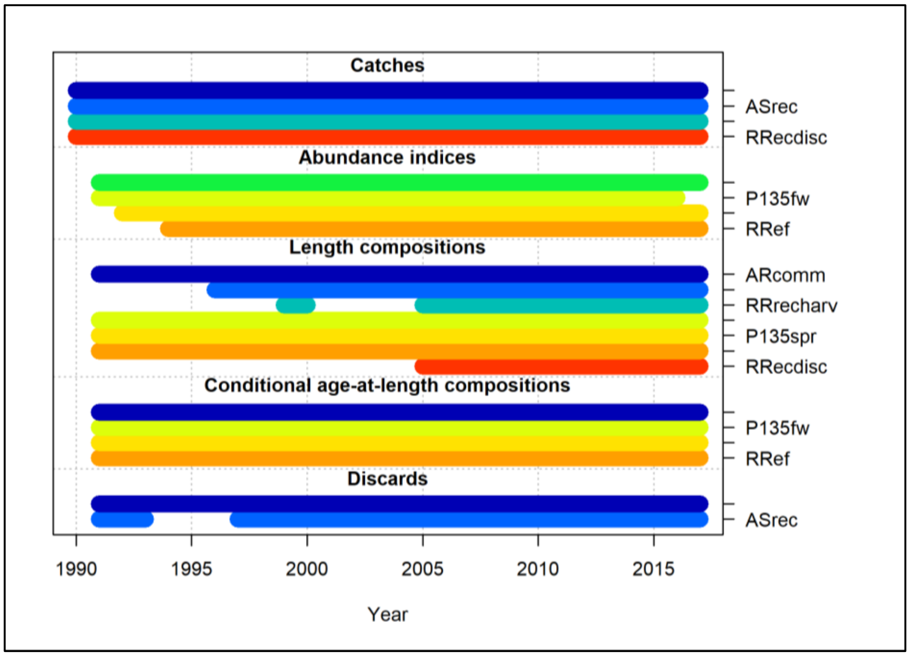


Figure 3.4. Summary of the data sources and types used in the stock assessment model for striped bass.

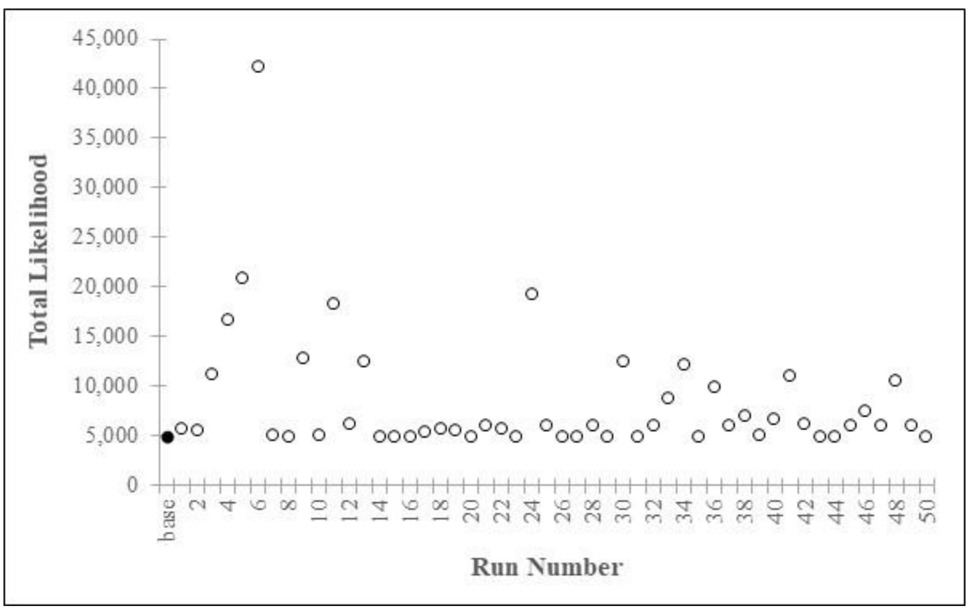


Figure 3.5. Negative log-likelihood values produced from the 50 jitter trials in which initial parameter values were jittered by 10%. The solid black circle is the value from the base run.

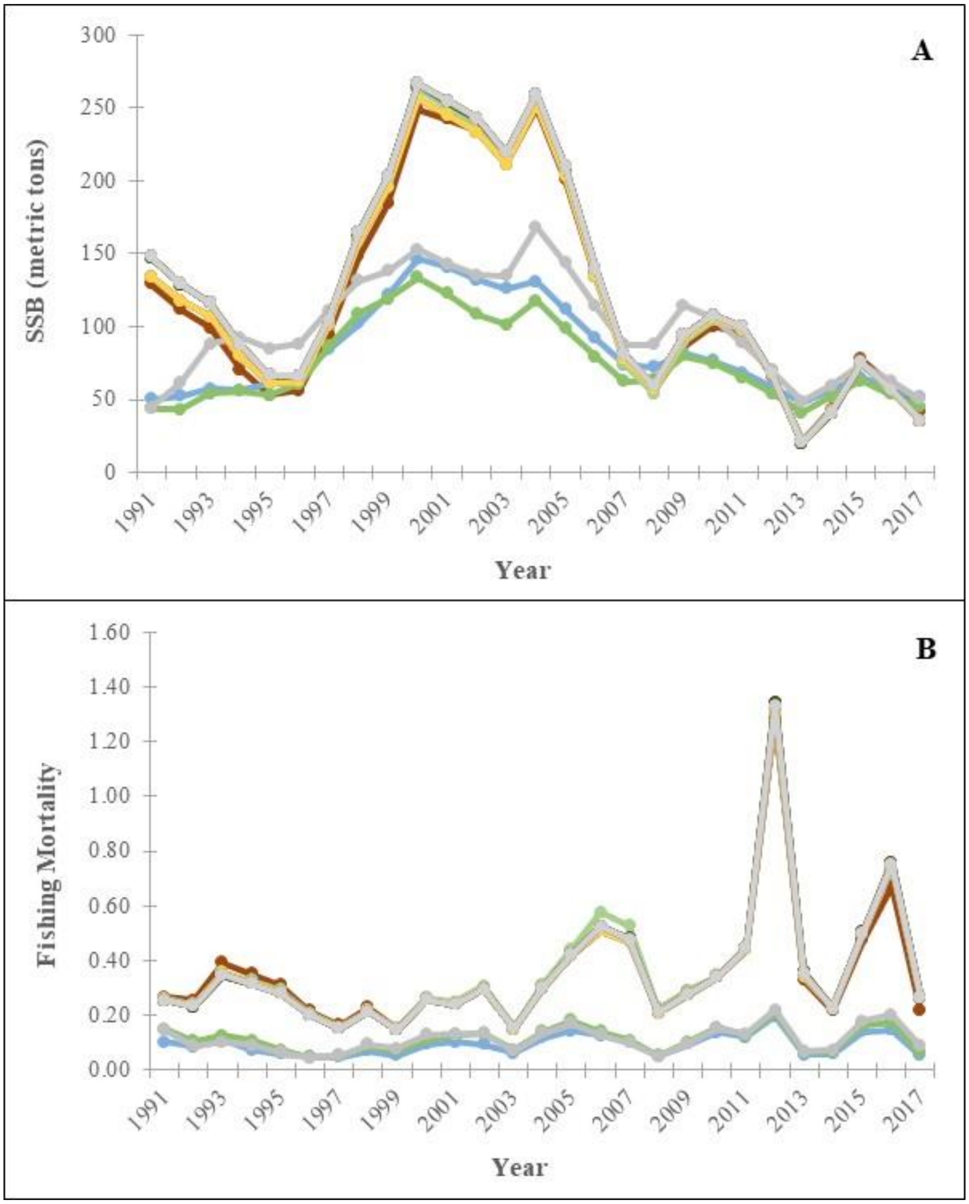


Figure 3.6. Predicted (A) female SSB and (B) *F* (numbers-weighted, ages 3–5) from the converged jitter trials (run 46 removed) in which initial parameter values were jittered by 10%, 1991–2017.

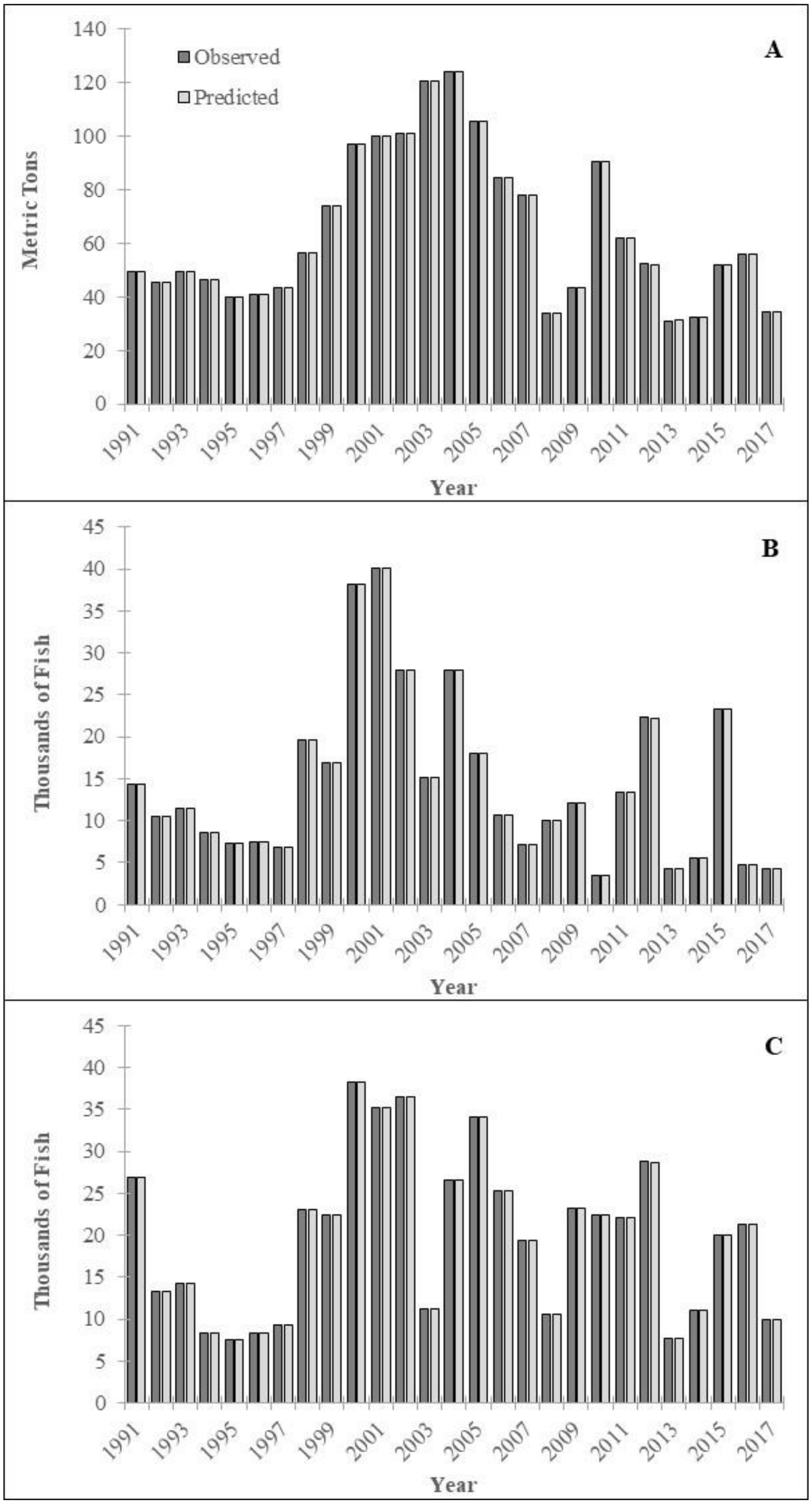


Figure 3.7. Observed and predicted (A) ARcomm landings, (B) ASrec harvest, and (C) RRrec harvest from the base run of the stock assessment model, 1991–2017.

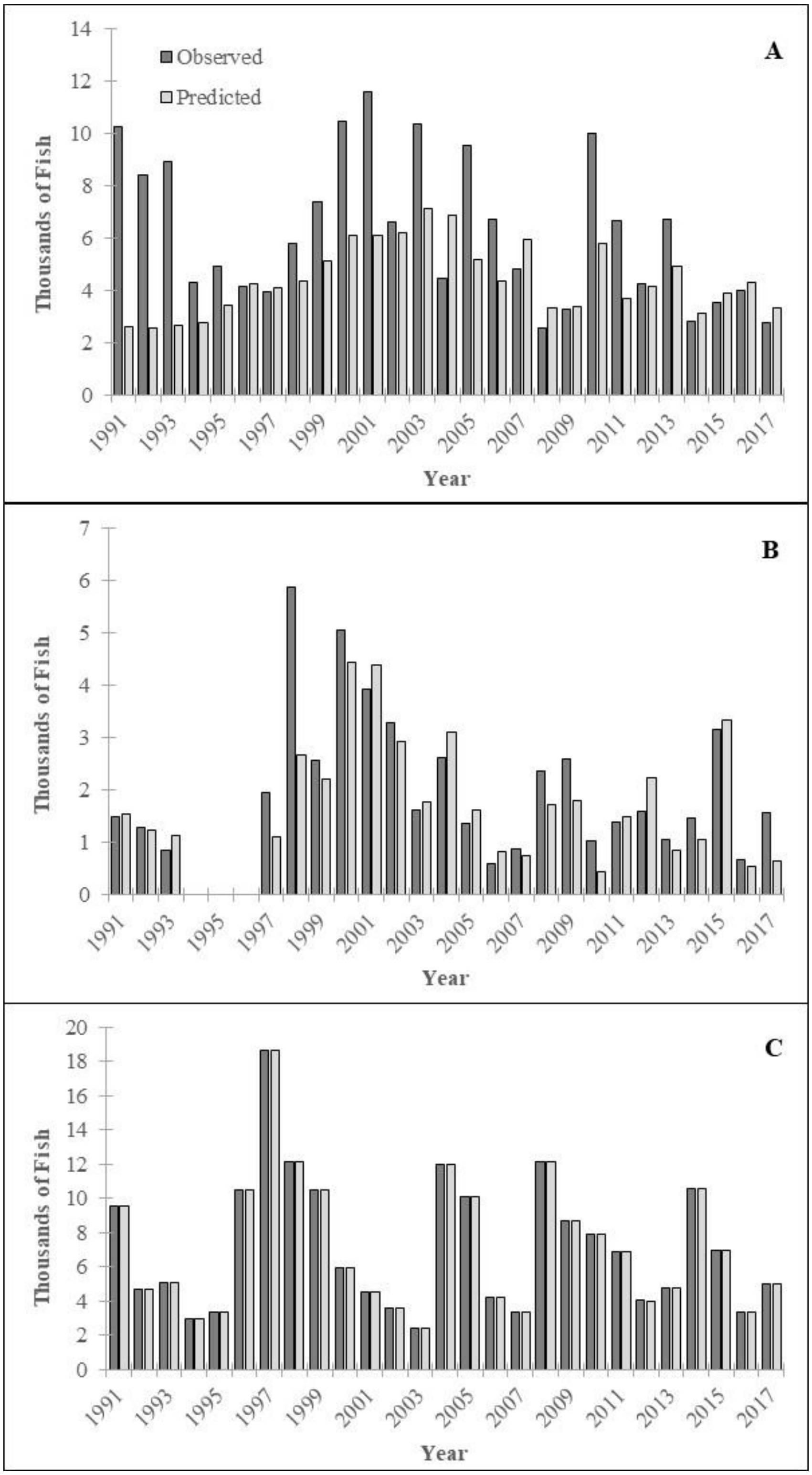


Figure 3.8. Observed and predicted (A) ARcomm, (B) ASrec, and (C) RRrec dead discards from the base run of the stock assessment model, 1991–2017.

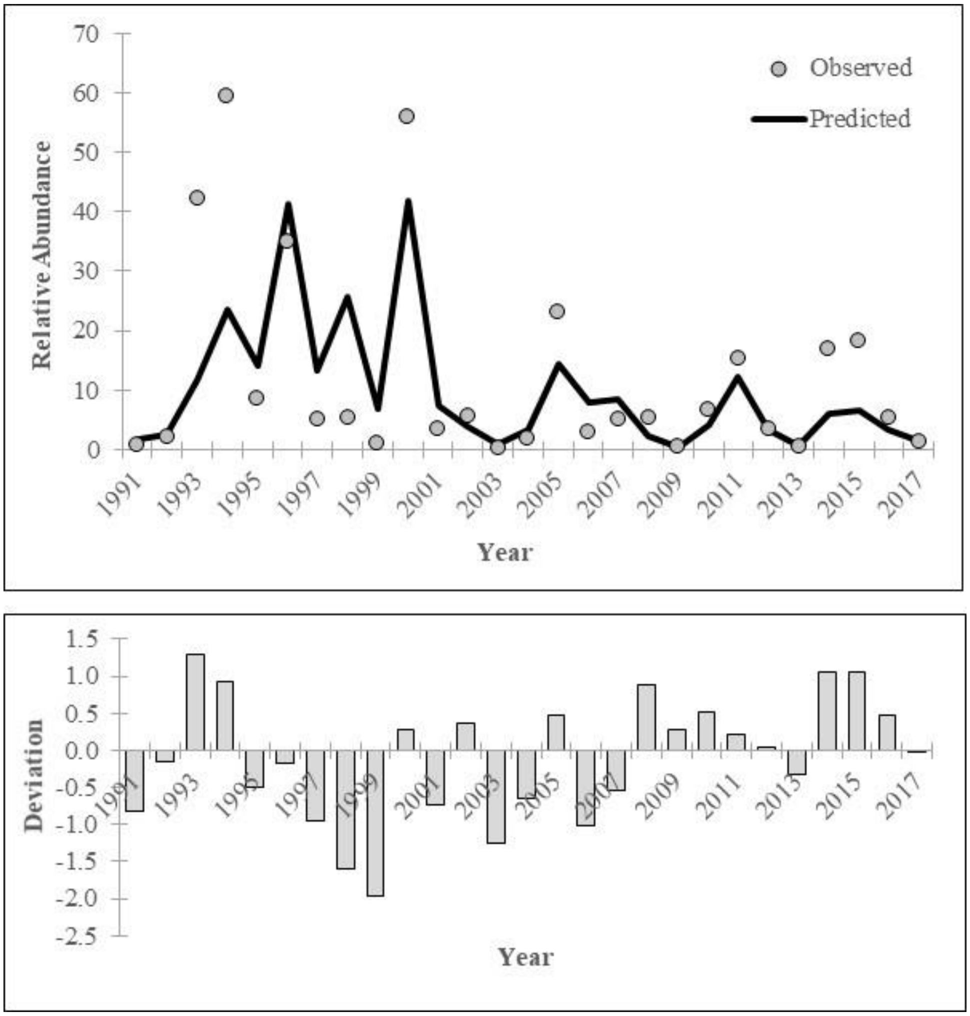
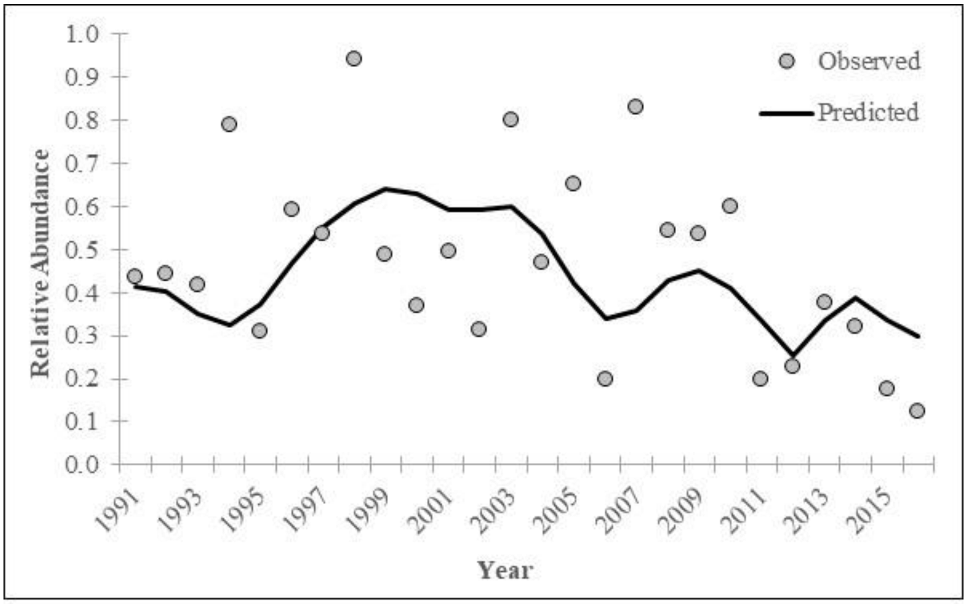


Figure 3.9. Observed and predicted relative abundance (top graph) and standardized residuals (bottom graph) for the P100juv survey from the base run of the stock assessment model, 1991–2017.



