

Atlantic States Marine Fisheries Commission

American Lobster Management Board

January 31, 2023
10:15 a.m. – 12:45 p.m.
Hybrid Meeting

Draft Agenda

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

1. Welcome/Call to Order (*J. McNamee*) 10:15 a.m.
2. Board Consent 10:15 a.m.
 - Approval of Agenda
 - Approval of Proceedings from November 2022
3. Public Comment 10:20 a.m.
4. Review Report from Atlantic Large Whale Take Reduction Team and Progress on Atlantic Large Whale Take Reduction Plan (*C. Coogan/M. Trego*) 10:30 a.m.
5. Consider Draft Addendum XXVII on Increasing Protection of Spawning Stock Biomass of the Gulf of Maine/Georges Bank Stock for Public Comment (*C. Starks*) **Action** 11:00 a.m.
6. Update from Work Group on Implementation of Addendum XXIX on Electronic Vessel Tracking for Federal Permit Holders (*C. Starks*) 12:15 p.m.
7. Other Business 12:30 p.m.
8. Adjourn 12:45 p.m.

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

MEETING OVERVIEW

American Lobster Management Board

November 7, 2022

10:15 a.m. – 12:45 p.m.

Chair: Dr. Jason McNamee (RI) Assumed Chairmanship: 02/22	Technical Committee Chair: Kathleen Reardon (ME)	Law Enforcement Committee Representative: Rob Beal
Vice Chair: Pat Keliher (ME)	Advisory Panel Chair: Grant Moore (MA)	Previous Board Meeting: November 7, 2022
Voting Members: ME, NH, MA, RI, CT, NY, NJ, DE, MD, VA, NMFS, NEFMC (12 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from November 7, 2022

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

4. Review Report from Atlantic Large Whale Take Reduction Team and Progress on Atlantic Large Whale Take Reduction Plan (10:30-11:00 a.m.)

Background

- The Atlantic Large Whale Take Reduction Team (ALWTRT) met virtually over six days in November and December 2022. The goal of this meeting was for the ALWTRT to develop recommendations to NMFS for measures in the pot/trap and gillnet fisheries along the Atlantic coast to reduce mortality and serious injury (M/SI) of right whales in US commercial fisheries to below the Potential Biological Removal (PBR) level required by the Marine Mammal Protection Act. This equates to an 88-93% total risk reduction, or an additional 41-46% reduction beyond that accomplished through the Phase 1 measures implemented in 2021. The team reviewed all available data, analyses of various combinations of measures using the decision support tool, and qualitative information to inform the discussion and recommendations.
- The ALWTRT did not produce a consensus recommendation to NMFS during its December 2022 meeting. Rather, a document including key considerations and input from various stakeholder groups was provided to NOAA Fisheries to consider as it develops measures to meet the required risk reduction.

Presentations

- Report from Atlantic Large Whale Take Reduction Team and Progress on Atlantic Large Whale Take Reduction Plan by C. Coogan and M. Trego

5. Consider Draft Addendum XXVII on Increasing Protection of Spawning Stock Biomass of the Gulf of Maine/Georges Bank Stock for Public Comment (11:00 a.m.-12:15 p.m.) Action

Background

- Draft Addendum XXVII was initially initiated in 2017 to proactively increase protection of the GOM/GBK stock but stalled due to the prioritization of Atlantic right whale issues. After accepting the 2020 Benchmark Stock Assessment for American lobster, the Board reinitiated work on the draft addendum in February 2021, with a focus on developing a trigger mechanism that would automatically implement management measures to improve protection of the GOM/GBK spawning stock if the trigger is reached.
- The Addendum considers modifications to the management program with the goal of increasing protection of the GOM/GBK spawning stock. Two issues are included in the addendum. Issue 1 addresses the standardization of a subset of management measures within LCMAs and across the GOM/GBK stock. Issue 2 considers applying either a trigger mechanism or a predetermined schedule for implementing biological management measures that are expected to provide increased protection to the spawning stock biomass and increase the resiliency of the stock.
- The Board approved Draft Addendum XXVII for public comment in January 2022, but then paused development of the Draft Addendum to allow time to better understand other challenges facing the fishery. At its November 2022 meeting the Board rescinded the motion to approve the document for public comment in order to make additional changes to the Draft Addendum. Specifically, the Board requested the management options be modified such that only one trigger level that would result in implementation of new gauge sizes, rather than two triggers (**Briefing Materials**).

Presentations

- Overview of Draft Addendum XXVII for Board Consideration for Public Comment by C. Starks

Board Actions for Consideration at the Meeting

- Make further changes to proposed management options, if necessary
- Approve Draft Addendum XXVII for Public Comment

6. Update from Work Group on Implementation of Addendum XXIX on Electronic Vessel Tracking for Federal Permit Holders (12:15-12:30 p.m.)

Background

- In March 2022, the Board approved Addendum XXIX to Amendment 3 to the Interstate Fishery Management Plan (FMP) for American Lobster and Addendum IV to the Jonah Crab FMP. The Addenda establish electronic tracking requirements for federally-permitted vessels in the American lobster and Jonah crab fisheries. The addenda address several challenges facing the fishery, including stock assessment limitations, protected species interactions, marine spatial planning efforts, and enforcement in federal waters.

- The Addenda require federally-permitted American lobster and Jonah crab vessels with commercial trap gear area permits for Lobster Conservation Management Areas (LCMAs) 1, 2, 3, 4, 5, and Outer Cape Cod to collect location data via an approved electronic tracking device.
- Since approval of the Addenda, Commission staff formed a Work Group comprised of state and federal partners to develop a request for quotes from vessel tracking device manufacturers. The request for quotes was released in the fall of 2020, and the Work Group received five quotes.
- The Work Group reviewed all five quotes, and has determined that four of them met the criteria required by Addendum XXIX for use in the lobster and Jonah crab fishery and have been sent letters of approval.

Presentations

- Update on Implementation of Addendum XXIX by C. Starks

7. Other Business (12:30-12:45 p.m.)

8. Adjourn

American Lobster and Jonah Crab TC Task List

Activity level: Medium

Committee Overlap Score: Medium

Committee Task List

Lobster TC

- August 1, 2023: Annual Compliance Reports Due
- Fall 2023: Annual data update of lobster abundance indices

Jonah Crab TC

- Spring-Summer 2023: Development of Jonah crab stock assessment
- August 1, 2023: Annual Compliance Reports Due

TC Members

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

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

Jonah Crab Stock Assessment Subcommittee (SAS) Members

Jonah Crab: Derek Perry (MA, TC Chair), Joshua Carloni (NH), Jeff Kipp (ASMFC), Kathleen Reardon (ME), Burton Shank (NOAA), Corinne Truesdale (RI), Jeremy Collie (URI)

Addendum XXVII PDT Members

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

Draft Proceedings of the American Lobster Management Board Hybrid Meeting
November 2022

**DRAFT PROCEEDINGS OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
AMERICAN LOBSTER MANAGEMENT BOARD**

**The Ocean Place Resort
Long Branch, New Jersey
Hybrid Meeting**

November 7, 2022

These minutes are draft and subject to approval by the American Lobster 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 of August 2, 2022** by consent (Page 1).
3. **Move to rescind the following two motions passed in August 2022 and January 2022 meetings, respectively** (Page 13):
 - **Move to postpone consideration of public hearings on Draft Addendum XXVII until the Annual Meeting to allow the Plan Development Team (PDT) time to address challenges raised by existing Magnuson-Stevens Act language regarding possession of lobsters smaller than the lowest minimum size limit specified in the American Lobster FMP. This could include language which differentiates harvest vs. possession limits to reduce impacts on dealers and processors. The Law Enforcement Committee should also review new language that may be suggested by the PDT.**
 - **Move to rescind the ability to approve Draft Addendum XXVII for Public Comment, as amended Motion by Pat Keliher; second by Cheri Patterson. Motion approved by unanimous consent** (Page 14).
4. **Main Motion**
Move that the PDT simplify section 3.2 of Draft Addendum XXVII to the American Lobster FMP, by creating a single trigger level, that shall act as a backstop, protecting the stock from further declines. The PDT shall use the Technical Committee's trigger level recommendation (Sept 10, 2021 Memo to the Board), utilizing a three-year running average of the trigger index when it declines by 45% from the reference period (Page 14). Motion by Pat Keliher; second by Dennis Abbott. Motion amended.

Motion to Amend
Move to amend the percentage to a range of 30% to 45% (Page 17). Motion by Cheri Patterson; second by Eric Reid. Motion carried with one abstention (Page 18).

Main Motion as Amended
Move that the Plan Development Team simplify Section 3.2 of Draft Addendum XXVII to the American Lobster FMP, by creating a single trigger level, that shall act as a backstop, protecting the stock from further declines. The PDT shall use the Technical Committee's trigger level recommendation (Sept 10, 2021 Memo to the Board), utilizing a three-year running average of the trigger index when it declines by 30-45% from the reference period. Motion approved with one abstention (Page 19).
5. **Move to change the years in Issue 2 Option E to 2025 and 2027** (Page 20). Motion by Pat Keliher; second by Dennis Abbott. Motion approved with one abstention (Page 21).
6. **Move to adjourn** by consent (Page 25).

ATTENDANCE

Board Members

Pat Keliher, ME (AA)	Bill Hyatt, CT (GA)
Stephen Train, ME (GA)	Sen. Craig Miner, CT (LA)
Cherie Patterson, NH (AA)	John Maniscalco, NY, proxy for J. Gilmore (AA)
Doug Grout, NH (GA)	Emerson Hasbrouck, NY (GA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)	Joe Cimino, NJ (AA)
Dan McKiernan, MA (AA)	Tom Fote, NJ (GA)
Raymond Kane, MA (GA)	John Clark, DE (AA)
Sarah Ferrara, MA, proxy for Rep. Peake (LA)	Roy Miller, DE (GA)
Jason McNamee, RI (AA)	Craig Pugh, DE, proxy for Rep. Carson (LA)
David Borden, RI (GA)	Russell Dize, MD (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)	Shanna Madsen, VA, proxy for J. Green (AA)
Colleen Bouffard, CT, proxy for J. Davis (AA)	Jay Hermsen proxy for A. Murphy, NOAA

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

Ex-Officio Members

Kathleen Reardon, Technical Committee Chair	Derek Perry, Jonah Crab Technical Committee Chair
Rob Beal, Law Enforcement Committee Rep.	

Staff

Bob Beal	Emilie Franke	Mike Rinaldi
Toni Kerns	Chris Jacobs	Adam Lee
Madeline Musante	Jeff Kipp	Anna-Mai Christmas-Svajdlenka
Tina Berger	Adam Lee	Caitlin Starks
Lindsey Aubart		

Guests

Richard Balouskus, RI DEM	Erica Fuller, CLF	Thomas Newman
Kurt Blanchard, RI DEM	Pat Geer, VMRC	Jeffrey Nichols, ME DMR
Sarah Bland, NOAA	Lewis Gillingham, VMRC	Victoria Oriole, CFARM
David Borden, RI (GA)	Jennifer Goebel, NOAA	Nick Popoff, US FWS
Colleen Bouffard, CT DEEP	Heidi Henninger, AOLA	Chad Power, NJ DEP
Michael Brown, ME DMR	Helen T. Heumacher, US FWS	Tracy Pugh, MA DMF
Josh Carloni, NH F&G	Matthew Heyl, NJ DEP	Daniel Sawyer
Patrick Cassidy	Jesse Hornstein, NYS	Nathan Shivers, CFARM
Heather Corbett, NJ DEP	Dierdre Keliher, ME DMR	Ethan Simpson, VMRC
Nicole Caudell, MD DNR	Jared Lamy, NH F&G	Melissa Smith, ME DMF
Jessica Daher, NJ DEP	Danni Logue	Somers Smott, VMRC
Wes Eakin, NYS DEC	Gregory Mataronas	Renee St. Amand, CT DEEP
Aubrey Ellertson, CFR Foundation	Genine McClair, MD DNR	ElizaBeth Streifeneder, NYS DEC
Catherine Fede, NYS DEC	Lorraine Morris, ME DMR	Kevin Sullivan, NH F&G
Marianne Ferguson, NOAA	Brandon Muffley, MAFMC	Pam Thames, NOAA
	Brian Neilan, NJ DEP	Jason Surma, Woods Hole Group

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Guests (continued)

Mary Beth Tooley
Corinne Truesdale, RI DEM
Jessica Waller, ME DMR
Anna Webb, MA DMF
Craig Weedon, MD DNR

Ritchie White, CCA NH
Angel Willey, MD DNR
John P. Williams
Steven Witthuhn
Greg Wojcik, CT DEEP

Chris Wright, NOAA
Jordan Zimmerman, DE DFW
Renee Zobel, NH F&G

The American Lobster Management Board of the Atlantic States Marine Fisheries Commission convened in The Monmouth I Room of The Ocean Place Resort via hybrid meeting, in-person and webinar; Monday, November 7, 2022, and was called to order at 9:45 a.m. by Chair Jason McNamee.

CALL TO ORDER

CHAIR JASON McNAMEE: All right, I think we are good to get started here. Welcome everybody. Welcome to the American Lobster Management Board. We will call the meeting to order.

APPROVAL OF AGENDA

CHAIR McNAMEE: We were provided an Agenda. Does anybody have any additions, deletions, any comments on the agenda?

Okay, not seeing any hands or anyone moving to their microphones, so we'll consider the agenda approved as submitted. Actually, are there any objections to approving the agenda as submitted? No hands in the room. Anybody raise a hand online? No hands online. The agenda is approved as submitted.

We are still hybrid. There are some folks online, so that is kind of the tact I will take here is I'll check the room first for hands and then ask Caitlin to check the virtual hands for me.

APPROVAL OF PROCEEDINGS

CHAIR McNAMEE: The agenda is approved, next up we've been provided a copy of the proceedings from our August meeting. Any changes, deletions, comments on the minutes from the last meeting?

No hands in the room, anyone on line? No hands online. Are there any objections to approving the proceedings from the last meeting as submitted? No hands in the room,

no hands online. We will consider those meeting proceedings approved as submitted.

PUBLIC COMMENT

CHAIR McNAMEE: Next up we have opportunity for public comment for things that are not on the agenda.

Do we have anyone signed up for comments? Okay, no one has signed up. Is there anyone in the room who wishes to make a comment on something that is no on the agenda, please raise your hand? No hands raised in the room, no hands online either, so we'll conclude the public comment section there.

I'll provide other opportunities while we're in the agenda for public comment as well, but that was the opportunity for things that aren't currently on our agenda, so that you can raise them so we can get them on a future agenda.

UPDATE ON THE NORTH ATLANTIC RIGHT WHALE COURT CASES

CHAIR McNAMEE: Moving on to our next agenda item, we have our update on the North Atlantic Right Whale Court Cases, and I have been told that Chip is going to give that update.

MR. CHIP LYNCH: Good to see everybody here. I'll provide an update from where we were when we last met and spoke at the August meeting. Just to orient everyone, at the August meeting we had three cases that were somewhat up in the air. The first was the CBD versus the Agencies, et al. At that time when we met in August, we had just received an Opinion from Judge Boasberg a month earlier in early July, finding both NOAA's Final Rule defective and its Biological Opinion defective.

That is sort of the big case. That is the case that is really the engine that is moving things. But there were also other cases. There was the Maine Lobster Union case. That was the case that challenged the Area 1 closure. We had just

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received a First Circuit decision in that case that had found the Agencies science to be reasonable. At that time, again we're talking now about where we were last August.

It was also the MLA case, the Maine Lobstermen's Association case. At that time, that as you all know is the flip side to the CBD, the Judge Boasberg case, where CBD is brought by a certain number of environmental plaintiffs. The MLA case was brought by a number of industry plaintiffs.

Even though we had heard from Judge Boasberg in the CBD case, we had not heard from Judge Boasberg in the MLA case. The issue at that time was how are we going to proceed and discuss the remedy part of the CBD case, when we haven't heard on the underlying merits of the MLA case? That is where we were in August, and a lot has happened since then.

I'll sort of handle them in reverse order, and we'll end up at the CBD case. The MLU case has since been dismissed. The plaintiffs there decided not to proceed forward. In the MLA case, we received a court order from Judge Boasberg in early September. In that case the Judge found that NOAA's science was reasonable.

The court didn't go so far as to say that reasonable minds could differ, there could be differences of opinion as to which is the best course. But the court found that NOAA's position was reasonable. Promptly, MLA appealed that matter and was later joined by MLU, who was also an intervener in that case, and the state of Maine. They are appealing. This matter is now at the District of Columbia Circuit of Appeals, and in fact there was an agreement where all the parties agreed to brief that case in an expedited fashion.

For the same reasons that were discussed in the underlying case, there are issues here. We need to get answers before courts move in a different direction than other cases. The court

agrees to move forward, and the DC Circuit agreed to move forward in an expedited fashion, and in fact that MLA plaintiffs, or the Maine Lobstermen's Association, MLU and Maine are going to provide their first brief, I think on Wednesday of this week, followed by NOAA and the environmental members of that lawsuit, will be filing something in mid-December.

Then MLA gets the final word in a reply in early January. Court has then signaled that it will want to hear an oral argument on that matter. We would probably be in a position to hear back from the court with a final decision sometime August or September of 2023. That is spit balling, there is a lot that can happen at any time that could spur a court to come back with an earlier decision. But we're thinking about a late summer, early autumn decision in that case. All of which leaves us with the CBD case. We are completed briefing. As of August, we had yet to file our brief, but as of now we've all completed our briefing. By that I mean, briefing is when the parties, everybody involved gets to write down their arguments, why their position is correct and why their opponent's position is incorrect.

That is all done. We would normally be in a position to be hearing from the court at any time now, but the parties have agreed to NOAA's request that there be an oral argument in this matter. That is going to happen on Thursday of this week. After Thursday, we anticipate that the Court will be in a position to render a decision.

When we were here last, I think I told you all that we could expect a decision in late November, early December. I think that timeframe remains true, even though we're having an additional oral argument. A lot of that will depend on of course what the Court asks. But the positions of the parties have become a little bit more clear than they were when were last here in August.

Specifically, as it relates to the allegedly defective rule, we have the parties seem to, or at least NOAA has said that it can complete a rule that gets to PBR that is the potential biological removal target under

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the Marine Mammal Protection Act, by December of 2024. The environmental plaintiffs originally said that was too long of a time, that it could be done in six months.

The industry side said that was too short of a time that it would really take much longer than two years, given the complexity of the matter. But it appears as though the parties have agreed to let that two-year timeframe stand in the briefing documents. Now that doesn't mean that the Court will accept that. But there is no opposition to NOAA's proposed two-year time schedule for the Rule.

The other part is the issuing a biological opinion that corrects the defect that the Court found. Again, we found that the plaintiffs had moved off the position of saying it can be done in six months. They are now agreeing that NOAA can do it, or agreeing to allow it to happen within two years. NOAA has tied its proposal to the development of ropeless on-demand fishing, which it thinks will take about eight years to happen. There is a difference of opinion there. I think a lot of the industry litigants here think that eight years is unduly optimistic.

That's really where the crux of the argument is right now. But again, it's narrowed a bit, so I could see the Court issuing an opinion soon after the oral argument. There are also a few cases involving wind power that also involve right whales. The Board would be interested in hearing the decisions on those when it eventually comes, simply because when the Court opines on the issues involving right whales it of course has reverberations everywhere, including species protected or a managed lobster fishery and Jonah Crab by this Board.

There are five of them, four of them involving the Vineyard Wind Project south of the Cape and the Islands, and then one of them involving South Fork, which is just sort of off of Rhode Island, Rhode Island/Connecticut and New York area. Those five cases are in various stages of

briefing, so it's behind where we are in the CBD case. All those cases have been brought in the Federal District Court in Massachusetts, in front of Judge Talwani. It looks as though those cases are lining up for a decision by the Judge sometime next spring, so in the May 2023 timeframe. There is a lot that's going to be happening within the next, well there is probably going to be a lot of things happening in the next few weeks. But there is certainly going to be a lot that is happening in the next few months. With that, Mr. Chair, I've concluded my presentation, and if there are any questions, I'm happy to entertain them.

CHAIR McNAMEE: Excellent, thanks so much, Chip, really appreciate that update. Any questions for Chip from the Board? Go ahead, Pat.

MR. PATRICK C. KELIHER: Not questions, I think, Chip, you nailed all the points. I mean he's living and breathing it, and I don't blame him for having his back to the wall. I think the take home for this Board is the timeframe around what may or may not come from the Courts in the CBD case, as it pertains to remedy.

There is alignment, Maine DMR and NMFS had very similar arguments on the timeframe for remedy, asking for two years basically to reach the potential biological removal. The real key take home here is that the CBD and the ENGOs, while they agreed to the two-year timeframe, they said they also wanted the two-year timeframe to achieve negligible impact determination.

That is closing this fishery, because as you heard from Chip, we are nowhere near having ropeless ready to be implemented, at least eight years. The timeframe here is really critical. On a parallel track the Agency is working on rulemaking to achieve this two-year timeframe that they laid out in their court brief.

The state of Maine and our other state partners, we're all approaching it a little bit differently, have been running utilizing the decision support tool to try to figure out where we're going to end up. I can

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tell you, I just want to put this on the table, because it's going to come up again later in the agenda.

The changes to this fishery I think are going to be draconian, especially in federal waters, in order to achieve PBR. Once you achieve PBR, you then have to reach NID, which is 10 percent of PBR, which is an impossible bar to achieve. I'm very concerned about the direction and the timeframe we're going. There is no guarantee that Judge Boasberg will agree to two years.

In fact, Chip and I talked in the hallway this morning. He thinks he will. Our attorney's, who everybody's got an opinion, including attorneys, and they are disagreeing where the Judge may come down on this. We could be in a situation that we're going to be trying to come up with something sooner than two years. A lot of uncertainty. A lot of uncertainty for management, and tremendous uncertainty for the industry. I'll leave it at that.

CHAIR McNAMEE: Thanks, Pat. Chip, there was no question there, I don't think any reaction. Next up I had Dan.

MR. DANIEL McKIERNAN: Great presentation, Chip. Chip, my question has to do with a comment that the Commonwealth put forward to NMFS in the scoping period last month, and it had to do with the timeframe from which the 90 percent reduction in takes needs to be accomplished. In our comments we recommended that we reverse the clock and go back maybe into the middle of the decade. Right now, I believe it's beginning in 2017, 2017 was notorious for a lot of spikes in deaths of right whales, particularly in the Gulf of St. Lawrence.

My question to you is, when will we know NMFS position about whether or not we can get credit for that Mass Bay restricted area closure, and whether or not we could accomplish a 90 percent reduction in takes, but from an earlier timeline?

MR. LYNCH: I am aware of the issue, and it's really not a legal issue, it's a matter of the scientists talking about it with managers. Dan, I guess I don't have an answer as to when, because it's not something I really have control over. But I can say certainly that the GARFO staff, the Science Center, the federal people here are exploring all legally defensible options here.

I know that they are aware of that issue, and I know that they are talking about, again all possibilities that are legal. That is not much of an answer, but other than to say I hear you, and this isn't the first time I've heard that issue.

CHAIR McNAMEE: Anyone else with questions for Chip, before we move on to the next agenda item? Anyone online? Okay, I think you are off the hook, Chip. Thank you very much for that report.

REVIEW OF THE ANNUAL DATA UPDATE OF AMERICAN LOBSTER INDICES

CHAIR McNAMEE: We are going to move on to our next agenda item, and this is a Review of the Annual Data Update of American Lobster Indices. These are the non-model indices that get generated. I believe Chair of the TC, Kathleen Reardon has a presentation for us, so Kathleen, whenever you're ready, please take it away.

MS. KATHLEEN REARDON: Coming out of the 2020's American Lobster Stock Assessment, it was recommended to provide data updates to the Board between assessments to allow for evaluation of potential changing trends and stock abundance. The objective of this process is to present information that could support additional research, or consideration of changes to management between assessments.

The datasets that I will present are those that may indicate the exploitable lobster stock abundance conditions in the future. Those datasets are the trawl survey indicators, including recruit abundance and survey encounter rate, ventless trap surveys, sex-specific indices by statistical area, and young-of-year settlement indicators.

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The updated data since the last assessment include 2019 data, 2020, 2021 and this is the second data update provided to the Board since the 2020 assessment. To show the relative status, we use a baseline from the assessment to understand potential changes in condition. For each time series below the 25th percentile is considered negative condition.

Between the 25th and 75th is considered neutral, and above the 75th is a positive condition. The terminal indicator status for each index is a five-year mean, and we compare the five-year mean from the assessment, including 2014 to 2018, to the most recent and updated five-year mean of 2017 to 2021. Some notes to consider. COVID-19 had impacts on sampling efforts in 2020, and will continue to impact our updated five-year mean in this period of 2017 to 2021. Also, the Massachusetts Southern New England Ventless Trap Survey reduced the spatial area sampled in 2021 due to issues with industry participation. The ventless trap indices have been recalculated to only consider the areas that have been sampled over the whole period. The figure shown on the slides only display the annual values of the time series, but the memo in your materials includes tables with the assessment and updated five-year mean values.

The red dots and lines in all of the figures represents the updated data since the last assessment, while the black dots and bold lines are the data time series considered in the assessment and time series, determining the 25th and 75th percentiles. The solid gray line is the 25th, below which is negative, and the dotted gray line is the 75th, above which is positive.

Between the gray horizontal lines represent neutral conditions. I'll start with the Gulf of Maine young of year indices. All updated five-year means were neutral, which is an improvement from the assessment, because both southwest areas were negative during the assessment. But, when we look at individual

years, the 2021 young-of-year indices fell below the 25th percentile into negative condition for the three most northeast areas, reversing some of the improvements that we saw in the previous years in those areas.

For the Gulf of Maine Trawl Survey recruit indices, the indicators remained positive, but showed some signs of decline since the assessment. The Maine/New Hampshire Fall Trawl Survey updated five-year mean changed from positive in the assessment to neutral in the update, while the others remained positive since the assessment.

Looking at individual years, the 2021 values for three of the four inshore indicators were neutral, and the only available 2020 value was also neutral. This is notable, because these were the first observed neutral annual values since 2014 or 2015 for these indicators. The offshore indicators from the Science Center Trawl Survey remain positive.

It is important to note that five of the six indicators were not available in 2020, due to COVID sampling restrictions. For encounter rates in the Gulf of Maine, all four updated five-year means for the inshore indicators were neutral, whereas only one was neutral in the assessment, showing declines in index condition.

The updated five-year mean for the two offshore indicators remained positive. Again, five of six indicators did not collect data in 2020. For the Gulf of Maine, Ventless Trap Survey indicators, the surveys have shown declines since the stock assessment. For the updated means, seven of eight updated means were neutral, and one was negative compared to four positive, four neutral, and no negative means during the assessment.

Two additional indices in Statistical Area 512 moved to negative conditions in 2021, while the values in 514 were among the lowest values observed. Switching to Georges Bank recruit abundance from the Science Center Trawl Survey, conditions were similar to the stock assessment, where both means remained neutral since the assessment.

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The 2021 annual values were both positive and relatively high. These indicators tend to be noisier than some of the other abundance indicators, with higher interannual variability and lack of discernable trends. For encounter rate in the Georges Bank, we have seen some decline in the fall since the assessment, so that fall mean changed from positive to neutral, but spring remained positive. No indicators were available for Georges Bank in 2020. For Southern New England the updated five-year means for young of year were all negative, while only two of three were negative in the assessment.

There has only been one non-negative annual indicator observed since the assessment, and no young of year have been observed in Massachusetts for the past seven years. For recruit abundance from trawl surveys in Southern New England, conditions were similar to the assessment, with some slight decline offshore.

The spring offshore updated mean changed from neutral to negative, while the other updated means were unchanged, with five recruit abundance indicators remaining negative, and the other two indicators, one inshore and one offshore, remaining neutral. Six of the eight indicators were unavailable in 2020.

For Southern New England encounter rates, the conditions have deteriorated since the assessment, with all updated means and negative conditions, with two changing from neutral to negative since the assessment, and all annual encounter rates indicators negative in 2021. For Southern New England Ventless Trap Survey, all updated five-year means were neutral, which is unchanged from the stock assessment.

It is important to note that the ventless trap survey has only taken place in Southern New England during depleted stock conditions, coinciding with adverse environmental regime.

Interannual variability can be misleading without the context of the longer time series encompassing varying stock conditions.

As noted earlier, the Massachusetts Survey reduced its spatial coverage, so the prior years were recalculated to include only the consistent reduced survey area. The female index, calculated with the reduced survey area and Statistical Area 538 was similar to the index from the broader historical survey area reviewed last year. The 2018 and 2019 values for the male index changed from neutral for the historical survey, to negative for the reduced survey area.

In summary, the Gulf of Maine indicators show declines from time-series highs observed during the stock assessment. Georges Bank indicators show conditions similar to the assessment, but there are also no young of year or ventless trap indicators available for this sub-stock area. In Southern New England, indicators show continued unfavorable conditions with some further signs of decline since the assessment. Thank you for your time, and I will take any questions.

CHAIR McNAMEE: Thank you so much, Kathleen. There is no action item here, but this information kind of plays into our next agenda item, so it's important to kind of clarify any questions that you might have on this information. Looking around the table here for any questions for Kathleen on the indices. Go ahead, Steve.