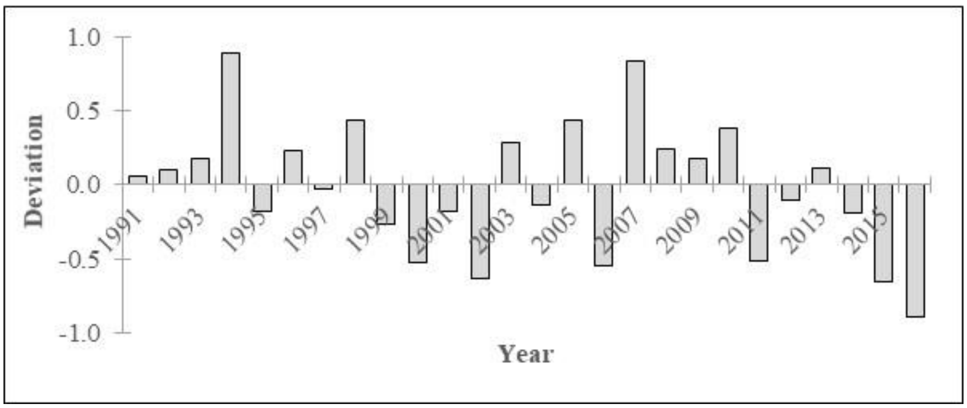


Figure 3.10. Observed and predicted relative abundance (top graph) and standardized residuals (bottom graph) for the P135fw survey from the base run of the stock assessment model, 1991–2017.

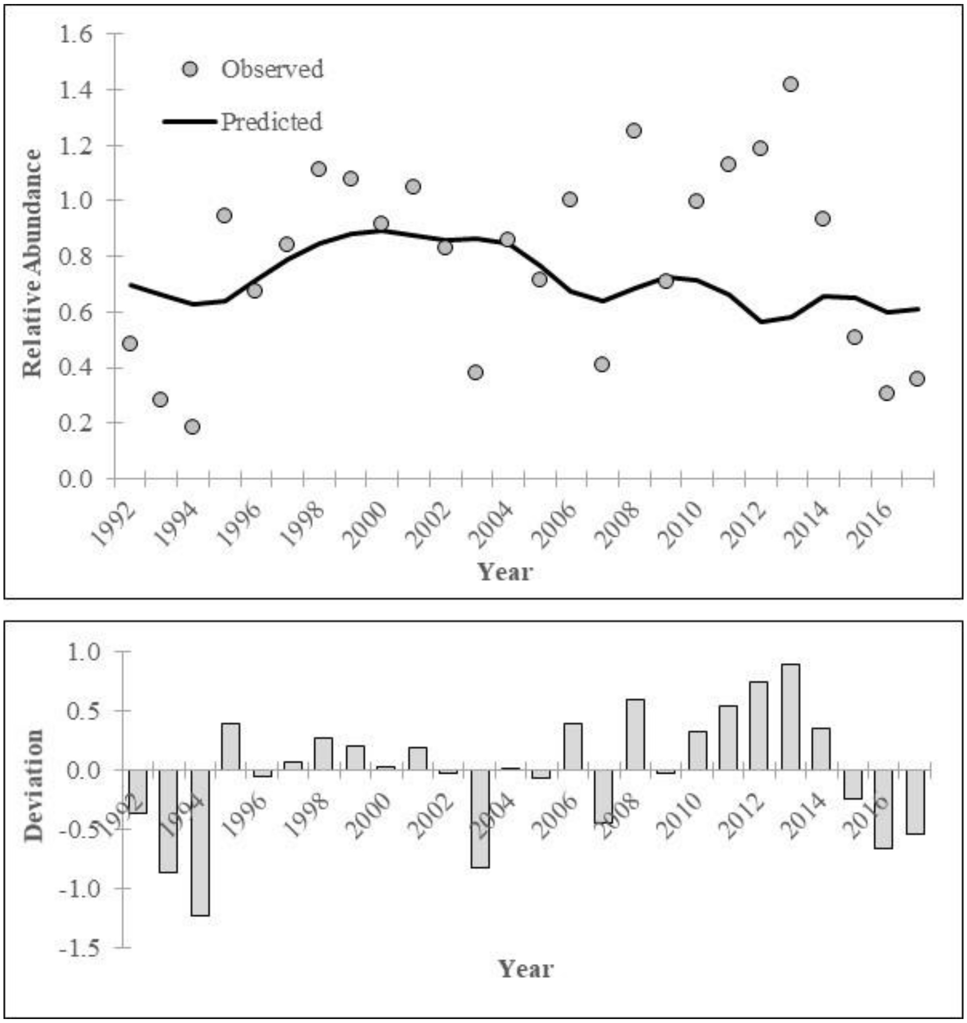


Figure 3.11. Observed and predicted relative abundance (top graph) and standardized residuals (bottom graph) for the P135spr survey from the base run of the stock assessment model, 1992–2017.

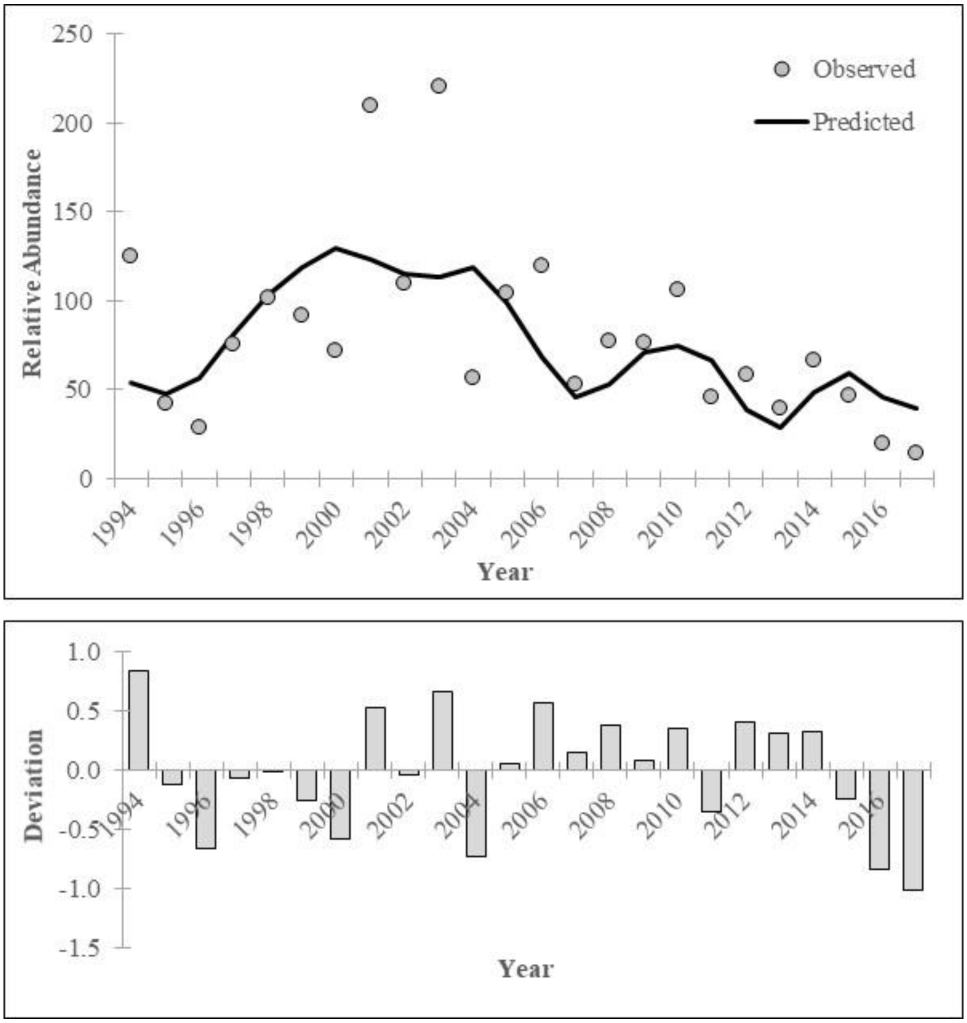


Figure 3.12. Observed and predicted relative abundance (top graph) and standardized residuals (bottom graph) for the RRef survey from the base run of the stock assessment model, 1994–2017.

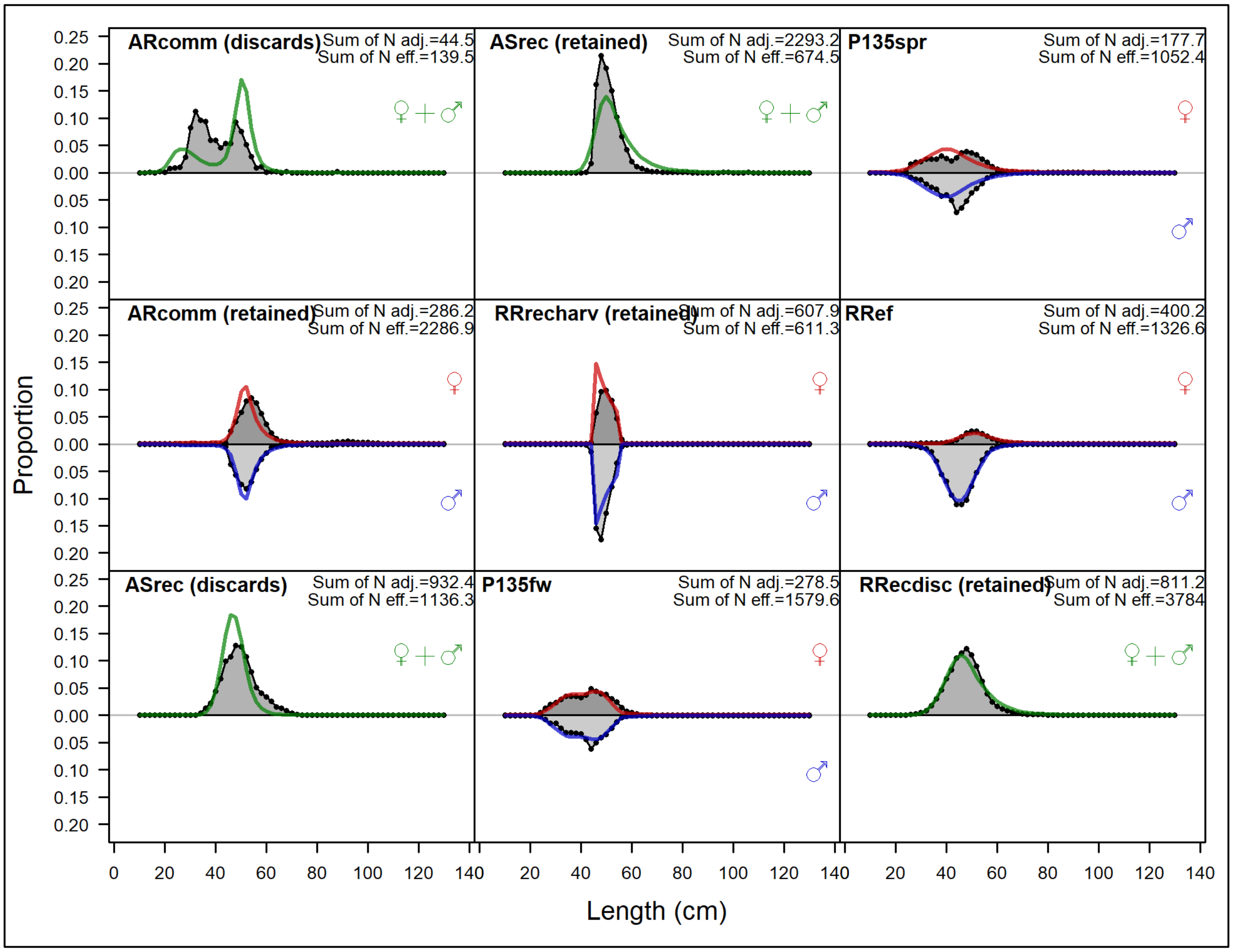


Figure 3.13. Observed and predicted length compositions for each data source from the base run of the stock assessment model aggregated across time. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

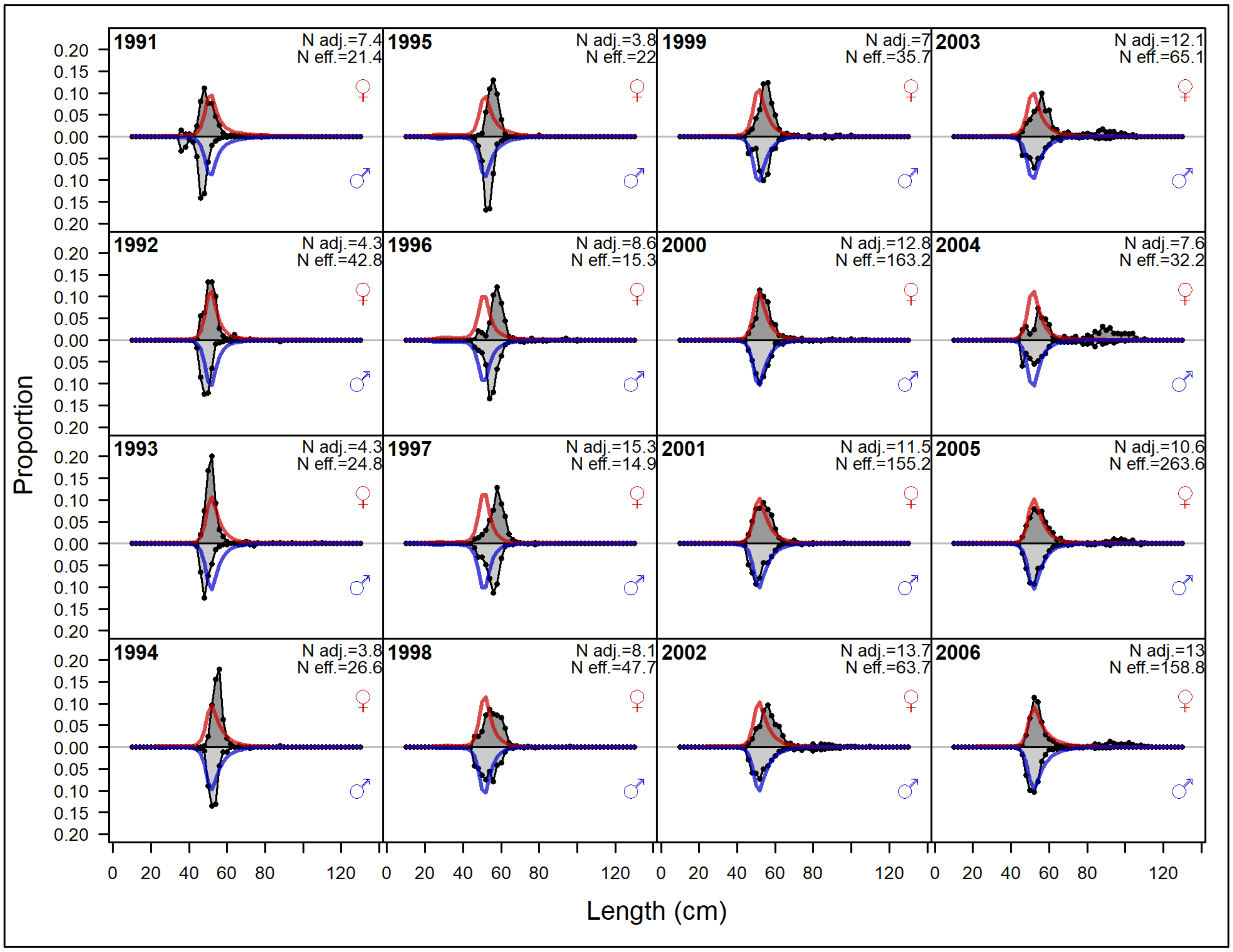


Figure 3.14. Observed and predicted length compositions for the ARcomm landings from the base run of the stock assessment model, 1991–2006. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

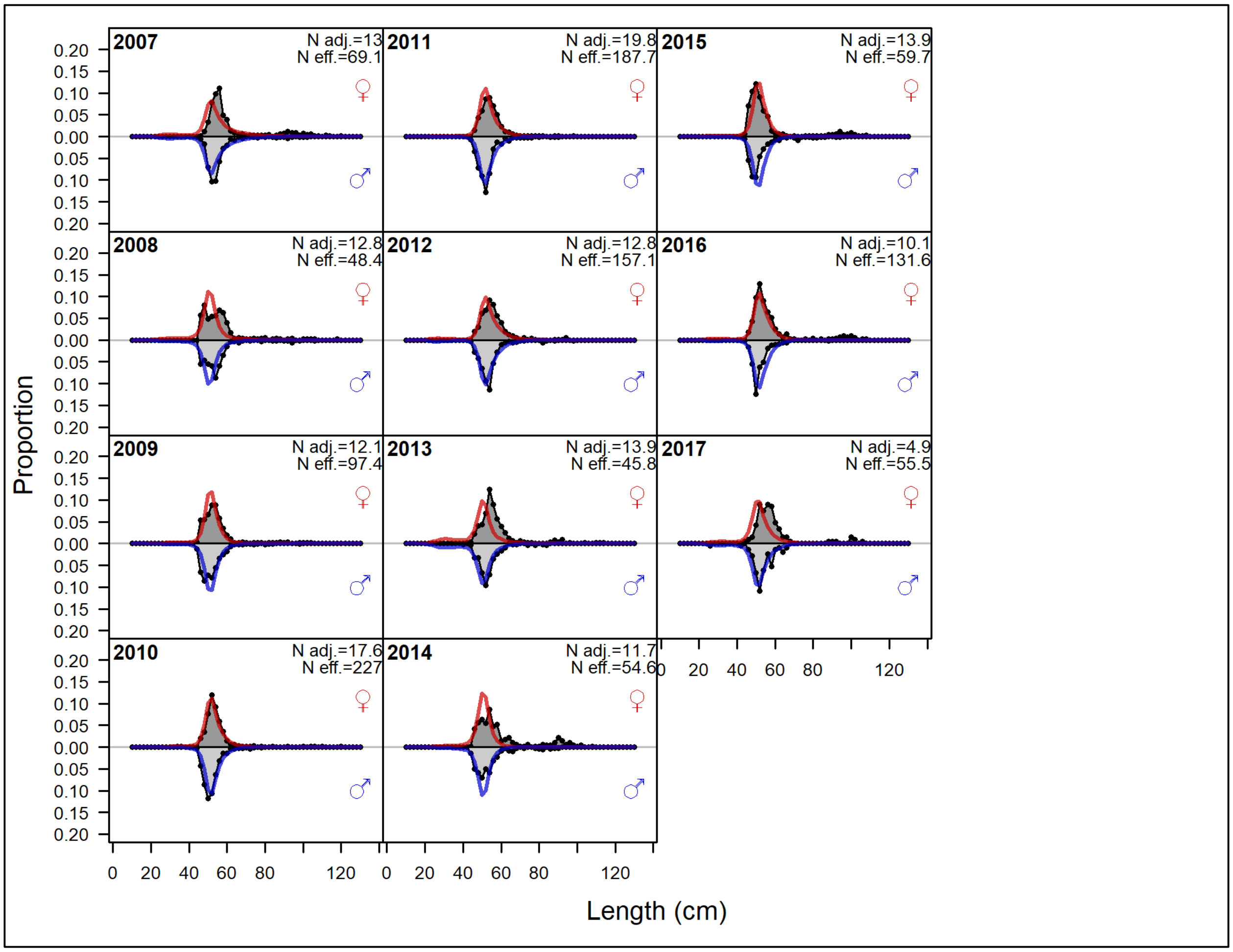


Figure 3.15. Observed and predicted length compositions for the ARcomm landings from the base run of the stock assessment model, 2007–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

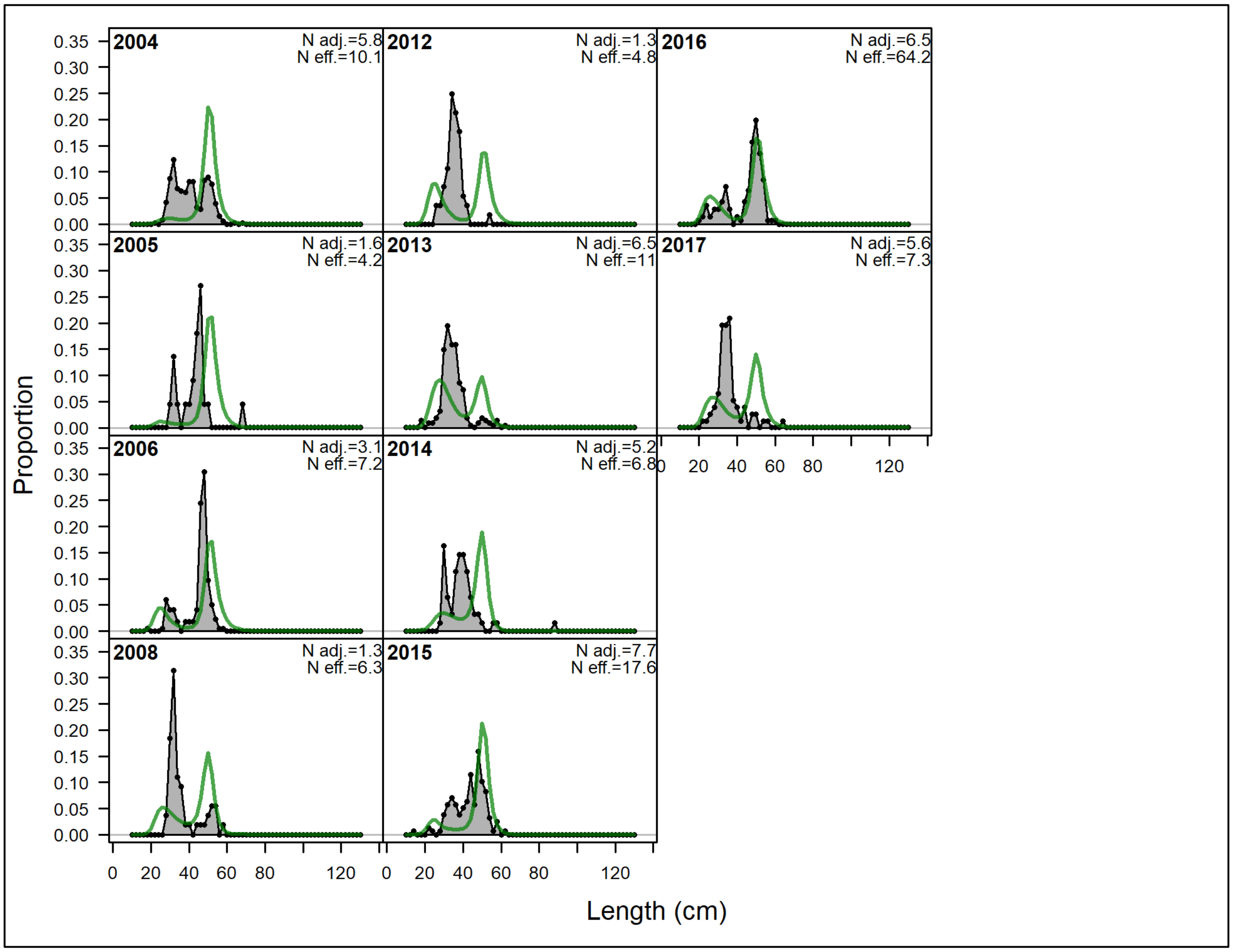


Figure 3.16. Observed and predicted length compositions for the ARcomm discards from the base run of the stock assessment model, 2004–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

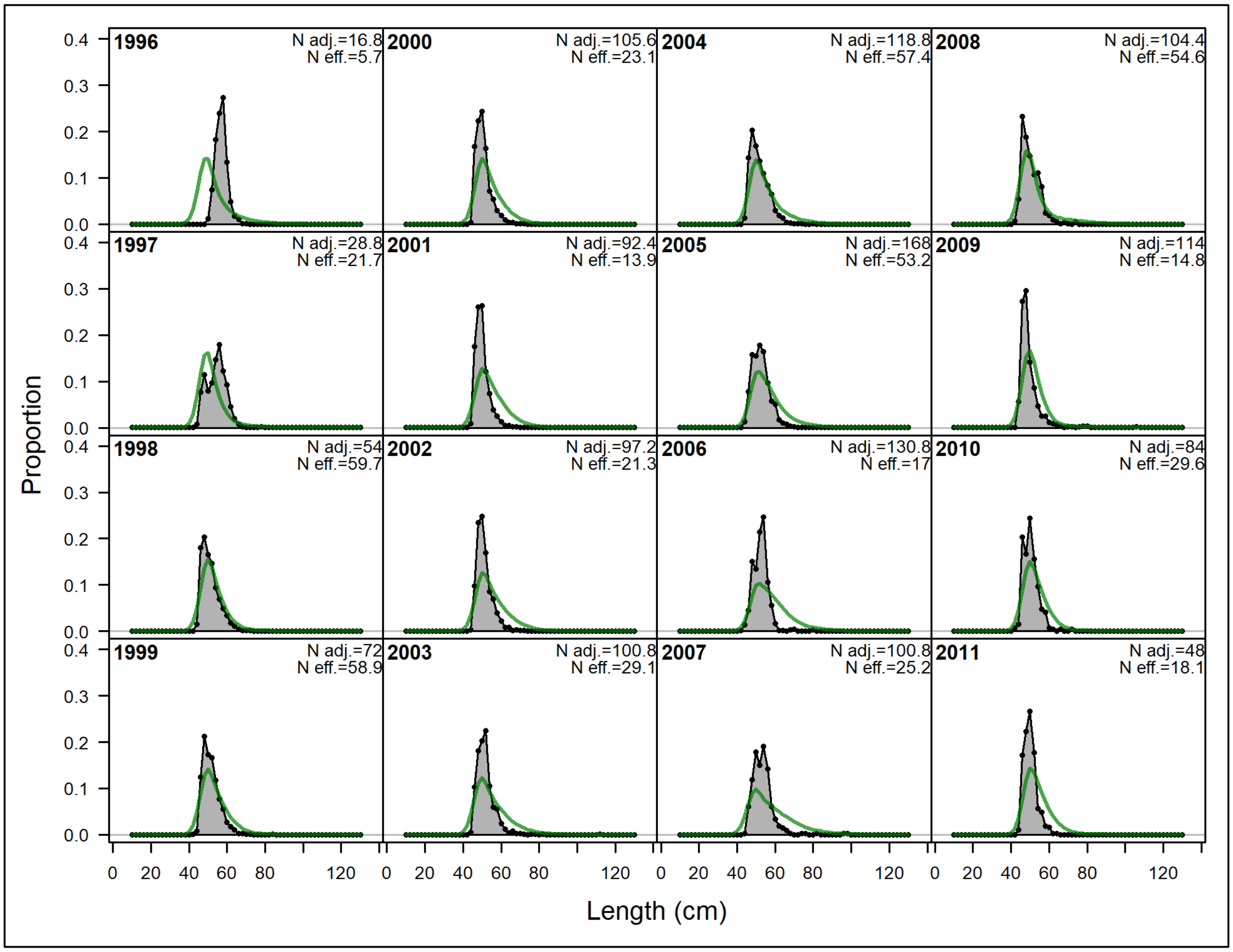


Figure 3.17. Observed and predicted length compositions for the ASrec harvest from the base run of the stock assessment model, 1996–2011. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

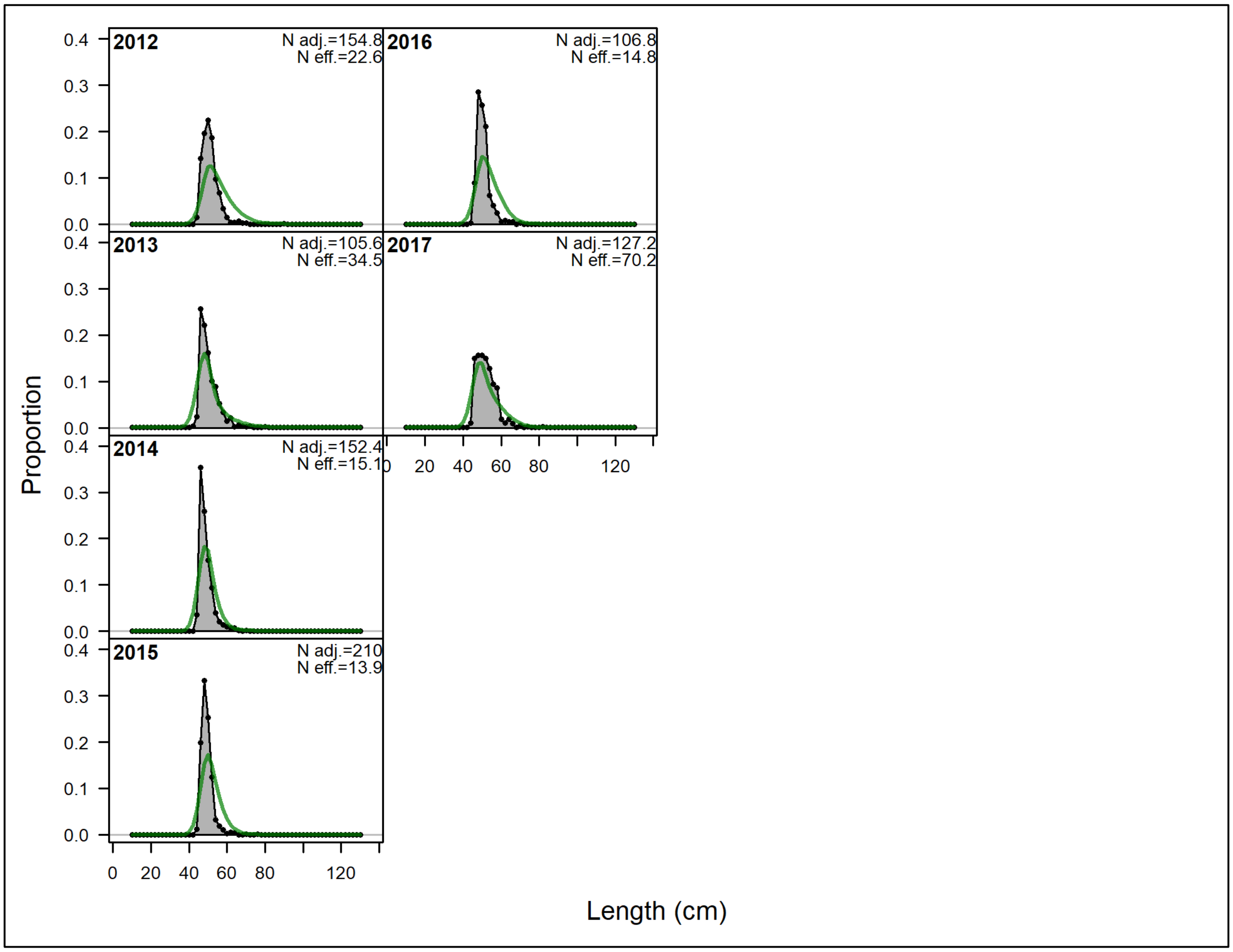


Figure 3.18. Observed and predicted length compositions for the ASrec harvest from the base run of the stock assessment model, 2012–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

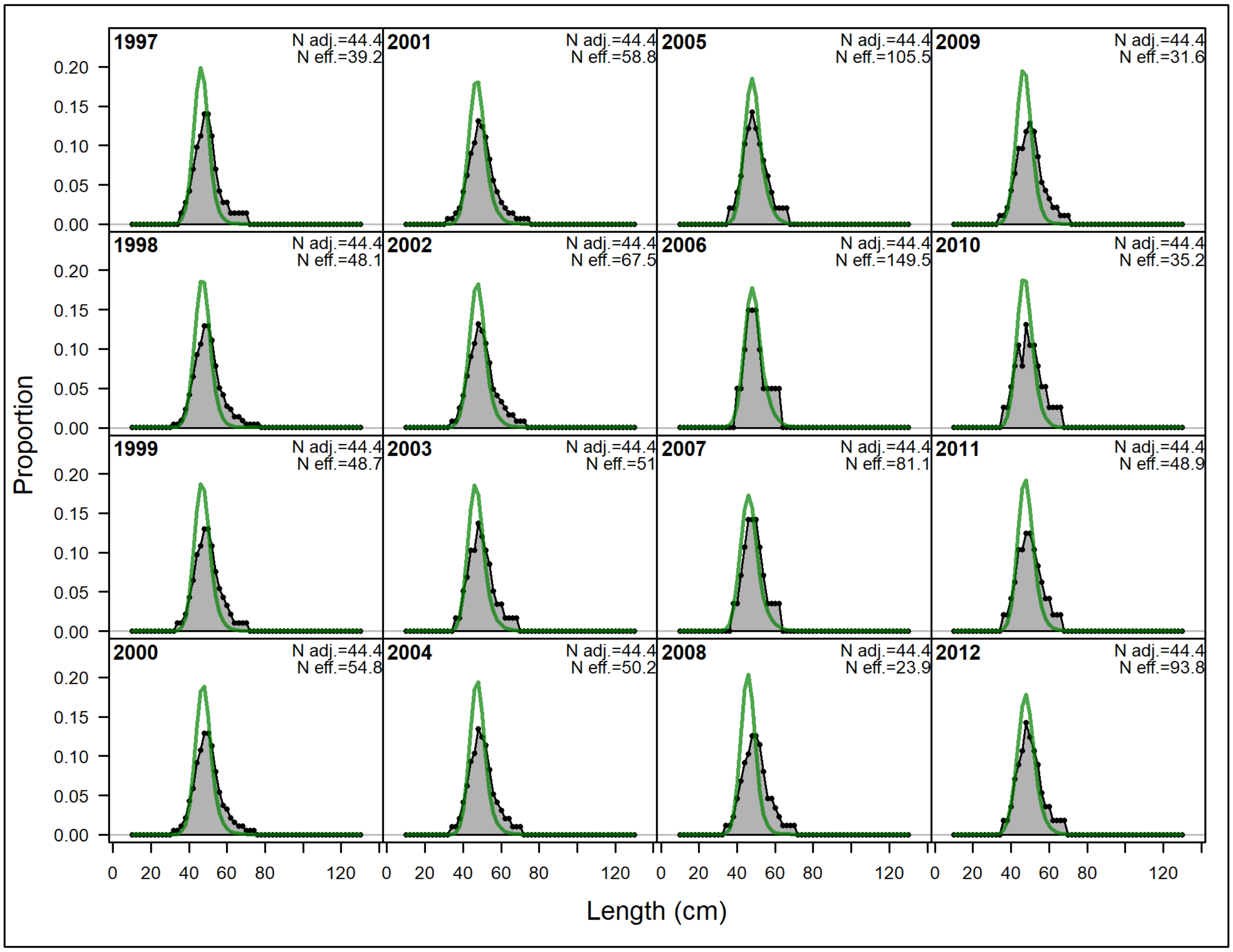


Figure 3.19. Observed and predicted length compositions for the ASrec discards from the base run of the stock assessment model, 1997–2012. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

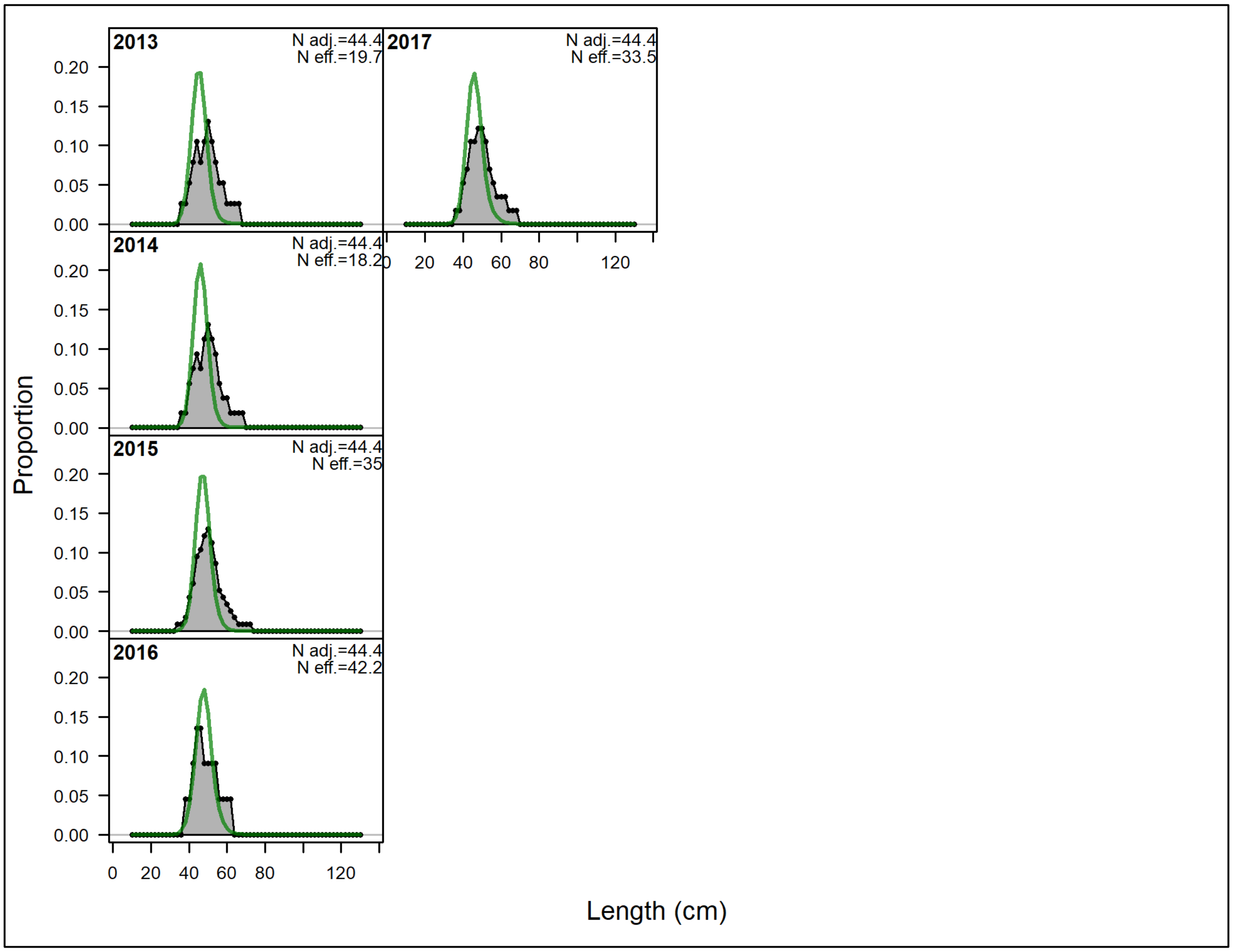


Figure 3.20. Observed and predicted length compositions for the ASrec discards from the base run of the stock assessment model, 2013–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

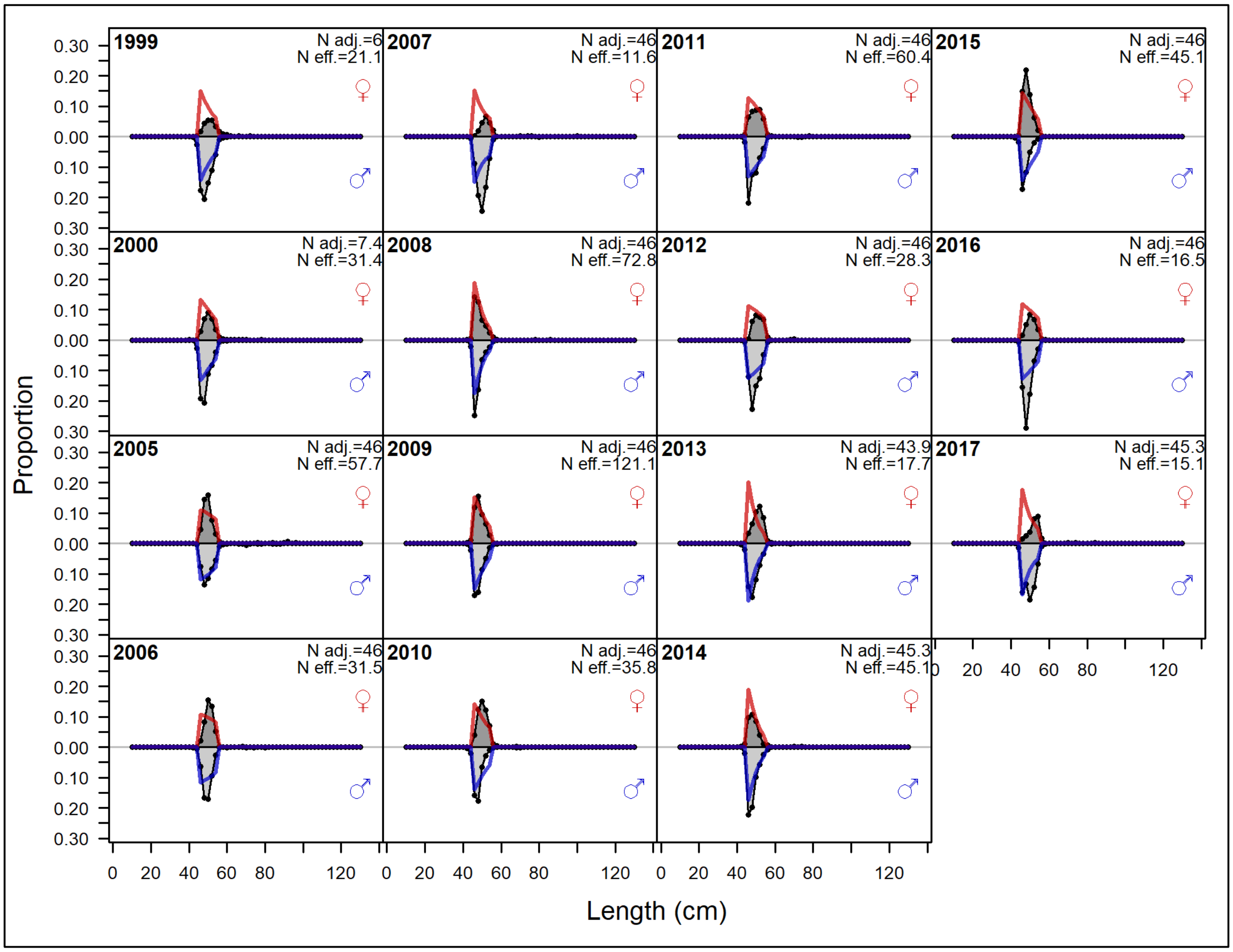


Figure 3.21. Observed and predicted length compositions for the RRrec harvest from the base run of the stock assessment model, 1999–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