MR. STEPHEN TRAIN: Kathleen, if you don't mind, the Gulf of Maine indices you had up, if you could find them again. You said there were a lot of things that were neutral, because they were between the bars. Is that correct? I know you're supposed to present the facts and science and maybe not voice an opinion. But it seemed like when I was looking at those, those one that you said were neutral, not positive and negative, they were still between the bars, but they were continuing declining the whole time.

You didn't voice a comment on that, and thank you. But as someone who is dependent on this resource,

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when you see continuing declines and you say, well it's neutral. Yes, we were at all-time highs seven years ago or six years ago. But obviously, whether neutral or not, it's a pretty bad indication at this point. Am I wrong?

MS. REARDON: It is one of the reasons that this was recommended coming out of the assessment to share this information between assessments, because we can look at trends. It does complicate matters, because we don't have 2020 in a number of the surveys. The only survey that went, I'm pretty sure, is the fall Maine/New Hampshire Trawl Survey in 2020.

For many areas the only number, we have 2019 and we have 2021. There is a difference in those, but when we're looking at the five-year means, it's 2017 to 2021. That is why I noted here that all of the 2021 numbers, except for I think the spring, we have definitely been seeing those declines.

CHAIR McNAMEE: Anyone else with question for Kathleen? Any hands online? All right. With that, why don't we go ahead and move on to our next agenda item. Kathleen, you'll hang out with us in case any questions come up? Great.

**CONSIDER NEXT STEPS ON DRAFT ADDENDUM
XXVII ON INCREASING PROTECTION OF
SPAWNING STOCK BIOMASS OF THE GULF OF
MAINE/GEORGES BANK STOCK**

CHAIR McNAMEE: Okay, our next agenda item is to Consider Next Steps on Draft Addendum XXVII on Increasing Protection of Spawning Stock Biomass of the Gulf of Maine/Georges Bank Stock.

I think we're going to start off with a brief presentation from Caitlin, and then I think we have a few procedural things we need to take care of from our last meeting, and then we can get on with the possible action on this item from there. Caitlin, whenever you're ready, you can get us oriented to the task here.

MS. CAITLIN STARKS: I'll go over where we currently stand with Draft Addendum XXVII on increasing the protection of spawning stock biomass in the Gulf of Maine and Georges Bank stock. I'll start off with some brief background on the draft addendum, and then very briefly review the proposed management options, considering the Board had seen these a number of times.

Then I'll outline the concerns that have been brought forward related to the proposed gauge size increase, and then lead the Board into discussion on how to move forward today. For a very quick recap on the background. The Board originally initiated this addendum in August, 2017, and the focus at that point was on standardizing management measures across the lobster conservation and management areas within the stock, to increase stock resiliency.

Then Draft Addendum XXVII was put on hold for several years, as the Board had to prioritize work related to right whale risk reduction efforts and then resumed work on this addendum after the 2020 benchmark assessment. Then at that point, the objective of the agenda was changed to focus on using a trigger mechanism that when a trigger is reached it would result in automatic implementation of measures that would increase the overall protection of spawning stock biomass of the Gulf of Maine and Georges Bank Stock. After the re-initiation of work on Draft Addendum XXVII in February of 2021, the Board approved the Draft Addendum for public comment in January of 2022.

However, after that Lobster Board meeting, the Policy Board decided to delay the release of the Draft Addendum for public comment, to allow for additional information to develop that could impact the public comment and the scoping meeting. Then at the August meeting this year, the public comment period was further delayed to give the PDT time to discuss a concern relating to how changing the minimum gauge size would impact trade under the Magnuson-Stevens Act. That is where we left off with Draft Addendum XXVII. Today we're discussing it again.

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To quickly refresh everyone's memory, I'm just going to run through the proposed management option. The proposed options are separated into two issues. We have Issue 1, which addresses the standardization of a subset of the management measures within the LCMAs and across the LCMAs in the Gulf of Maine/Georges Bank stock.

Issue 2 considers applying either a trigger mechanism or a predetermined schedule to implement biological management measures that are expected to provide increased protection to the spawning stock biomass. Under Issue 1, the two main options are A, status quo or B, which is to implement some standardized measures upon approval of the Addendum.

Within Option B there are four sub-options that define what those standardized measures include. Sub-Option B1 includes standardizing measures only within areas where there are current discrepancies. E2 includes standardizing the V-notch requirements across the Areas in the stock. E3 is to standardize the V-notch possession definition across the areas in the stock, and B4 is to standardize the regulations for issuing additional trap tags for trap tag losses.

Then Issue 2 again focuses on implementing management measures to increase protection of the spawning stock biomass with options that consider changes to the maximum and minimum gauge sizes, along with corresponding vent sizes. These are the five options under Issue 2. A is status quo, no additional changes to measures.

B is that the gauge size changes would be triggered by a 17 percent decline in the trigger index, and then additional changes triggered by 32 percent decline in the index. Option C is that gauge size changes would be triggered by 20 percent decline, and then additional changes with a 30 percent decline. Option D is for a 17 percent decline in the index to trigger a series

of gradual changes in gauge sizes over several years, and then Option E considers changes to the minimum gauge size in Area 1 only, on a predetermined schedule, as opposed to using a trigger index.

These are the proposed measures that would be implemented if each of the two triggers is reached under Option B, and that is an increase in the Area 1 minimum size at each trigger, and a decrease to the maximum size for Area 3 and Outer Cape Cod on the second trigger. This is identical to Option B, except that the trigger levels are different at 20 and 30 percent. Then Option D considers implementing a series of gradual changes in the gauge sizes that would be initiated by one trigger being met, which is set at 17 percent decline in the trigger index. Here we have the Area 1 minimum gauge size increasing to 3 and 3/8 of an inch in increments of 1/16 of an inch, and the maximum gauge size for Area 3 at Outer Cape Cod would decrease to 6 inches in increments of 1/4 inch.

Then Option E would establish a schedule for changing the Area 1 minimum gauge size and vent sizes, no change to increase the spawning stock biomass, with no changes occurring for Area 3 and Outer Cape Cod. This is the updated trigger index through 2021. This is the most recently available data that we have for the trigger index, and a combined index is shown in the top left corner, upper left corner, with each of those surveys that go into the trigger index in the other three panels.

Each of the proposed trigger levels that are considered in the Addendum are shown with the horizontal black lines in the graph. Go from top to bottom that is 17 percent, 20 percent, and then 30 percent and 32 percent. On this next figure there are some additional red lines for reference, which are not currently considered for trigger levels in the Addendum. The second line from the bottom represents a 45 percent decline from the reference period, which is one of the options that was previously removed from the Addendum.

That 45 percent decline was meant to approximate the 75th percentile of the moderate abundance

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regime. Then the bottom line is a 51 percent decline, and that is not included in the Addendum, based on the Technical Committee recommendation that this would not be a proactive trigger level, because this level approximates the abundance limit reference point from the stock assessment, which is a point below which the stock is considered depleted, because the stocks ability to replenish itself is diminished.

The 2021 value for the trigger index is 0.765, which is a 23 percent decline from the reference value. That means at this point the top two proposed trigger levels have already been surpassed. At the last meeting, the Board discussed this concern regarding the minimum size that is proposed for Area 1 in the Addendum under Issue 2, and the implications that could have for commerce, given the language in the Magnuson-Stevens Act.

Magnuson-Stevens prohibits the import and sale of lobster smaller than the minimum possession size currently in effect under the Commission's FMP. Since the Addendum proposes an increase in the minimum size in LCMA 1, which is currently the smallest minimum size at 3 and ¼ of an inch. The increase would go to 3 and 5/16 of an inch, and that would mean imports would then have to follow the new minimum size of 3 and 5/16 of an inch.

This could have impacts on the market and supply chain. At the last meeting the Board tasked the PDT with discussing this issue and offering some potential paths forward. The PDT met October 6, 2022. Unfortunately, based on this discussion, there is not a clear answer on how to move forward.

The PDT discussed that in Maine dealers do rely on Canadian lobster imports during the spring, when the U.S. fishery can't supply them. If that minimum size does increase, that would affect their supply during that season. The PDT discussed a possible solution, which would be

to add language to the Addendum to say that the increased gauge sizes implemented through this Addendum would not apply to imported lobster. However, NOAA has advised that if the Commission were to put that type of language in the Addendum, it would need to demonstrate why it is acting counter to the MSA provision that I discussed, by showing what the economic impacts associated with the increased minimum size would be applying to imports.

Another concern was whether language to that affect would then open up the market such that lobsters of any size could be imported from other countries. In that case, there were concerns that imports of even smaller lobsters coming into the U.S. could have a negative effect on the market here.

All this being said, the PDT does recommend moving forward with the Draft Addendum, given the continued declines in the indices that we're seeing. We also had a meeting with the Law Enforcement Committee to discuss this topic last month. The general feedback provided by the LEC is that if imports were allowed to be smaller than the minimum size that is in effect in the U.S., it would create additional challenges for enforcement.

In particular, it would open up opportunities for the illegal sale of lobster that are caught in the U.S. below the legal minimum size. The LEC said that enforcing the differences in size is easy when the lobsters are coming in through the borders, but it is not as easy once those lobsters get to the dealers in the U.S., because at that point they are usually comingled, and it would be very hard to maintain separation of U.S. and non-U.S. origin lobsters.

In some states that currently have a larger minimum size than Maine's, they've dealt with the issue of different minimum sizes in trade by requiring dealers to have special exception permits, in order to possess lobsters from Maine or Canada that are under the state's minimum size. They have requirements on those dealers to report all shipments of those smaller lobsters, keep records of

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all their transactions, and they're not allowed to sell those smaller lobsters within the state.

That could be something to consider if imports were allowed to be smaller than the Area 1 minimum size. The LEC also touched on the topic of standardizing management measures under Issue 1. They reiterated that wherever possible they would use support measures being standardized within and across the LCMAs in the stock.

With that I want to set the Board up for discussion and guidance on how to proceed with Draft Addendum XXVII at this time. I see a few paths forward here, which is one that the Board could take the document out for public comment as is, and use that as an opportunity to get input on the impact of increasing the minimum gauge size, given the way MSA is written.

That would mean that the size increase would apply to imports as well. Second, the Board could direct the PDT to make modifications to the management options in the document, such as the trigger levels, or measures proposed, or some kind of language on the MSA issue, to specify that the gauge size changes under the Addendum would only apply to U.S. lobster harvest.

This is where the guidance from NOAA has been that if we were to go that route, we would need to provide some substantial information on potential economic impact, to justify why the size limit should not apply to imports. Then with this second option, I'll also note that because this Draft Addendum was already approved for public comment, we would need a motion to rescind that motion from before, in order to make changes to the Addendum today. Then lastly, the Board could always choose to postpone action until a time certain or indefinitely.

With that the next steps, just for a quick possible timeline. I think this is the fastest that

we could get through this addendum development at this point, given where we are in the year. If the Board were to agree to take the document out for public comment as is, we could get that posted relatively quickly this month, and schedule public hearings.

I'm not sure we could get hearings to actually happen before the holidays though. I put early January as a rough timeline for those, and then the AP would meet in January as well, and the Board could consider the document for final action in February, 2023 at the earliest. This is an example, obviously things would move back a little bit if we were to make changes to the document. With that I am happy to take any questions.

CHAIR McNAMEE: Excellent, thanks so much, Caitlin, and thanks so much for kind of laying out the next steps for us there at the end. Let's start off with questions for Caitlin, before we get into our discussion. Are there any clarification questions? I see Shanna. Go ahead.

MS. SHANNA MADSEN: Caitlin, have the CESS Committee been consulted yet to see if there is enough information to get that economic impact statement off the ground?

MS. STARKS: In short, no. We've talked with the states though, and it seems like it would be pretty hard to dig up the economic information on imports. Toni.

MS. TONI KERNS: Caitlin and I have not had a conversation yet. But I did have a conversation this morning where, I think we might have a different path forward to getting around the Mitchel provision. I'm going to continue to work on it. If this document does move forward with some additional work, I will be able to resolve that prior to the February Board meeting. But I'm not sure we need it.

CHAIR McNAMEE: Follow up, Shanna? Okay, any other questions? Dan, go ahead.

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MR. DAN McKIERNAN: Caitlin, in one of your slides it says that the PDT recommends moving forward with the Draft Addendum, given the decline in indices. Did they have a preferred trigger, because I know there was some series of triggers? But are there some triggers that they would embrace, and other triggers that they would not embrace?

MS. STARKS: I would say the PDT has not made a recommendation on what triggers would be most appropriate at this time, given that we just got the updated information to show where we are with the trigger index. I don't have a recommendation from them.

MS. McKIERNAN: But I think that the graph you showed said some in red that were not favored by the PDT.

MS. STARKS: Madeline, if you could put up that slide, which is Slide Number 15. I put them in red, just because they are not currently in the Addendum. They have been discussed previously by the TC and PDT. The 45 percent level was included in the Addendum originally, and removed by the Board to try to focus on those more proactive trigger levels.

That one was recommended as a potential option, it's obviously less conservative than the others. The 51 percent decline level is coming to the point where the TC did not recommend using that, because it is getting to the abundance limit.

MR. McKIERNAN: But did the TC embrace 45?

MS. STARKS: The 51 percent is approaching the abundance limit, and I might have forgotten the second part of your question.

MR. McKIERNAN: The question was, did they assess the usefulness of 45, because 45 is great. But it was the Board that rejected 45.

MS. STARKS: Yes, the Board was the one that removed the 45. The TC did say it was a viable option.

CHAIR McNAMEE: Okay, next up I have David Borden online. Go ahead, David.

MR. DAVID V. D. BORDEN: I've got a question for Caitlin. I'm getting feedback.

CHAIR McNAMEE: We can hear you now, yes it was a little stilted there. But I think you're back.

MR. BORDEN: Okay, so my question, I have a number of questions, but I'm going to try to deal with those at the appropriate time. On the question of timing, and I guess it's a question for staff. There are things in this Addendum that need to be fixed. I support the Addendum going out to public hearings.

I think it is really critical to get industry's feedback, and particularly during the time period of the spring, slowly starting when there is the least amount of activity so we can kind of maximize the input from the industry. My question to the staff is, there are a number of provisions that need to get reworked in this Addendum. If we were to do that in the next month or so, is it possible that we could finalize on a final document, either via a new pot, or the pot (feedback on recording)?

MS. STARKS: I am getting advice from Bob that we could do a virtual Lobster Board meeting separately to address this issue.

MR. BORDEN: Okay, so I would just offer the opinion. I think that would help, and then my second point, last one. This point is, I think it's kind of important to talk through some of these issues separately, instead of comingling the issues, so I'm going to talk about triggers, have an entire session on triggers we might issue. Thank you, Mr. Chair.

CHAIR McNAMEE: I have Steve Train next. Go ahead, Steve.

MR. TRAIN: Caitlin, I had a lot of similar questions to Dan, and there were numbers that are

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disconcerting. I mean we haven't done anything yet, and we've already mowed through two triggers that were possible. I was going to ask if the numbers, get it back up there. What is that final number where the star is? Where are we currently? What level are we at now?

MS. STARKS: We're at a 23 percent decline from the reference value.

MR. TRAIN: We're at a 23 percent decline with nothing being done yet.

MS. STARKS: Correct.

MR. TRAIN: This is the most valuable fishery in the northeast. I'm sorry, I can't believe we waited this long.

CHAIR McNAMEE: Go ahead, Ray.

MR. RAYMOND W. KANE: Not to confuse the public, is there any need to have the 17 and 20 percent decline, being how we're already beyond that, or 23 percent, so when you go out to the public and they look at these graphs. They are going to look at 17 and 20, and they are going to reflect, as Steve just did, and say, well why are we even talking about those trigger numbers, we're already beyond that. Maybe that should be removed from the graph.

MS. STARKS: Right, so I think that is part of the guidance I'm looking for today, is if the Board would like to modify the triggers that are included in the Addendum. If the intention is not to take action until a trigger is met, then I would suggest removing 17 percent and 20 percent from the document, since they've already been reached. I think if that is the case that would be easy modification to make, to change the options to only have those later two triggers. But there might be some more Board advice that I could ask for on what those trigger levels should be.

CHAIR McNAMEE: Go ahead, Pat.

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MR. KELIHER: I've been struggling with this particular issue for a long time. You know we've kicked the can down the road now twice. It is a situation, as I said earlier, about uncertainty. We didn't know if we would have any decision from Judge Boasberg yet, on what the remedy was going to be and what that timeframe is going to be.

All of the scenarios that we're running from a Decision Support Tool perspective, are going to benefit the lobster stock while we're in the process of trying to protect whales, with severe trap limits and the expansion of closed areas. It's those unknowns, not having that information on the table, that continues to lead me kind of wanting to delay, but at the same time, and as I've talked to others around this table.

We obviously have a mandate to protect this resource. We've got a public trust obligation, and I would urge the Board that we take the approach of working through the whale rules, but also putting a backstop in place now, that would protect us from further declines. Dan actually asked the question that I was going to bring up to Caitlin, regarding the third trigger option that we actually removed from the document, as a potential to utilize as a backstop in the interim, to figure out where we're going to be with whale rules.

I think there are some other tasking of the TC that we'll have to talk about, probably at the winter meeting. But in thinking about this, I think a backstop approach might be the best approach. I have prepared some motions that staff have, to get to that when the time comes.

CHAIR McNAMEE: Thank you, Pat, and I'll just remind the response to David Borden's question was, you know this type of thing could happen and still have a process in time for the spring. David Borden, go ahead, David.

MR. BORDEN: I have a question just going back to 17 percent of the volume. Caitlin, was that originally recommended as the industry target?

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MS. STARKS: Yes, so the 17 percent trigger, I think was associated with the industry target. I'm just going to verify that.

MR. BORDEN: My understanding is that was based on a discussion that industry wanted to be proactive, and didn't want the decline in economic viability. Is that correct?

MS. STARKS: That industry target came out of the stock assessment, so it was proposed by the Stock Assessment Subcommittee, not industry.

MR. BORDEN: I thought the industry gave us a recommendation and the TC and Stock Assessment Committee basic relayed it to the Board. It was industry based anyway. (Interference on recording)

MS. STARKS: David, I'm going to defer to Kathleen. I think she will have a clear explanation of where the 17 percent. Well, the 17 percent is related to the trigger index for this Addendum, but the fishery industry target was a reference point that was put forward by the Stock Assessment Subcommittee.

MS. REARDON: The 17 percent is the 25th percentile of the highest regime in the last stock assessment. Within the Stock Assessment Committee, we were talking about the abundance limit, which would be around 51 percent, but we recognized that there would be economic concerns, and more of an industry concern. That is why we introduced that 25th percentile of the highest regime. It just happens to be statistically 17 percent. That was why it was put forward within this Addendum.

MR. BORDEN: Okay, I just voiced an opinion that I think it's appropriate to have a range so we can put into anything that goes to the public. Believe me, I spin a lot. It's been an awful year, with a lot occurring. If you looked at what the lobster industry is concerning right now, it's this really poisonous mix of issues all coming to a head together, not the least of which is the declining lobster industries fuel

prices of \$6.00. There was a discussion on the Business Channel today talking about \$9.00 diesel fuel prices, cost of bait is \$300.00 a barrel, where it is normally \$100.00 a barrel, and insurance prices have gone through the roof. All of that, in combination with the whale issue and the wind issue is kind of a poisonous mixture for the industry.

Having said that, I think we've got to balance this whole, and go back and reflect on the origin of this. The state of Maine representative basically proposed this, for the most honorable of objectives. They wanted to get ahead of the curve on this, and avoid the situation that occurred in Southern New England.

Because of this kind of poisonous mix of issues, I think if we take this out, we've got to have a range. I think that's important to do. It is going to generate a discussion from a number of industry people about the need to be conservative. Most people that I know in the industry are not going to like the gauge increase, so I'll just state the obvious.

But when they start looking at declines like this for a billion-dollar fishery that you start talking about 20, 30, 40 percent declines. People are going to get very concerned about the longevity of their financial businesses. I think we should have a full range of items in the triggers, to generate a discussion on it.

MS. STARKS: Thanks, David. I just want to clarify one thing here. Are you suggesting keeping the 17 percent and 20 percent trigger levels in the document, despite the fact that they've already been surpassed? If that's the case, if the document were approved, would that mean those management measures would automatically go into place, if one of those options were adopted with those trigger levels?

MR. BORDEN: I'm not suggesting that. What I'm suggesting is it is important to keep in mind that the industry wanted to be proactive when we started this. Granted, it was a period of historic highs. The industry wanted to be proactive and get ahead of

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the issue, and that is one of the reasons we ended up with 17 percent.

It's almost like we need a short history of how the trigger has declined. I think for the range, I think we need a number higher than 23, 26, 27 or whatever, up to something like 45 as the range in the document. I don't think, to answer your question directly, I don't think we should start out with a trigger that is automatically triggered. We might as well just take a proposal to public hearing and say, we're going to raise the gauge, or whatever mechanism we choose.

CHAIR McNAMEE: We're starting to drift into a comment, so I just want to make sure, you know does anybody have any remaining clarifying questions for Caitlin, just to make sure you have the info you need, before we start to have our deliberations here? Not seeing any hands, any hands online? No, okay. Pat, I saw you raise your hand. Go ahead, please.

MR. KELIHER: I think what I would like to do to start this process is make a motion that would rescind prior motions. Then there are some conversations around some changes to the document that seem to be drowning on potentially one or two different options. I'm wondering if we couldn't maybe even take a five-minute break to have some caucus time to kind of maybe fine tune something. But I'll leave that up to you. If the staff, look at that, has pulled up the motions. I'll go ahead and make that now, Mr. Chairman, and we can go from there.

CHAIR McNAMEE: Okay.

MR. KELIHER: Did you have something, Toni? No, okay. **I would move to rescind the following two motions passed in the August 2022, and the January 2022 meetings respectively. Move to postpone the consideration of public hearings on the Draft Addendum until the Annual Meeting, to allow the PDT time to address challenges raised by existing MSA language regarding possession of**

lobsters smaller than the lowest minimum size limit specified in the American Lobster FMP.

This could include language which differentiates harvest vs. possession limits to reduce impacts to dealers and processors. The LEC should also review the new language that may be suggested by the PDT, and then also move to approve. Hold on, what's going on here?

MS. STARKS: That's the motion to approve it for public comment. That needs to be rescinded.

MR. KELIHER: Okay, so it's a little bit different than the way I drafted, sorry. **Then also move to rescind, the ability to approve the Draft Addendum for public comment as amended.**

CHAIR McNAMEE: Okay, do I have a second to the motion? I saw Cheri Patterson, thank you, Cheri. This is the sort of procedural element I talked about earlier that we needed to sort of take care of, depending on how we wanted to go here. We've got a motion on the table. Discussion on that motion. I saw Dennis first. Go ahead, Dennis.

MR. DENNIS ABBOTT: Yes, I'm in favor of the motions, I believe. But I would just like clarification from Bob Beal as the process for rescinding a motion at this point in time.

CHAIR McNAMEE: Go ahead, Bob.

EXECUTIVE DIRECTOR ROBERT E. BEAL: A few years back the Commission passed a special rule that is included in the Rules and Regulations of the Commission, and it effects amending or rescinding previously approved actions. It differs a little bit from what's in Robert's Rules of Order, but essentially, in order to approve this motion, which would rescind those two previous motions, it would need a two-thirds majority vote of the entire voting membership of the Board. It is a special rule that was approved by the Full Commission a few years ago.

CHAIR McNAMEE: All set, Dennis? Great.

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CHAIR McNAMEE: We have a motion on the board, it's been seconded. Pat, anything remaining you want to say, it's sort of procedural? Any further discussion on the motion? Anybody online with a hand raised? Okay. I think we are ready to vote. I guess what we'll do is, I'll first do. Have I mis-stepped here? I'm seeing some chatter, so I'm just making sure I haven't done anything wrong. Okay, good. I'm going to first look at the table for a vote, and then we'll count hands online as well. I'm sorry, I should stop looking over there. Every time you move, I think I've done something wrong. All those in favor of the motion around the table, please raise your hand.

MS. KERNS: Jason, I'm going to read the names out loud, since we have people on the webinar, just like we have been. I have Massachusetts, Connecticut, New York, Rhode Island, New Jersey, Virginia, Delaware, Maryland, Maine, and New Hampshire, and those online.

CHAIR McNAMEE: Is that everybody?

MS. KERNS: I need those online to raise their hand if they are in favor.

CHAIR McNAMEE: Folks online, please raise your hand if you approve the motion.

MS. KERNS: No hands online.

CHAIR McNAMEE: Okay, no hands online. All those opposed to the motion, please raise your hand around the table first. No hands around the table. Folks opposed to the motion online, please raise your virtual hand. Okay, no virtual hands online. Any abstentions around the table, please raise your hand.

Not seeing any abstentions, online, any abstentions to the motion, please raise your hand. Okay, no hands online. All right, so with that I guess that is unanimous. The motion is approved. Thanks for that, Pat. All right, so

that gets us started with procedural element. Senator Miner, go ahead.

SENATOR CRAIG A. MINER: With the passage of that action, what if anything does that do, in terms of our obligation to do something, seeing as it was postponed back in January and in August, the motion was postponed? That action now says that we didn't postpone it. I believe. We also didn't take any action. Have I got that right?

CHAIR McNAMEE: I think the intent here is to sort of free us now to be able to make modifications. I think currently as we stand right now you are correct. But we can now take additional steps to not make that be true.

SENATOR MINER: I'll accept that, but I would have thought that we actually could have taken action, even though those were in place, because they were specific to a day at which time, we would take them. That's all right.

CHAIR McNAMEE: Go ahead, Bob, for a response.

EXECUTIVE DIRECTOR BEAL: Essentially where the Board is now is Addendum XXVII is no longer approved for public comment. You've got a document that sort of reverted back to draft form when you rescinded the second motion up there, which is approving the Draft Addendum for public comment. Now the Board has this document open for editing, and then any changes that the PDT makes or the Board makes today, can then be approved for public comment in a subsequent motion, and then we can have hearings after that. Essentially all this did was clear the slate, unapproved the Addendum for public comment, and now you can manipulate it anyway you want.

CHAIR McNAMEE: Great. Good? Okay. All right, so now we're sort of free to make modifications or other adjustments as needed. I see Pat with a hand raised. Go ahead, Pat.

MR. KELIHER: I have another motion prepared that would task the PDT. Mr. Borden talked about getting something out to the public this spring.

That is the intent within the motion that I'm going to make. It sounds like there may be some other thoughts around this, but I thought it would be good to put this motion up, and if I get a second, I can give a little bit more clarity.

I would move that the PDT simplify Section 3.2 of Draft Addendum XXVII to the American Lobster FMP, by creating a single trigger level that shall act as a backstop, protecting the stock from further declines. The PDT shall use the Technical Committee's trigger level recommendation (from the September 10, 2021 memo to the Board), utilizing a three-year running average of the trigger index when it declines by 45% from the reference period.

CHAIR McNAMEE: Okay, we have a motion by Pat Keliher. Is there a second to that motion? Seconded by Dennis Abbott. Discussion on the motion? Pat, I'll give you first crack at it.

MR. KELIHER: I realize this is a change, but again this change is to put something on the table while whale rules continue to be worked on. Mr. Borden talked about all of the challenges facing the lobster industry, and the uncertainty from the expense side to the wind side to the whale side.

There is a lot at stake right now. My belief that we do have some time left to continue to deal with this issue, but I was unwilling to just continue to delay, without having something in place, again to act as that backstop. I guess I'll just stop there, Mr. Chairman, we can deal with it as comments come.

CHAIR McNAMEE: Dennis, do you want to make a comment as the seconder?

MR. ABBOTT: No, I'll pass at this time to my more learned.

CHAIR McNAMEE: Okay, around the table, folks wishing to make a comment on the motion. I see Steve Train.

MR. TRAIN: Thank you, Pat, for straightening some of this out and getting us a backstop. If we could get that other table back up there for a minute that showed the rate of decline, or the declines where we are. I would really appreciate it if somebody could pull that up. There is a lot going on in the industry. We're dealing with whale restrictions, law suits, fuel costs, increased bait cost, possible displacement by windmills, and other things.

It is a maelstrom, and the one thing that we keep thinking will get us through all this, besides being right, is we have a healthy resource. That right there may still be a healthy resource, but it's going in the wrong direction. That star is at 23 percent. We're talking about twice the length of that down before we do anything for the backstop. What was the figure on the dotted red line, the one we said we wouldn't use, because it was already at the limit?

MS. STARKS: Fifty-one percent.

MR. TRAIN: We're coming almost close to that line before we do anything, which I guess is better than doing nothing. But to me, 45 percent is too far away. I'll support it over nothing, but it's already. If we're hoping that the health of the resource is going to save us from all the other problems, we're going to make sure we've got a healthy resource.

CHAIR McNAMEE: Okay, looking around the table for other comments on the motion. David, we see you online, but I'm going to go to Doug Grout first.

MR. DOUGLAS GROUT: Just a clarification. I was trying to go through the document, and currently is the trigger in the document based on a five-year running average, or a three-year running average?

MR. KELIHER: Three.

MR. GROUT: Okay, thank you.

CHAIR McNAMEE: Okay, the answer to that was three years. Next up I have David Borden online. Go ahead, David.

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MR. BORDEN: I have a slightly different view, as I echoed before. I think we need a range in this document. I support what Pat has proposed for 45 percent, but if you go back and reflect on the comments that Steve Train has made today, who is a key player in the Maine industry.