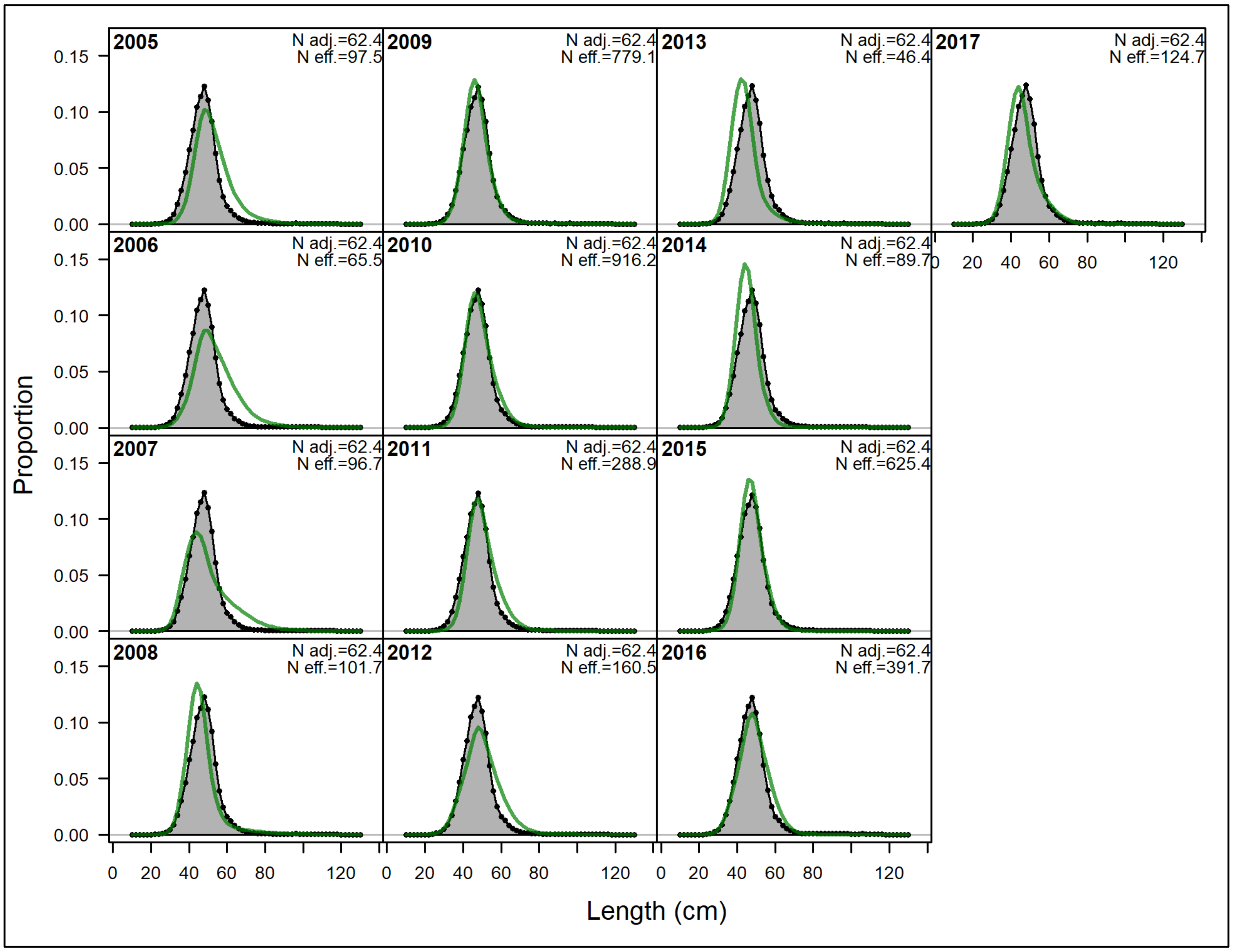


Figure 3.22. Observed and predicted length compositions for the RRrec discards from the base run of the stock assessment model, 2005–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

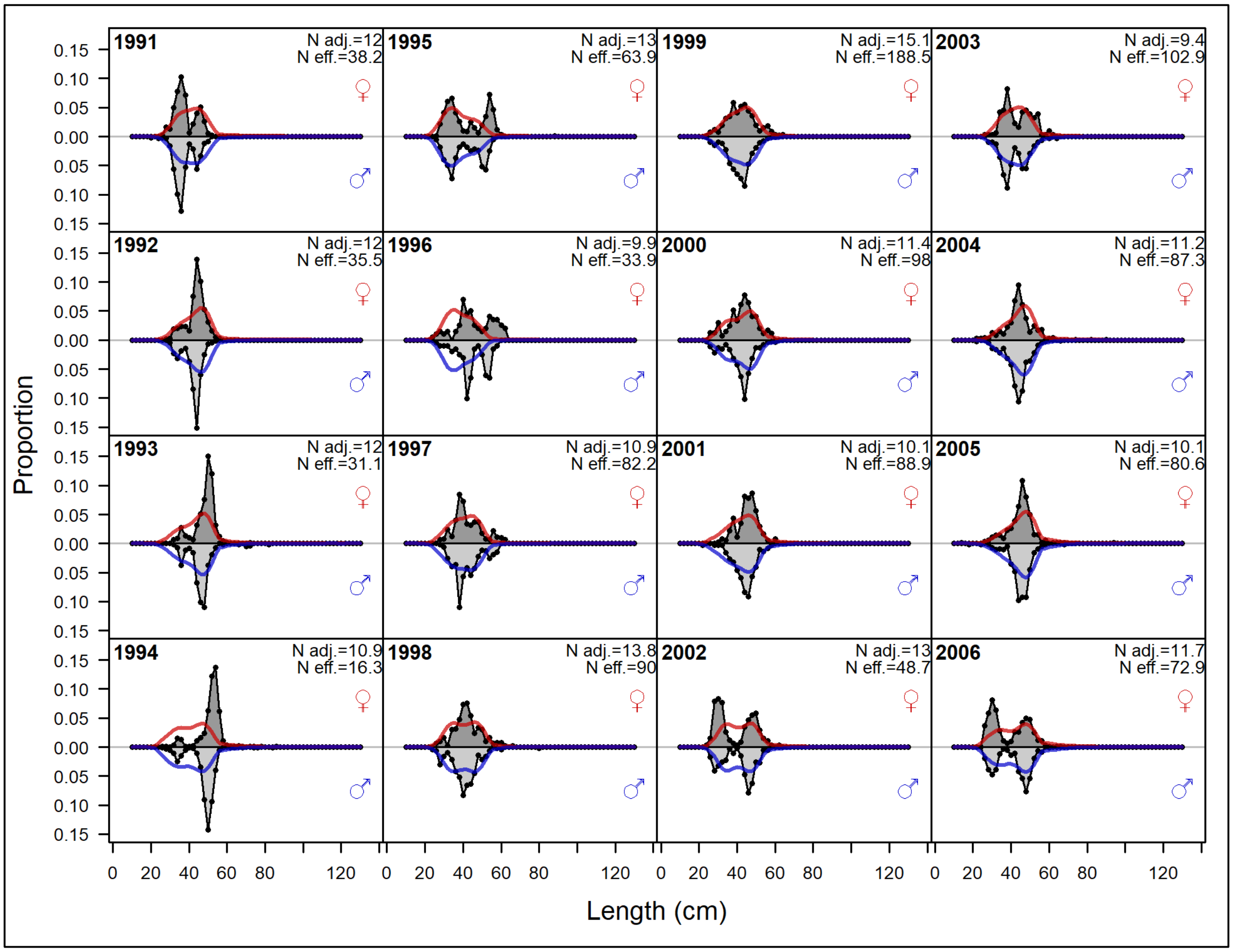


Figure 3.23. Observed and predicted length compositions for the P135fw survey from the base run of the stock assessment model, 1991–2006. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

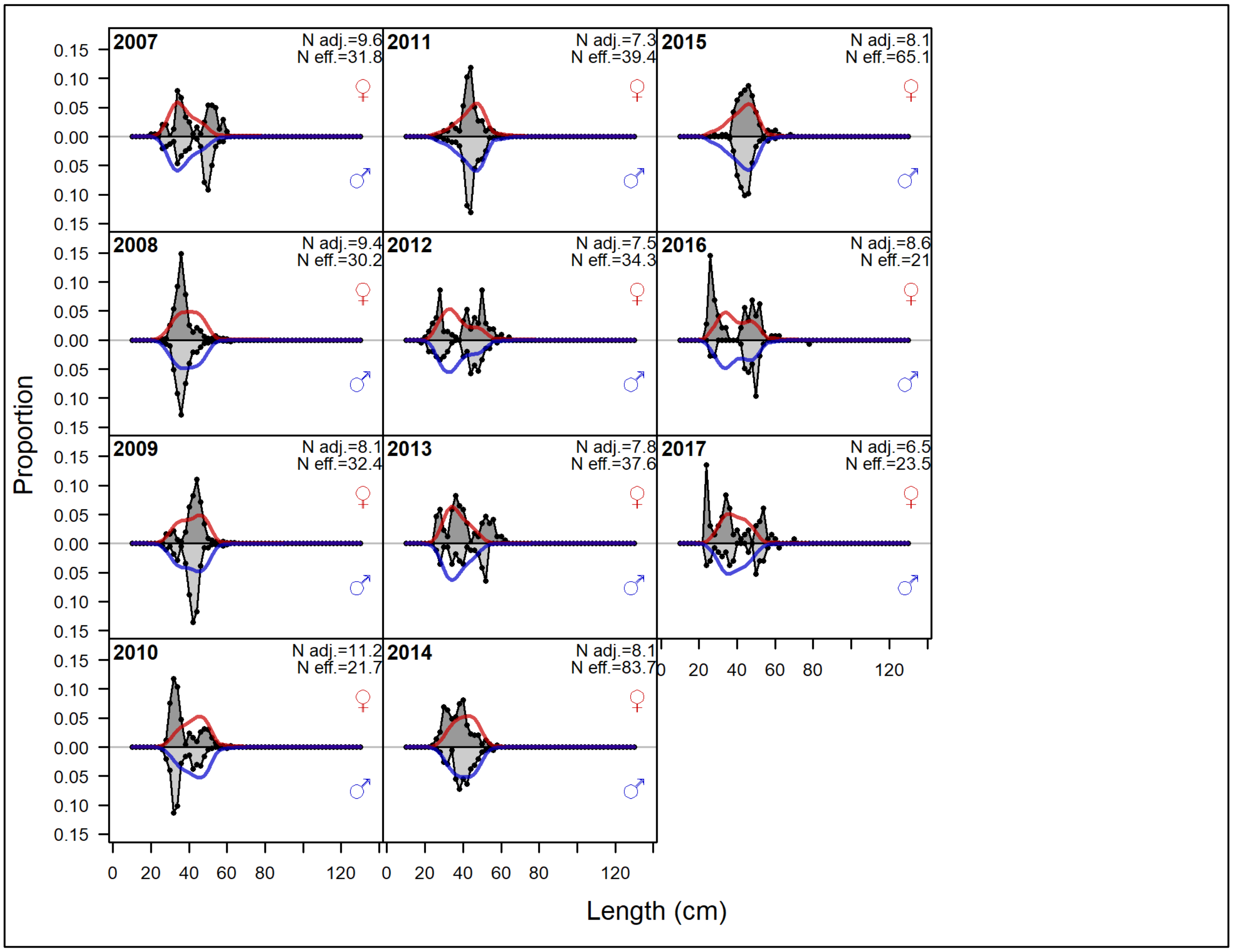


Figure 3.24. Observed and predicted length compositions for the P135fw survey from the base run of the stock assessment model, 2007–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

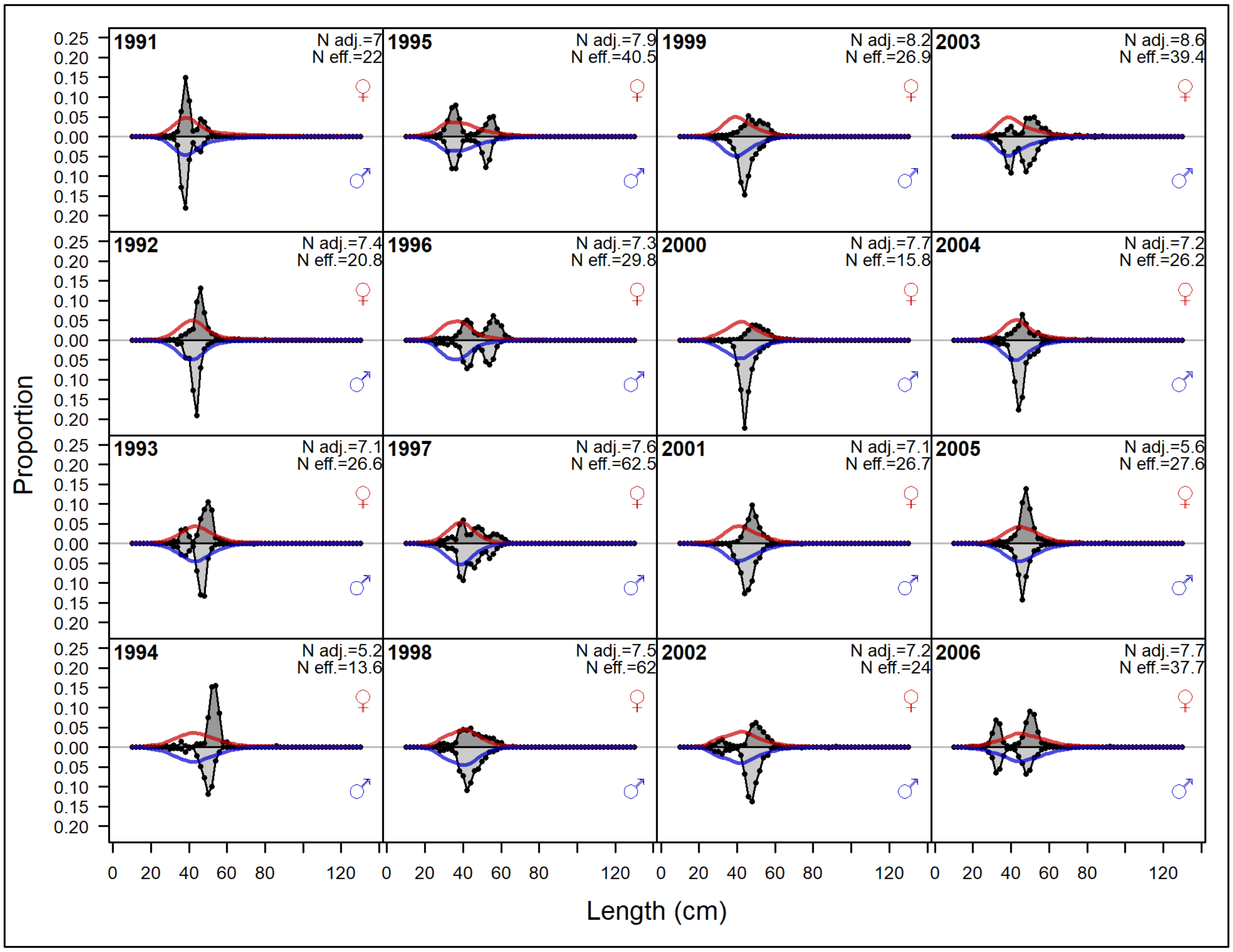


Figure 3.25. Observed and predicted length compositions for the P135spr survey from the base run of the stock assessment model, 1991–2006. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

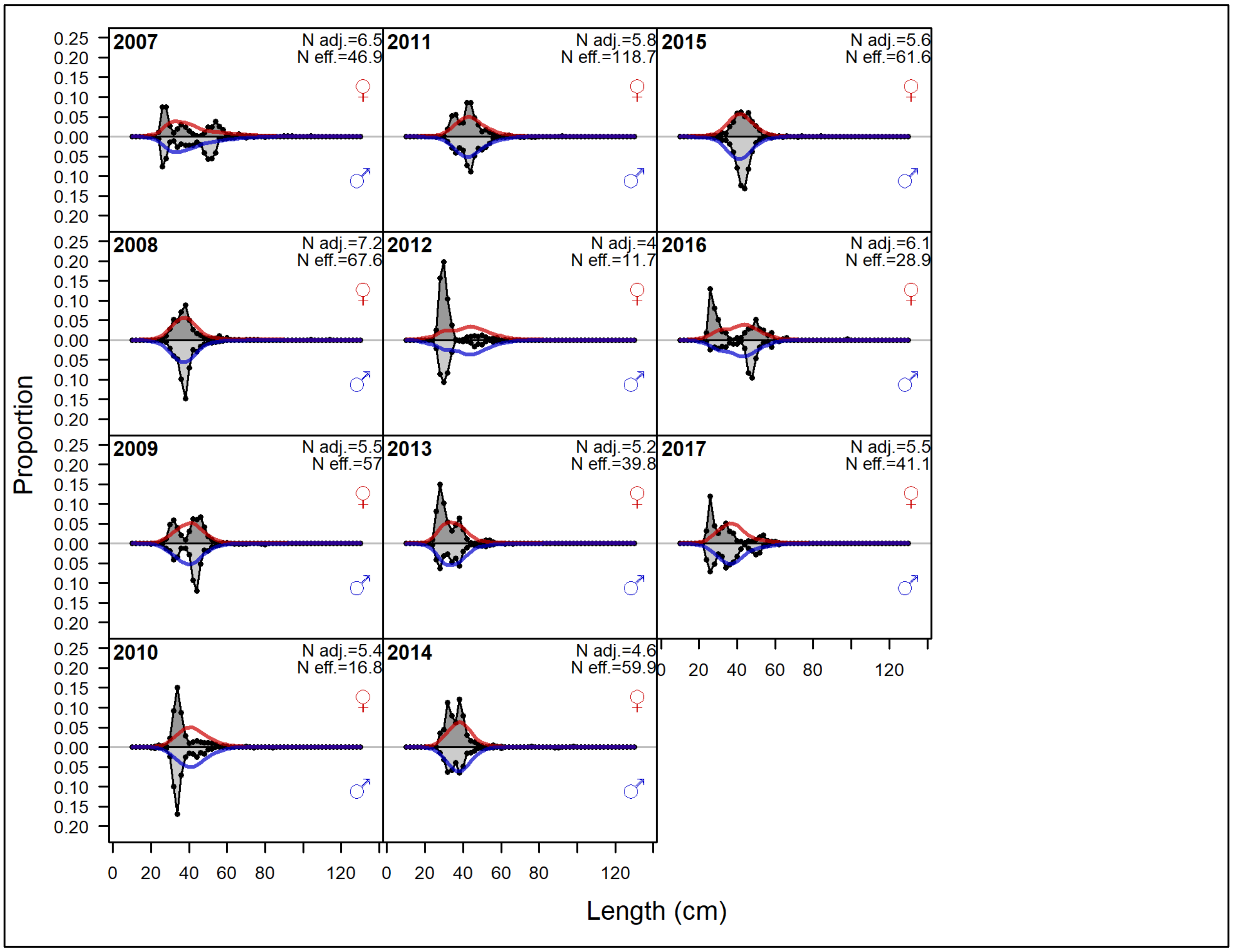


Figure 3.26. Observed and predicted length compositions for the P135spr survey from the base run of the stock assessment model, 2007–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

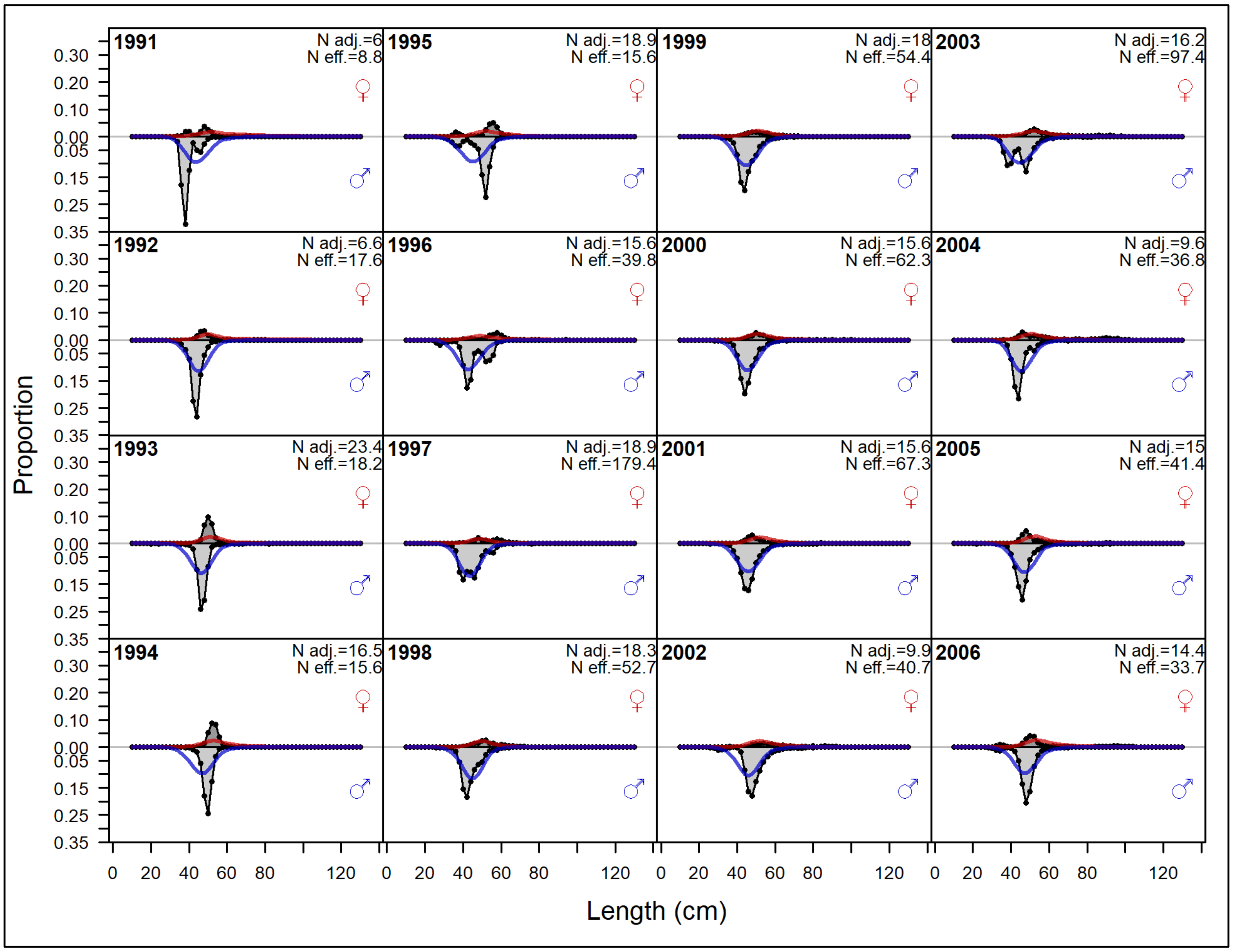


Figure 3.27. Observed and predicted length compositions for the RRef survey from the base run of the stock assessment model, 1991–2006. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

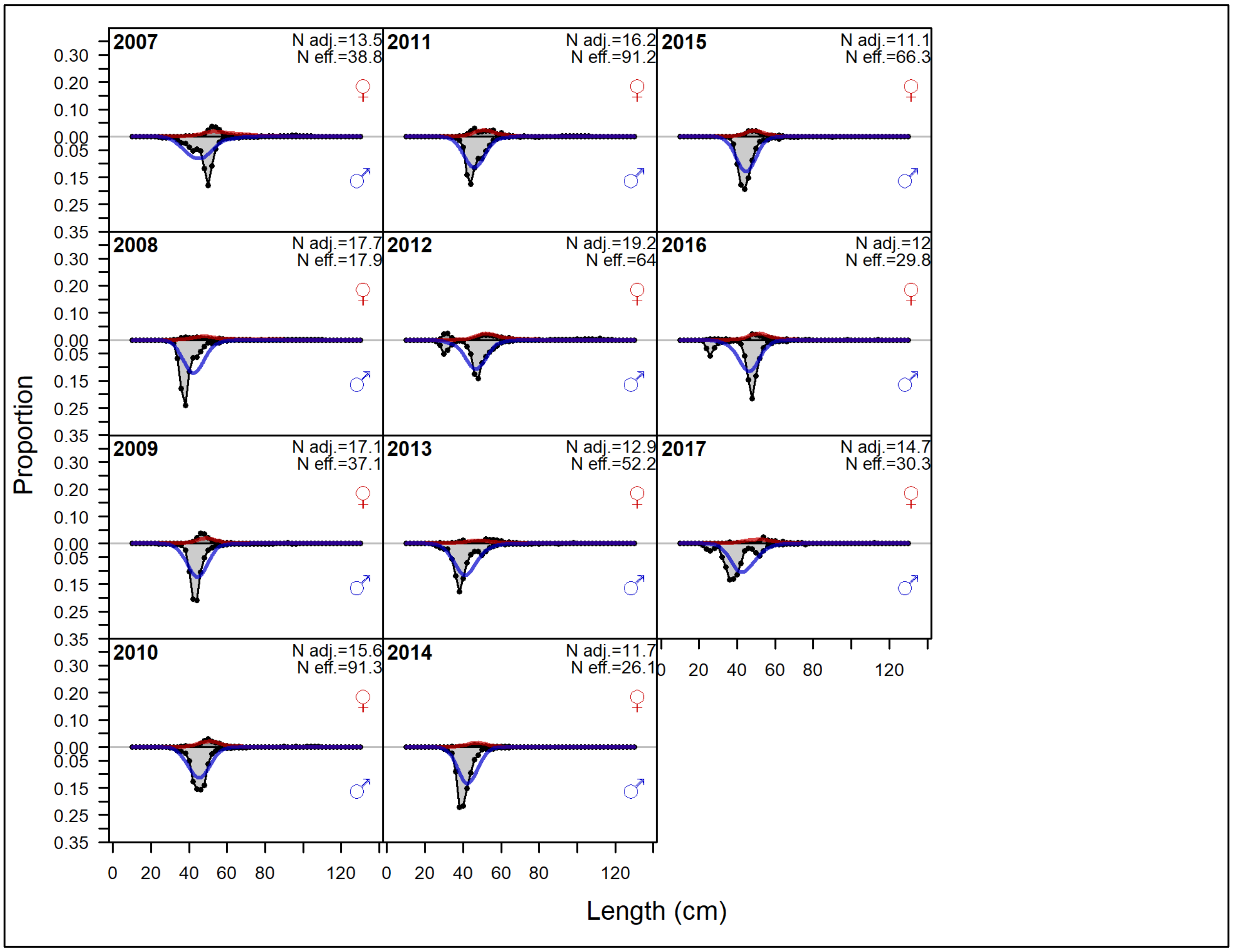


Figure 3.28. Observed and predicted length compositions for the RRef survey from the base run of the stock assessment model, 2007–2017. N adj. represents the input effective sample size (number of trips sampled) and N eff. represents the model estimate of effective sample size.

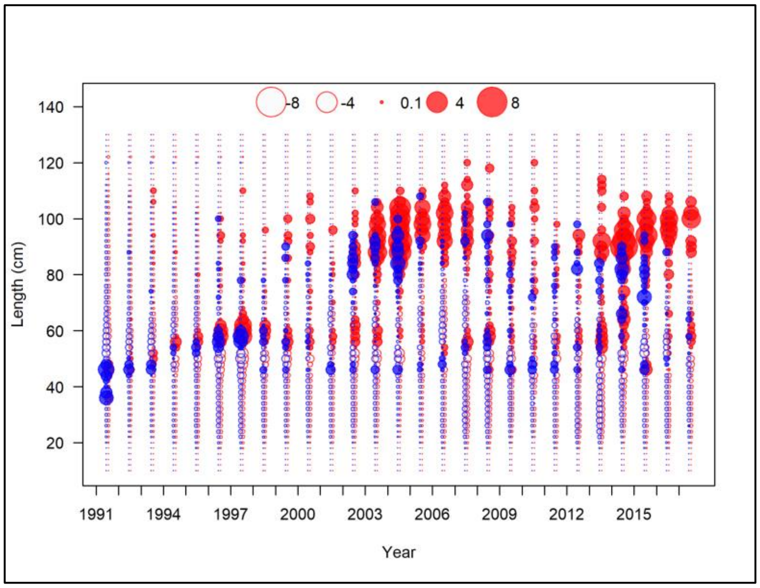


Figure 3.29. Pearson residuals (red: female; blue: male) from the fit of the base model run to the ARcomm landings length composition data, 1991–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

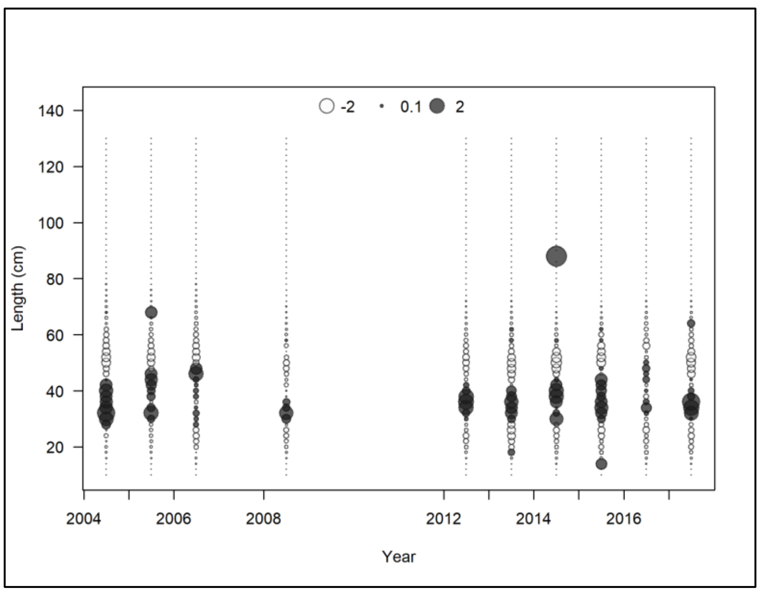


Figure 3.30. Pearson residuals from the fit of the base model run to the ARcomm discards length composition data, 1991–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

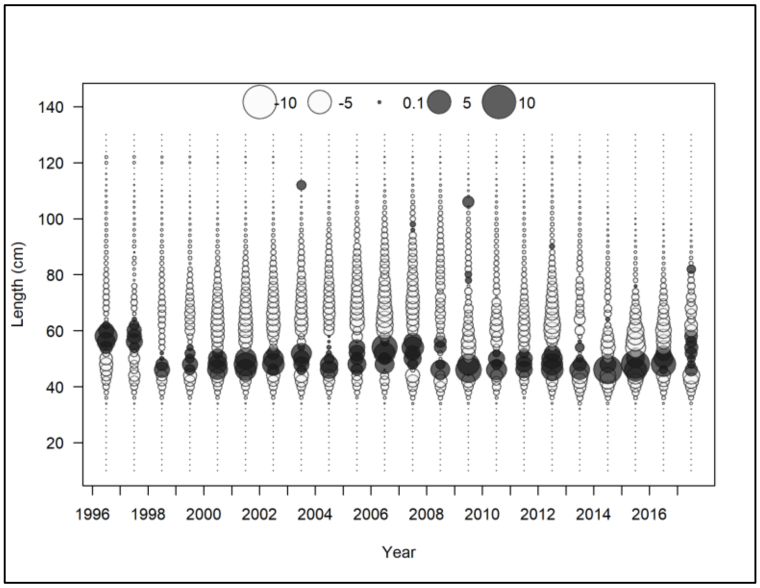


Figure 3.31. Pearson residuals from the fit of the base model run to the ASrec harvest length composition data, 1996–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

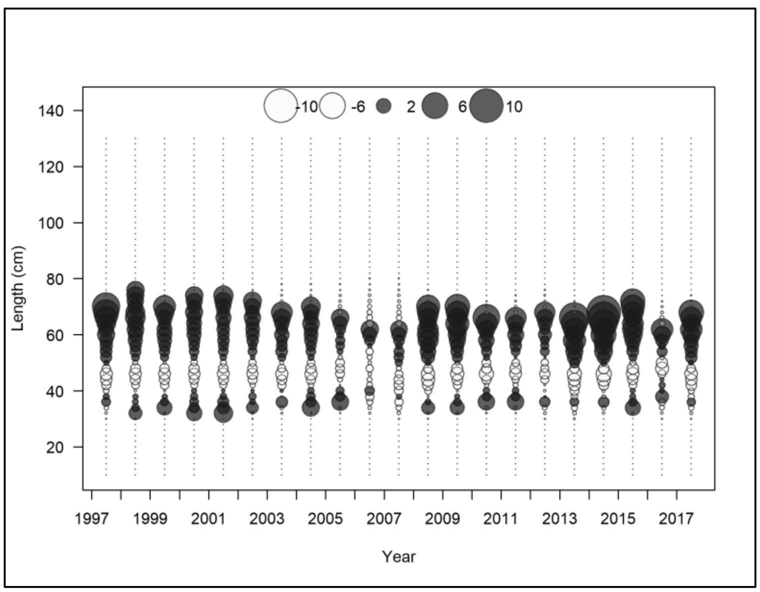


Figure 3.32. Pearson residuals from the fit of the base model run to the ASrec discard length composition data, 1997–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

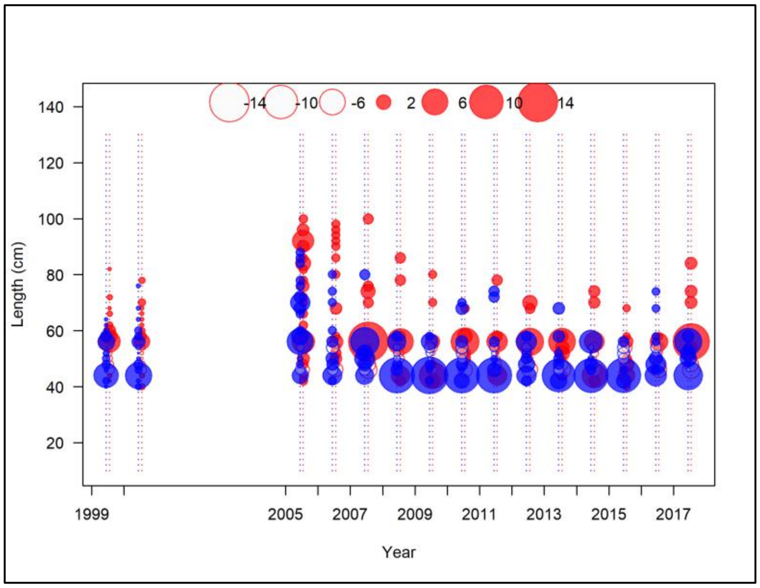


Figure 3.33. Pearson residuals (red: female; blue: male) from the fit of the base model run to the RRrec harvest length composition data, 1999–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

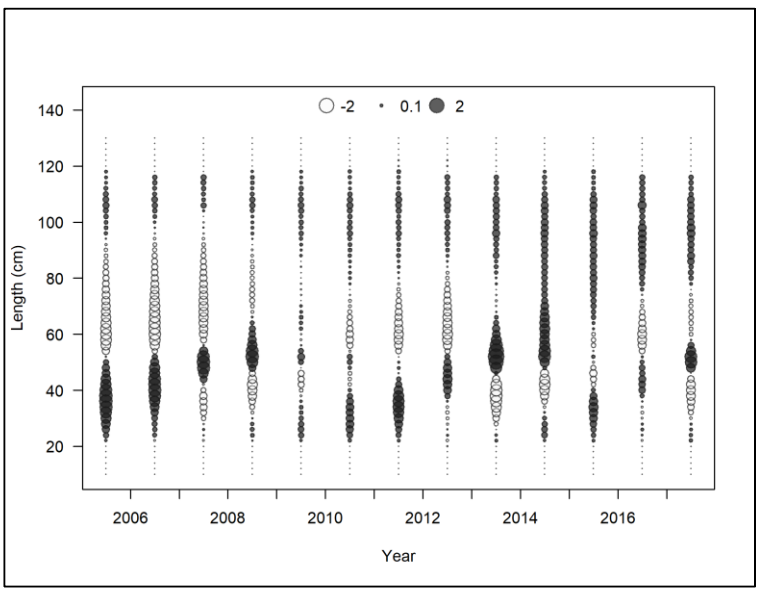


Figure 3.34. Pearson residuals from the fit of the base model run to the RRrec discard length composition data, 2005–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

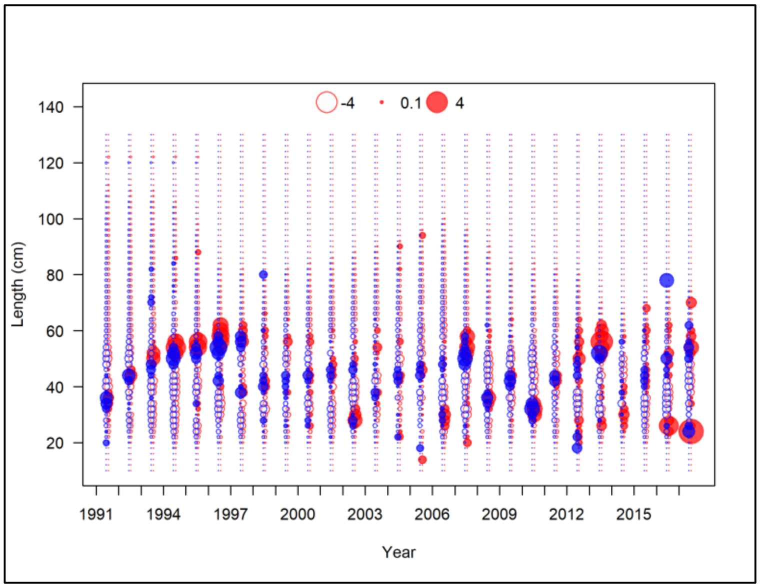


Figure 3.35. Pearson residuals (red: female; blue: male) from the fit of the base model run to the P135fw survey length composition data, 1991–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

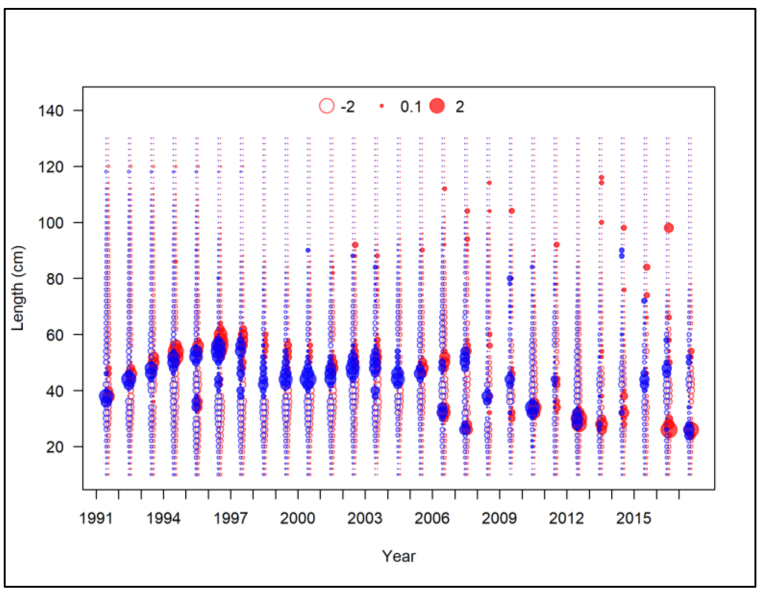


Figure 3.36. Pearson residuals (red: female; blue: male) from the fit of the base model run to the P135spr survey length composition data, 1991–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

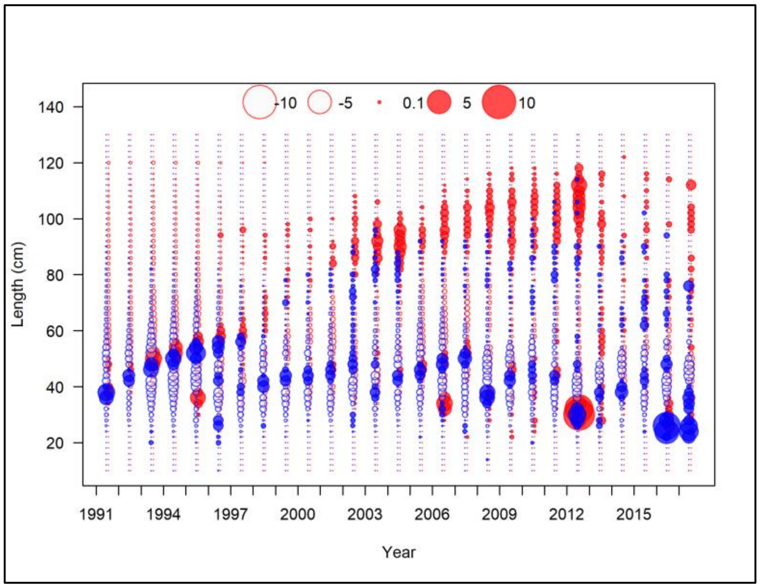


Figure 3.37. Pearson residuals (red: female; blue: male) from the fit of the base model run to the RRef survey length composition data, 1991–2017. Closed bubbles represent positive residuals (observed > expected) and open bubbles represent negative residuals (observed < expected).