I think he has been arguing steadily for another set of alternatives that would be more conservative, not because he necessarily wants those to implement, because he wants to promote a discussion and dialogue among the industry. I'm kind of in the same position. I would be happy to offer a motion to amend at the appropriate time.

I think we should insert something like a range from something that is higher than we are now, say 26 or 27 percent, so we've got some separation between where we are and actual action. Then take that range out to public hearing. That is my position, and if I get some positive feedback from other Board members, I'll offer a motion to amend.

CHAIR McNAMEE: The idea there would be to amend the motion to add some other potential options in there. We'll let folks' kind of think about that for a minute, and I had a hand from Cheri, so go ahead, Cheri.

MS. CHERI PATTERSON: I agree with Dave. I think that we should present a range over a single target number that is going to put us on a brink, as opposed to being proactive, more proactive, I should say. I would like to also propose a range when the time comes. But I also think it would behoove us all to take a beat, and maybe talk amongst ourselves, before we get to the decision.

CHAIR McNAMEE: Yes, so let me just take one more pass around the table, to see if anybody wants to make a comment right now. I think what I will do is take like a five-minute break for folks. There has been some talk about some additional levels to kind of drop in here, not very specific at this point.

I'm hoping the little break will give people some time to think about the specific range or values that they would want to drop in there for potentially an amended motion. I suppose it could be just a second motion as well, as long as folks are okay with this one. However, folks want to approach it is fine. I have Dan McKiernan.

MR. McKIERNAN: Yes, before we break, I just want to plant this idea in our collective heads. If this rule were already enacted, we would be looking at the 2019 through 2021 trigger value reported today in 2022, and it would trigger two-gauge increases, one in 2023 and a second gauge in 2025. We are essentially enacting a rule that creates like a four-year timeline between the introduction of the value and the final action. I hope that that makes people pause and think about, maybe we need to accelerate this Amendment.

CHAIR McNAMEE: Eric.

MR. ERIC REID: My question is, we were having a discussion about 17 and 20 percent, and now we're talking about perhaps something above where we are now, 25 or 26. That is the numbers that I've heard. What does that do after we come back from the public? If we do a range, are we bound by that range, or can we go to 17 percent or 21 percent in final document?

CHAIR McNAMEE: Good question, I'm looking over at Caitlin.

MS. STARKS: I believe you would be bound by the range that is included. Whatever trigger level is implemented would have to fall between the lowest and the highest.

MR. REID: That would be what goes out to the public. Okay, thank you.

CHAIR McNAMEE: Dan.

MR. McKIERNAN: Just a follow up. I think to answer Eric's question. I think Option E is simply scheduled changes to minimum gauge size. There is

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actually an option that ignores the trigger and just takes gauge increases, so that is kind of built in.

CHAIR McNAMEE: I'm looking around the table, not seeing hands. Any hands online? I'm seeing a no, so why don't we, let's see, it's 11:20, let's take five minutes. I'll check in at five minutes. Let's make it ten, because I think this takes a little bit of thought. We'll be back at 11:30 to bring this motion back up.

(Whereupon a recess was taken.)

CHAIR McNAMEE: All right, so just to recap, we've got a motion on the table made by Pat Keliher, I think seconded by Dennis Abbot. Then we took a quick break, so folks could kind of construct an amended motion, because it seemed like that was where the discussion was going around the table.

I'm going to ask that we make sure we clarify two things before we kind of wrap this up here. The first is to clarify whether we are now, remember the original construct was to have two triggers. There was sort of like an entry trigger and then like another trigger. It's important to clarify whether or not we're now defaulting to just a single trigger.

Then to go along with that, that impacts the steps, in particular the gauge increases. I would suggest that if we are going to a single trigger that we just drop to that second step. But that is something I think we want to clarify. Then the second thing to clarify is under Option 1D, and that is the years that we're talking about here.

Maybe you will want to keep the ones that are there, but I'll just sort of flag that for you so you can take a look to make sure. With that, let me look around the table to see if anybody has come up with an amended motion, and I see a hand from Cheri Patterson. Go ahead, Cheri.

MS. PATTERSON: If you can bring up the motion. I would like to move to amend the percentage to a range of 30 percent to 45 percent.

CHAIR McNAMEE: Okay, motion on the table by Cheri. Is there a second? I see Eric Reid seconding the motion. We have a motion it's been seconded. Any discussion, Cheri, I'll go to you first?

MS. PATTERSON: I think that this gives us a little bit of comfort in knowing that we're not going to be reacting when we hit a 45 percent level, which is a pretty severe trigger to wait for. The range of 30 percent was within the range that the PDT had indicated, and if you want to bring up the table so people can see it again, or the chart.

Then I think that this gives us some buffer to work within, as the Atlantic Large Whale Take Reduction Plan becomes modified over the next year or two, or at least we'll have a clearer idea as to whether we're going to be realizing any resiliency from a modification to that plan.

CHAIR McNAMEE: Eric, do you wish to make a comment?

MR. REID: Yes, thank you, Mr. Chairman, I'm more comfortable with a range that is more proactive than 45 percent. As uncomfortable as it is, I'm comfortable having a range and being more proactive. Sort of in line with Mr. Train's comments about protecting the resource.

CHAIR McNAMEE: Ray Kane, go ahead.

MR. KANE: I can support this motion, but my concern and maybe Caitlin could answer this, it probably has to go back to the PDT. But 30 percent, this is a three-year running average, so it was 18, 19, 20 that was included?

MS. STARKS: Twenty-twenty-one was the final year.

MR. KANE: Oh, '21 was, because with COVID and what not. Any projections on when we're going to hit 30 percent? I mean when you look at that graph it's quick. I support this motion, Cheri and Steve,

but I'm concerned that we're going to hit 30 rather quickly.

CHAIR McNAMEE: Ray, I think your comments about the rate of decline is a good one. But I don't think we have that information at hand to answer.

MR. KANE: Thank you, Mr. Chairman.

CHAIR McNAMEE: You're welcome. Any other hands around the table for discussion? Not seeing any around the table. Anyone online? No one online. I think we are, well maybe I'll offer a quick opportunity for public comment. We've got a motion on the table, and so I'll first look in the room. If there is anybody in the room wishing to make a public comment on this. Okay, not seeing any hands in the room. Any online hands? All right, so back to the table here. Why don't we go ahead and call the vote? All those in favor of the motion, please raise your hand.

MS. KERNS: Clarifies the Motion to Amend.

CHAIR McNAMEE: Thanks, Toni, yes this is to approve the Motion to Amend offered by Cheri Patterson and seconded by Eric Reid.

MS. KERNS: I have Rhode Island, Massachusetts, New York, Connecticut, New Jersey, Virginia, Maryland, Delaware, Maine and New Hampshire.

CHAIR McNAMEE: Any hands online, those to approve the amended motion? Okay, no hands, are there any objections to the Motion to Amend? Looking around the table first, please raise your hand if you object to the motion. No hands around the table, any hands online? No hands online. Are there any abstentions that folks wish to cast? Looking around the table first, please raise your hand. No hands around the table. Anyone online?

MS. KERNS: NOAA Fisheries.

CHAIR McNAMEE: NOAA Fisheries is abstaining. Great, and I guess I forgot to ask about null votes. I think I'll go ahead and ask, even though I think that accounts for everybody. Any null votes, please raise your hand around the table. Not seeing any hands, any online? No. **That approves the Motion to Amend, and it was unanimous with one abstention.**

Now we're back to the Main Motion. I can't turn my head quite far enough to read it, but I'm assuming it's up on the board here. Back to the main motion, any discussion on the main motion before we take a vote? No hands around the table. Any hands online? Okay, let's call the vote. Go ahead, Dan.

MS. McKIERNAN: I'm just working at the language. Is it clear that this Board will pick a number in a final addendum, as opposed to having a document that says in a Final Rule when it declines by 30-45% giving us discretion? I just want to be sure that the document captures the fact that after the final approval there will be one number.

CHAIR McNAMEE: Caitlin, did you want to respond to that?

MS. STARKS: Yes, thank you, Dan, I would like clarification on that as well, and I think it would need to be clarified whether the intention is to just have one single trigger, where the final gauge size changes that are proposed in the Addendum go into place, not the first step, but the second step.

CHAIR McNAMEE: Okay, why don't I first look to the, we're back to the main motion here, so go ahead, Pat.

MR. KELIHER: Dan picked up exactly what I was going on, because the original motion, the intent was to have a single trigger. Just for clarity, the Board will choose a trigger from a range between 30 and 45 percent, based on the public comment that we receive.

CHAIR McNAMEE: Thank you, Pat, so that is clear for the record now, thank you. All right, we're back

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to the Main Motion, and I think we're ready to vote. All those in favor of approving the Main Motion, please raise your hand around the table first.

MS. KERNS: We have Rhode Island, Massachusetts, Connecticut, New York, New Jersey, Virginia, Maryland, Delaware, Maine and New Hampshire.

CHAIR McNAMEE: Okay, any hands online to approve the Main Motion?

MS. KERNS: No hands.

CHAIR McNAMEE: Okay, thanks for that, any objections to the motion, please raise your hand around the table. No hands around the table. Any hands online? No hands online. Any abstentions to the motion looking around the table? No hands raised around the table. Any hands online?

MS. KERNS: NOAA Fisheries.

CHAIR McNAMEE: NOAA Fisheries abstains, and then finally, any null votes looking around the table first? No hands around the table, any hands online? I'm going to assume no. All right, so the motion stands approved. Thanks for that everybody. Any further discussion on this topic? Oh right, so the other clarification that we need is the years that we're talking about. That is in Option E. Caitlin, do you want to clarify what we're looking for by way of clarification?

MS. STARKS: Sure, I just want to ask from the Board if there was an intent to modify this option in the document. Currently the years that were proposed for changing gauge sizes were 2023 and 2025. This is the option that doesn't involve the trigger, it's just a scheduled change to the gauge sizes.

CHAIR McNAMEE: Okay, thanks for that. If folks are okay with this, you know 2023 is not too far off, but if folks are okay with this, we

can stick with it, but we can also modify those if folks wish. I see Pat.

MR. KELIHER: These dates were chosen when the document was being developed two years ago, right, so in my mind they have to be moved out with the corresponding timeframe if we're going to leave them in the document. That would be 2025/2027, I believe.

CHAIR McNAMEE: I think a motion is in order here to make that modification.

MR. KELIHER: So moved.

CHAIR McNAMEE: Let's give it a minute to get up on the board. Oh, go ahead, Bob.

EXECUTIVE DIRECTOR BEAL: Thank you, Mr. Chair. Just for efficiencies sake, if there is no objection to changing those two dates around the table, I think it can just be made as a direction to the PDT. You won't need a motion.

CHAIR McNAMEE: That's much better, but let's see. Let's not count our chickens just yet, because I see Dan has got his hand raised. Go ahead, Dan.

MR. McKIERNAN: Yes, I appreciate Pat's recollection, but practically speaking, I would be comfortable with 2024, 2026. If we're going to go to instant gauge increases, there is no reason to wait two more years. I mean 2023 is too early. February of 2023, if it's enacted, I couldn't get rules in place for another five or six months, but I could certainly do it in 2024. I think we should just move it that one year to each of those steps.

CHAIR McNAMEE: Okay, so I'm going to see if we have some sort of agreement, and I'm looking over at you, Pat, and so the answer to that is no. We probably need to then go with a motion here. Pat, do you wish to introduce that motion?

MR. KELIHER: Bob just whispered in my ear the question the comment that I was going to bring up. We have to have gauges made, right. Nobody is going to even start building them until a Board

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process went forward, was finished, finalized and voted on. My Major is probably running out of the room right now.

But Major Beal did contact all of the manufacturers in gauges, and to get gauges based on supply chain issues and all kind of other complications, we wouldn't get them done. It wouldn't be done for that timeframe. **I would move that we push these out to 2025, 2027.**

CHAIR McNAMEE: Okay, so there is a motion. Pat, you are making that as a motion, correct? Motion on the table to basically add two years to each of the years currently in this Option E. There is like some Jimi Hendrix feedback going on there. I think it's gone away. I think we've got the motion up on the board here. Is there a second for that motion? Seconded by Dennis Abbott. All right, so we've got a motion on the board to extend the existing years by two years for Issue 2, Option E. Discussion. Senator Miner, go ahead.

SENATOR MINER: What happens if the trigger is hit before the dates?

CHAIR McNAMEE: I believe there are sort of two things. I think this one is kind of these automatic gauge increases, without the triggers, unless I'm thinking about the wrong one. But the triggers have their own set of rules, and so I think gauge increases would occur when that trigger was hit under that regime.

SENATOR MINER: Well, I don't think this says that, and I just get concerned that if we have put out a range for public discussion, and choose a point at which we'll know what the trigger is. If the trigger is reached before 2025, does this supersede the trigger?

CHAIR McNAMEE: Caitlin is going to help us clarify.

MS. STARKS: There are two completely separate options, so this is Option E, and it does

not involve a trigger mechanism at all. These are simply just scheduled changes in advance. If this option was selected, the final approval of the Addendum, then there would be no trigger mechanism.

CHAIR McNAMEE: Go ahead, Senator Miner.

SENATOR MINER: Follow up, so if the trigger was achieved prior to these dates, would the trigger then trigger the gauge? What does the trigger, trigger?

MS. STARKS: The trigger options are separate. In those trigger options, if we're using the 45% or 30 % range trigger. If that option is selected to use a trigger mechanism, then it would trigger gauge increases at that time. But that is a separate option from these years, so if this is chosen to use the scheduled years, there would be no trigger mechanism, we wouldn't be monitoring that index, we would just make these changes at these times.

SENATOR MINER: Thank you.

CHAIR McNAMEE: Dan, go ahead.

MR. MCKIERNAN: I appreciate Pat's insight, in terms of the amount of time gauges have to be manufactured. But I think what Craig is referring to is, there is a disconnect here, and I guess the real question is, if we come back next summer or fall, and one we've tripped the trigger, exceeded the trigger, then the gauge increase has to take place. What Pat is describing for us is the fact that it takes a long time to build gauges, so are we de facto building in another year of delay for the gauge increase?

In my mind there is already a lot of gauges, well actually not that particular gauge. That is a special size, the intermediate size. I think we had better wrap our heads around this, and maybe figure out. Maybe through the public hearing process. We learn if the gauge manufacturers can actually produce enough gauges in time to do it within one year.

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CHAIR McNAMEE: Toni.

MS. KERNS: Perhaps while the PDT is working on the document, the states can talk to the manufacturers, and when we come back to the Board to approve the document for public comment, we'll have better clarity.

CHAIR McNAMEE: Pat.

MR. KELIHER: Yes, I would volunteer Major Robert Beal from Maine Marine Patrol to pull that information together for the Board.

CHAIR McNAMEE: Thanks, Pat. Okay, so we've got a motion on the table here, it's been seconded. Any additional discussion on this before we call the vote? Not seeing any hands around the table, so let's go ahead. All those in favor of the motion, please raise your hand. Sorry, around the table first.

MS. KERNS: Jay, I can take the webinar at the same time.

CHAIR McNAMEE: We'll do them all at once then. Please, both in the virtual world and the real world here in the room, please raise your hand if you approve the motion.

MS. KERNS: I have Rhode Island, Massachusetts, Connecticut, New York, New Jersey, Virginia, Maryland, Delaware, Maine and New Hampshire. No hands online.

CHAIR McNAMEE: Okay, any objections to the motion, please raise your hand, both here in the room and online.

MS. KERNS: No objections.

CHAIR McNAMEE: Okay, any abstentions in the room or online?

MS. KERNS: NOAA Fisheries.

CHAIR McNAMEE: Then finally, any null votes please raise your hand.

MS. KERNS: No null votes.

CHAIR McNAMEE: Okay, so the motion stands approved. Great. Caitlin, anything else we need to clear up before we move on from this topic? Toni, go ahead.

MS. KERNS: I was going to ask about the timeline. There was a suggestion to do a Board meeting in December. But if it is the intention of the Board to finalize this document at the May meeting, then I'm not sure what the December approval gets you. I don't think that if we do a December approval of the document, it will be very tight to pull off public hearings between December and the winter meeting. I'm not sure that that would be viable for us. If there is a desire for that, then I would like to know if that is what the Board is wanting.

CHAIR McNAMEE: Go ahead, Dan.

MR. McKIERNAN: I think May final approval would be ideal, because it would give us a chance to meet with the industry at the wintertime trade shows.

CHAIR McNAMEE: Okay, I heard one voice of support for that. I'm seeing thumbs up around the table. Anyone have a different feeling or take on that, either in the room or online? Please, flag me down, raise your hand. Nobody in the room, anybody online? Did you have something, Caitlin? Go ahead, Caitlin.

MS. STARKS: Sorry, just want to clarify, make sure I have my head on straight here. It is the intention of the Board to come back in February and approve the document for public comment?

CHAIR McNAMEE: I think the answer to that is yes. Yes, seeing nodding heads around the table. Doug, go ahead.

MR. GROUT: Just one quick clarification for me. You know we've approved a range for the triggers, but what is the management measures that they are going to trigger in the document? What are we putting out there? Is it that a single gauge increase, by an eighth of an inch, or something else, or

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including the maximum gauge reduction in Area 3, and the vent size changes? Is it just a single, we're going to do it at that time? Is that the way we've decided to craft this document?

CHAIR McNAMEE: I think that's right, I'll look to Caitlin to see if that is her understanding as well.

MS. STARKS: That was my understanding, so if there is a difference that needs to be made, we can change it.

CHAIR McNAMEE: Nobody is raising their hand, so we'll assume that that is correct. All right, I think Caitlin, are we done with that one?

MS. KERNS: If we need some additional work for the provision, the Mitchel Provision and Magnuson-Stevens, we'll work with the PDT on that. But again, I think we might have a workaround, where we don't need that. Staff will make sure we have what we need for February.

CHAIR McNAMEE: Great, thanks for that, Toni. That is the MSA provision, so thanks for that. We're way over, we're not way over, 15 minutes over time here. We still have a number of things to kind of get through on the agenda, so I guess we'll keep plugging along here, and maybe some of these more update-oriented things we can get done quickly.

**UPDATE FROM WORK GROUP ON
IMPLEMENTATION OF ADDENDUM XXIX ON
ELECTRONIC VESSEL TRACKING FOR
FEDERAL PERMIT HOLDERS**

CHAIR McNAMEE: Why don't we just go ahead and go to the next thing here. I'll go to Toni for the Addendum, what is that XXIX update, so Toni, whenever you're ready.

MS. KERNS: I'll be brief, and if anybody has questions or more details, I'm happy to chat anytime this week. This Addendum is dealing with the Trackos, the Tracking Work Group, and

subsets of the Tracking Work Group have been diligently working. We did receive five applications of trackers. There is only one tracker per application.

The Review Committee is in process of reviewing those. We are going to ask all five permittees to test their data with the API, and we have some additional follow up questions for those five companies. In terms of the work that ACCSP has been doing, the SAFIS API is complete, and it is ready for testing, hence why we were asking for the devices to be tested.

It includes data validations in new fields that support the Lobster Addendum requirements. In addition, there has been comprehensive requirements document that has been completed for the application, as well as the tracker viewer and compliance reports are in process of development. ACCSP and GARFO staff have been coordinating on the GARFO provisions of the lobster permit data, and the VTRs that are being submitted directly to GARFO, so that we can combine the landings reports with the trackers, so they can talk to each other. That's what I have.

CHAIR McNAMEE: Awesome, very concise, thanks, Toni. Any questions for Toni on this topic? Looking around the table. Okay no hands, any hands online? David Borden, go ahead.

MR. BORDEN: I guess a question for Toni, or possibly Bob. When is the funding going to be available to the state agencies to fund this?

EXECUTIVE DIRECTOR BEAL: It's like a trick question. Actually, the ASMFC has the money available to the Commission. However, we need to develop the state spend plans for specific state allocations for each jurisdiction will receive a subcomponent of the overall 14-million-dollar allocation.

We need to develop those spend plans. We've had some conversations with the four northern states, and we need to have more conversations with the states to the south. We're going to have that

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conversation at the Executive Committee on Wednesday morning of this week. We should be able to get those spend plans pulled together pretty quickly after that conversation.

MR. BORDEN: Mr. Chairman, can I follow up on that?

CHAIR McNAMEE: You sure can, David, go ahead.

MR. BORDEN: Thank you very much for that response. One point that has come up in my discussions with the industry on whales, has been some individuals have talked about mechanisms, using techniques to reduce risk. It would require tracking sooner than what the Commission has proposed as an enforcement tool. You may want to at least consider that, and even if the Commission, if some group, one of these LMAs proposes something like that, is some mechanism to get access to the funding earlier than what has been proposed.

CHAIR McNAMEE: Okay, so with no additional questions, not seeing any other hands around the table. Let's move on to the next agenda item, which may also be quick. This was to Discuss the Trap Transfer Tax, was an item that Dan McKiernan asked to put on the agenda here. Dan, I'll kind of turn to you for this one.

MR. MCKIERNAN: Can I ask that this be postponed until the February meeting?

CHAIR McNAMEE: I think that would be perfectly fine.

MR. MCKIERNAN: Thank you.

PROGRESS UPDATE ON JONAH CRAB BENCHMARK STOCK ASSESSMENT

CHAIR McNAMEE: We're going to pick this one back up at our next meeting. Moving on to the next agenda item, it's a progress item on the Jonah Crab Benchmark Stock Assessment, and I will look to you, Jeff, to take us into that one.

MR. JEFF J. KIPP: I'll be providing a quick progress update here in the next few slides on the ongoing 2023 Jonah Crab benchmark stock assessment. The review the TC and SAS have completed since we initiated the assessment at the beginning of the year were the Data Workshop and Methods Workshop. The Data Workshop was held virtually from June 13-15.

The Data Workshop built upon our Preassessment Workshop and report, to review the available datasets for their use in this first coastwide stock assessment. Major topics covered during the workshop included the stock structure, to assess the population, potential stock and fishery indicators from available datasets, and necessary data revisions based on determinations made from those two previous topics.

The Methods Workshop was held virtually from October 3rd through the 5th. The TC and SAS reviewed the results of those data revisions identified during the Data Workshop, continued development of potential stock indicators, and also discussed the assessment methods to pursue following this workshop with our available datasets.

I will note that we have experienced some whale work related data delays, but we are currently working through those to get all the completed datasets finalized for this assessment, and for the assessment methods and stock indicators covered at the workshop.

Looking forward to our many milestones include an Assessment Workshop to review and finalize assessment results in early 2023, an external peer review of the assessment in mid-2023, and delivery of assessment to the Board at the ASMFC Annual Meeting next year, to be considered for management. That's what I've got for my presentation, I can take any questions on the Jonah Crab Assessment.

CHAIR McNAMEE: Awesome, thank you, Jeff. Any questions for Jeff on the update about the Jonah

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

Crab Assessment? Looking around the table, not seeing any hands, any hands online? No hands online either, so thanks for that, Jeff. Nice and easy.

**CONSIDER FISHERY MANAGEMENT PLAN
REVIEWS AND STATE COMPLIANCE FOR
AMERICAN LOBSTER AND JONAH CRAB
FOR 2021**

CHAIR McNAMEE: We're on our last agenda item here, and that is to Consider Fishery Management Plan Reviews and State Compliance for American Lobster and Jonah Crab for 2021, and with that I will turn to you, Caitlin.

MS. STARKS: Given that we're over time at this point, I'm going to really abbreviate this. The Lobster FMP Review had no issues identified by the PRT in a comprised report, so if it's all right, I can send that out to the Board for approval by e-mail after this meeting. Then for Jonah Crab, we've discussed this over the last several years.

But the only issue that was noted by the PRT is related to the New York implementation of the required measures of the Jonah crab FMP, and that's just the regulations to limit the directed trap fishery to lobster permit holders only, and the 1,000-crab bycatch limit. I just want to give a quick update on this issue, which is that New York is now in the process of implementing those measures.

They have not been implemented because of the way New York's crab legislation had to be revised, in order to allow NYSDEC to put those regulations in place. But the legislature had to revise the law so that they can now put those in place in their rulemaking process. I just wanted to provide that quick update, and we can also send this one out to the Board for approval via e-mail.

CHAIR McNAMEE: All right, thanks, Caitlin. It sounds like the one kind of issue that was within the compliance report world is at least in

the process for being resolved. Any questions for Caitlin on this? Dan.

MR. McKIERNAN: Caitlin, I wanted to correct that one section about the lack of Massachusetts recreational landings. Is there an opportunity for me to do that? There will be?

MS. STARKS: If it's all right. I can get the correction from you, Dan, and just work it into the document before I send it out for approval by the Board.

CHAIR McNAMEE: The plan here then is to do e-mail vote on the management plan. Keep an eye out for additional information. I think that is the opportunity, Dan, for you to offer your correction, and we'll take it from there. Anything else on that, Caitlin?

**OTHER BUSINESS
TAKE REDUCTION TEAM, TRAP COMPONENT**

CHAIR McNAMEE: All right, so we are on our last agenda item which is any Other Business? Pat, go ahead.

MR. KELIHER: I'll be very quick. I think this can happen organically between the states that are dealing with this whale issue. The Take Reduction Team will be meeting in November, and two days in early December. There is a good chance that traps could become part of the currency with that conversation, so yet to be seen. I'm not sure what is being put on the table, but I think it's going to be imperative that this management board deals with the trap component, and we don't depend on the Take Reduction Team process.

I don't want to see that coming in that direction. I would urge us to, as we start to understand where the Take Reduction Team conversations, to come together as states to talk a little bit offline, and maybe be able to have something ready, and maybe some formal tasking of the TC at the winter meeting. I just wanted to put that stake in the ground.

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

CHAIR McNAMEE: Thanks, Pat. Just to summarize the idea of trap reductions in developing metrics, to kind of understand what those trap reductions are doing is kind of the idea. Thanks for kind of getting that out in front of the Board, Pat, something that we'll revisit here in the near future. All right, any other business from anyone else on the Board?

ADJOURNMENT

CHAIR McNAMEE: Are there any hands online, Caitlin? All right, so I think that does it. Thanks everybody for hanging in. Sorry it went a little long there. Actually, I guess I'm supposed to make that into a motion. Is there any objection from the Board to adjourning? No objections to adjourning, we are adjourned, thanks everybody.

(Whereupon the meeting adjourned at 11:55
a.m. on Monday, November 7, 2022)

Atlantic States Marine Fisheries Commission

DRAFT ADDENDUM XXVII TO AMENDMENT 3 TO THE AMERICAN LOBSTER FISHERY MANAGEMENT PLAN FOR PUBLIC COMMENT

Increasing Protection of Spawning Stock in the Gulf of Maine/Georges Bank



This draft document was developed for Management Board review and discussion. This document is not intended to solicit public comment as part of the Commission/State formal public input process. However, comments on this draft document may be given at the appropriate time on the agenda during the scheduled meeting. Also, if approved, a public comment period will be established to solicit input on the issues contained in the document.

January 2023



Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Public Comment Process and Proposed Timeline

In August 2017, the American Lobster Management Board (Board) initiated Draft Addendum XXVII to increase the resiliency of the Gulf of Maine/Georges Bank (GOM/GBK) stock. Work on this addendum was paused due to the prioritization of work on take reduction efforts for Atlantic right whales and the 2020 stock assessment. The Board reinitiated work on Draft Addendum XXVII in February 2021, and has since revised the goal of the addendum to consider a trigger mechanism such that, upon reaching the trigger, measures would be automatically implemented to increase the overall protection of spawning stock biomass of the GOM/GBK stock. The management action was initiated in response to signs of reduced settlement and the combining of the GOM and GBK stocks following the 2015 Stock Assessment. This document presents background on the Atlantic States Marine Fisheries Commission's management of lobster, the addendum process and timeline, a statement of the problem, and management measures for public consideration and comment.

The public is encouraged to submit comments regarding the proposed management options in this document at any time during the addendum process. The final date comments will be accepted is **Month Day, 2023 at 11:59 p.m. EST**. Comments may be submitted by mail, email, or fax. If you have any questions or would like to submit comments, please use the contact information below.

Mail: Caitlin Starks

Atlantic States Marine Fisheries Commission
1050 N. Highland St. Suite 200A-N
Arlington, VA 22201

Email: comments@asmfc.org
(Subject line: Lobster
Draft Addendum XXVII)

<i>May – Dec 2022</i>	Draft Addendum for Public Comment Developed
<i>Winter 2023</i>	Board Considers Draft Addendum for Public Comment
<i>February 2023</i>	Public Comment Period Including Public Hearings
<i>May 2023</i>	Board Reviews Public Comment, Selects Management Measures, Final Approval of Addendum XXVII
<i>TBD</i>	Implementation of Addendum XXVII Provisions

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1.0 Introduction

The Atlantic States Marine Fisheries Commission (ASMFC) has coordinated the interstate management of American lobster (*Homarus americanus*) from 0-3 miles offshore since 1996. American lobster is currently managed under Amendment 3 and Addenda I-XXVI to the Fishery Management Plan (FMP). Management authority in the Exclusive Economic Zone (EEZ) from 3-200 miles from shore lies with NOAA Fisheries. The management unit includes all coastal migratory stocks between Maine and Virginia. Within the management unit there are two lobster stocks and seven management areas. The Gulf of Maine/Georges Bank (GOM/GBK) stock (subject of this draft addendum) is primarily comprised of three Lobster Conservation Management Areas (LCMAs), including LCMA 1, 3, and OCC (Figure 1). There are three states (Maine through Massachusetts) which regulate American lobster in states waters of the GOM/GBK stock; however, landings from the GOM/GBK stock occur from Rhode Island through New York and these states regulate the landings of lobster in state ports.

The Board initiated Draft Addendum XXVII as a proactive measure to improve the resiliency of the GOM/GBK stock. Since the early 2000's, landings in the GOM/GBK stock have exponentially increased. In Maine alone, landings have increased three-fold from 57 million pounds in 2000 to a record high of 132.6 million pounds in 2016. Maine landings have declined slightly but were still near time-series highs at 97.9 million and 108.9 million in 2020 and 2021, respectively. However, since 2012, lobster settlement surveys throughout the GOM have generally been below the time series averages in all areas. These surveys, which measure trends in the abundance of newly-settled lobster, can be used to track populations and potentially forecast future landings. Consequently, persistent lower densities of settlement could foreshadow decline in recruitment and landings. In the most recent years of the time series, declines in other recruit indices have already been observed.

Given the American lobster fishery is one of the largest and most valuable fisheries along the Atlantic coast, potential decreases in abundance and landings could result in vast economic and social consequences. With peak values in 2016 and 2021, the at-the-dock value of the American lobster fishery has averaged \$660 million dollars from 2016-2021, representing the highest ex-vessel value of any species landed along the Atlantic coast during peak years. Ex-vessel value declined slightly from 2017 to 2020, but not proportionally to declines in landings. The vast majority of the overall landings value (>90%) comes from the GOM/GBK stock, and more specifically from the states of Maine through Rhode Island. As a result, the lobster fishery is an important source of jobs (catch, dock side commerce, tourism, etc.) and income for many New England coastal communities. The lack of other economic opportunities, both in terms of species to fish and employment outside the fishing industry, compounds the economic reliance of some coastal communities on GOM/GBK lobster – particularly in Maine.

Draft Addendum XXVII responds to signs of reduced settlement and the combination of the GOM and GBK stocks following the 2015 Stock Assessment. The Board specified the following objective statement for Draft Addendum XXVII:

Given persistent low settlement indices and recent decreases in recruit indices, the addendum should consider a trigger mechanism such that, upon reaching the trigger, measures would be automatically implemented to increase the overall protection of spawning stock biomass of the GOM/GBK stock.

Draft Addendum XXVII considers implementing management measures—specifically gauge and vent sizes—that are expected to add an additional biological buffer through the protection of spawning stock biomass (SSB). The addendum also considers immediate action upon final approval to standardize some management measures within and across LCMAs in the GOM/GBK stock. The purpose of considering more consistency in measures is to resolve discrepancies between the regulations for state and federal permit-holders, to provide a consistent conservation strategy, and simplify enforcement across management areas and interstate commerce.

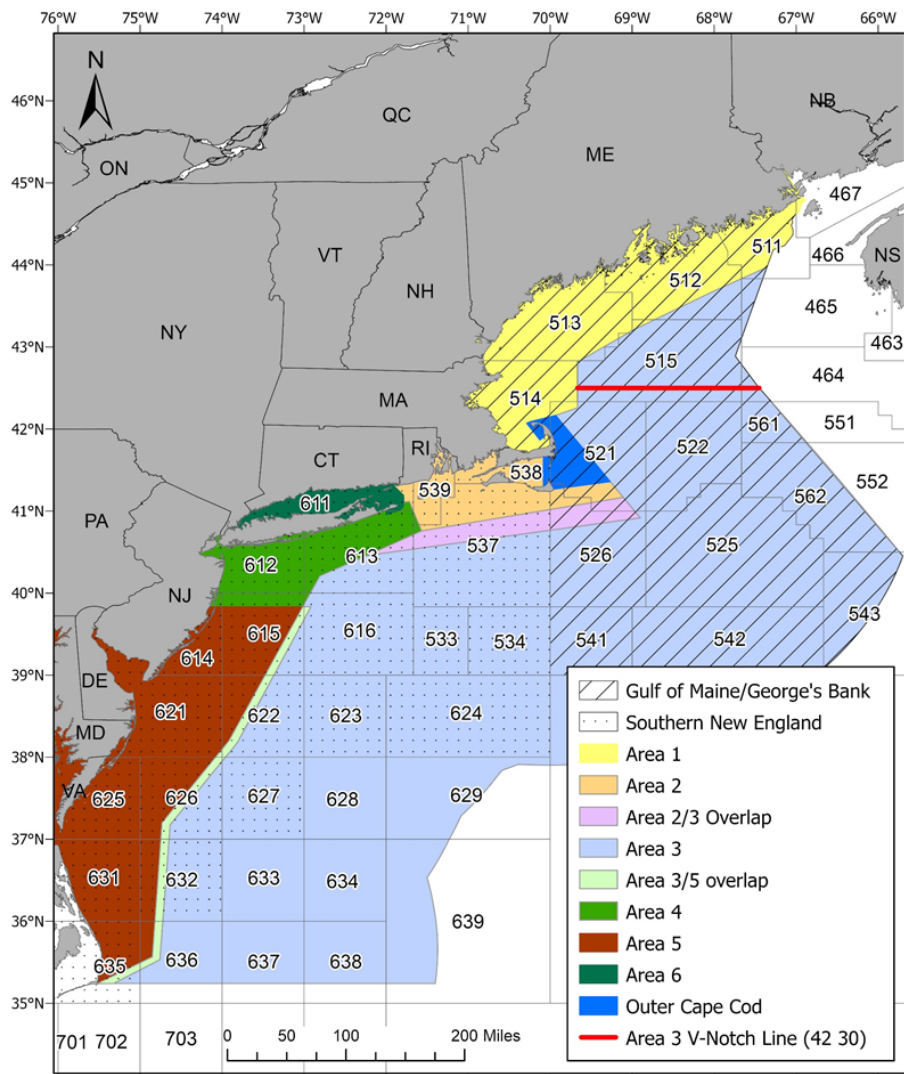


Figure 1. Lobster conservation management areas (LCMAs) in the American lobster fishery. LCMAs 1, 3, and OCC make up the majority of the GOM/GBK stock. The Area 3 V-Notch line is shown in red where v-notching is required north of the 42°30' line.

2.0 Overview

2.1 Statement of Problem

While 2016 landings in the GOM/GBK lobster fishery were the highest on record, settlement surveys for more than five years have consistently been below the 75th percentile of their time series, indicating neutral or poor conditions. Additionally, there is evidence of declines in recruit abundance in ventless trap survey and trawl surveys for the GOM/GBK stock since the most recent stock assessment. These declines could indicate future declines in recruitment and landings. Given the economic importance of the lobster fishery to many coastal communities in New England, especially in Maine, potential reductions in landings could have vast socioeconomic impacts. In addition, the 2015 Stock Assessment combined the GOM and GBK stocks into a single biological unit due to evidence of migration between the two regions. As a result, there are now varying management measures within a single biological stock. In response to these two issues, the Board initiated Draft Addendum XXVII to consider the standardization of management measures across LCMAs.

However, in 2021, the Board revised the focus of Addendum XXVII to prioritize increasing biological resiliency of the stock over standardization of management measures across LCMAs. Increased resiliency may be achieved without completely uniform management measures, so the main objective of the Addendum is to increase the overall protection of SSB while also considering management options that are more consistent than status quo. Increasing consistency across management areas may help to address some assessment and enforcement challenges, as well as concerns regarding the shipment and sale of lobsters across state lines.

2.2 Status of the GOM/GBK Fishery

The GOM/GBK fishery has experienced incredible growth over the last two decades. Throughout the 1980s, GOM/GBK landings averaged 35 million pounds, with 91% of landings coming from the GOM portion of the stock. In the 1990s, landings slightly increased to an average of 53 million pounds; however, landings started to rapidly increase in the mid-2000s. Over a one-year span (2003-2004), landings increased by roughly 18 million pounds to 86 million pounds. This growth continued through the 2000s with 97 million pounds landed in 2009 and 113 million pounds landed in 2010. Landings continued to increase and peaked at 156 million pounds in 2016 (Figure 2).

In the peak year of 2016, Maine alone landed 132.7 million pounds, representing an ex-vessel value of over \$541 million. The states of Maine through Rhode Island (the four states that account for the vast majority of harvest from the GOM/GBK stock), landed 158 million pounds in 2016, representing 99% of landings coastwide. Total ex-vessel value of the American lobster fishery in 2016 was \$670.4 million, the highest valued fishery along the Atlantic coast in 2016. While landings have declined slightly from peak levels in 2016, they remain near all-time highs. Coastwide landings and ex-vessel value for 2017-2021 averaged 133.4 million pounds and \$658.4 million, respectively. However, ex-vessel value in 2021 increased and was estimated at over \$924 million, the highest value in the time series.

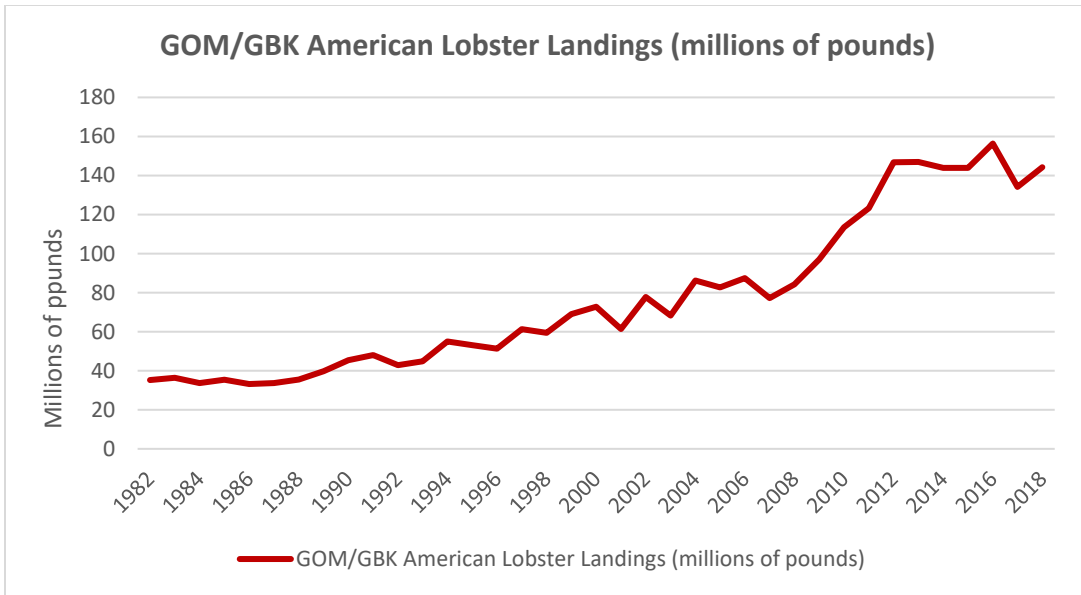


Figure 2. Landings in the GOM/GBK stock (1982-2018). Stock specific landings are updated during each benchmark stock assessment.

2.3 Status of the GOM/GBK Stock

2.3.1 2020 Stock Assessment

Results of the 2020 Benchmark Stock Assessment indicate a dramatic overall increase in the abundance of lobsters in the GOM/GBK stock since the late 1980s. After 2008, the rate of increase accelerated, and the stock reached a record high abundance level in 2018. Based on a new analysis to identify shifts in the stock that may be attributed to changing environmental conditions and new baselines for stock productivity, the GOM/GBK stock shifted from a low abundance regime during the early 1980s through 1995 to a moderate abundance regime during 1996-2008, and shifted once again to a high abundance regime during 2009-2018 (Figure 3). Spawning stock abundance and recruitment in the terminal year of the assessment (2018) were near record highs. Exploitation (proportion of stock abundance removed by the fishery) declined in the late 1980s and has remained relatively stable since.

Based on the new abundance reference points adopted by the Board, the GOM/GBK stock is in favorable condition. The average abundance from 2016-2018 was 256 million lobsters, which is greater than the fishery/industry target of 212 million lobsters. The average exploitation from 2016-2018 was 0.459, below the exploitation target of 0.461. Therefore, the GOM/GBK lobster stock is not depleted and overfishing is not occurring.

Stock indicators based on observed data were also used as an independent, model-free assessment of the lobster stocks. These indicators included exploitation rates as an indicator of mortality; YOY, fishery recruitment, SSB, and encounter rates as indicators of abundance, and total landings, effort, catch per unit effort, and monetary measures as fishery performance indicators. Additionally, annual days with average water temperatures $>20^{\circ}\text{C}$ at several temperature monitoring stations and the prevalence of epizootic shell disease in the population

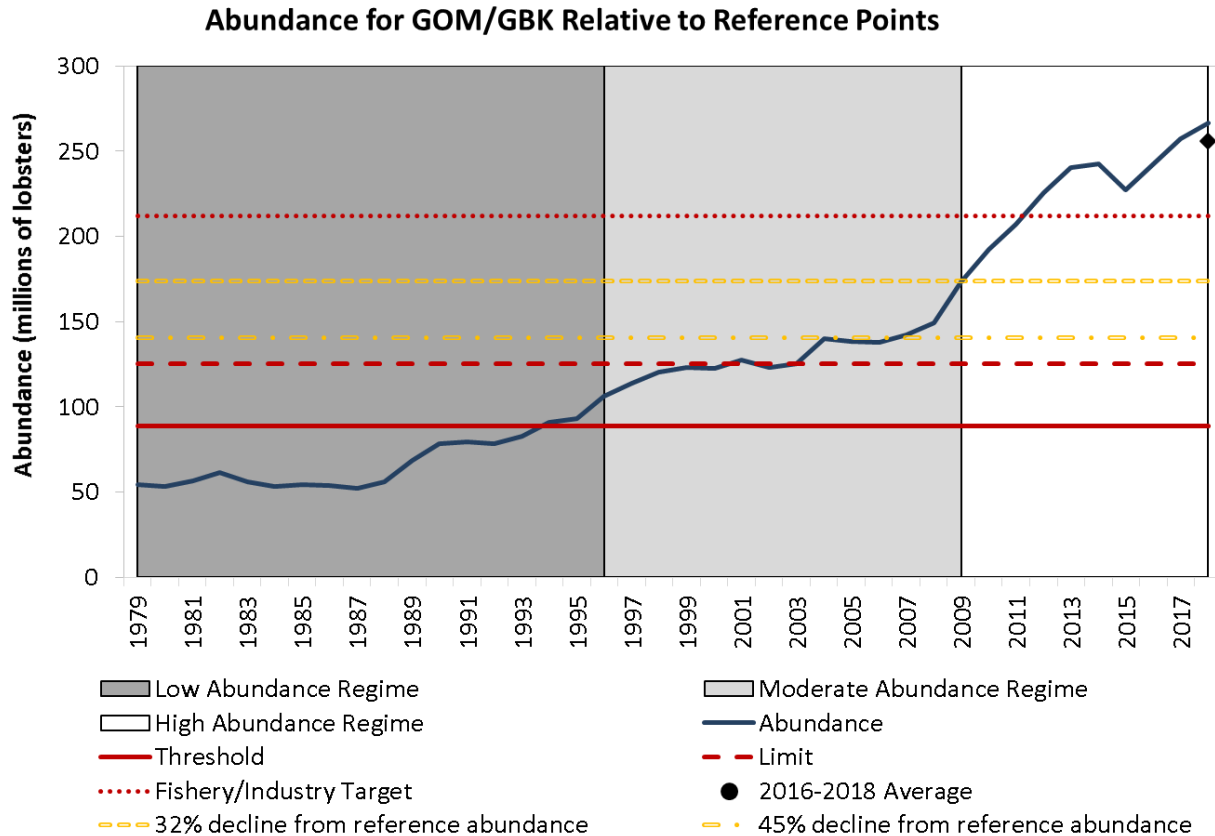


Figure 3. GOM/GBK stock abundance from the 2020 Stock Assessment.

were added as indicators of environmental stress. The 20°C threshold is a well-documented threshold for physiological stress in lobsters. Epizootic shell disease is considered a physical manifestation of stress that can lead to mortality and sub-lethal health effects.

While the stock assessment model and model-free indicators supported a favorable picture of exploitable stock health during the recent 2020 Stock Assessment, the assessment conversely noted young-of-year (YOY) indices did not reflect favorable conditions in recent years and indicate potential for decline in recruitment to the exploitable stock in future years (Table 1). Specifically, YOY indices in two of five regions were below the 25th percentile of the time series (indicating negative conditions) in the terminal year of the assessment (2018) and when averaged over the last five years (2014-2018); the remaining three regions were below the 75th percentile (indicating neutral conditions).

Mortality indicators generally declined through time to their lowest levels in recent years. Fishery performance indicators were generally positive in recent years with several shifting into positive conditions around 2010. Stress indicators show relatively low stress, but indicate some increasingly stressful environmental conditions through time, particularly in the southwest portion of the stock.

As recommended in the 2020 stock assessment, a data update process will occur annually to update American lobster stock indicators, including YOY settlement indicators, trawl survey indicators, and ventless trap survey indices. The second annual data update was completed in 2022 with data through 2021, and the results are provided in Appendix A.

2.3.2 YOY Surveys

Since the terminal year of the assessment (2018), YOY indices have continued to show unfavorable conditions in the GOM/GBK stock. There have been sustained low levels of settlement observed from 2012 through the assessment and in the time period since the assessment terminal year in 2018. In Maine, 2019, 2020, and 2021, YOY indices were below the 75th percentile of their time series throughout most statistical areas sampled, (all except Statistical Area 512 in 2019). In 2021, YOY values fell below the 25th percentile in all three northeast areas. In New Hampshire, YOY values have shown a lot of interannual variation over the past three years (2019-2021) with values above the 50th percentile in 2019, then below the 25th in 2020, followed by an increase in the terminal year (2021) above the 75th percentile of the time series. In Massachusetts, the 2019 index was below the 25th percentile of its time series; it rebounded slightly in 2020 and 2021, but remained below the 75th percentile.

Sustained and unfavorable YOY indices are concerning as they could foreshadow poor future year classes in the lobster fishery. Lobster growth is partially temperature-dependent and it is expected that it takes seven to nine years for a lobster to reach commercial size. Thus, decreased abundance of YOY lobsters today could foreshadow decreased numbers of lobsters available to the fishery in the future. Given there have been nine consecutive years of low YOY indices in the GOM, this trend may soon be reflected in the GOM/GBK stock. What is more concerning is that declines in the SNE stock, which is currently at record low abundance, began with declines in YOY indices. Specifically, SNE YOY indices began to decline in 1995, two years before landings peaked in 1997, and roughly five years before landings precipitously declined in the early 2000's.

There are several hypotheses as to why the YOY indices have been low and what this could mean for the future of the GOM/GBK stock. One hypothesis is that declines in the YOY indices are reflecting a true decline in the newly-settled portion of the stock, and are related to declining food resources (specifically zooplankton). Carloni et al. (2018) examined trends in lobster larvae to explore linkages between SSB and YOY abundance. The study found a significant increasing trend in stage I larval abundance consistent with the increases in SSB in the GOM. Planktonic postlarvae on the other hand, had a declining trend in abundance similar to trends for YOY settlement throughout western GOM. The study also found significant correlations between lobster postlarvae and the copepod *C. finmarchicus*, but there were no relationships with other zooplankton. This suggests recruitment processes in the GOM could be linked to larval food supply.

Declines in the YOY indices could also be an artifact of the lobster population moving further offshore. Recent work suggests warming in the GOM on the scale of decades has expanded thermally suitable habitat areas and played a significant role in the increase of observed

settlement into deeper areas, particularly in the Eastern Gulf of Maine (Goode et al. 2019), so lobster settlement may be diluted across a greater area. Given the YOY surveys typically occur inshore, the surveys may be unable to account for increased abundance of YOY lobsters farther offshore. In an effort to test this theory, the TC looked at potential increases in the habitat available for recruitment in the GOM/GBK stock due to warming waters. Specifically, the TC calculated the quantity of habitat by depth in the GOM. Results showed that incremental increases in depth result in incremental increases in recruitment habitat and small observed decreases in recruit densities in shallow waters; there is no evidence that incremental increases in depth result in exponential increases in available habitat. In order for the diffusion of YOY lobsters over a larger area to completely explain the observed decreases in the YOY indices, the habitat available to recruitment would have to more than double. This suggests dilution effects from increased habitat availability alone are not sufficient to explain decreases in the YOY indices, and there are likely other changes occurring in the system.

2.3.3 Ventless Trap Surveys and Trawl Surveys

While YOY surveys have detected declines in the number of newly settled lobsters, results of the ventless trap survey (VTS) and trawl surveys, which encounter larger sized lobsters just before they recruit to the fishery, have only exhibited evidence of decline in the most recent years and interpretation of these trends are complicated by sampling restrictions and limited surveys in 2020 resulting from the COVID-19 pandemic. VTS indices show declines since peaking in 2016, especially in the eastern regions. The ME/NH and the MA Fall Trawl Surveys have both showed declines in recruit lobster abundance since 2018. For the spring trawl surveys, recruit abundance indices increased from 2018 to 2019, but decreased again in 2021. Only the ME/NH Fall trawl survey ran in 2020 due to the COVID-19 pandemic.

It is important to continue to closely monitor these surveys as marked decreases in the VTS and/or trawl surveys would confirm the declines seen in the YOY surveys.

2.4 Economic Importance of the American Lobster Fishery

Much of the concern regarding the declines in the lobster indices result from the vast economic importance of the lobster fishery to much of the GOM. For the states of Maine through Massachusetts, lobster is one of the most valuable fisheries and the large majority of landings come from the GOM/GBK stock.

For Maine, American lobster is an essential economic driver for the coastal economy. Lobster annually represents more than 75% of Maine's marine resource landings by ex-vessel value (82% in 2021). The landings peaked in 2016 with more than 132 million pounds harvested, while in 2021, the ex-vessel value was estimated as more than \$730 million dollars¹. The lobster harvester sector includes more than 5,770 license holders, 4,200 of which are active license holders who complete more than 250,000 trips a year selling to 240 active lobster dealers (Maine DMR, unpublished data). The lobster distribution supply chain was estimated in 2018 to contribute an additional economic impact of \$1 billion annually ("Lobster to Dollars", 2018).

¹ <https://www.maine.gov/dmr/commercial-fishing/landings/documents/lobster.table.pdf>

Not included in these numbers are the vessel crew members and other associated businesses (bait vessels and dealers, boat builders, trap builders, and marine supply stores) that are essential in delivering lobsters to consumers worldwide, supporting the industry, and driving Maine's coastal communities.

The American lobster fishery is the most valuable commercial fishery in New Hampshire with an ex-vessel value of over \$44 million in 2021. The value of lobster landed accounted for over 90% of the value of all commercial species landed in New Hampshire. The lobster fishery in New Hampshire includes over 300 licensed commercial harvesters, over 200 of which are active, who sold to more than 30 licensed wholesale lobster dealers (Renee Zobel, personal communication). The importance of the economic impact of the lobster fishery to New Hampshire is also seen in the over 350 businesses licensed to sell lobster to consumers at the retail level.

For Massachusetts, American lobster is the second most valuable fishery in terms of overall landings value, and the most valuable of all fisheries conducted within Massachusetts state waters. The total estimated value for annual lobster landings in Massachusetts has been over \$93 million per year on average for 2017-2021. On average, landings from the GOM/GBK stock make up 96% of the total lobster landings for Massachusetts; roughly 72% of this comes from LCMA 1, 22% from LCMA 3, and 7% from LCMA OCC (Massachusetts DMF, unpublished data).

Though the state is not directly situated on the GOM, a significant contingent of the Rhode Island commercial lobster fleet harvests lobsters in GOM/GBK. In 2020 and 2021, approximately 30% and 19% of Rhode Island's commercial landings, respectively, came from statistical areas in GOM/GBK (2020: 497,705 pounds, 2021: 257,225 pounds). The estimated ex-vessel value for lobsters from this stock was approximately \$2.9 million in 2020.

2.5 Current Management Measures in the GOM/GBK Stock

Lobster is currently managed under Amendment 3, and its 27 addenda. One of the hallmarks of Amendment 3 was the creation of seven LCMAs along the coast. The GOM/GBK stock is primarily comprised of LCMAs 1 and OCC as well as the northern half of LCMA 3. Each management area has a unique set of management measures. Table 2 shows the current measures for each area. Because the GOM/GBK stock is now assessed as a single area the result is a diverse suite of regulations for each LCMA within a single stock unit, creating challenges for assessing the impacts of management measures within the stock. Specifically, the minimum gauge size (the smallest size lobster that can be legally harvested) in LCMA 1 is 3 ¼" while it is 3³/₈" in LCMA OCC and 3¹⁷/₃₂" in LCMA 3². Likewise, the maximum gauge size (the largest size lobster that can be legally harvested) differs among the three areas, with a 5" maximum gauge size in LCMA 1, a 6 ¾" maximum gauge size in LCMA 3 and for federal permit holders in LCMA OCC, and no maximum gauge size for state-only OCC permit holders. V-notch definitions are inconsistent where LCMA 1 implements a no tolerance for possession of any size v-notch or

² The coastwide minimum size remains at 3 ¼ inches, this is the minimum size that no LCMA can go below. It is noted that each LCMA has its own minimum size that may be higher than the coastwide minimum size.

mutation and LCMA 3 defines a v-notch as greater than $\frac{1}{8}$ " with or without setal hairs while OCC has different definitions for federal permits (similar to LCMA 3) state only permits ($> \frac{1}{4}$ " without setal hairs). V-notch requirements are also inconsistent, with LCMA 1 requiring all egg-bearing lobsters to be V-notched, LCMA 3 only requiring V-notching above 42°30' line, and no requirement in OCC (Figure 1).

Several concerns have been noted regarding the current management measures beyond these disparities. At the current minimum sizes, growth overfishing is occurring in the LCMAs within the GOM/GBK stock. Growth overfishing refers to the harvest of lobsters at sizes smaller than the size where their collective biomass (and fishery yield) would be greatest, and when they have very large scope for additional growth. This is demonstrated by the potential increases in catch weight associated with increasing the minimum gauge size (see Appendix B). In LCMA 1, most of the catch consists of individuals within one molt of minimum legal size, which results in a much smaller yield-per-recruit (YPR) than could be achieved if lobsters were allowed to survive and grow to larger sizes before harvest. While the size distribution of the lobsters harvested in LCMA 3 is much broader than inshore (the fishery is less recruit-dependent) there is still considerable potential for additional growth, and delaying harvest could increase yield per recruit in this region as well. Another concern is the loss of conservation benefit of measures across LCMA lines due to inconsistent measures between areas. The 2015 assessment combined the GOM and GBK areas into one stock because the NEFSC trawl survey showed evidence of seasonal exchange and migration of lobsters between areas. Loss of conservation benefit occurs when lobsters are protected in one area but can be harvested in another when they cross the LCMA boundaries.

2.6 Biological Benefits of Modifying Gauge Sizes

Of the existing biological management measures for the lobster fishery, the minimum and maximum gauge sizes are most likely to have biological impacts on the GOM/GBK stock and fishery. Analyses were performed by the American Lobster Technical Committee to evaluate the impacts of alternate minimum and maximum sizes for the LCMAs within the stock. For LCMA 1, analysis involved updating existing simulation models with more recent data to estimate the impacts of specific minimum and maximum gauge size combinations on total weight of lobsters landed, number of lobsters landed, SSB and exploitation. A separate analysis for LCMA 3 was performed due to concerns that the offshore fishery in LCMA 3 is considerably different from the inshore (which tends to drive stock-wide modelling results). For OCC, simulations were run with both LCMA 1 and LCMA 3 parameters because it is considered a transitional area. The full report on these analyses is included in Appendix B.

Based on these analyses, several general assumptions can be made about potential changes to the minimum and maximum gauge sizes. Increasing the minimum legal gauge size in LCMA 1 is projected to result in large increases in SSB; while increasing the minimum gauge size for LCMA 3 and OCC is projected to result in much smaller increases in SSB relative to LCMA 1. This is primarily because of the significantly larger magnitude of the LCMA 1 fishery and that the current minimum legal size in LCMA 1 is significantly below the size at maturity; meanwhile, the current minimum gauge sizes in LCMA 3 and OCC are much closer to the size at maturity and,

additionally, landings from these areas account for only a small fraction of the fishery. Minimum sizes that approach or exceed the size at maturity produce increasing returns on SSB as this allows a much larger portion of the population to reproduce at least once. Therefore, increasing minimum legal size in LCMA 1 to $3^{15}/_{32}$ " (88 mm) is projected to result in a near doubling of SSB. This would significantly increase egg production potential and may provide some buffer against the effects of future changes in productivity. At the same time, this change would be expected to produce only marginal decreases in the total number of lobsters landed but result in a net increase in YPR and total weight of catch.

Generally, decreasing maximum gauge sizes is projected to have larger effects for LCMA 3 both relative to increasing the minimum size in LCMA 3 and to changing the maximum sizes for the other LCMA's. However, relative to increasing the minimum size in LCMA 1, the positive impact to the overall stock projected to result from decreasing the maximum gauge sizes in LCMA 3 and OCC is significantly smaller.