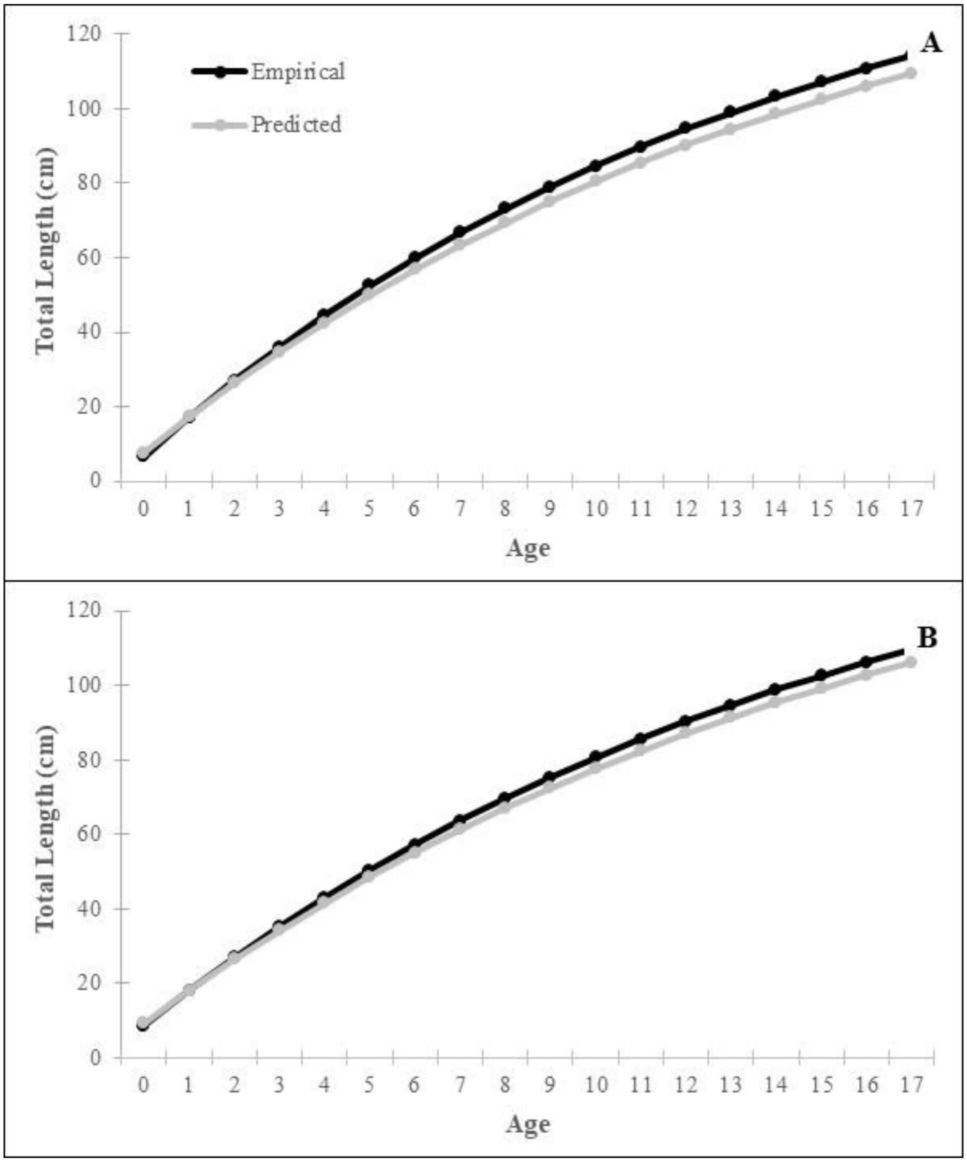


Figure 3.38. Comparison of empirical and model-predicted age-length growth curves for (A) female and (B) male striped bass from the base run of the stock assessment model.

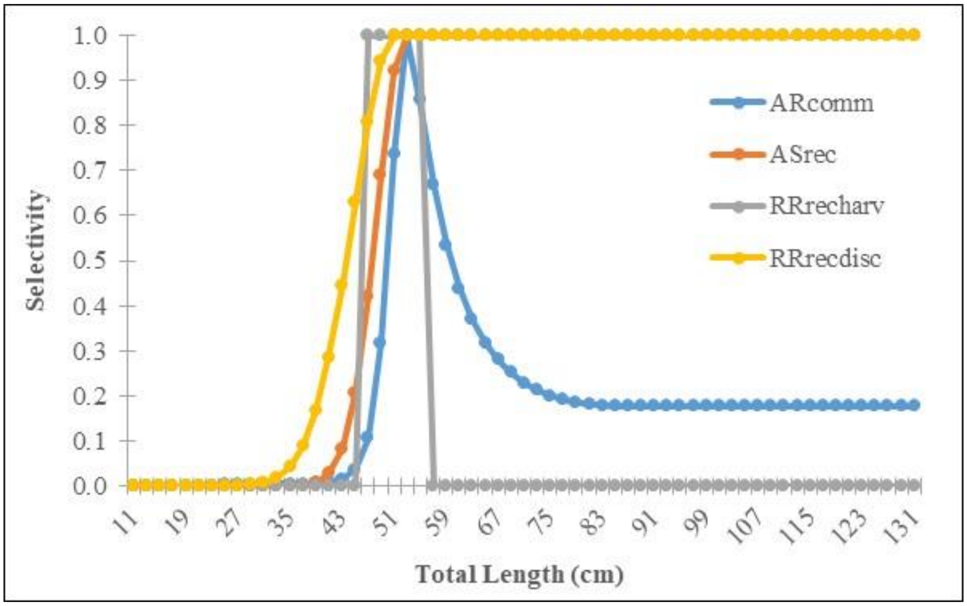


Figure 3.39. Predicted length-based selectivity for the fleets from the base run of the stock assessment model.

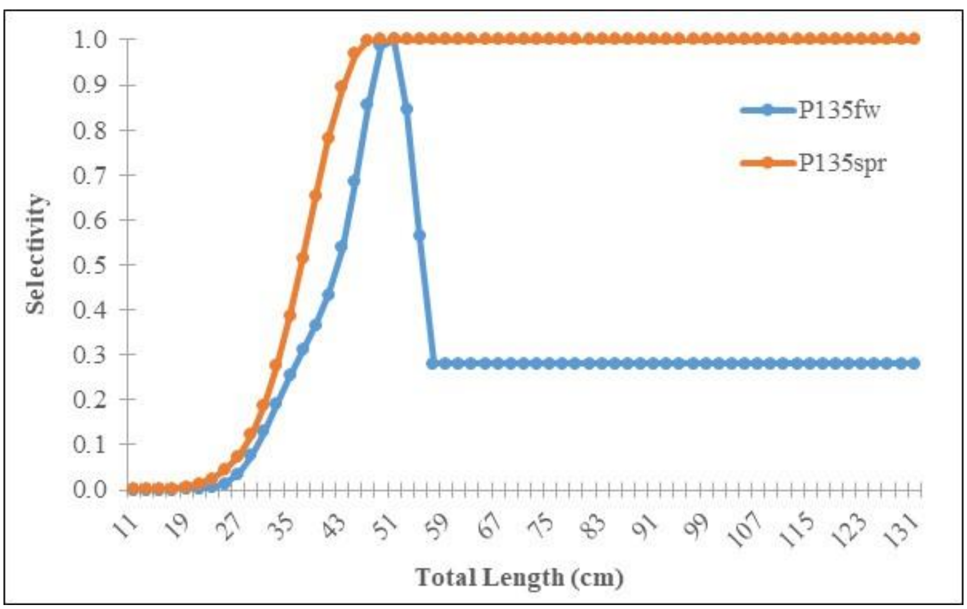


Figure 3.40. Predicted length-based selectivity for the P135fw and P135spr surveys from the base run of the stock assessment model.

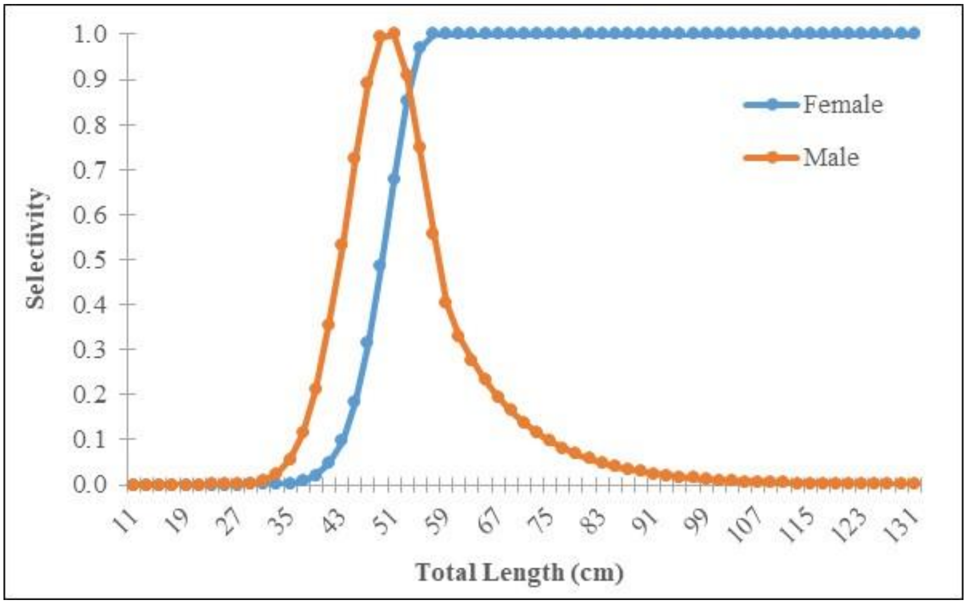


Figure 3.41. Predicted length-based selectivity for the RRef survey from the base run of the stock assessment model.

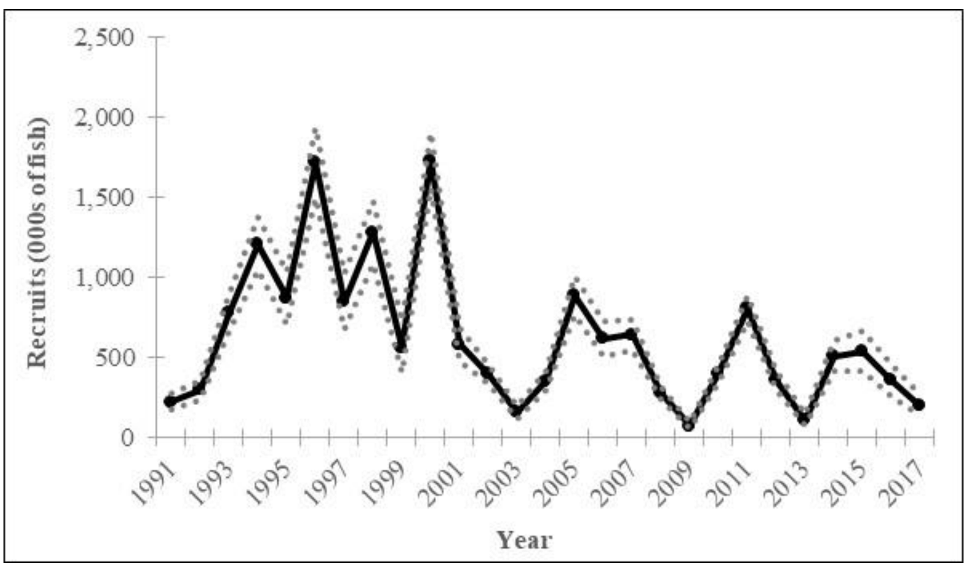


Figure 3.42. Predicted recruitment of age-0 fish from the base run of the stock assessment model, 1991–2017. Dotted lines represent ± 2 standard deviations of the predicted values.

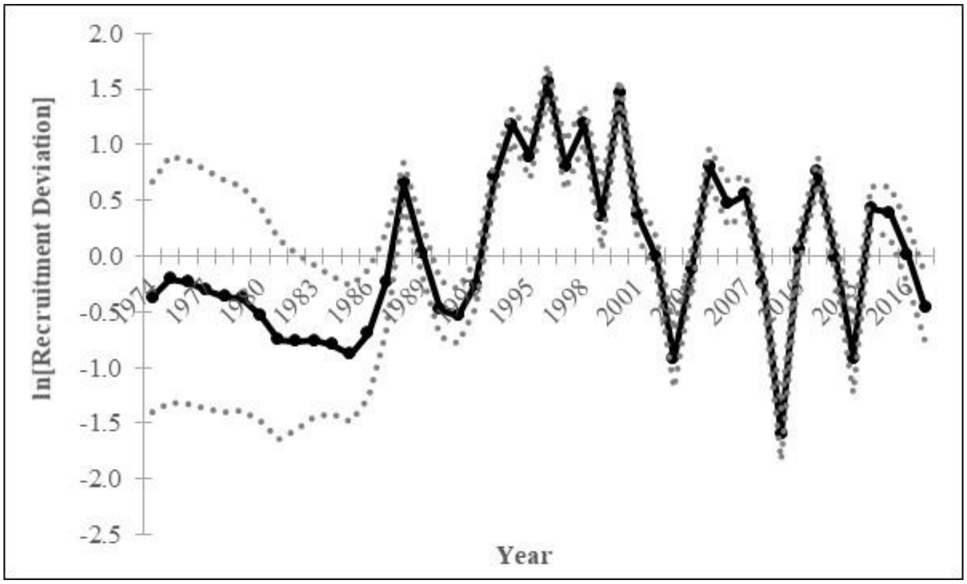


Figure 3.43. Predicted recruitment deviations from the base run of the stock assessment model, 1991–2017. Dotted lines represent ± 2 standard deviations of the predicted values.

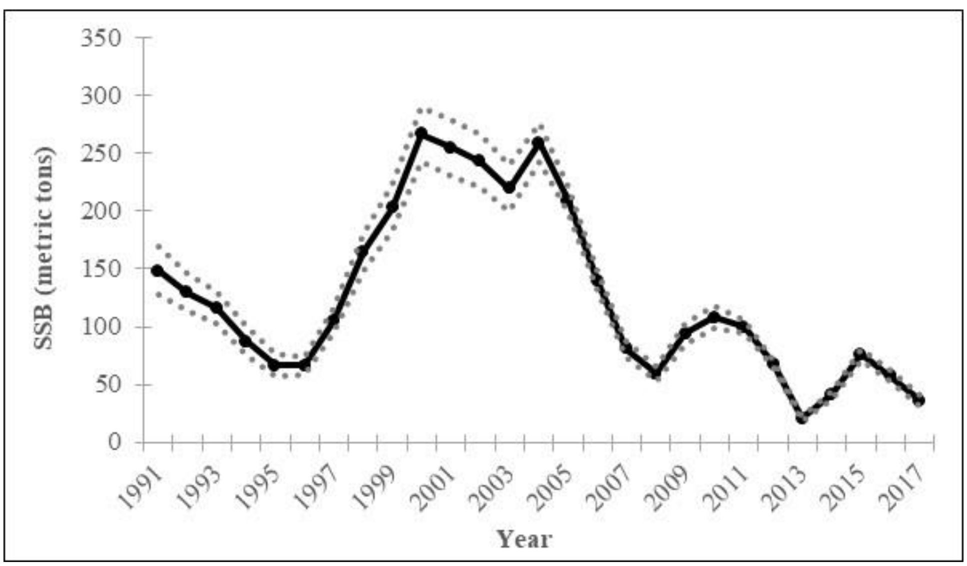


Figure 3.44. Predicted female spawning stock biomass from the base run of the stock assessment model, 1991–2017. Dotted lines represent ± 2 standard deviations of the predicted values.

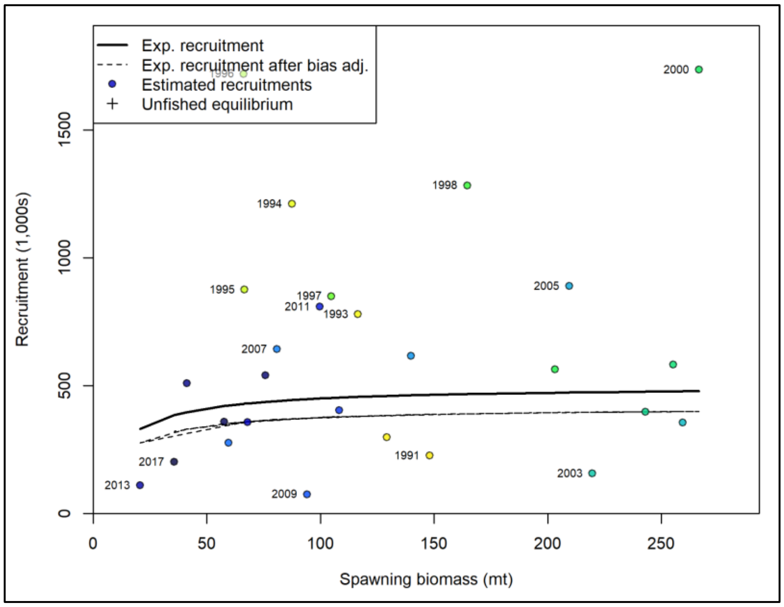


Figure 3.45. Predicted Beverton-Holt stock-recruitment relationship from the base run of the stock assessment model with labels on first (1991), last (2017), and years with (log) deviations > 0.5.

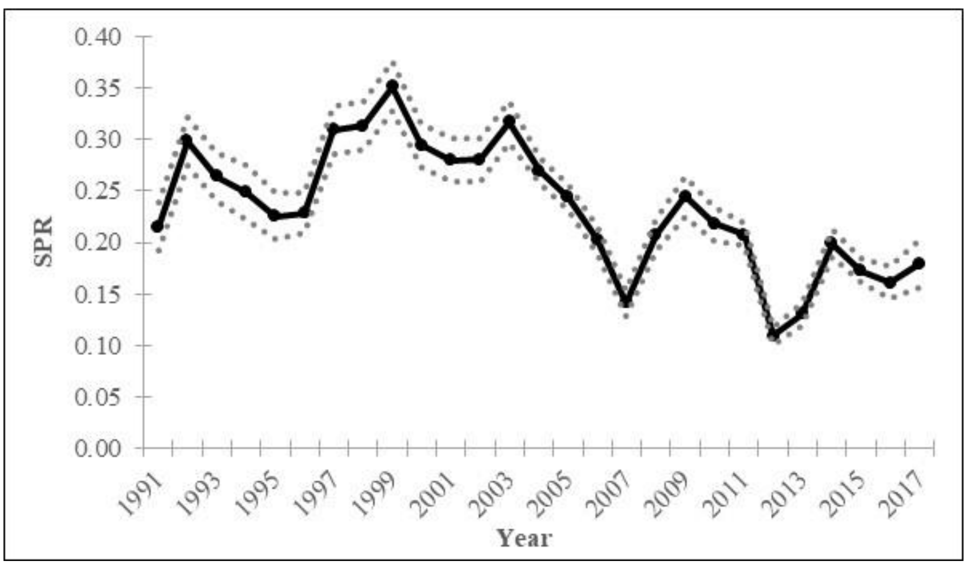


Figure 3.46. Predicted spawner potential ratio (SPR) from the base run of the stock assessment model, 1991–2017. Dotted lines represent ± 2 standard deviations of the predicted values.

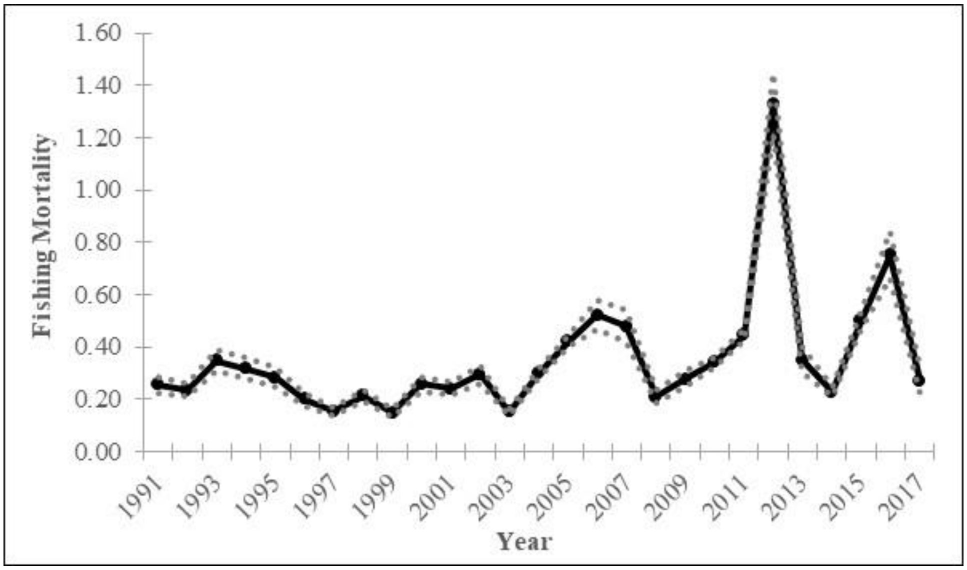


Figure 3.47. Predicted fishing mortality (numbers-weighted, ages 3–5) from the base run of the stock assessment model, 1991–2017. Dotted lines represent ± 2 standard deviations of the predicted values.

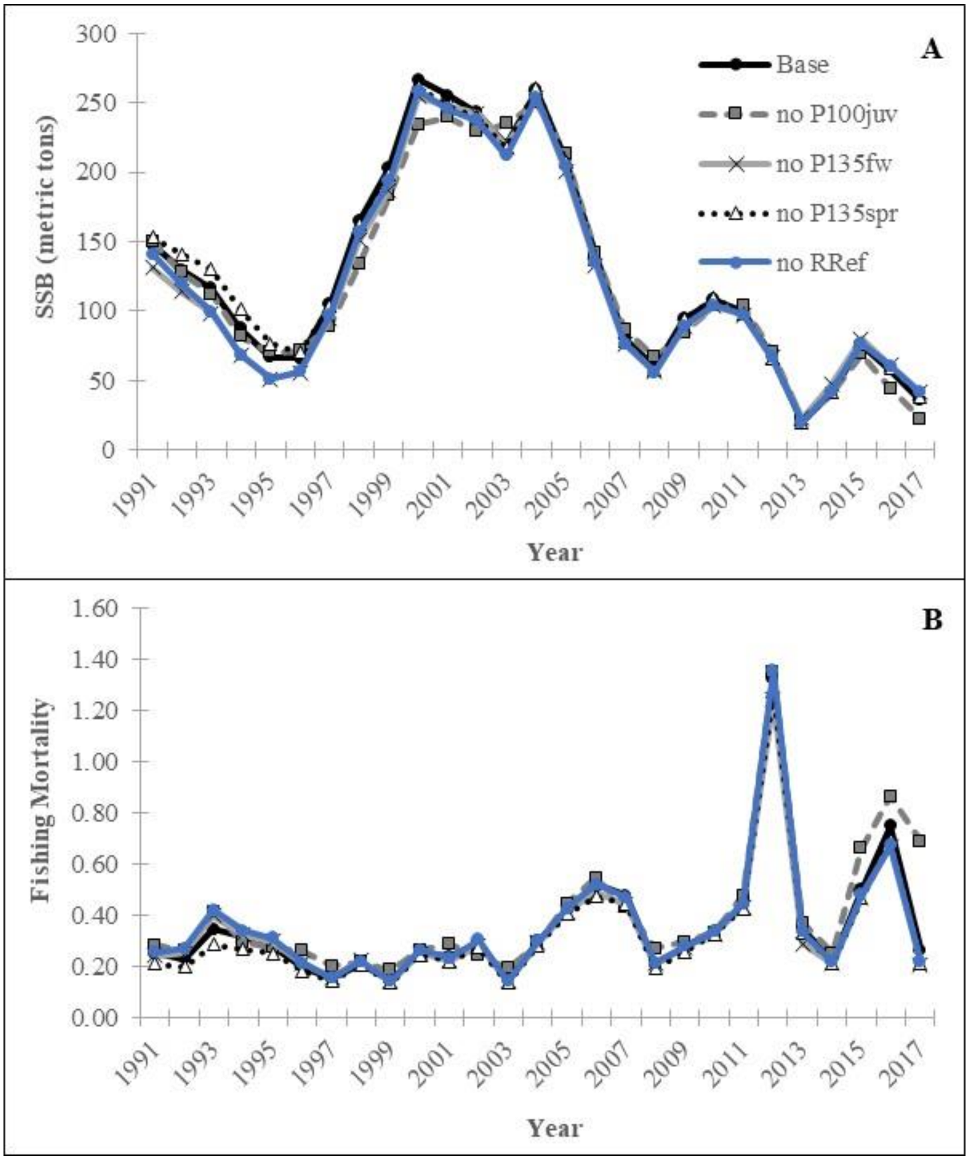


Figure 3.48. Sensitivity of model-predicted (A) female spawning stock biomass (SSB) and (B) fishing mortality rates (numbers-weighted, ages 3–5) to removal of different fisheries-independent survey indices from the base run of the stock assessment model, 1991–2017.

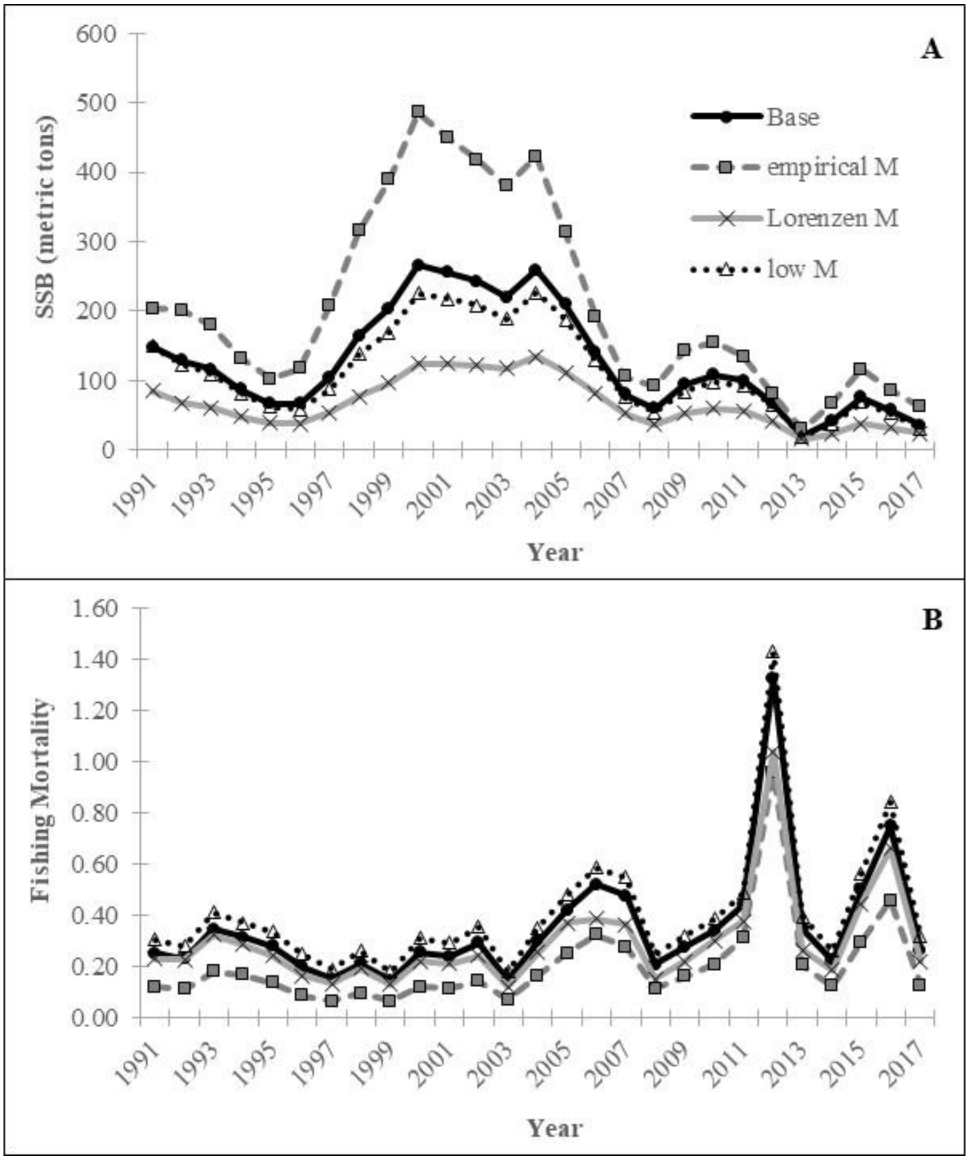


Figure 3.49. Sensitivity of model-predicted (A) female spawning stock biomass (SSB) and (B) fishing mortality rates (numbers-weighted, ages 3–5) to the assumption about natural mortality, 1991–2017.

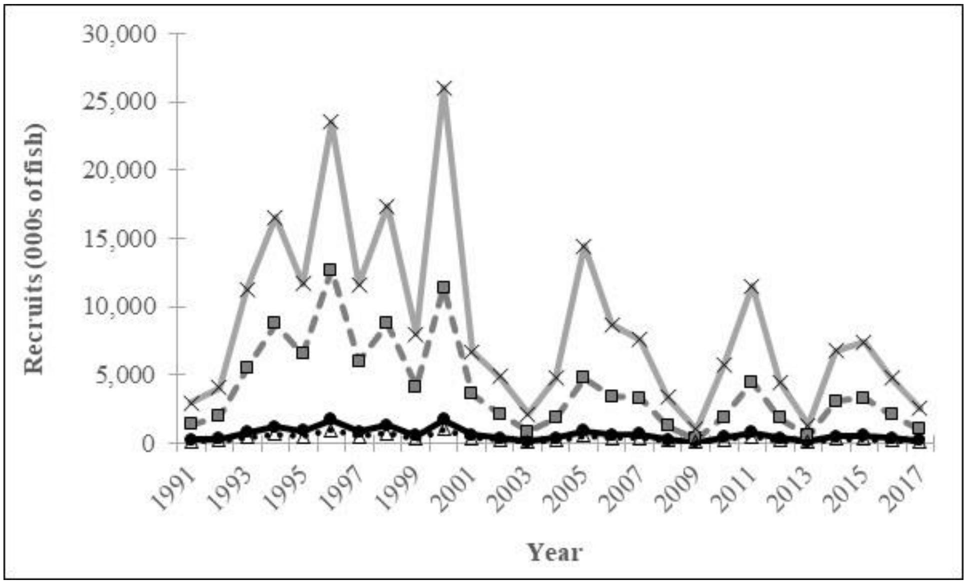


Figure 3.50. Predicted recruitment from the sensitivity runs in which the assumption about natural mortality was changed, 1991–2017.

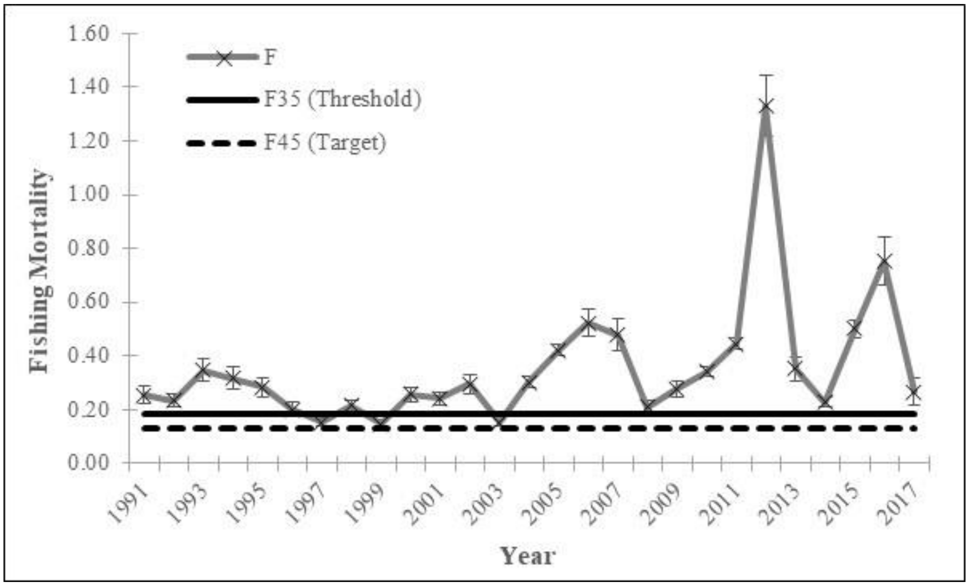


Figure 4.1. Estimated fishing mortality (numbers-weighted, ages 3–5) compared to fishing mortality target ($F_{45\%}$=0.13) and threshold ($F_{35\%}$=0.18). Error bars represent ± two standard errors.

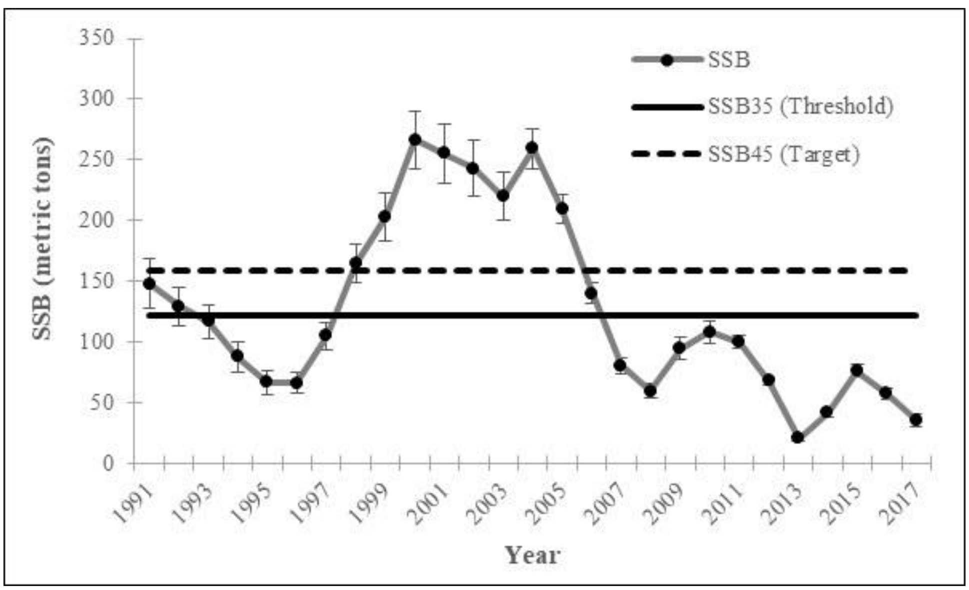


Figure 4.2. Estimated female spawning stock biomass compared to spawning stock biomass target ($SSB_{45\%}$=159 mt) and threshold ($SSB_{35\%}$=121 mt). Error bars represent ± two standard errors.

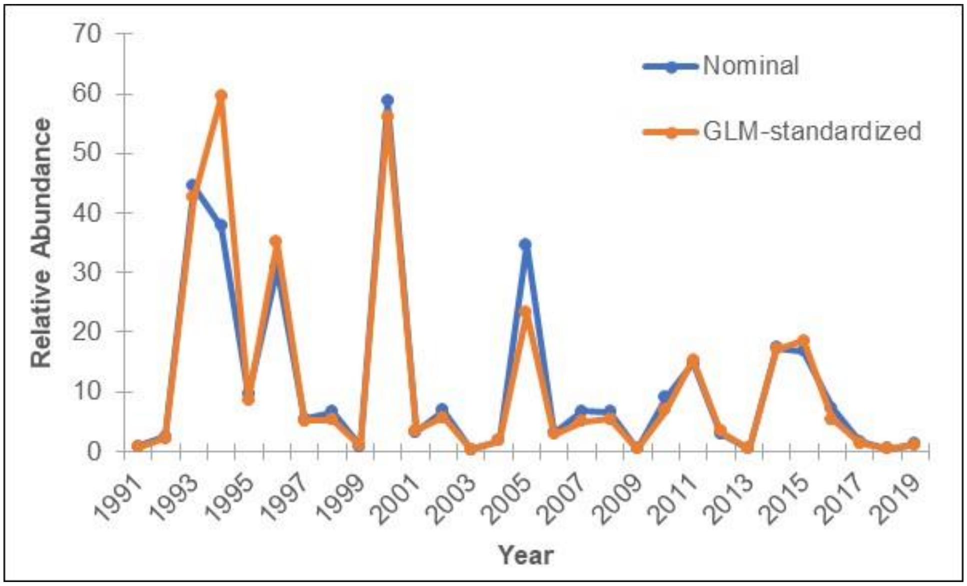


Figure 5.1. Update of the nominal and GLM-standardized indices of relative age-0 abundance derived from the Juvenile Abundance Survey (P100), 1991–2019.

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

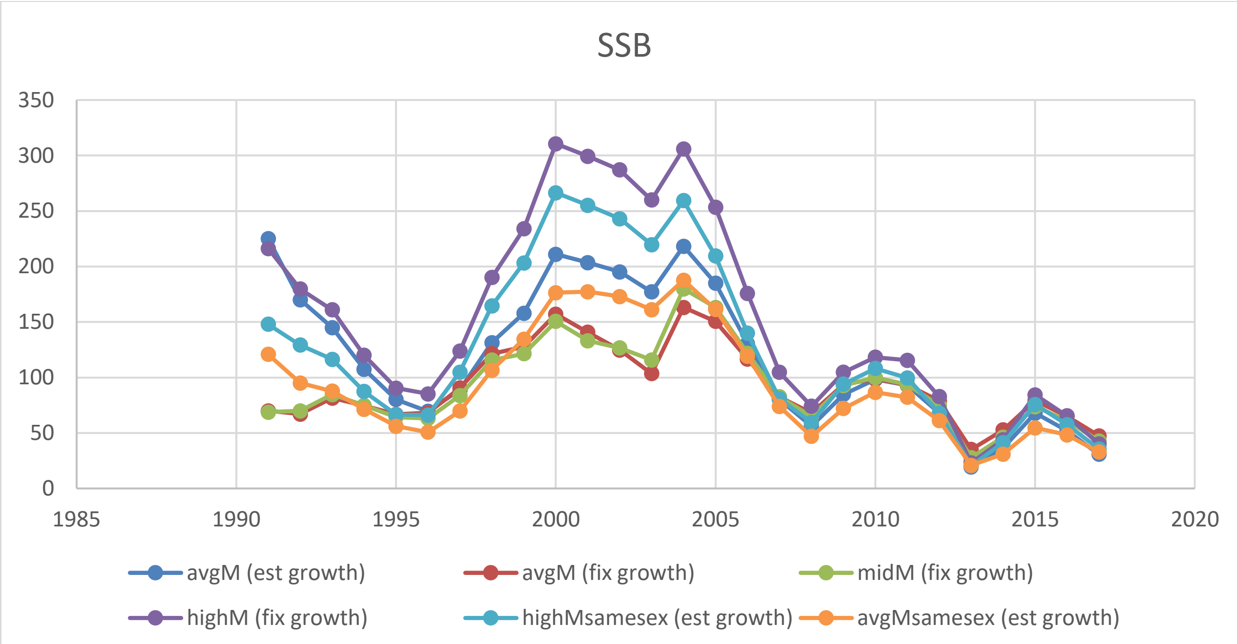


Figure 1. Female spawning stock biomass estimates (metric tons) across natural mortality sensitivity runs.

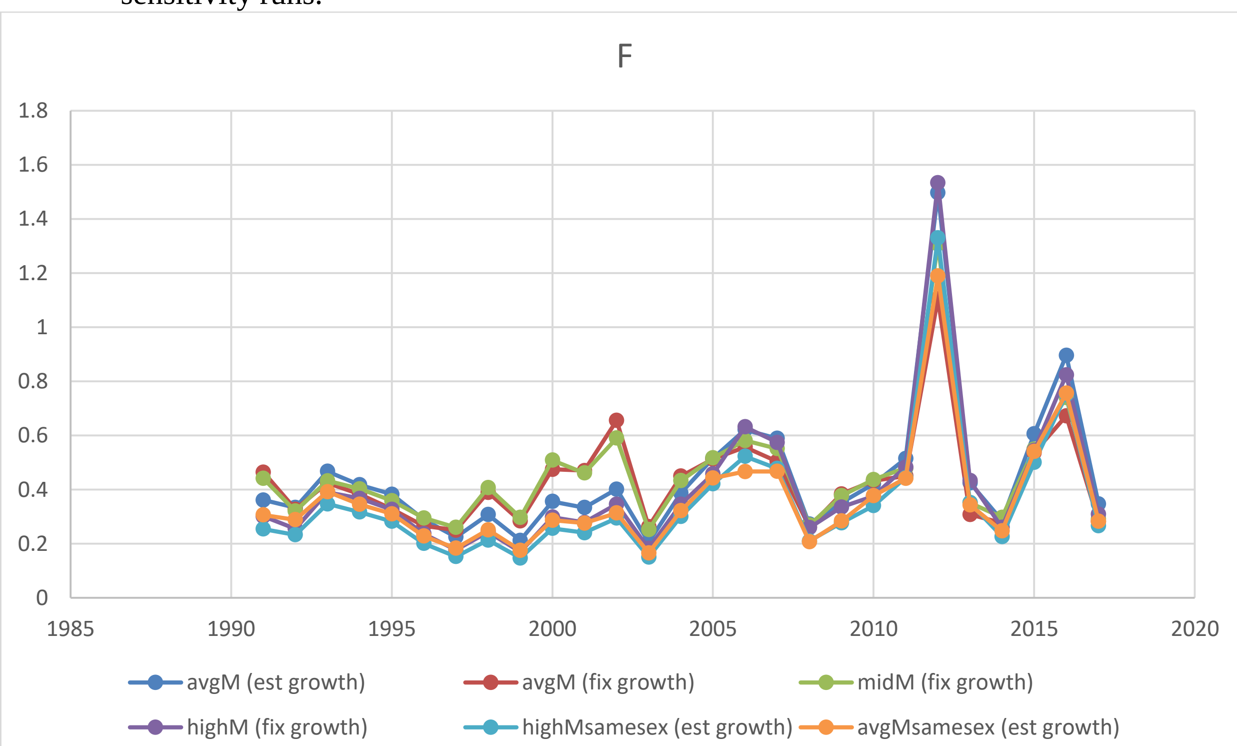


Figure 2. Numbers-weighted ages 3-5 average fishing mortality estimates across natural mortality sensitivity runs.