2.7 Potential Implications of Increasing Consistency of Measures

Beyond the biological concerns for the GOM/GBK lobster stock, the disparities in the current measures also create challenges for stock assessment, law enforcement, and commerce. Increasing consistency among the measures for the LCMA's within the stock could have benefits in each of these areas, which are described in the following sections.

2.7.1 Stock Boundaries

A complicating factor in the management of lobster is that the boundaries of the LCMA's do not align with the biological boundaries of the stocks (GOM/GBK vs. SNE). This is particularly problematic in LCMA 3 which spans both GOM/GBK and SNE. The intricacy of the stock boundaries is further complicated by the fact that many vessels fishing out of Rhode Island and Massachusetts, which are harvesting lobsters on Georges Bank, must travel through the SNE stock area to reach their port of landing. In addition, these vessels may be permitted to fish in multiple management areas, including areas that span both lobster stocks.

To date, there have been no permit requirements to delineate within which stock a harvester in LCMA 3 is eligible to fish. In addition, management actions responding to the decline in the SNE stock have been applied throughout LCMA 3. Given the Board initiated this addendum with the goal of increasing resiliency in the GOM/GBK stock, new management measures must either apply to all LCMA 3 fishermen regardless of location and stock fished (with implications on the SNE fishery) or be stock specific.

2.7.2 Interstate Shipment of Lobsters

Increasing consistency in regulations may address concerns regarding the sale and shipment of lobsters across state lines. With decreased landings in SNE and expanding markets for the GOM/GBK stock, there has been increased demand for the shipment of lobsters across state lines. This movement of lobster can be complicated by the fact that the gauge sizes differ across LCMA's, and many states implement the minimum and maximum gauge sizes as possession limits rather than landing limits per state regulation or law. This means the gauge sizes apply to

anyone in the lobster supply chain, not just harvesters. While these strict regulations improve the enforcement of gauge sizes, it can complicate interstate shipment of lobsters, particularly given the minimum size in LCMA 1 is smaller than the other management areas. As a result, some dealers must sort lobster by size in order to ship product across state lines.

Moving toward more consistent minimum sizes within the inshore LCMAs would help alleviate this issue by easing the ability of states to participate in the GOM/GBK lobster supply chain. This would not only reduce the burden on dealers that sort product by size but also enhance the enforcement of gauge sizes in the fishery.

2.7.3 Improve Enforcement

Another potential advantage of more consistent management measures is the ability to improve enforcement throughout the stock. Currently, disparate management measures hinder the ability for law enforcement to enforce various regulations in the lobster fishery. For example, vessels landing in Massachusetts harvest lobsters from four LCMAs, each of which has a different set of minimum gauge sizes (ranging from 3 ¼" to 3 17/32") and maximum gauge sizes (ranging from 5" to no maximum gauge size). As a result, at dealers only the most liberal measure can be implemented as a strict possession limit. The Law Enforcement Committee has continually recommended the use of standardized management measures in the lobster fishery, as inconsistent regulations mean that the least restrictive regulations becomes the only enforceable standard once product leaves the dock. In addition, regulatory inconsistencies decrease the likelihood of successful prosecution of violators.

3.0 Proposed Management Options

The following management options consider modifications to the management program with the goal of increasing protection of the GOM/GBK spawning stock. The final management program selected will apply to LCMAs 1, 3, and OCC.

- Issue 1 addresses the standardization of a subset of management measures within LCMAs and across the GOM/GBK stock.
- Issue 2 considers applying either a trigger mechanism or a predetermined schedule for implementing biological management measures that are expected to provide increased protection to the spawning stock biomass and increase the resiliency of the stock.

3.1 Issue 1: Measures to be standardized upon final approval of Addendum XXVII

This issue considers options to modify some management measures immediately upon final approval of the Addendum to achieve more consistency in measures within and across LCMAs. One option proposes to modify some of the OCC measures to address differing regulations for state and federal permit holders. Specifically, for state-permitted fisherman in state waters there is no maximum gauge size and the V-notch definition is 1/4" without setal hairs. For federal permit holders, the maximum gauge size is 6 3/4" and the V-notch definition is 1/8" with or without setal hairs. The disparity between regulations for different harvesters within the same area creates challenges for enforcement, and potentially weakens the conservation benefit of the stricter definition.

Options are also proposed to standardize V-notch regulations across the LCMAs within the GOM/GBK stock, as well as regulations related to the issuance of tags for trap tag losses. Uniformity in these measures would benefit enforcement and apply a consistent conservation strategy across the stock unit.

Option A: Status Quo

This option would maintain the current management measures for each LCMA at final approval of the addendum.

Option B: Standardized measures to be implemented upon final approval of addendum

The Board may select more than one of the below options. The states would be required to implement the selected management measures for the fishing year specified by the Board at final approval of the addendum.

- **Sub-option B1:** Upon final approval of the addendum, implement standardized measures within an LCMA to the most conservative measure where there are inconsistencies between state and federal regulations within GOM/GBK stock LCMAs. This would result in the maximum gauge being standardized to 6-3/4" for state and federal permit holders, and the V-notch possession definition being standardized to 1/8" with or without setal hairs in Outer Cape Cod (OCC). This means harvest is prohibited for a female lobster with a V-shaped notch greater than 1/8".
- **Sub-option B2:** Upon final approval of the addendum, implement a standard V-notch requirement across all LCMAs in the GOM/GBK stock. This would result in mandatory V-notching for all eggerters in LCMA 1, 3, and OCC.
- **Sub-option B3:** Upon final approval of the addendum, implement a standard V-notch possession definition of 1/8" with or without setal hairs for LCMA 1, 3, and OCC. Any jurisdiction could implement more conservative regulations.
- **Sub-option B4:** Upon final approval of the addendum, standardize regulations across LCMAs 1, 3, and OCC to limit the issuance of trap tags to equal the harvester trap tag allocation. This would mean no surplus trap tags would be automatically issued until trap losses occur and are documented.

3.2 Issue 2: Implementing management measures to increase protection of SSB

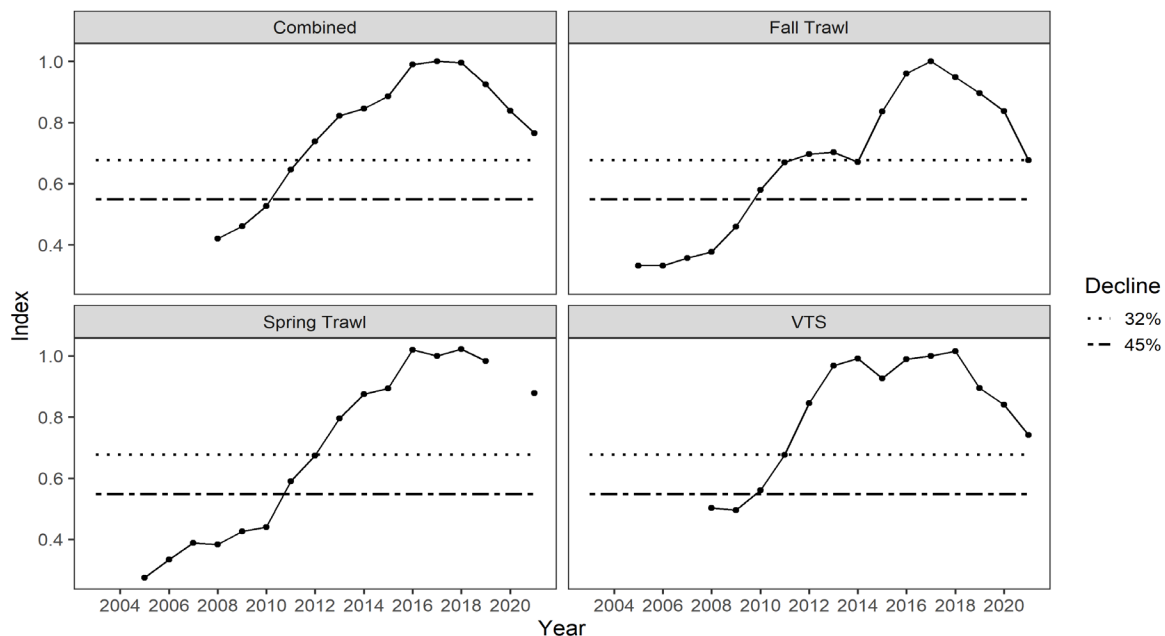
The primary objective of this action is to increase the protection of SSB in the GOM/GBK stock. The proposed options consider changes to the minimum and maximum gauge sizes along with corresponding vent sizes for the LCMAs within the stock. The proposed measures are expected to 1) increase SSB, and 2) result in the minimum gauge size increasing to meet or exceed the size at 50% maturity (L50) for each LCMA (LCMA 1: eastern GOM L50 = 88 mm, western GOM L50 = 83 mm, LCMA 3: Georges Bank L50 = 91 mm). Appendix B includes a full technical report of analysis performed to project the impacts of various gauge size combinations on total weight of lobsters landed, number of lobsters landed, SSB and exploitation.

This issue proposes two approaches for implementing management changes to increase protection of SSB. One approach, which is applied in Options B through D, is to establish a trigger mechanism whereby pre-determined management changes would be triggered upon reaching a defined trigger level based on observed changes in recruit (71-80 mm carapace length) abundance indices. The proposed mechanism includes establishing a management trigger based on recruit conditions observed in three surveys that were used to inform the assessment model estimates of reference abundance and stock status for the GOM/GBK stock. These recruit indices include: 1) combined ME/NH and MA spring trawl survey index, 2) combined ME/NH and MA fall trawl survey index, and 3) model-based VTS index.

The management trigger is defined by a certain level of decline in the indices from an established reference period. The reference value for each index is calculated as the average of the index values from 2016-2018. The percent declines in the indices are expected to approximate comparable declines in overall abundance of the stock, and relate to the abundance reference points established by the Board. The analyses conducted to develop the trigger mechanism and evaluate its performance in appropriately triggering management are described in detail in Appendix C. Figure 4 (top left panel) shows the calculated trigger index compared to the two proposed trigger levels in this document.

A second approach, which is applied in Option E, is to establish a pre-determined schedule for future changes to the management measures. This approach is more proactive in nature and addresses the issue of growth overfishing by increasing the minimum legal size while the stock conditions are favorable.

Figure 4. Scaled survey-specific indices and combined trigger index compared to proposed trigger levels. Top-left: combined trigger index that would be used to trigger changes in management measures. Top-right: moving three-year average of fall trawl survey indices. Bottom-left: moving three year average of spring trawl survey indices. Bottom-right: moving three year average of VTS indices.



Option A: Status Quo

Under this option there would be no additional changes to the management measures for the LCMA's within the GOM/GBK stock beyond the option(s) selected under Issue 1.

Option B: Gauge and vent size changes triggered by 32% decline in trigger index

This option would establish a trigger based on observed changes in indices of recruit abundance compared to the reference level of the trigger index. The trigger point would be a change in the recruit abundance indices greater than or equal to a 32% decline from the reference abundance level (equal to the average of the index values from 2016-2018). This trigger level approximates a decline in reference abundance to the level where the stock abundance regime shifted from moderate to high abundance (Figure 3). Upon this trigger level being reached, the minimum gauge size for LCMA 1 would increase by from the current size (3 1/4") to 3 3/8" for the following fishing year. The vent size in LCMA 1 would be adjusted corresponding with the minimum gauge size change.

Additionally, the maximum gauge size in LCMA 3 and OCC would decrease to 6" for the following fishing year. The proposed gauge and vent size changes are expected to maintain similar retention rates of legal lobsters and protection of sub-legal sizes as the current gauge and vent sizes. The vent size is consistent with the current vent size used in SNE for the same minimum gauge size of 3 3/8". The table below lists the management measures that would be automatically implemented when the trigger point is reached, with changes from the current measures in bold.

Option B	LCMA 1	LCMA 3	OCC
Management Triggered by 32% decline	Minimum gauge: 3 3/8" (86 mm) Maximum gauge: status quo Vent size: 2 x 5 3/4" rectangular; 2 5/8" circular	Minimum gauge: status quo Maximum gauge: 6" Vent size: status quo	Minimum gauge: status quo Maximum gauge: 6" Vent size: status quo

The proposed increase to the minimum gauge size in LCMA 1 is expected to increase the proportion of the population protected from being harvested by the fishery before being able to reproduce. The proposed decreases to the maximum gauge sizes in LCMA 3 and OCC are expected to enhance resiliency by placing forever protections on a small proportion of the population, including larger lobsters of both sexes.

Option C: Gauge and vent size changes triggered by 45% decline in trigger index

This option is identical to Option B above, with the exception of the trigger level that would result in changes to the management measures. Under this option, the trigger point would be a change in the recruit abundance indices greater than or equal to a 45% decline from the reference abundance level (equal to the average of the index values from 2016-2018). This trigger level approximates a decline in stock abundance to the 75th percentile of lobster abundance during the moderate abundance regime from the stock assessment (Figure 3). The

measures that would be implemented when the trigger level is reached are shown in the table below.

Option C	LCMA 1	LCMA 3	OCC
Management Triggered by 45% decline	Minimum gauge: 3 3/8" (86 mm) Maximum gauge: status quo Vent size: 2 x 5 3/4" rectangular; 2 5/8" circular	Minimum gauge: status quo Maximum gauge: 6" Vent size: status quo	Minimum gauge: status quo Maximum gauge: 6" Vent size: status quo

Option D: Gradual change in gauge sizes triggered by 32% decline in trigger index

This option considers establishing a trigger level which, upon being reached, would initiate a series of gradual changes in gauge sizes for the LCMAs in the GOM/GBK stock. The minimum gauge size would change in increments of 1/16", and the maximum gauge size would change in increments of 1/4". The first change would be triggered by a change in the recruit abundance indices greater than or equal to a 32% decline from the reference abundance level (equal to the average of the index values from 2016-2018). Following this initial change, incremental changes to the gauge sizes would occur every other year. The gauge size changes that would be implemented at each step and the final gauge sizes that would be reached for each area are shown in the table below. The vent size in LCMA 1 would be adjusted when the final gauge size is implemented in order to maintain protect sub-legal sizes. The final vent size is also consistent with the current vent size used in SNE for the same minimum gauge size of 3 3/8".

Option D	LCMA 1	LCMA 3	OCC
Current Measures	Minimum gauge: 3 1/4" Maximum gauge: 5" Vent size: status quo	Minimum gauge: 3 17/32" Maximum gauge: 6 3/4" Vent size: status quo	Minimum gauge: 3 3/8" Maximum gauge: 6 3/4" Vent size: status quo
Trigger 1 (32% decline)	Minimum gauge: 3 5/16" (84 mm) Maximum gauge: status quo Vent size: status quo	Minimum gauge: status quo Maximum gauge: 6 1/2" Vent size: status quo	Minimum gauge: status quo Maximum gauge: 6 1/2" Vent size: status quo
Intermediate gauge sizes	Minimum gauge: 3 3/8" (86 mm) Maximum gauge: status quo Vent size: 2 x 5 3/4" rectangular; 2 5/8" circular	Minimum gauge: status quo Maximum gauge: 6 1/4" Vent size: status quo	Minimum gauge: status quo Maximum gauge: 6 1/4" Vent size: status quo
Final gauge and vent sizes	Minimum gauge: 3 3/8" Maximum gauge: status quo Vent size: status quo	Minimum gauge: status quo Maximum gauge: 6" Vent size: status quo	Minimum gauge: status quo Maximum gauge: 6" Vent size: status quo

Option E: Scheduled changes to minimum gauge size in LCMA 1

This option considers establishing a predetermined schedule for implementing gradual changes to the minimum gauge and vent size in LCMA 1 to increase the SSB (see table below for the proposed changes). The first step increases the minimum gauge size in LCMA 1 by $\frac{1}{16}$ " to $3\frac{5}{16}$ " for the 2025 fishing year. In the final year of adjustments, the minimum gauge size in LCMA 1 would be increased to $3\frac{3}{8}$ " for the 2027 fishing year. The vent size in LCMA 1 would also be adjusted once, at the same time the final gauge size is implemented. The final gauge and vent size changes are expected to maintain similar retention rates of legal lobsters and protection of sub-legal sizes as the current gauge and vent sizes.

Option E	LCMA 1	LCMA 3	OCC
2025 fishing year measures	Min: $3\frac{5}{16}$" (84 mm) Max: status quo Vent size: status quo	Min: status quo Max: status quo	Min: status quo Max: status quo
2027 fishing year measures	Min: $3\frac{3}{8}$ (86 mm) Max: status quo Vent size: $2 \times 5\frac{3}{4}$" rectangular; $2\frac{5}{8}$" circular	Min: status quo Max: status quo	Min: status quo Max: status quo

3.3 Implementation of Management Measures in LCMA 3

Although only a portion of LCMA 3 pertains to the GOM/GBK stock (see Section 2.8 Stock Boundaries for additional information), the measures selected by the Board pertaining to LCMA 3 would apply to all LCMA 3 permit holders, including those that fish in the SNE stock.

Applying the selected measures to only the GOM/GBK portion of LCMA 3 would create a significant administrative burden, as well as additional potential for confusion and noncompliance among LCMA 3 permit holders. To date there have been no permit requirements that delineate in which stock area an LCMA 3 fisherman is eligible to fish. Given the objective of this addendum is specific to protecting the GOM/GBK spawning stock, new management measures must either apply to all LCMA 3 harvesters regardless of location and stock fished (and therefore also impact the SNE fishery) or new measures would have to be stock (and geographic area) specific in order to only affect the GOM/GBK fishery. For example, an LCMA 3 harvester seeking to continue fishing in GOM/GBK would either have to declare and be permitted to fish within the GOM/GBK stock area to be held accountable, or opt to not participate in the GOM/GBK fishery to avoid the more restrictive measures.

Applying the measures across the entire management area is consistent with previous changes to the management measures in LCMA 3. When several addenda implemented reductions in fishing capacity and the Area 3 conservation tax (Addendum XIX) to address the declining condition of the SNE stock, the measures were also applied to the GOM/GBK portion of LCMA 3, which was not overfished nor experiencing overfishing. Though the impacts of the proposed measures on the SNE stock and fishery have not been analyzed, it is likely that the proposed changes would have only trivial negative impacts to catch and positive impacts to SSB considering the current depleted status of the stock.

4.0 Compliance

If the existing FMP is revised by approval of this draft addendum, the American Lobster Management Board will designate dates by which states will be required to implement the provisions included in the addendum. A final implementation schedule will be identified based on the management tools chosen.

5.0 Recommendations for Actions in Federal Waters

The management of American lobster in the EEZ is the responsibility of the Secretary of Commerce through the National Marine Fisheries Service. The Atlantic States Marine Fisheries Commission recommends that the federal government promulgate all necessary regulations in Section 3.0 to implement complementary measures to those approved in this addendum.

6.0 References

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7.0 Tables

Table 1. Existing LCMA specific management measures.

Mgmt. Measure	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	OCC
Min Gauge Size	3 1/4"	3 3/8"	3 17/32 "	3 3/8"	3 3/8"	3 3/8"	3 3/8"
Vent Rect.	1 15/16 x 5 3/4"	2 x 5 3/4"	2 1/16 x 5 3/4"	2 x 5 3/4"	2 x 5 3/4"	2 x 5 3/4"	2 x 5 3/4"
Vent Cir.	2 7/16"	2 5/8"	2 11/16"	2 5/8"	2 5/8"	2 5/8"	2 5/8"
V-notch requirement	Mandatory for all eggers	Mandatory for all legal size eggers	Mandatory for all eggers above 42°30'	Mandatory for all eggers in federal waters. No V-notching in state waters.	Mandatory for all eggers	None	None
V-notch Definition ¹ (possession)	Zero Tolerance	1/8" with or w/out setal hairs ¹	1/8" with or w/out setal hairs ¹	1/8" with or w/out setal hairs ¹	1/8" with or w/out setal hairs ¹	1/8" with or w/out setal hairs ¹	State Permitted fisherman in state waters 1/4" without setal hairs Federal Permit holders 1/8" with or w/out setal hairs ¹
Max. Gauge (male & female)	5"	5 1/4"	6 3/4"	5 1/4"	5 1/4"	5 1/4"	State Waters none Federal Waters 6 3/4"
Season Closure				April 30-May 31 ²	February 1-March 31 ³	Sept 8-Nov 28	February 1-April 30

Table 2. GOM/GBK model-free indicators for the 2020 Stock Assessment. The left table shows the GOM spawning stock abundance, the right table shows GBK spawning stock abundance.

SPAWNING STOCK ABUNDANCE						
Mean weight (g) per tow of mature females						
Survey	NESFC		ME/NH		MA 514	
	fall	spring	fall	spring	fall	spring
1981	175.32	400.28			502.65	430.53
1982	39.45	113.58			626.48	151.21
1983	206.03	234.21			844.76	67.08
1984	234.64	443.81			593.77	126.47
1985	499.62	2771.23			919.56	93.81
1986	267.97	502.99			231.88	112.97
1987	85.35	497.40			194.34	148.62
1988	186.56	244.92			200.58	88.14
1989	325.69	247.15			293.61	230.26
1990	216.65	516.20			1048.72	241.94
1991	247.11	430.56			335.80	165.54
1992	193.95	453.31			512.83	212.89
1993	284.34	484.30			120.59	229.72
1994	430.32	720.67			783.17	285.01
1995	464.96	390.15			520.26	171.71
1996	734.25	872.53			569.39	156.53
1997	568.34	1083.76			235.18	114.78
1998	381.81	1182.44			282.79	170.21
1999	1444.07	807.41			365.53	282.12
2000	585.66	1281.05	4430.55		533.40	236.55
2001	511.25	1498.42	2446.85	690.89	165.74	235.85
2002	1789.42	2022.04	4638.64	1436.34	324.34	175.73
2003	985.93	2343.63	3949.63	1226.05	129.67	72.99
2004	685.89	2773.35	3610.67	907.07	120.27	259.35
2005	465.35	1670.29	4805.25	1990.08	248.23	489.12
2006	681.87	1810.96	3698.94	1327.93	240.27	410.97
2007	445.78	1536.47	3163.24	1437.85	176.95	139.94
2008	805.10	1894.91	4080.36	1107.00	559.70	300.35
2009	1787.92	1864.92	6906.45	1747.30	630.52	219.83
2010	2850.60	2476.79	5793.51	1886.61	1424.75	211.52
2011	2317.94	2089.39	6169.40	2013.80	1268.44	267.51
2012	3215.29	3516.38	4174.85	2287.55	889.87	124.81
2013	3299.56	2499.71	5363.14	2007.92	1135.54	300.86
2014	4979.28	3083.09	5891.58	3010.73	768.88	382.81
2015	3553.44	3665.39	8488.62	2233.05	1947.04	418.46
2016	3692.26	5142.42	7691.01	2613.49	3712.66	1119.26
2017	3274.69	6566.80	4629.68	2530.74	2309.44	564.30
2018	2093.20	3555.09	5242.34	2005.07	2782.55	550.68
2014-2018 mean	3518.57	4402.56	6388.65	2478.62	2304.11	607.10

25th median	272.06	487.57	4015.00	1355.03	242.26	149.27
75th	539.79	1389.74	4638.64	1938.34	526.83	224.78
75th	1789.05	2443.50	5842.54	2178.24	878.60	296.52

SPAWNING STOCK ABUNDANCE		
Mean weight (g) per tow of mature females		
Survey	NESFC	
	fall	spring
1981	707.14	69.71
1982	670.07	123.96
1983	643.84	152.05
1984	397.33	45.17
1985	504.87	39.00
1986	491.96	307.05
1987	537.31	113.27
1988	695.27	307.49
1989	933.18	161.43
1990	761.64	103.62
1991	848.03	164.32
1992	817.25	213.11
1993	626.81	126.03
1994	774.61	41.77
1995	939.85	71.74
1996	1051.09	482.61
1997	754.00	62.46
1998	993.56	64.67
1999	1363.68	395.66
2000	945.69	132.57
2001	1756.38	313.41
2002	2183.80	341.90
2003	1030.19	842.92
2004	1557.16	298.95
2005	1404.20	491.00
2006	2123.43	465.72
2007	1859.53	728.26
2008	3074.33	1827.61
2009	3703.99	1336.34
2010	2120.51	1126.52
2011	4681.76	1113.11
2012	2696.38	1510.08
2013	2530.26	1369.39
2014	3012.69	1833.98
2015	3743.71	1509.13
2016	3020.98	2138.96
2017	6627.18	3749.60
2018	9630.86	725.09
2014-2018 mean	5207.09	1991.35

25th median	755.91	124.47
75th	1040.64	310.45
75th	2443.64	1045.56

Appendix A. 2022 Annual Data Update of American Lobster GOM/GBK Stock Indicators

Background

An annual Data Update process between American lobster stock assessments was recommended during the 2020 stock assessment to more closely monitor changes in stock abundance. The objective of this process is to present information—including any potentially concerning trends—that could support additional research or consideration of changes to management. Data sets updated during this process are generally those that indicate exploitable lobster stock abundance conditions expected in subsequent years and include:

- YOY settlement indicators
- Trawl survey indicators, including recruit abundance (71-80 mm carapace length lobsters) and survey encounter rate
- Ventless trap survey sex-specific abundance indices (53 mm+ carapace length lobsters)

This is the second Data Update and provides an update of last year’s review with the addition of 2021 data. Indicator status (negative, neutral, or positive – see table below) was determined relative to the percentiles of the stock assessment time series (i.e., data set start year through 2018).

Indicator	< 25 th percentile	Between 25 th and 75 th percentile	> 75 th percentile
YOY settlement (larval or YOY)	Negative	Neutral	Positive
Trawl survey recruit abundance	Negative	Neutral	Positive
Trawl survey encounter rate	Negative	Neutral	Positive
Ventless trap survey abundance	Negative	Neutral	Positive

The five-year means provided during the stock assessment (2014-2018) for terminal indicator status determinations were also updated with new years of data. This treatment of data is consistent with stock indicators provided during stock assessments (see Section 5 in the stock assessment report for more detail). As noted in last year’s Data Update memo, ventless trap survey abundance indices were added to indicators used in the stock assessment for this Data Update process. Note that updated five-year means (2017-2021) for several trawl survey-based indicators remain impacted by covid-19 data collection disruptions. A change that impacted this year’s update is a reduction in the spatial coverage of Massachusetts’ Southern New England (statistical area 538) ventless trap survey due to reduced participation. This change necessitates dropping out data collected during earlier years from areas no longer sampled to calculate an index from a consistent survey footprint, resulting in changes to the indices from what was reviewed last year. Note that the updated index increased slightly in scale (the reduced footprint excludes most of the interior of Buzzards Bay), but the pattern over time is generally consistent with the previous index. Below are the results of the data updates by sub-stock.

Results

Gulf of Maine (GOM)

Overall, Gulf of Maine indicators show declines from time series highs observed during the stock assessment.

- YOY conditions showed improvements since the stock assessment, but were still not positive (Table 1 and Figure 1).
 - Updated five-year means were all neutral, indicating improvement since the stock assessment when two of the five-year means were negative (both southwest areas).

- 2021 values moved from neutral to negative conditions in all three northeast areas, reversing some improvements seen in previous years. The two most southwest areas remained in neutral conditions observed in 2020.
- Trawl survey recruit abundance indicators generally remained positive, but showed some sign of decline since the stock assessment (Table 2 and Figure 2).
 - One of the updated five-year means changed from positive to neutral. The others remained positive.
 - 2021 values for three of four inshore indicators were neutral and the only available 2020 value was also neutral, the first observed neutral values since 2014 or 2015 for these indicators.
 - Five of six indicators were not available for 2020 due to covid-19 sampling restrictions.
- Trawl survey encounter rates show deteriorating conditions inshore since the stock assessment (Table 3 and Figure 3).
 - All four updated five-year means for inshore indicators were neutral, whereas only one was neutral during the stock assessment. Updated five-year means for the two offshore indicators remain positive.
 - Five of six indicators were not available for 2020 due to covid-19 sampling restrictions.
- Ventless trap survey indices show abundance declining since the stock assessment (Table 4 and Figure 4).
 - Seven of eight updated five-year means were neutral and one was negative, compared to four positive means and no negative means during the stock assessment.
 - Two additional values in 2021 moved into negative conditions.
 - 2021 values for both sexes in statistical area 514 were among the lowest values observed during the time series.

Georges Bank (GBK)

Overall, Georges Bank indicators show conditions similar to during the stock assessment. Note that there are no YOY or VTS indicators for this sub-stock area.

- Trawl survey recruit abundance indicators showed conditions similar to during the stock assessment (Table 5 and Figure 5).
 - Updated means for both indicators were neutral. This is unchanged from the stock assessment.
 - 2021 values were both positive and relatively high compared to other recent years.
 - No indicators were available for 2020 due to covid-19 sampling restrictions.
 - These indicators tend to be noisier than some of the other abundance indicators, with high interannual variability and lack of discernible trends.
- Trawl survey encounter rates showed declines in the fall since the stock assessment (Table 6 and Figure 6).
 - The updated mean for the fall indicator changed from positive to neutral, while the updated mean for the spring indicator remained positive.
 - No indicators were available for 2020 due to covid-19 sampling restrictions.

Southern New England (SNE)

Overall, Southern New England indicators show continued unfavorable conditions with some further signs of decline since the stock assessment.

- YOY conditions were negative across the stock with some decline since the stock assessment (Table 7 and Figure 7).

- Updated five-year means were all negative, whereas one of three was neutral during the stock assessment.
 - Only one non-negative annual indicator has been observed since the stock assessment.
 - No YOY have been caught during the MA survey for the last seven years.
- Trawl survey recruit abundance indicators generally showed conditions similar to during the stock assessment with some slight decline offshore (Table 8 and Figure 8).
 - The updated five-year mean for the spring indicator offshore changed from neutral to negative. Other updated means were unchanged, with five inshore indicators remaining negative and the other two indicators (one inshore and one offshore) remaining neutral.
 - Six of eight indicators were not available for 2020 due to covid-19 sampling restrictions.
- Trawl survey encounter rates showed deteriorating conditions since the stock assessment (Table 9 and Figure 9).
 - Updated five-year means for all eight indicators were negative, with two changing from neutral to negative since the stock assessment.
 - 2021 values for all indicators were negative, the first year these uniform conditions have occurred during the time series.
 - Six of eight indicators were not available for 2020 due to covid-19 sampling restrictions.
- Ventless trap survey indices showed conditions similar to conditions during the stock assessment (Table 10 and Figure 10).
 - Updated five-year means were all neutral, unchanged from the stock assessment.
 - All annual values since the stock assessment have been negative in statistical area 539, but higher values observed in 2018 have kept the five-year means neutral.
 - The female index calculated with reduced survey area in statistical area 538 was similar to the index from the historical survey area reviewed last year. The 2018 and 2019 values for the male index changed from neutral for the historical survey area to negative for the reduced survey area.
 - It is important to note that the ventless trap survey has only taken place during depleted stock conditions coinciding with an adverse environmental regime, so interannual variability can be misleading without the context of a longer time series encompassing varying stock conditions.

Tables and Figures

Table 1. GOM abundance indicators: YOY indices.

YOUNG-OF-YEAR INDICES					
Survey	ME				MA
	511	512	513 East	513 West	514
1981					
1982					
1983					
1984					
1985					
1986					
1987					
1988					
1989			1.64		
1990			0.77		
1991			1.54		
1992			1.30		
1993			0.45		
1994			1.61		
1995		0.02	0.66		0.91
1996		0.05	0.47		
1997		0.05	0.46		0.10
1998		0.00	0.14		0.03
1999		0.04	0.65		0.43
2000	0.00	0.10	0.13	0.17	0.07
2001	0.24	0.43	2.08	1.17	0.39
2002	0.13	0.29	1.38	0.85	1.00
2003	0.22	0.27	1.75	1.22	0.75
2004	0.18	0.36	1.75	0.67	1.02
2005	1.42	1.25	2.40	1.12	1.06
2006	0.49	1.06	1.57	1.08	0.45
2007	0.59	1.11	2.23	1.30	1.27
2008	0.32	0.59	1.27	1.10	0.33
2009	0.66	0.33	1.51	0.48	0.17
2010	0.16	0.64	1.25	0.63	0.44
2011	0.41	0.98	2.33	0.90	0.58
2012	0.44	0.62	1.27	0.30	0.08
2013	0.10	0.20	0.48	0.12	0.00
2014	0.16	0.47	1.04	0.42	0.11
2015	0.15	0.22	0.42	0.03	0.00
2016	0.13	0.21	0.42	0.14	0.08
2017	0.21	0.36	0.65	0.23	0.08
2018	0.27	0.34	0.62	0.22	0.03
2014-2018 mean	0.18	0.32	0.63	0.21	0.06
2019	0.43	0.64	0.94	0.45	0.06
2020	0.29	0.51	1.06	0.33	0.19
2021	0.06	0.12	0.38	0.28	0.28
2017-2021 mean	0.25	0.39	0.73	0.30	0.13
25th median	0.15	0.18	0.51	0.23	0.08
75th	0.22	0.34	1.26	0.63	0.33
	0.42	0.60	1.60	1.09	0.67

Figure 1. GOM abundance indicators: YOY indices.

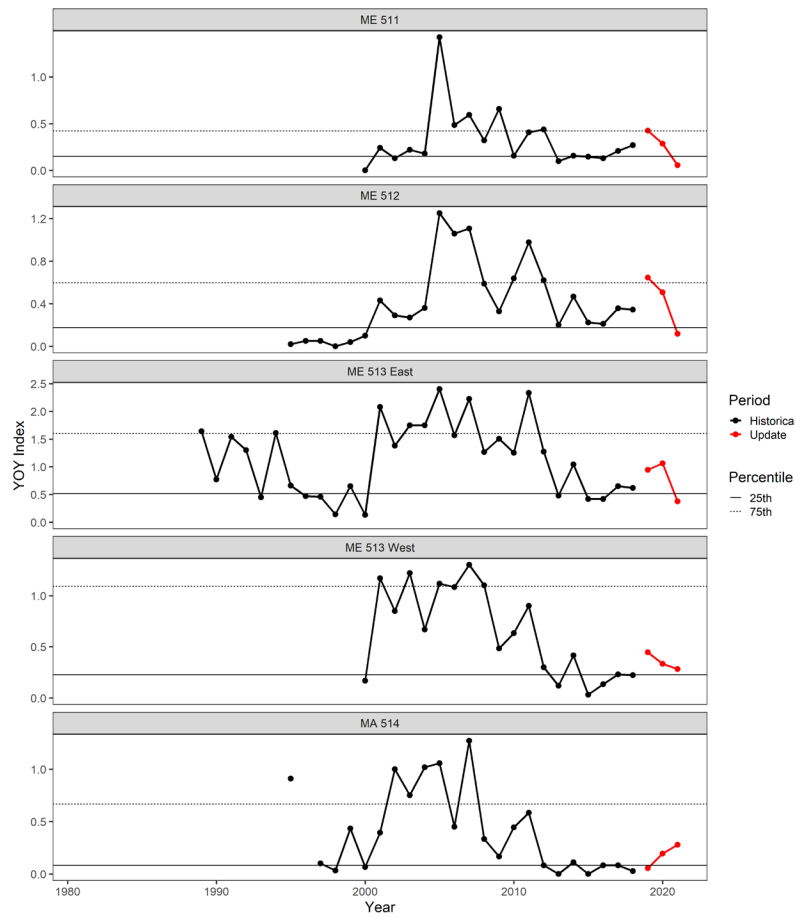


Table 2. GOM abundance indicators: trawl survey recruit abundance.

RECRUIT ABUNDANCE (SURVEY)						
Abundance of lobsters 71 - 80 mm CL (sexes combined)						
<i>Survey</i>	<i>NEFSC</i>		<i>ME/NH</i>		<i>MA 514</i>	
	<i>Spring</i>	<i>Fall</i>	<i>Spring</i>	<i>Fall</i>	<i>Spring</i>	<i>Fall</i>
1981	0.13	0.06			6.38	4.84
1982	0.29	0.42			2.74	3.85
1983	0.28	0.90			1.76	9.76
1984	0.20	0.31			2.15	6.13
1985	0.14	1.41			4.48	9.60
1986	0.27	1.29			3.01	3.80
1987	0.67	0.57			2.47	1.16
1988	0.67	1.21			2.52	4.12
1989	0.00	1.61			4.48	7.51
1990	0.27	1.76			6.11	15.36
1991	0.55	1.41			2.73	7.55
1992	0.50	1.37			4.31	8.95
1993	0.25	0.86			5.12	3.19
1994	0.15	2.75			7.59	13.77
1995	1.45	1.44			4.54	12.12
1996	0.76	4.59			3.09	12.10
1997	2.02	2.12			4.59	6.46
1998	1.59	2.16			4.50	7.47
1999	1.51	3.01			4.29	8.73
2000	4.64	3.01		24.09	4.24	8.87
2001	1.05	1.51	9.28	17.81	4.32	1.58
2002	1.08	1.91	22.00	22.41	3.43	5.00
2003	1.41	0.36	10.65	18.32	1.96	0.66
2004	0.84	2.26	7.55	12.29	2.46	1.30
2005	0.34	0.87	18.51	25.90	4.35	2.11
2006	2.17	1.27	18.07	18.30	6.09	5.30
2007	1.62	0.64	15.91	16.82	0.77	1.61
2008	0.99	2.41	17.88	31.61	2.54	6.12
2009	4.88	4.90	24.72	32.67	3.19	8.88
2010	2.98	4.53	17.66	37.35	2.22	9.39
2011	10.27	11.83	39.25	46.09	5.24	15.04
2012	11.25	6.74	36.55	37.12	3.03	11.30
2013	10.93	18.12	34.50	37.86	4.83	12.20
2014	11.66	21.54	65.07	41.95	3.35	7.06
2015	14.44	17.89	38.51	67.99	7.05	17.91
2016	13.25	22.54	50.83	60.07	13.61	17.44
2017	15.74	15.87	48.42	48.13	7.85	13.58
2018	14.15	15.87	42.77	55.84	5.25	25.69
2014-2018 mean	13.84	19.46	49.12	54.80	7.42	16.34
2019	16.69	7.62	46.37	50.85	10.69	14.59
2020	10.04	8.04	32.86	34.65	6.39	10.16
2021	10.04	8.04	32.86	29.64	6.39	10.16
2017-2021 mean	14.15	10.51	42.61	43.82	7.55	16.01
25th median	0.30	1.21	17.72	20.37	2.73	4.30
75th	1.07	1.76	23.36	32.67	4.30	7.53
75th	4.23	4.53	39.07	44.02	5.05	11.90

Figure 2. GOM abundance indicators: trawl survey recruit abundance.

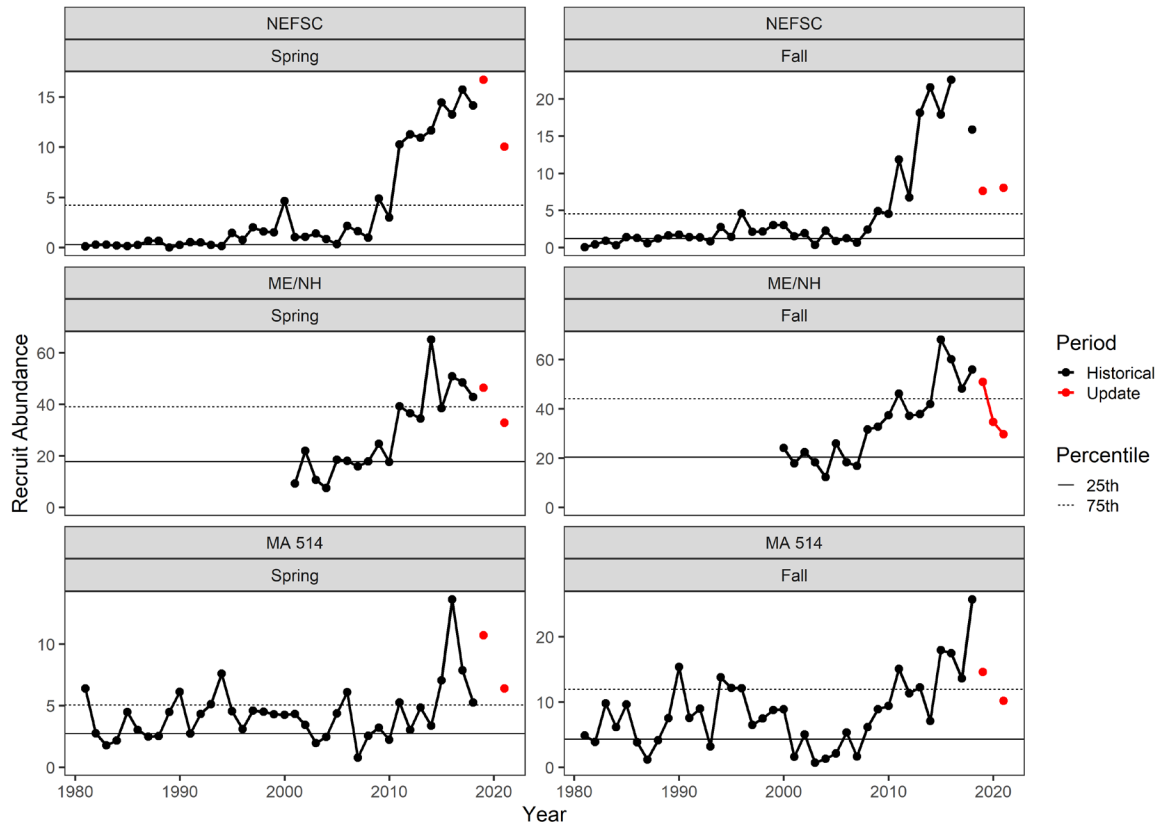


Table 3. GOM abundance indicators: trawl survey encounter rate.

SURVEY LOBSTER ENCOUNTER RATE						
Proportion of postive tows						
Survey	NEFSC		ME/NH		MA 514	
	Spring	Fall	Spring	Fall	Spring	Fall
1981	0.44	0.25			0.86	0.72
1982	0.34	0.18			0.50	0.70
1983	0.26	0.33			0.76	0.76
1984	0.28	0.36			0.76	0.76
1985	0.38	0.49			0.71	0.67
1986	0.33	0.47			0.68	0.83
1987	0.43	0.24			0.85	0.54
1988	0.31	0.30			0.76	0.58
1989	0.19	0.35			0.78	0.95
1990	0.41	0.32			0.86	0.95
1991	0.42	0.32			0.87	0.94
1992	0.40	0.24			0.93	0.77
1993	0.41	0.39			0.97	0.82
1994	0.45	0.40			1.00	0.93
1995	0.41	0.37			0.93	0.93
1996	0.54	0.54			0.91	0.95
1997	0.64	0.35			0.93	0.86
1998	0.52	0.40			0.76	0.69
1999	0.51	0.42			0.73	0.91
2000	0.63	0.42		0.94	0.93	0.98
2001	0.57	0.40	0.88	0.86	0.93	0.72
2002	0.75	0.53	0.94	0.95	0.91	0.73
2003	0.69	0.44	0.92	0.85	0.82	0.55
2004	0.87	0.31	0.89	0.86	0.84	0.56
2005	0.77	0.36	0.95	0.91	0.95	0.67
2006	0.72	0.60	0.93	0.93	0.91	0.88
2007	0.72	0.43	0.97	0.85	0.51	0.54
2008	0.84	0.49	0.92	0.86	0.83	0.75
2009	0.82	0.63	0.98	0.92	0.89	0.87
2010	0.85	0.75	0.98	0.96	0.87	0.98
2011	0.83	0.74	0.99	0.96	0.89	0.85
2012	0.86	0.78	0.98	0.98	0.91	0.95
2013	0.87	0.73	1.00	0.93	0.96	0.95
2014	0.90	0.71	1.00	0.99	0.79	0.96
2015	0.93	0.69	1.00	0.96	0.98	0.95
2016	0.94	0.75	1.00	0.96	0.96	0.97
2017	0.86	0.71	0.99	0.94	0.84	0.98
2018	0.86	0.71	0.98	0.96	0.84	0.90
2014-2018 mean	0.90	0.72	0.99	0.96	0.88	0.95
2019	0.83	0.71	0.99	0.95	0.85	0.92
2020	0.90	0.75	1.00	0.96	0.86	0.90
2021	0.90	0.75	1.00	0.91	0.86	0.90
2017-2021 mean	0.86	0.72	0.99	0.94	0.85	0.93
25th median	0.41	0.35	0.93	0.89	0.78	0.72
75th	0.60	0.42	0.98	0.94	0.87	0.86
75th	0.84	0.60	0.99	0.96	0.93	0.95

Figure 3. GOM abundance indicators: trawl survey encounter rate.

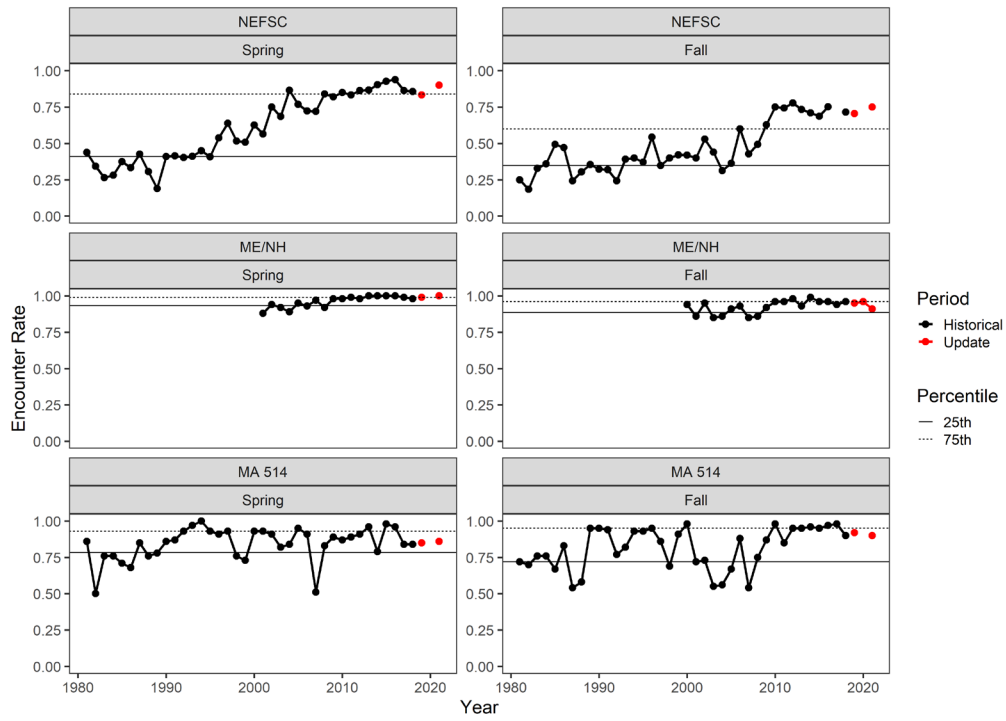


Table 4. GOM abundance indicators: ventless trap survey abundance.

VENTLESS TRAP ABUNDANCE								
Abundance of lobsters ≥ 53 mm CL								
Survey	511		512		513		514	
	Female	Male	Female	Male	Female	Male	Female	Male
1981								
1982								
1983								
1984								
1985								
1986								
1987								
1988								
1989								
1990								
1991								
1992								
1993								
1994								
1995								
1996								
1997								
1998								
1999								
2000								
2001								
2002								
2003								
2004								
2005								
2006	7.65	5.34	6.87	5.38	5.73	4.37	3.10	3.40
2007	5.06	3.91	3.95	3.83	5.82	4.35	1.85	1.84
2008	4.94	3.87	5.78	4.95	5.78	4.97	2.77	2.51
2009	3.60	2.65	6.31	5.35	6.89	5.53	2.72	2.66
2010	5.66	3.90	6.95	5.69	6.61	5.27	2.49	2.22
2011	8.70	6.52	11.10	8.48	7.32	5.60	3.47	2.60
2012	10.95	7.64	12.06	9.47	11.40	7.72	5.21	4.52
2013	11.14	7.95	11.87	8.64	9.36	6.49		
2014	10.38	6.63	11.92	8.04	7.74	4.96	3.15	2.35
2015	8.47	4.63	10.39	7.70	8.54	5.48	4.01	3.16
2016	14.59	9.15	14.34	10.75	10.78	7.56	4.79	3.56
2017	11.69	7.07	11.61	8.52	8.46	5.56	3.38	2.45
2018	15.10	9.43	11.26	8.23	9.57	6.37	3.47	2.43
2014-2018 mean	12.05	7.38	11.90	8.65	9.02	5.99	3.76	2.79
2019	12.93	8.27	8.22	5.94	8.68	5.25	2.85	1.93
2020	7.66	5.47	7.91	5.96	9.29	6.61	2.50	1.69
2021	7.34	5.44	5.94	5.23	8.24	5.93	1.77	1.37
2017-2021 mean	10.94	7.14	8.99	6.78	8.85	5.94	2.80	1.97
25th median	5.66	3.91	6.87	5.38	6.61	4.97	2.76	2.41
75th	8.70	6.52	11.10	8.04	7.74	5.53	3.27	2.56
75th	11.14	7.64	11.87	8.52	9.36	6.37	3.61	3.22

Figure 4. GOM abundance indicators: ventless trap survey abundance.

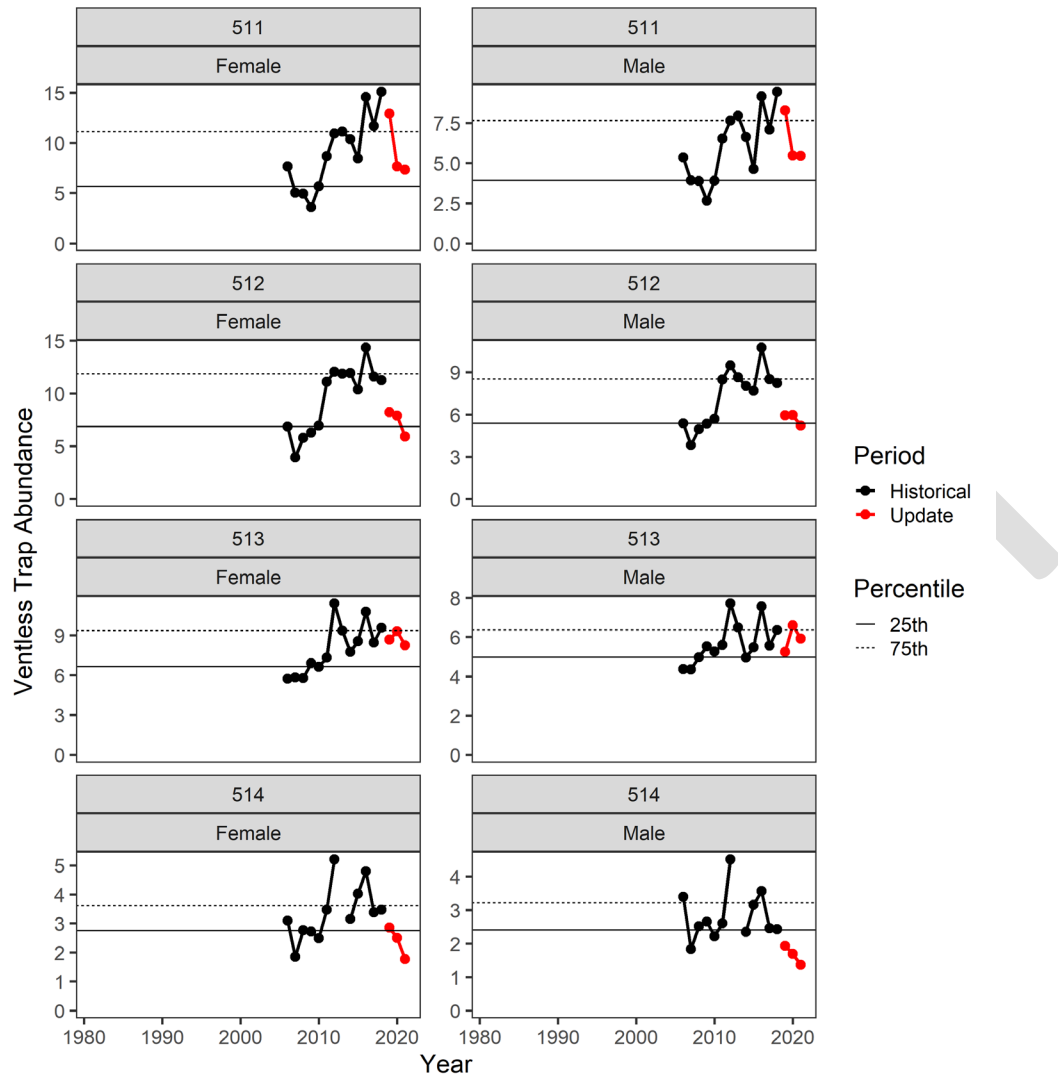
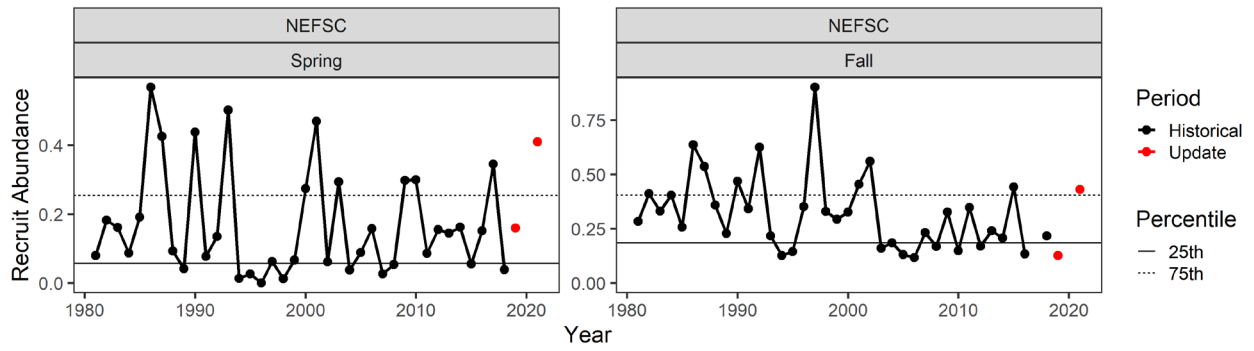


Table 5. GBK abundance indicators: trawl survey recruit abundance.

RECRUIT ABUNDANCE (SURVEY)		
Abundance of lobsters 71 - 80 mm CL (sexes combined)		
<i>Survey</i>	<i>NEFSC</i>	
	<i>Spring</i>	<i>Fall</i>
1981	0.08	0.28
1982	0.18	0.41
1983	0.16	0.33
1984	0.09	0.40
1985	0.19	0.26
1986	0.57	0.64
1987	0.43	0.54
1988	0.09	0.36
1989	0.04	0.23
1990	0.44	0.47
1991	0.08	0.34
1992	0.13	0.62
1993	0.50	0.22
1994	0.01	0.13
1995	0.03	0.14
1996	0.00	0.35
1997	0.06	0.90
1998	0.01	0.33
1999	0.07	0.29
2000	0.27	0.33
2001	0.47	0.45
2002	0.06	0.56
2003	0.29	0.16
2004	0.04	0.18
2005	0.09	0.13
2006	0.16	0.12
2007	0.03	0.23
2008	0.05	0.17
2009	0.30	0.33
2010	0.30	0.15
2011	0.09	0.35
2012	0.15	0.17
2013	0.14	0.24
2014	0.16	0.21
2015	0.06	0.44
2016	0.15	0.13
2017	0.35	
2018	0.04	0.22
2014-2018 mean	0.15	0.25
2019	0.16	0.13
2020		
2021	0.41	0.43
2017-2021 mean	0.24	0.26
25th median	0.06	0.18
75th	0.11	0.29
	0.25	0.40

Figure 5. GBK abundance indicators: trawl survey recruit abundance.

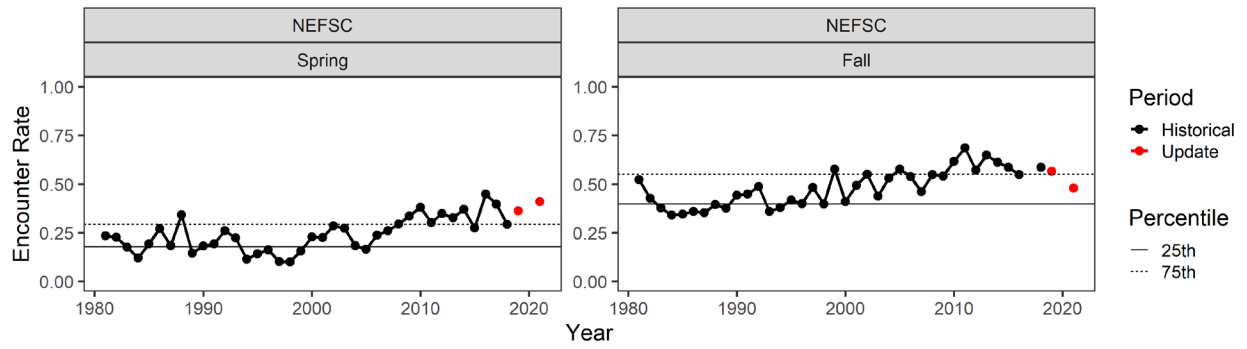


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Table 6. GBK abundance indicators: trawl survey encounter rate.

SURVEY LOBSTER ENCOUNTER RATE		
Proportion of positive tows		
<i>Survey</i>	<i>NEFSC</i>	
	<i>Spring</i>	<i>Fall</i>
1981	0.23	0.52
1982	0.23	0.43
1983	0.18	0.38
1984	0.12	0.34
1985	0.19	0.35
1986	0.27	0.36
1987	0.18	0.35
1988	0.34	0.40
1989	0.14	0.38
1990	0.18	0.44
1991	0.19	0.45
1992	0.26	0.49
1993	0.22	0.36
1994	0.11	0.38
1995	0.14	0.42
1996	0.16	0.40
1997	0.10	0.48
1998	0.10	0.40
1999	0.16	0.58
2000	0.23	0.41
2001	0.23	0.49
2002	0.29	0.55
2003	0.27	0.44
2004	0.18	0.53
2005	0.16	0.58
2006	0.24	0.54
2007	0.26	0.46
2008	0.29	0.55
2009	0.34	0.54
2010	0.38	0.62
2011	0.30	0.69
2012	0.35	0.57
2013	0.33	0.65
2014	0.37	0.61
2015	0.27	0.59
2016	0.45	0.55
2017	0.40	0.40
2018	0.29	0.59
2014-2018 mean	0.36	0.58
2019	0.36	0.57
2020	0.36	0.57
2021	0.41	0.48
2017-2021 mean	0.37	0.54
25th median	0.18	0.40
75th	0.23	0.48
	0.29	0.55

Figure 6. GBK abundance indicators: trawl survey encounter rate.