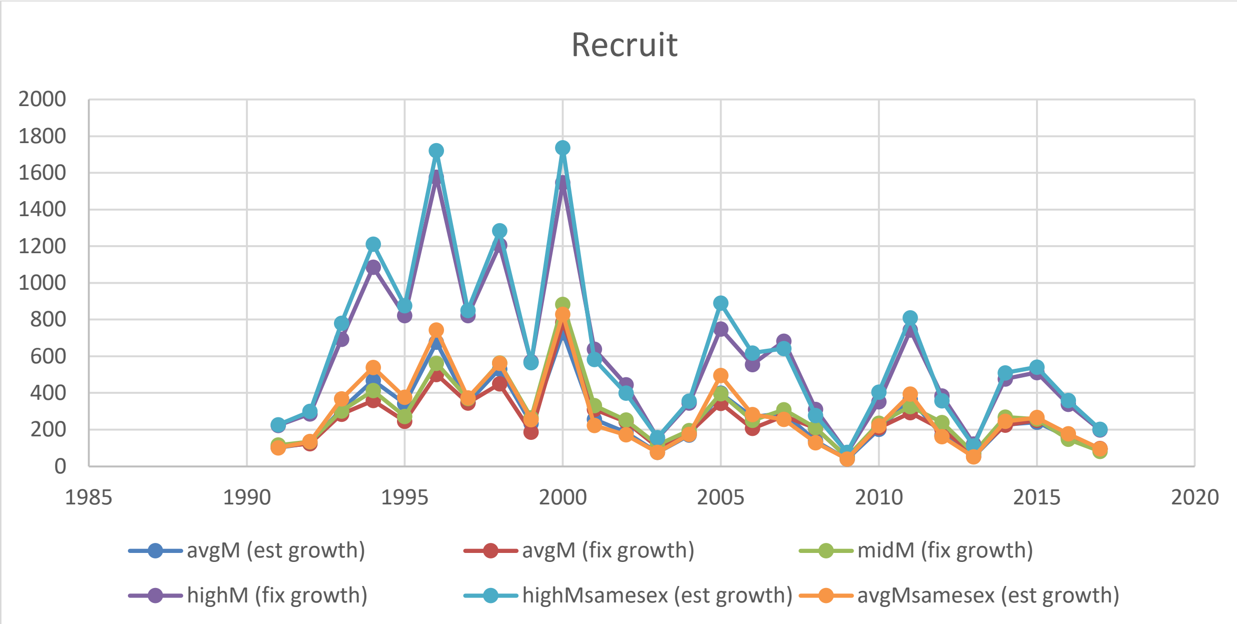


Figure 3. Age-0 recruitment estimates (thousands) across natural mortality sensitivity runs.

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

Atlantic States Marine Fisheries Commission

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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.

M21-52

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

<u>Harvest Control</u>

- 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.

<u>Spawning Protection</u>

- 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.

<u>Enforcement</u>

- 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.

<u>Others</u>

- 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

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)

Commenters from:	
MA	30
ME	2
NH	1
NY	1
PA	1
MD	1
DC	1

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

Commenters from:	
MD	13
ME	1

14 people provided comments including comments on behalf of the Southern Maryland Recreational Fishing Organization (SMRFO) and Chesapeake Bay Foundation (CBF)

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

<u>Harvest Control</u>

- 2 people support a moratorium if needed.

<u>Spawning Protection</u>

- 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.

<u>Enforcement</u>

- 1 person commented that effective enforcement programs should be incentivized, especially for CE, and states need to show they have effective enforcement programs.

<u>Others</u>

- 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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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.

<u>Issue 1: Fishery Goals and Objectives</u>

- **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.

M21-51

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.

<u>Issue 9: Coastal Commercial Quota Allocation</u>

- **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.

<u>Issue 10: Other Issues</u>

- **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.

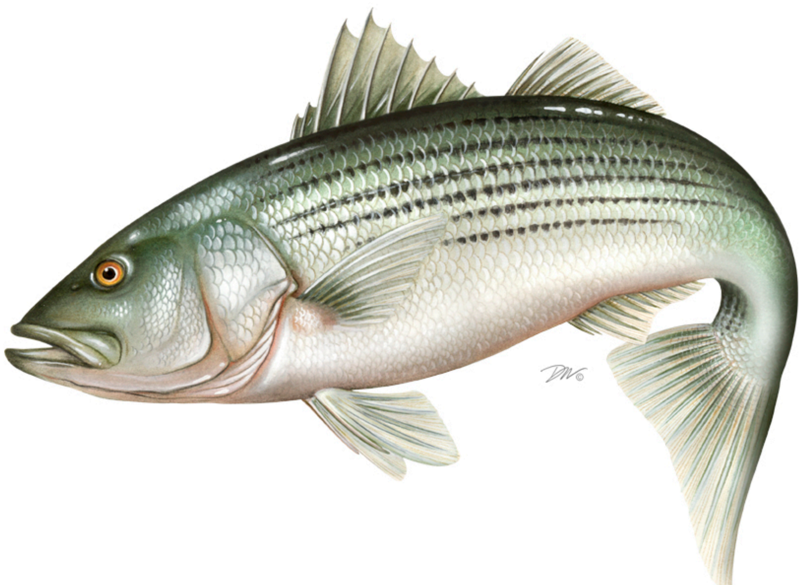
[2] AP member had to step away from the meeting before this issue was discussed and provided this comment to staff after the meeting.

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.

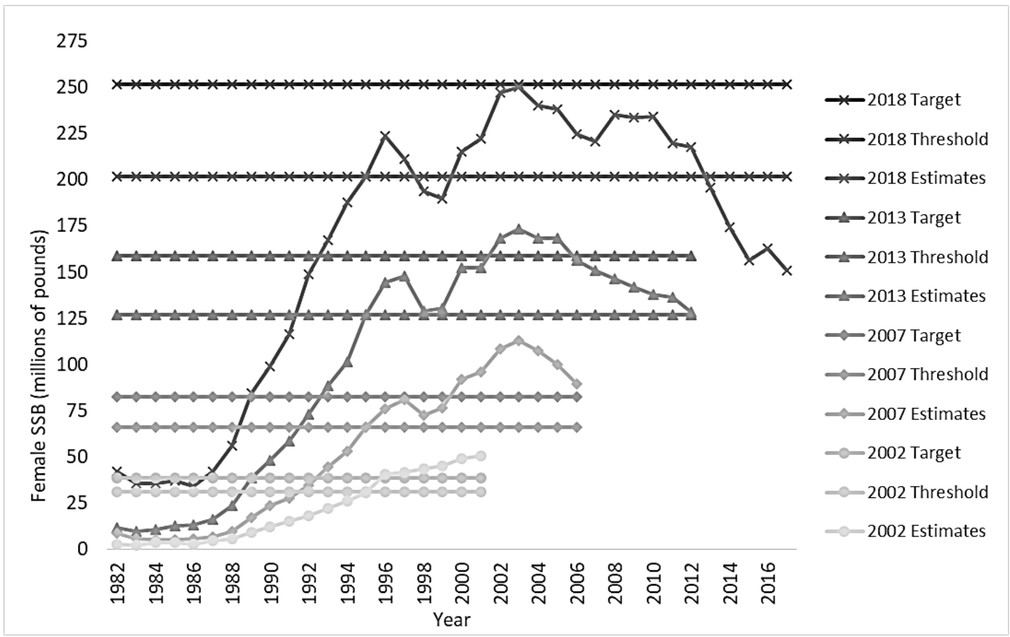


Figure 1. Historical perspective of Atlantic striped bass female spawning stock biomass (SSB) estimates and resulting SSB target and threshold since implementation of Amendment 6 in 2003. The SSB threshold and target are based on the estimate of female SSB in 1995 which has changed over time with improved data and modeling techniques. Source: ASMFC.

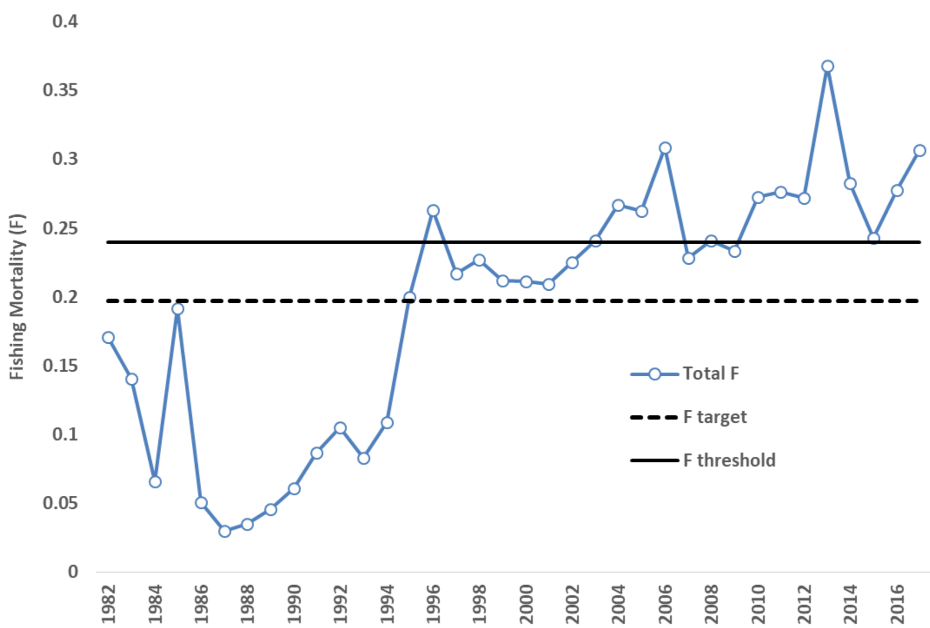


Figure 2. Current estimates of fishing mortality (F) relative to the F target and threshold, 1982-2017. Source: NEFSC 2018a.

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**

&

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.

<u>Statement of the Problem</u>: 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.

<u>Statement of the Problem:</u> 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.

<u>Public Comment Questions:</u> 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).

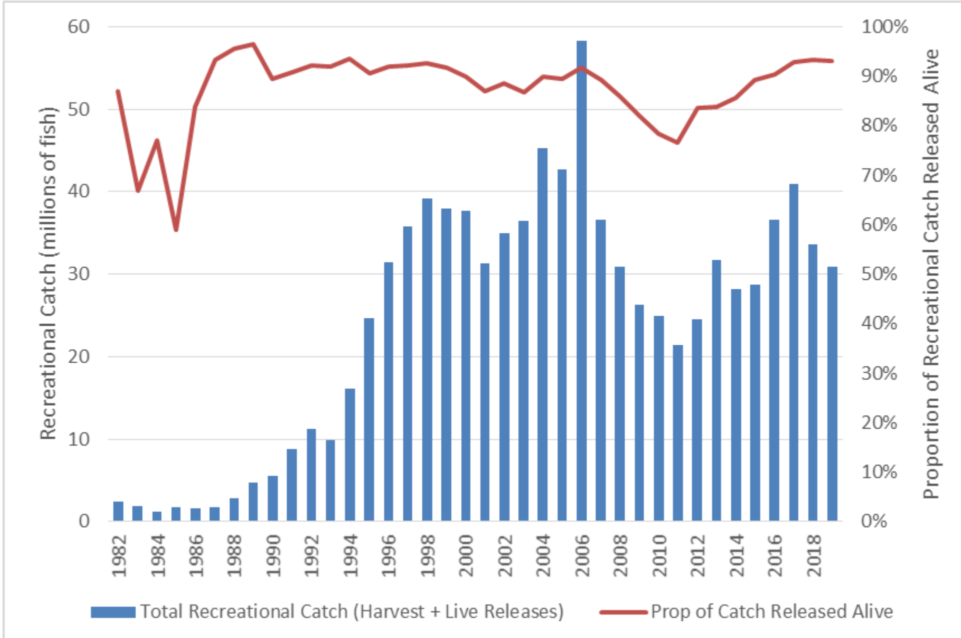


Figure 4. Total recreational catch (harvest + live releases) and the proportion of catch released alive, 1982-2019. Source: MRIP; excludes inshore estimates from A/R in North Carolina.

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.

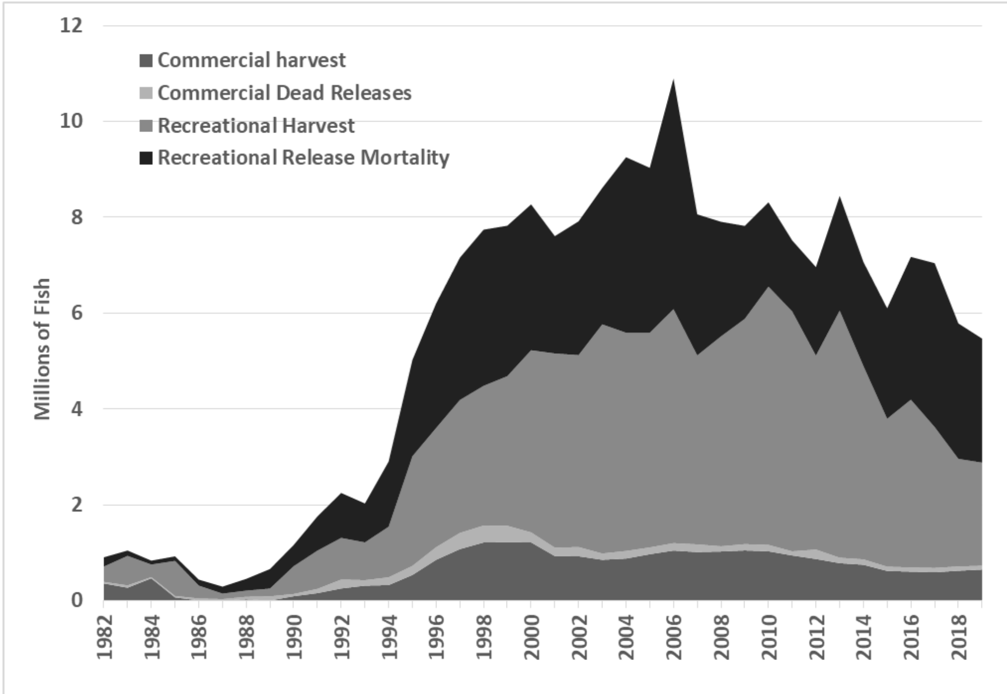


Figure 5. Total striped bass removals by sector in numbers of fish, 1982-2019. Note: Harvest is from ACCSP/MRIP, commercial discards and recreational release mortality is from ASMFC. Estimates exclude inshore harvest from A/R in North Carolina.

<u>Statement of the Problem:</u> 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.

<u>Public Comment Questions:</u> 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 ° (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)
°Addendum 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

Diodati, P.J. and R.A. Richards. 1996. Mortality of Striped Bass Hooked and Released in Salt Water. Transactions of the American Fisheries Society 125:300-307.

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

1050 N. Highland Street • Suite 200A-N • Arlington, VA 22201
703.842.0740 • 703.842.0741 (fax) • www.asmfc.org

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

M21-06

ATLANTIC STRIPED BASS ADVISORY PANEL

Bolded names await approval by the Atlantic Striped Bass Management Board April 20, 2021

Maine

Vice-Chair - David Pecci (rec)
144 Whiskeag Road
Bath, ME 04530
Phone (o): (207) 442-8581
Phone (c): (207) 841-1444
FAX: (207) 442-8581
dave@obsessioncharters.com
Appt. Confirmed 5/23/02
Appt Reconfirmed 5/10

Bob Humphrey (comm. rod and reel/for-hire)
727 Poland Range Road
Pownal, ME 04069
Phone (day): 207.688.4966
Phone (eve): 207.688.4854
bob@bobhumphrey.com
Appt. Confirmed 2/18/20

New Hampshire

Peter Whelan (rec)
100 Gates Street
Portsmouth, NH 03801
Phone (o): (603) 205-5318
Phone (h): (603) 427-0401
pawhelan@comcast.net
Appt. Confirmed 2/24/03
Appt Reconfirmed 5/10

Massachusetts

Douglas M. Amorello (comm. rod & reel)
68 Standish Street
Pembroke, MA 02359
Cell: (774)766-8781
sashamysportfishing@gmail.com
Appt. Confirmed 3/23/11
Appt. Reconfirmed 8/18

Patrick Paquette (rec/for-hire/comm)
61 Maple Street
Hyannis, MA 02601
Phone: (781)771.8374
Email: basicpatrick@aol.com
Appt. Confirmed 8/16

Rhode Island

Andrew J. Dangelo (for-hire)
1035 Liberty Lane
West Kingston, RI 02892
Phone: 401.788.6012
Maridee2@gmail.com
Appt. Confirmed 2/3/21

Michael Plaia (comm/rec/for-hire)
119 Currituck Road
Newtown, CT 06470
Phone: 203.512.4280
Makomike3333@yahoo.com
Appt. Confirmed 2/3/21

Connecticut

Kyle Douton (rec/tackle shop owner)
5 Rockwell Street
Niantic, CT 06357
Phone (day): (860)739-7419
Phone (eve): (860)739-8899
FAX: (860)739-9208
kyle@jbtackle.com
Appt. Confirmed 5/13/14

Vacancy (rec)

New York

Bob Danielson (rec)
86 Balin Avenue
South Setauket, NY 11720
Phone: 631.974.8774
Bdan93@optonline.net
Appt. Confirmed 10/22/20

Nathaniel Howard Miller (comm)
95 Church Lane
East Hampton, NY 11937
Phone: 631.702.5374
Miller_nat@yahoo.com
Appt. Confirmed 2/3/21

New Jersey
C. Louis Bassano, Chair
1725 West Central Avenue
Ortley Beach, New Jersey 08751
Phone (c): (908) 241-4852
FAX: (908) 241-6628
lbassano@comcast.net
Appt. Confirmed 10/15/01
Appt. Reconfirmed 2/9/06; 5/17/10; 4/14/14

Capt. Al Ristori (charterboat)
1552 Osprey Court
Manasquan Park, NJ 08736
Phone: (732) 223-5729
FAX: (732) 528-1056
cristori@aol.com
Appt. Confirmed 10/17/94
Appt. Reconfirmed 9/15/98; 9/15/02; 2/9/06; 5/17/10

Pennsylvania
Vacancy (rec)

Delaware
Leonard Voss, Jr. (com)
2854 Big Oak Road
Smyrna, DE 19977
Phone: (302) 653-7999
Appt. Confirmed 4/21/94
Appt. Reconfirmed 7/27/99; 7/03 and 7/07

Steven Smith (rec)
59 Burnham Lane
Dover, DE 19901
Phone (day): (302)744-9140
Phone (eve): (302)674-5186
smithbait@verizon.net
Appt. Confirmed 10/23/18

Maryland
2 Vacancies – for-hire and recreational

Virginia
Kelly Place (comm; reappted chair 10/2010)
213 Waller Mill Road
Williamsburg, VA 23185
Phone (h): (757) 220-8801
Phone (c): (757) 897-1009
FAX: (757) 259-9669
kelltron@aol.com
Appt. Confirmed 5/23/02
Appt Reconfirmed 5/06 and 5/10

William Edward Hall Jr. (rec)
PO Box 235
26367 Shoremain Drive
Bloxom, VA 23308
Phone (day): (757)854-1519
Phone (eve): (757)894-0416
FAX: (757)854-0698
esangler@verizon.net
Appt. Confirmed 5/13/14

North Carolina
Riley W. Williams (com)
336 Selwin Road
Belvidere, NC 27919
Phone: (252) 312-8457
Appt. Confirmed 11/10/04
Appt Reconfirmed 11/08; 8/18

Jon Worthington (rec)
405 Japonica Drive
Camden, NC 27921
Phone: (252) 562-2914
ncpierrat@gmail.com

District of Columbia
Joe Fletcher (rec)
1445 Pathfinder Lane
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)
P.O. Box 283
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____________________ ________________________________

________________________________ ________________________________

________________________________ ________________________________

<u>FOR COMMERCIAL FISHERMEN</u>:

1. How many years has the nominee been the commercial fishing business?

2. Is the nominee employed <u>only</u> in commercial fishing? ☐yes ☐no

3. What is the predominant gear type used by the nominee? ________________________

<u>FOR CHARTER/HEADBOAT CAPTAINS:</u>

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/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 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