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Table 7. SNE abundance indicators: YOY indices.

YOUNG-OF-YEAR INDICES			
<i>Survey</i>	<i>MA</i>	<i>RI</i>	<i>CT / ELIS</i> <i>Larvae</i>
1981			
1982			
1983			
1984			0.43
1985			0.53
1986			0.90
1987			0.78
1988			0.74
1989			0.74
1990		1.18	0.81
1991		1.51	0.55
1992		0.63	1.44
1993		0.51	1.19
1994		1.27	0.98
1995	0.17	0.34	1.46
1996	0.00	0.15	0.31
1997	0.08	0.98	0.21
1998	0.28	0.57	0.55
1999	0.06	1.03	2.83
2000	0.33	0.33	0.78
2001	0.11	0.75	0.32
2002	0.11	0.25	0.64
2003	0.00	0.73	0.25
2004	0.06	0.42	0.45
2005	0.17	0.54	0.49
2006	0.22	0.44	0.71
2007	0.17	0.36	0.37
2008	0.00	0.14	0.37
2009	0.06	0.06	0.19
2010	0.00	0.11	0.35
2011	0.00	0.00	0.26
2012	0.00	0.09	0.12
2013	0.17	0.19	0.16
2014	0.11	0.22	0.06
2015	0.00	0.17	0.19
2016	0.00	0.06	0.45
2017	0.00	0.03	0.10
2018	0.00	0.03	0.17
2014-2018 mean	0.02	0.10	0.19
2019	0.00	0.03	0.21
2020	0.00	0.14	0.10
2021	0.00	0.08	0.19
2017-2021 mean	0.00	0.06	0.15
25th median	0.00	0.14	0.26
75th	0.06	0.34	0.45
	0.17	0.63	0.76

Figure 7. SNE abundance indicators: YOY indices.

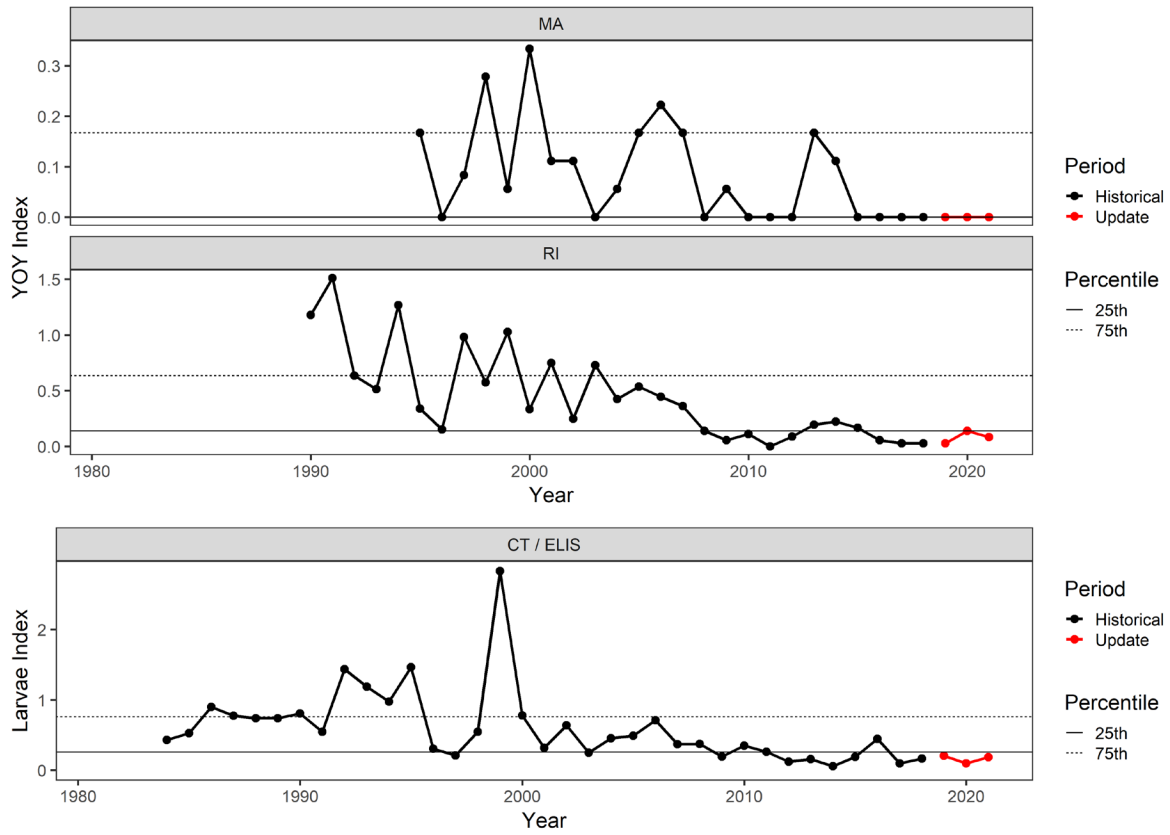


Table 8. SNE abundance indicators: trawl survey recruit abundance.

RECRUIT ABUNDANCE (SURVEY)								
Abundance of lobsters 71 - 80 mm CL (sexes combined)								
Survey	NEFSC		MA		RI		CT	
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
1981	0.10	0.89	0.65	0.07	0.89	1.31		
1982	0.74	0.74	0.10	0.04	0.26	0.64		
1983	0.45	0.62	0.09	0.04	0.94	0.43		
1984	0.10	0.81	0.42	0.01	1.03	1.35	10.09	6.80
1985	1.99	1.01	0.34	0.09	0.28	0.97	3.08	3.93
1986	0.18	0.59	0.17	0.20	0.91	1.28	2.77	5.76
1987	1.04	0.45	0.26	0.17	0.79	3.14	2.93	6.86
1988	0.55	0.60	0.24	0.16	0.47	4.05	1.85	4.88
1989	0.09	1.65	0.14	0.43	0.90	3.26	4.86	5.28
1990	0.71	0.83	2.29	0.31	2.17	2.69	6.89	7.74
1991	0.31	0.51	1.18	0.87	4.77	3.10	10.83	10.32
1992	0.19	0.94	0.10	0.57	0.62	1.97	10.31	10.65
1993	0.59	0.42	0.25	0.52	7.81	8.29	7.78	15.18
1994	0.15	0.38	0.95	0.42	1.00	3.88	5.07	11.51
1995	0.01	0.61	1.14	0.03	1.33	4.50	12.13	11.20
1996	0.40	2.39	0.40	0.32	1.60	6.55	11.37	11.08
1997	1.64	1.60	1.45	0.12	2.58	6.10	15.42	24.99
1998	0.78	1.06	1.09	0.11	1.63	3.24	24.06	12.72
1999	2.43	0.66	0.75	0.19	1.71	2.07	24.57	12.96
2000	0.67	1.27	0.56	0.13	1.54	1.83	13.37	8.27
2001	0.39	0.45	0.18	0.03	2.97	2.17	10.77	7.41
2002	1.63	0.39	0.34	0.00	2.68	0.73	8.07	2.75
2003	0.34	0.33	0.07	0.00	0.29	0.93	3.52	4.08
2004	0.27	0.28	0.05	0.00	1.86	1.48	2.38	3.37
2005	0.11	0.24	0.08	0.00	1.07	2.53	2.26	1.54
2006	0.19	0.32	0.08	0.03	3.63	2.24	2.02	1.38
2007	0.19	0.35	0.08	0.00	0.68	2.68	2.65	1.12
2008	0.21	0.29	0.16	0.01	0.64	2.95	2.20	1.27
2009	0.15	0.35	0.16	0.05	1.14	1.36	1.20	1.33
2010	0.21	0.73	0.06	0.18	0.44	1.21	1.26	
2011	0.10	0.64	0.18	0.00	0.42	1.02	0.43	0.18
2012	0.11	0.99	0.07	0.21	0.30	0.18	0.44	0.08
2013	0.23	0.44	0.11	0.04	0.16	0.02	0.23	0.06
2014		0.67	0.04	0.00	0.02	0.14	0.15	0.05
2015	0.03	0.28	0.07	0.30	0.05	0.37	0.15	0.06
2016	0.83	0.69	0.05	0.14	0.57	0.25	0.16	0.00
2017	0.10		0.13	0.16	0.14	0.41	0.03	0.00
2018	0.08	0.38	0.02	0.01	0.18	0.68	0.00	0.01
2014-2018 mean	0.26	0.51	0.06	0.12	0.19	0.37	0.10	0.03
2019	0.06	0.32	0.01	0.02	0.52	0.50	0.03	0.00
2020					0.23	0.32		
2021	0.01	0.59	0.01	0.00	0.27	0.07	0.03	0.00
2017-2021 mean	0.06	0.43	0.04	0.05	0.27	0.40	0.02	0.00
25th median	0.11	0.38	0.08	0.02	0.42	0.78	1.23	1.16
75th	0.23	0.61	0.17	0.10	0.91	1.65	2.93	4.48
	0.67	0.83	0.42	0.20	1.62	3.07	10.20	9.81

Figure 8. SNE abundance indicators: trawl survey recruit abundance.

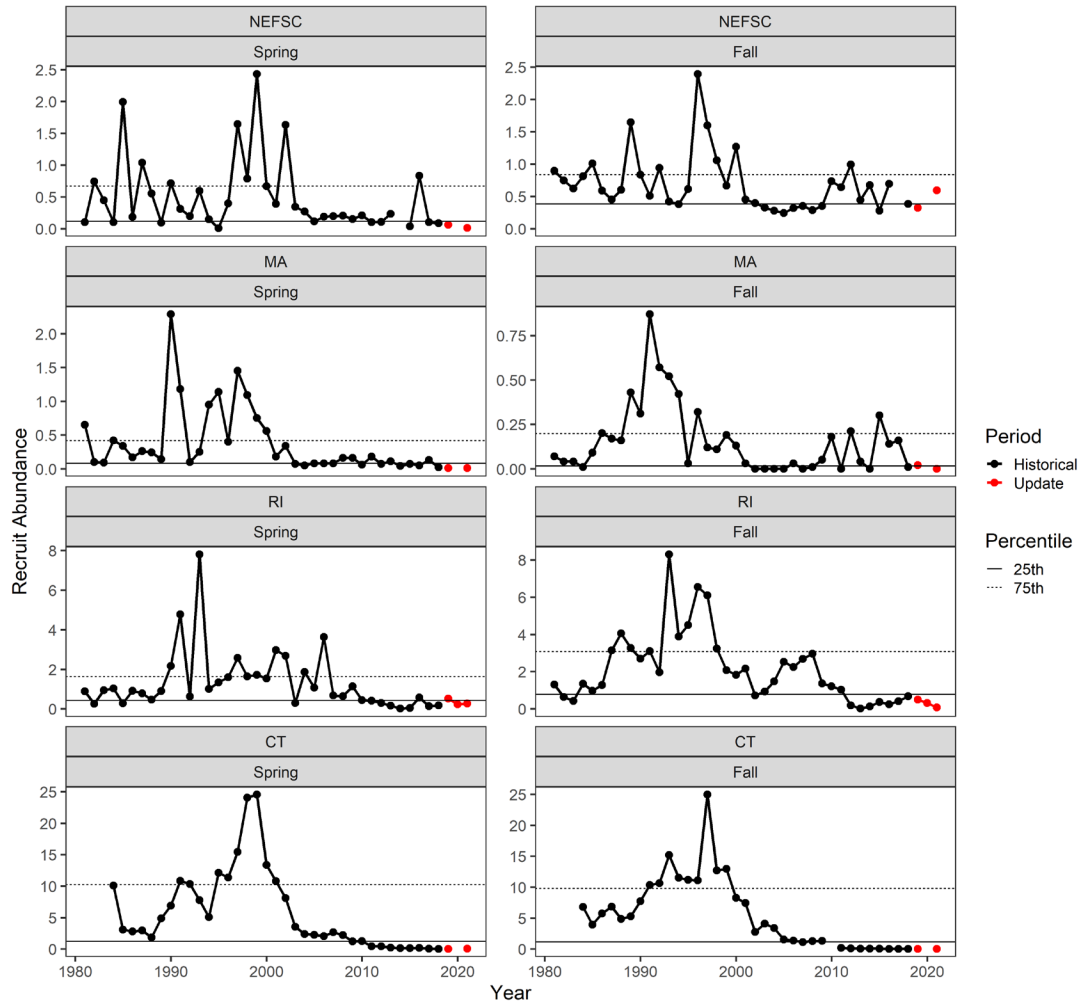


Table 9. SNE abundance indicators: trawl survey encounter rate.

SURVEY LOBSTER ENCOUNTER RATE								
Proportion of positive tows								
Survey	NEFSC		MA		RI		CT	
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
1981	0.18	0.47	0.38	0.15	0.49	0.41		
1982	0.26	0.35	0.28	0.21	0.30	0.43		
1983	0.14	0.26	0.21	0.16	0.46	0.37		
1984	0.08	0.32	0.40	0.18	0.59	0.44	0.63	0.76
1985	0.21	0.34	0.51	0.22	0.31	0.50	0.57	0.69
1986	0.17	0.25	0.39	0.38	0.64	0.46	0.67	0.61
1987	0.13	0.23	0.28	0.18	0.35	0.47	0.63	0.76
1988	0.09	0.28	0.39	0.21	0.49	0.55	0.65	0.66
1989	0.13	0.40	0.50	0.33	0.52	0.57	0.75	0.63
1990	0.14	0.44	0.66	0.44	0.64	0.53	0.73	0.76
1991	0.14	0.33	0.41	0.39	0.77	0.69	0.81	0.77
1992	0.22	0.34	0.51	0.23	0.40	0.57	0.77	0.68
1993	0.12	0.27	0.54	0.26	0.50	0.71	0.73	0.75
1994	0.09	0.25	0.51	0.20	0.58	0.57	0.73	0.74
1995	0.05	0.35	0.44	0.12	0.55	0.67	0.77	0.68
1996	0.10	0.39	0.30	0.16	0.79	0.76	0.66	0.78
1997	0.25	0.28	0.45	0.21	0.75	0.71	0.71	0.81
1998	0.12	0.34	0.54	0.13	0.59	0.55	0.83	0.71
1999	0.22	0.28	0.41	0.21	0.76	0.59	0.78	0.79
2000	0.13	0.31	0.45	0.15	0.68	0.63	0.81	0.73
2001	0.21	0.25	0.28	0.18	0.65	0.60	0.77	0.58
2002	0.19	0.24	0.28	0.03	0.61	0.45	0.73	0.59
2003	0.11	0.26	0.14	0.03	0.51	0.40	0.71	0.64
2004	0.10	0.19	0.28	0.03	0.54	0.50	0.61	0.66
2005	0.08	0.19	0.34	0.15	0.49	0.45	0.63	0.54
2006	0.14	0.23	0.42	0.03	0.79	0.62	0.61	0.51
2007	0.13	0.21	0.34	0.10	0.44	0.54	0.70	0.53
2008	0.10	0.22	0.32	0.10	0.55	0.52	0.63	0.65
2009	0.17	0.32	0.50	0.05	0.57	0.40	0.49	0.55
2010	0.12	0.33	0.22	0.24	0.47	0.45	0.54	
2011	0.13	0.35	0.17	0.05	0.30	0.23	0.46	0.28
2012	0.13	0.34	0.17	0.15	0.27	0.16	0.43	0.20
2013	0.10	0.28	0.18	0.08	0.20	0.09	0.28	0.15
2014		0.26	0.13	0.08	0.07	0.23	0.26	0.10
2015	0.06	0.27	0.10	0.05	0.12	0.16	0.27	0.10
2016	0.15	0.25	0.08	0.11	0.30	0.14	0.25	0.03
2017	0.08		0.07	0.16	0.16	0.23	0.08	0.03
2018	0.08	0.29	0.11	0.06	0.09	0.18	0.09	0.01
2014-2018 mean	0.09	0.27	0.10	0.09	0.15	0.19	0.19	0.05
2019	0.05	0.26	0.05	0.11	0.16	0.11	0.09	0.00
2020					0.16	0.16		
2021	0.04	0.18	0.07	0.00	0.20	0.12	0.06	0.03
2017-2021 mean	0.06	0.24	0.08	0.08	0.15	0.16	0.08	0.02
25th median	0.10	0.25	0.21	0.09	0.32	0.40	0.52	0.52
75th	0.13	0.28	0.34	0.16	0.51	0.49	0.65	0.64
	0.17	0.34	0.45	0.21	0.60	0.57	0.73	0.74

Figure 9. SNE abundance indicators: trawl survey encounter rate.

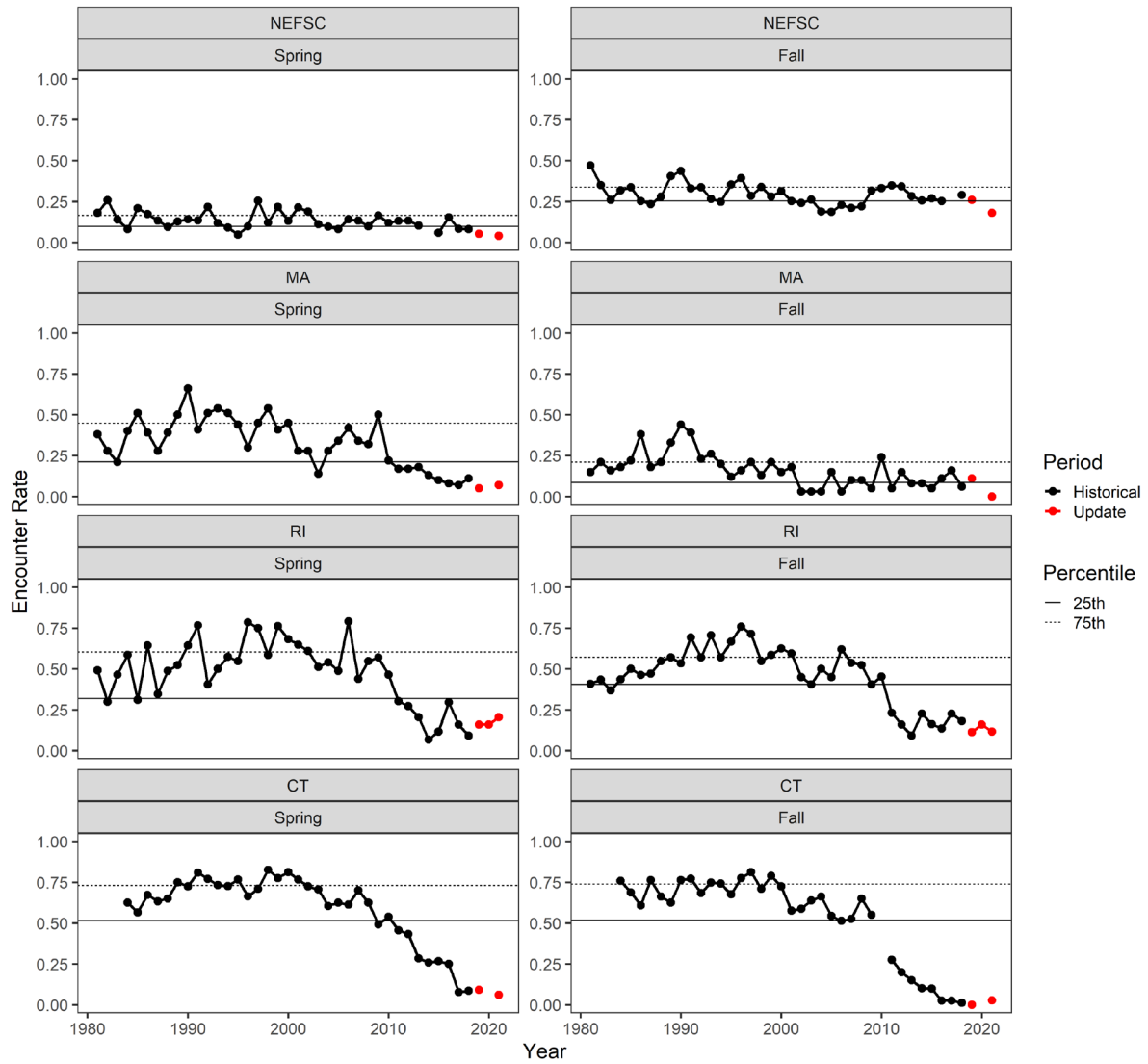
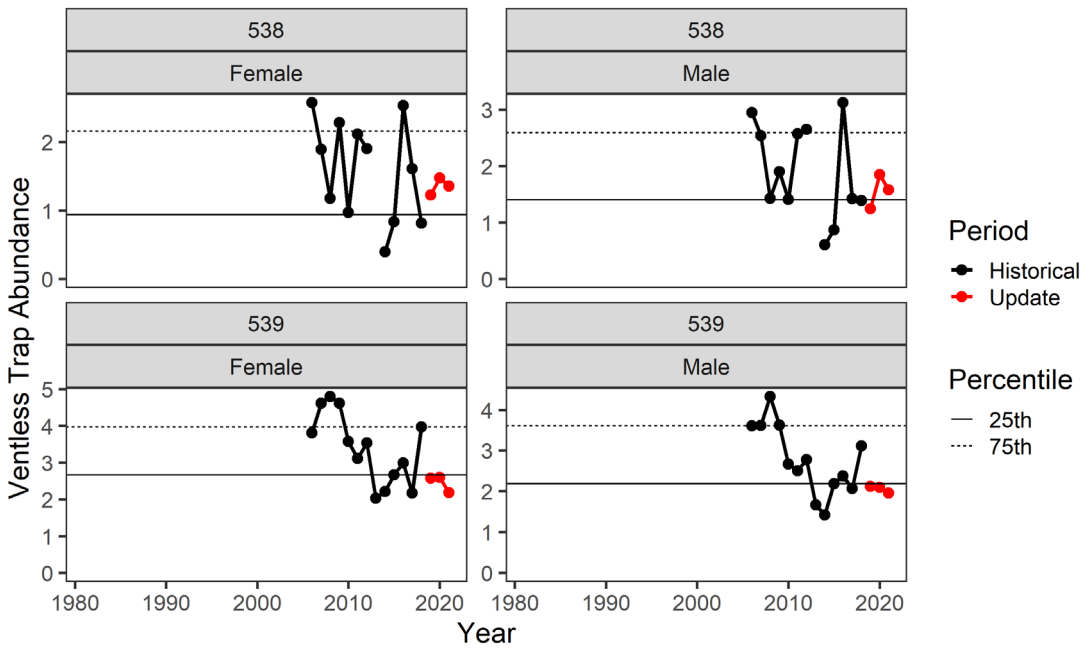


Table 10. SNE abundance indicators: ventless trap survey abundance.

VENTLESS TRAP ABUNDANCE				
Abundance of lobsters \geq 53 mm CL				
<i>Survey</i>	<i>538</i>		<i>539</i>	
	<i>Female</i>	<i>Male</i>	<i>Female</i>	<i>Male</i>
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005				
2006	2.58	2.95	3.81	3.60
2007	1.89	2.54	4.61	3.61
2008	1.18	1.43	4.80	4.32
2009	2.29	1.90	4.61	3.62
2010	0.97	1.41	3.57	2.67
2011	2.12	2.58	3.11	2.50
2012	1.90	2.65	3.53	2.77
2013			2.03	1.67
2014	0.40	0.61	2.22	1.42
2015	0.84	0.87	2.66	2.18
2016	2.53	3.13	2.99	2.38
2017	1.61	1.43	2.17	2.06
2018	0.82	1.39	3.97	3.12
2014-2018 mean	1.24	1.48	2.80	2.23
2019	1.23	1.25	2.57	2.12
2020	1.47	1.85	2.60	2.10
2021	1.36	1.58	2.19	1.95
2017-2021 mean	1.30	1.50	2.70	2.27
25th median	0.94	1.40	2.66	2.18
75th	1.75	1.67	3.53	2.67
75th	2.16	2.60	3.97	3.60

Figure 10. SNE abundance indicators: ventless trap survey abundance.



Appendix B. Analysis of alternate minimum and maximum sizes as management options for Lobster Management Areas in the Gulf of Maine. Report to the ASFMC Lobster TC and PDT.

Burton Shank and Jeff Kipp

Sept. 9, 2021

The Lobster TC provided analysis to the ASFMC Lobster Board ahead of the Spring 2021 meeting with estimated outcomes to the Gulf of Maine / Georges Bank lobster fishery given the implementation of alternative management measures (min and max gauge size), including changes to total weight of lobsters landed, number of lobsters landed, Spawning Stock Biomass (SSB) and Exploitation. The analysis included an attempt to examine how fisheries in different LCMAs would be affected though the population simulation model was not re-parameterized for each LCMA. In discussions, we concluded that the simulations for LCMA1 were probably reasonably accurate because:

1. Many of the inputs for the simulations are taken from the 2020 stock assessment. Because the vast majority of the landings come from LCMA1, the stock assessment parameters are essentially already tuned to the parameters of the LCMA1 fishery.
2. LCMA1 is primarily a recruitment-based fishery in inshore or nearshore habitats and, therefore, likely to be representative of the full stock model.

However, there was concern that the offshore fishery in Lobster Management Area 3 was considerably different from the full stock model and, thus, may have inaccurate outcomes due to a mis-parameterized simulation model. The parameters for the Outer Cape Cod fishery are probably somewhere between LCMA1 and LCMA3 as it consists of both a resident lobster population and a seasonally-migrating population, moving between inshore and offshore habitats.

To address these differences between the LCMAs in population simulations, we performed the following:

1. For the LCMA1 simulations, we used the stock assessment parameters as the inputs.
2. For LCMA3 simulations, we attempted to manually tune the population simulation model to match the catch characteristics of the LCMA3 fishery, under the assumption that a simulation model that could reproduce the catch characteristics of the fishery may more accurately project changes in the fishery given changing management measures.
3. For the OCC simulations, we ran two sets of simulations, using the input parameters for both LCMA1 and LCMA3 under the assumption that this bounds the dynamics we might see in OCC.

For all simulations, populations were initiated with zero abundance and run for 50 years with constant recruitment to allow population abundances and length comps to reach equilibrium.

The equilibrium populations were then compared across the various legal selectivity scenarios to determine the effect of these different management alternatives.

For a simple, model-free analysis of the fishery catch composition for LCMA1 and LCMA3, we calculated the cumulative proportion of catch by weight at length by converting catch-at-size to weight-at-size and weighting for unequal sex ratios and seasonality of landings.

LCMA1 Simulations

The input parameters for the LCMA1 simulations were primarily drawn from the 2020 stock assessment. This includes the recruitment seasonality, length composition and sex ratio, growth model, gear, legal and conservation selectivities and mean estimated fishing mortality from the terminal years.

LCMA1 Results

The cumulative catch weight-by-length curve indicates that the mean size of lobsters landed in the LCMA1 fishery is within the smallest legal size bin (83-91mm, Figure 1). Nearly 90% of the catch are below 100mm CL and only about 2% of the catch are over 120mm CL. This supports the perspective that LCMA1 landings involve a narrow range of small lobster sizes and is primarily a recruitment-dependent fishery.

Increasing the minimum legal size is projected to decrease the total number of lobsters landed but result in a net increase in yield-per-recruit (YPR) and total weight of catch (Table 1 and 2). However, the magnitude of these changes are small enough that they may not be detectable in the actual fishery given inter-annual variations in recruitment and catch. Changing the maximum legal size is projected to have very little effect on either catch number or weight.

Note that these are purely yield-per-recruit simulations so recruitment subsidies from increased SSB are not assumed in the calculations of catch weight or number so, thus, probably represent a conservative, lower bound. A less conservative upper bound would be the product of change in YPR and the change in SSB.

Increasing the minimum legal size is projected to result in large increases in SSB (Table 3). Minimum legal sizes that approach or exceed the size of maturity produce increasing returns on SSB as this allows a much larger portion of the population to reproduce at least once. Thus, increasing minimum legal size to 88mm is projected to result in a near doubling in SSB. Increasing maximum size can result in a large decrease SSB, particularly as the minimum legal size increases and more of the population survives to reach the current maximum legal size.

Increasing legal size would result in moderate to large decreases in exploitation as more of the stock becomes protected (Table 4) with exploitation decreasing by nearly 30% at a minimum legal size of 88mm. As with catch weight and number, changing maximum legal size has little effect on exploitation rates as these sizes represent a very small portion of the LCMA1 population.

LCMA3 Simulations

We first analyzed the port and sea sampling data provided for the 2020 benchmark assessment but constrained to LCMA3 to estimate fishery characteristics, including catch size composition, catch sex ratio, and conservation selectivity (discarding due to egg-bearing or V-notch status).

We then specified the conservation selectivity from the biosamples and current legal selectivity appropriate for LCMA3 in the population simulation model and iteratively tuned the following parameters:

1. Fully-selected fishing mortality, assumed constant across seasons
2. Recruitment sex ratio
3. Recruitment size composition for each sex.

For a given tuning run, the population simulation model was provided an updated set of input parameters and projected forward 25 year to reach equilibrium. The resulting catch composition from the model run was then compared to the average catch composition from the last five years of the biosamples to determine accuracy of the simulation models.

Comparisons were conducted both visually for obvious lack-of-fit and by correlating the simulated and observed catch compositions. Correlations were performed on both the catch proportions and logit-transformed catch proportions, the latter to place more emphasis on length compositions that occur in smaller proportions.

Once the model was tuned to perform as well as might be expected, given minor, seasonal lack-of-fit that could not be easily resolved, the simulation model was then run with the tuned parameters for all combinations of proposed minimum and maximum size limits. We then summarized the outputs from the different simulations as values relative to the current minimum and maximum size regulations in place for LCMA3.

Results

The cumulative catch weight-by-length curve indicates that 110 mm carapace length is the approximate mean size of lobsters landed in the LCMA3 fishery (Figure 1). However, the cumulative curve is nearly linear from 90mm through 130mm, indicating lobsters across this size range are about equally important to the landings of this fishery. Lobsters less than about 92mm constitute the lower 10% quantile of landings while lobsters greater than 136mm constitute the upper 10% quantile with lower and upper quartiles around 98mm and 123mm respectively. This suggests that LCMA3 landings include a broad range of lobster sizes, unlike typical inshore lobster fisheries that are primarily recruitment-driven.

The final tuned parameters included a quarterly fishing mortality of 0.1 (0.4 total annual mortality) and a 70:30 female to male recruitment sex ratio. The tuned recruit length

compositions are bi-modal for both sexes, indicating recruitment to the fishery comes both from growth of smaller individual within the LCMA and immigration from outside the LCMA (Figure 2). With these compositions, about 80% of male recruitment and 30% of female recruitment is attributed to growth with the remainder of new individuals coming from immigration from outside the LCMA.

Fitting the simulation length comps by manually tuning these parameters resulted in reasonably good fits to the observed length compositions (Figures 3, 4, and 5). Some lack-of-fit is still evident within seasons but this lack-of-fit is generally contrary to the lack-of-fit observed in other seasons, making it difficult to further improve the fit with just the parameters of interest. Correlations between observed and predicted compositions were 0.981 for simple proportions and 0.97 for logit-transformed proportions, suggesting both high and low proportion values for observed length comps are well matched by the simulation and we deemed this adequate to a basis to examine alternative management options.

Decreasing either the minimum or maximum legal size is projected to decrease total weight of catch (Table 5). However, contrary to the previous analysis for the full stock or inshore LCMA's, changes to the maximum size have much larger impacts on landings than changes to the minimum size, particularly once the maximum size drops to between 140 and 150mm. Decreasing the maximum size from 171mm to 127mm is projected to decrease landings by about 30% while decreasing the minimum size from 90mm to 83mm is only projected to decrease landings by a couple of percent.

Decreasing the minimum legal size is projected to marginally increase the number of lobsters being landed but decreasing the maximum size marginally to moderately decreases the number of lobsters landed, producing neutral effects for many of the management options explored here (Table 6).

Decreasing maximum legal size from current regulations is projected to increase SSB, possibly significantly, but decreasing minimum sizes would decrease SSB (Table 7). The greatest observed increase would be from holding the minimum size at current values but maximally decreasing maximum sizes, essentially narrowing the length range where lobsters are legal, which is estimated to result in a 64% increase in spawning stock. As above, changes to maximum size have bigger effects on SSB than changes to minimum sizes.

Decreasing maximum sizes would result in a decrease in exploitation but decreasing minimum sizes would increase exploitation (Table 8), countering each other and paralleling patterns observed for SSB. Because the calculation of exploitation is based on numbers of individuals rather than mass, decreasing minimum sizes have larger effects on exploitation than observed above for landings or SSB. Again, changes in exploitation increase rapidly with decreasing maximum sizes once the alternate maximum gauge size reaches a size that includes a significant portion of the catch for the LCMA.

OCC Simulations

Due to time and data constraints, we did not attempt to tune a simulation model for OCC. Rather, we assume that population dynamics and fishing mortality rates in OCC are bounded by the conditions observed in the LCMA1 and LCMA3 fisheries. Thus, we ran simulations for OCC using the OCC legal size range with both the LCMA1 and LCMA3 parameterizations and present both sets of results with the understanding that results for OCC should fall between these extremes.

In general, outputs (catch weight, number, SSB and exploitation) show different responses for the LCMA1 than the LCMA3 parameterizations. LCMA1 parameterizations tend to produce simulations that are very sensitive to changes in minimum legal size but not maximum legal size, while simulations with LCMA3 parameterization only slightly sensitive to changes in minimum legal size but moderately to highly sensitive to changes in maximum legal size.

Total weight of landings is projected to be sensitive to changing minimum legal size with the LCMA1 parameterization but be insensitive with the LCMA3 parameterization (Table 9 A & B). With the LCMA1 parameterization, decreasing minimum size is projected to decrease landings by ~5% while increasing legal size to 88mm would increase landings by 8%. Conversely, landings weight is insensitive to changes in maximum legal size for the LCMA1 parameterization but sensitive to changes for the LCMA3 parameterization.

Total catch number simulations shows trend similar to catch weight with the LCMA1 parameterization being sensitive to changes in minimum size and the LCMA3 parameterization sensitive to changes in maximum size (Figure 10 A & B). The pattern otherwise holds that larger minimum legal sizes result in lower catch numbers.

For SSB, the LCMA1 parameterization is responsive to both changes in minimum and maximum legal size while the LCMA3 parameterization is more sensitive to changes in maximum size (Figure 11 A & B). For example, decreasing minimum legal size to 127mm would increase SSB by between 24% and 65% for the LCMA1 and LCMA3 parameterizations, respectively. The ranges of minimum size tested in simulations produce changes in SSB in the range of -26% to +76% for the LCMA1 parameterization and -1% to +6.8% for the LCMA3 parameterization.

Decreasing minimum legal size produce increases moderate to small increases in exploitation (16% to 4% for LCMA1 and LCMA3 parameterizations, respectively, Figure 12 A & B). Either increasing minimum legal size or decreasing maximum legal size decrease serve to decrease exploitation with a maximum decrease of ~39% observed at the largest minimum and smallest maximum size and the LCMA3 parameterization.

Discussion

There is a stark difference in cumulative landings by size between LCMA1 and LCMA3. LCMA1 is clearly a recruitment-based fishery that would be highly sensitive to variations in recruitment.

The LCMA3 fishery, in contrast, is fishing a broad range of lobster sizes, and therefore ages, and is thus somewhat buffered from interannual variation in recruitment dynamics.

The LCMA1 fishery is highly sensitive to changes in minimum legal size because of high exploitation rates on newly-recruited lobsters. The range of minimum sizes tested in simulations encompasses size range that represents the majority of landings for the inshore / nearshore fishery. Thus, changes to minimum size would dramatically change the length composition of the catch. Increases in the minimum size will have temporarily but significantly depress landing in the years immediately after are implemented but the benefits to SSB would be similarly immediate. Increasing the minimum legal size can add to the resilience of the fishery by marginally increasing the spread of effort across multiple year classes and significantly increasing SSB and egg production which may buffer the effects in any future change in productivity.

Generally, decreasing maximum gauge sizes have larger effects for LCMA3 both relative to decreasing minimum sizes in LCMA3 or for changing maximum sizes for the other LCMA3s. This matches the conclusions based on the cumulative catch curve (Figure 1) that showed that the LCMA3 fishery lands a much broader size range of individuals than the inshore LCMA3s, with the upper portion of length compositions overlapping proposed alternative maximum sizes.

This analysis for LCMA3 matches previous analysis conducted for inshore LCMA3s, finding that larger minimum legal sizes had positive effects across population parameters including higher catch weights, increased SSB and decreased exploitation. However, decreasing maximum legal sizes has mixed effects, decreasing immediate landings but increasing SSB, potentially by a larger margin. Because recruitment subsidies from increasing SSB are not included in this simulation, the net effect of these two opposing changes are uncertain. While decreasing maximum legal sizes would decrease immediate landings and make a larger portion of the population inaccessible to the fishery permanently (i.e. excluded lobsters won't grow into a legal size in the future), this increase in SSB may eventually produce a recruitment subsidy that could offset this loss of catch. The net effect would depend on multiple factors including the connectivity of the added SSB to larval settlement habitat and the migration patterns of these large females into adjacent habitats including inshore Gulf of Maine and international waters.

Finally, it is important to note the importance of large female lobsters that dominate the landings for much of LCMA3. This both highlights the partial dependence of this fishery on immigration from adjacent habitats and adds uncertainty to this analysis. The growth and molt cycling of such large females is poorly understood and are not particularly well informed in the current growth model. Thus, the tuned parameters may be biased by mis-specification of the growth model and results in this analysis may be sensitive to the growth model used in some cases. Interpretation of tuned parameters and confidence in the precise results of this analysis should be taken with some caution. However, the general patterns of changing catch, SSB and

exploitation with changes in minimum and maximum legal sizes is consistent across this and previous analyses so may be treated with higher confidence.

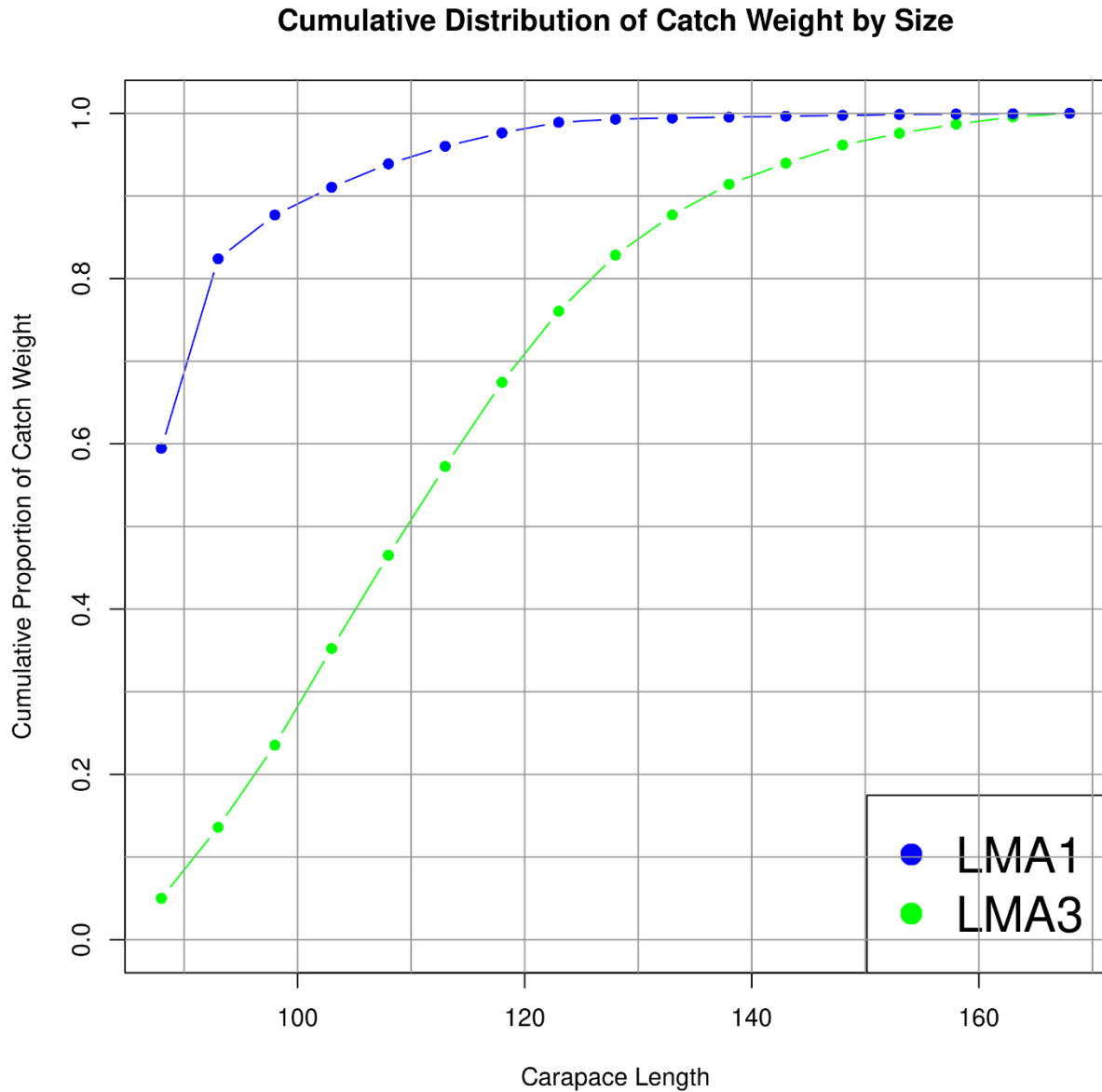


Figure 1. Cumulative proportion of catch weight by carapace length. To interpret, lobsters less than 90mm constitute approximately 8% of landings, while lobsters less than 130mm constitute approximately 85% of landings.

Recruit proportions for tuned population model

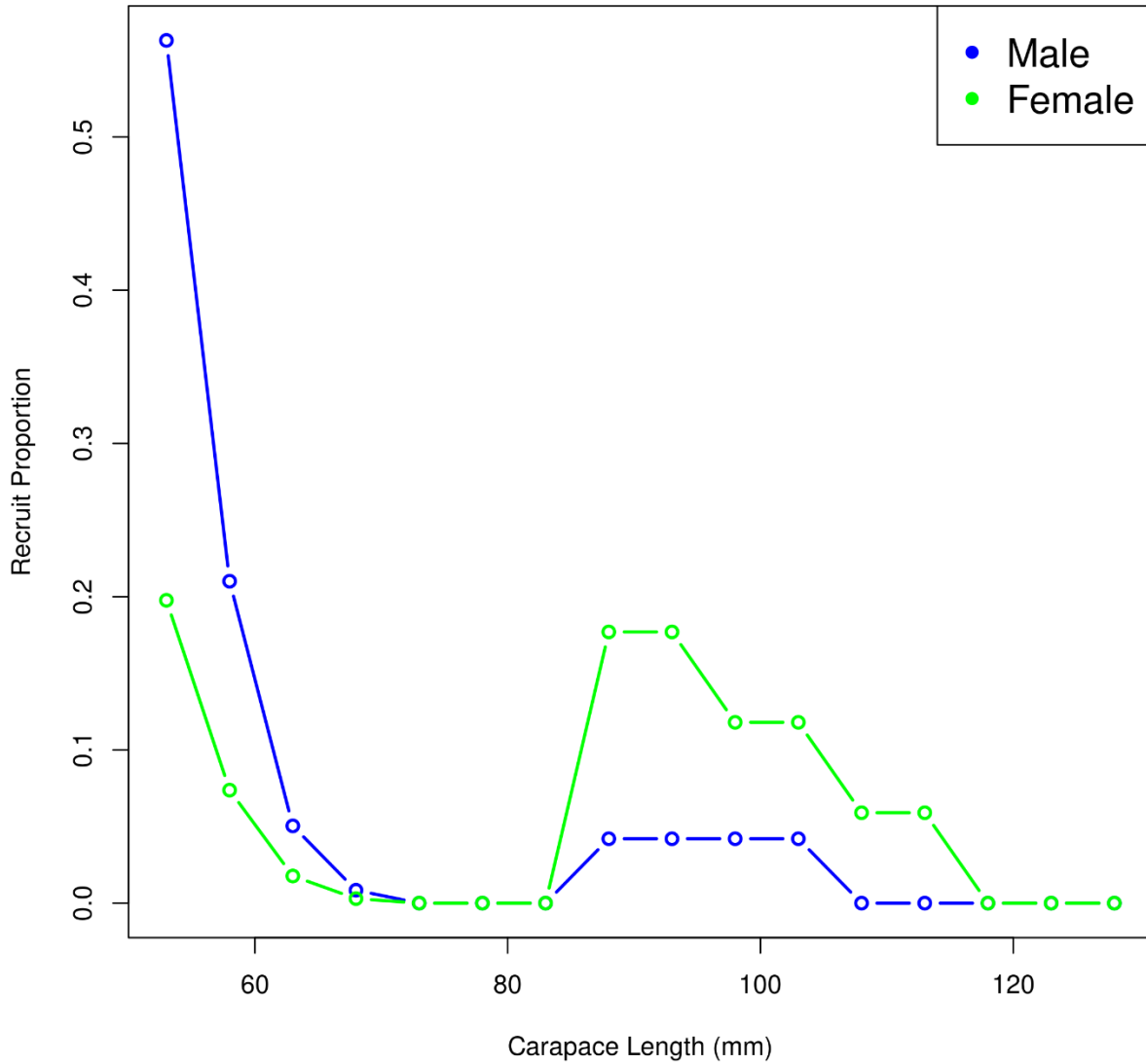


Figure 2. Tuned recruitment length compositions for the fitted model. The bi-modal length distribution suggests a combination of recruitment by growth (individuals <70mm) and migration (individuals >85 mm) with males primarily recruiting by growth and females primarily recruiting by migration as mature adults.

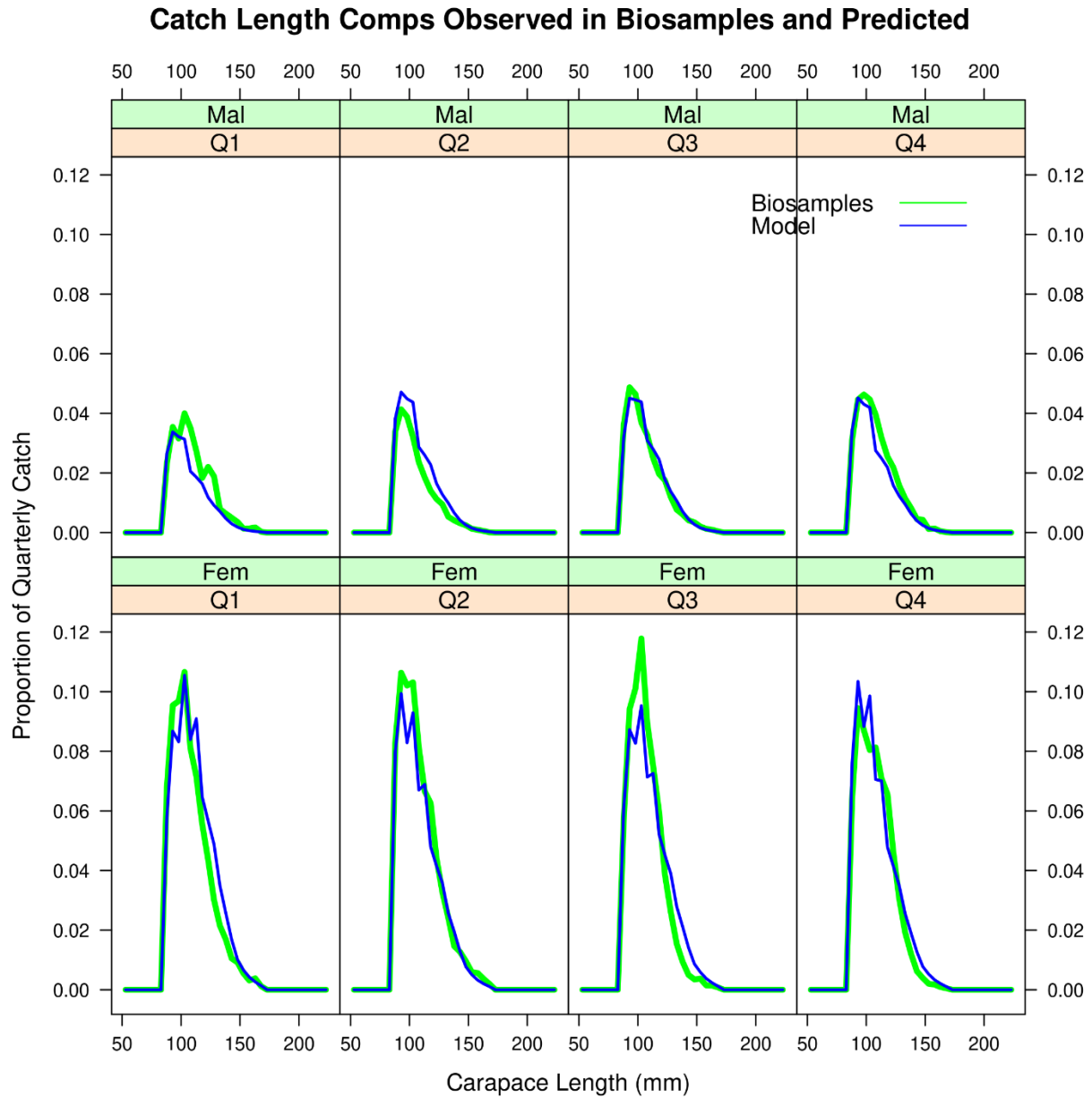


Figure 3. LCMA 3 catch length compositions by sex and quarter based on biosampling and from the tuned population model.

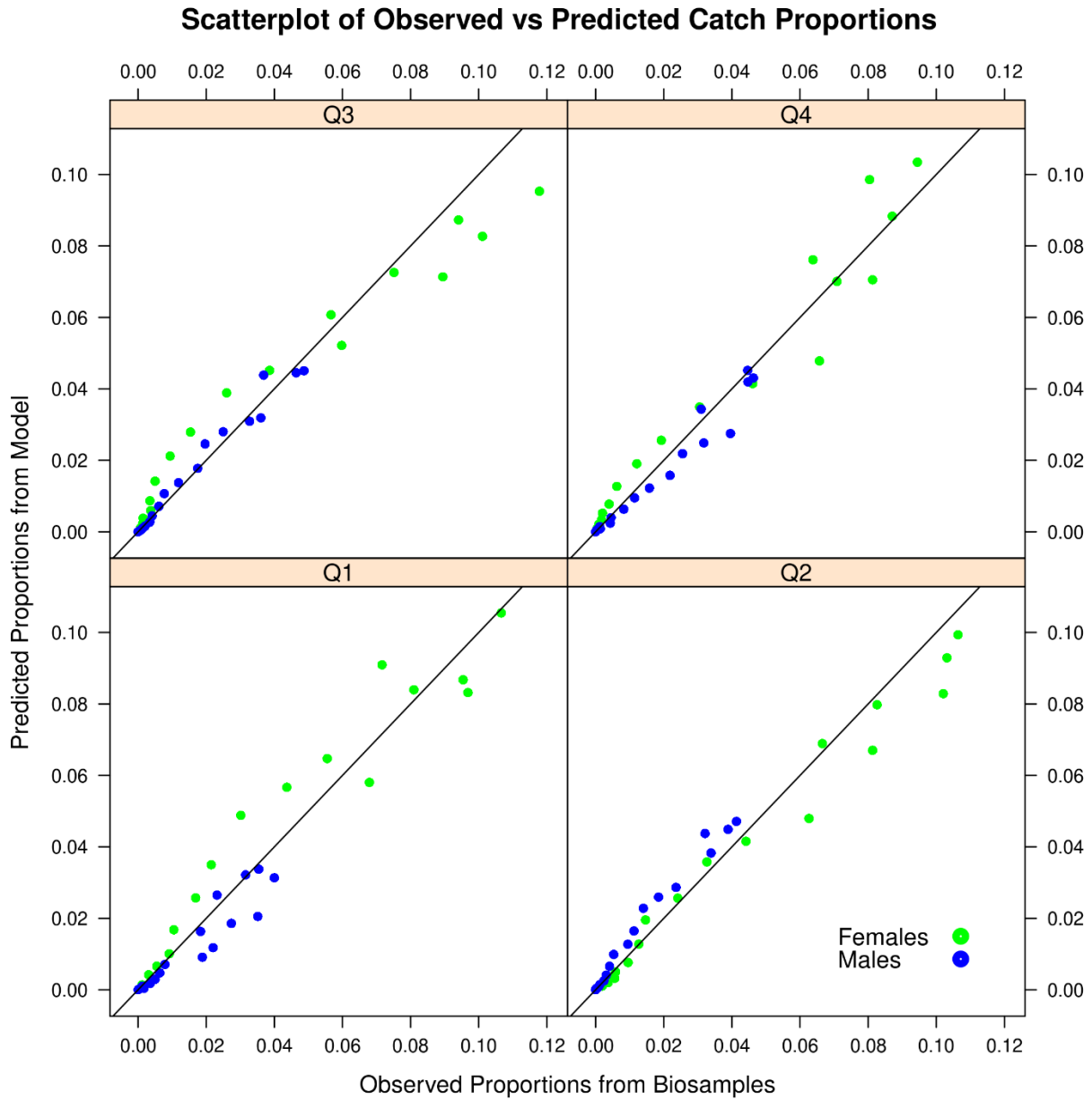


Figure 4. Relationship between length composition proportions observed in biosamples and predicted in the tuned population model by quarter and sex. The diagonal 1:1 line shows an ideal fit between the data sets.

Scatterplot of Observed vs Predicted Catch Proportions in Logit space

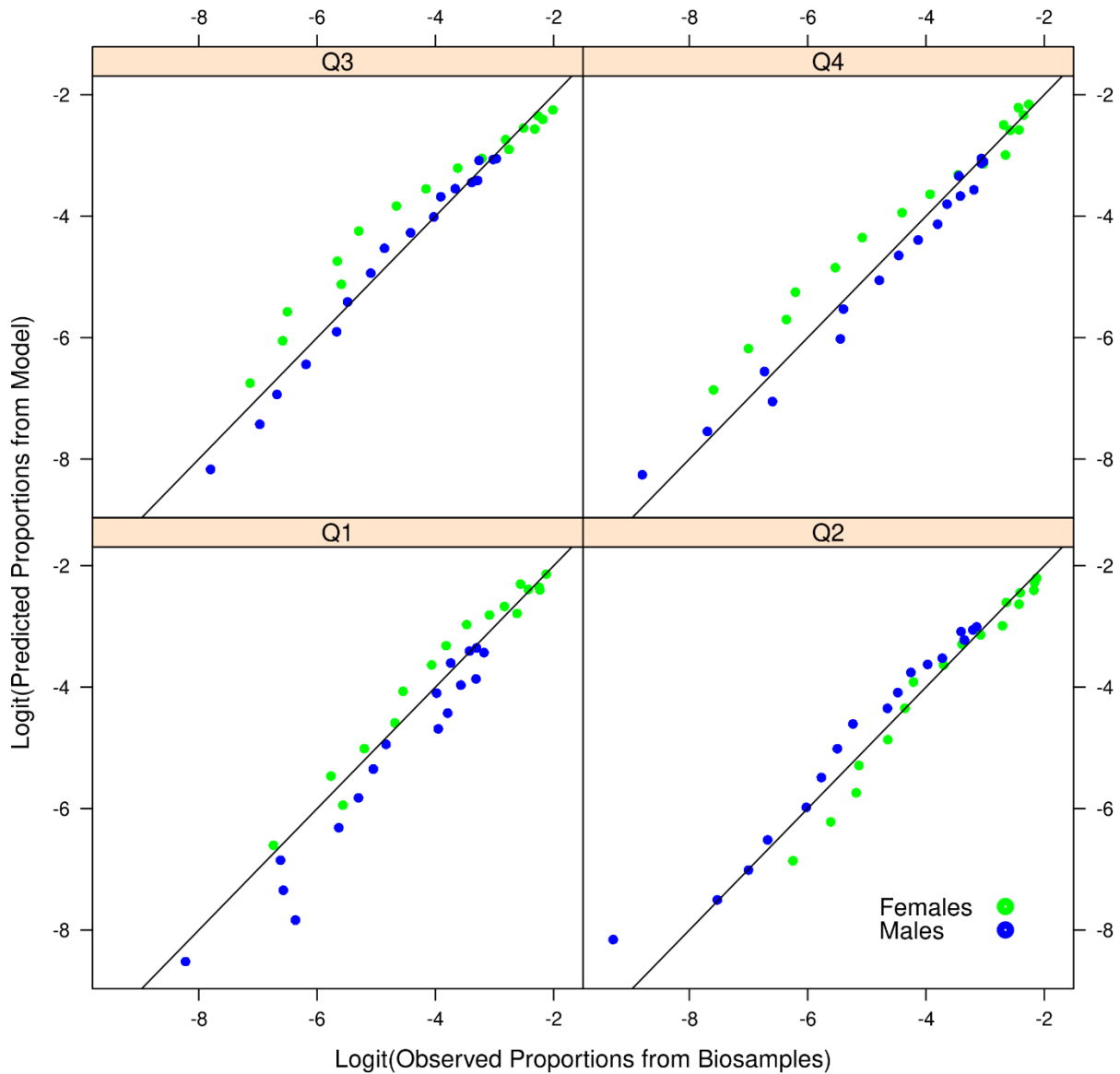


Figure 5. Relationship between length composition proportions observed in biosamples and predicted in the tuned population model by quarter and sex. Data points are logit-transformed to emphasize fit to lengths that occur in low proportions. The diagonal 1:1 line shows an ideal fit between the data sets.

Table 1. LCMA1 projected relative changes to Weight of Landings resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell).

		Maximum Gauge Size						None
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	
Minimum Gauge Size	3.25in / 83mm	0.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
	3.31in / 84mm	3.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
	3.38in / 86mm	5.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
	3.47in / 88mm	13.00%	14.00%	14.00%	14.00%	14.00%	14.00%	14.00%
	3.53in / 90mm	14.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
	3.594in / 91mm	16.00%	18.00%	18.00%	18.00%	18.00%	18.00%	18.00%

Table 2. LCMA1 projected relative changes to Number of lobsters Landed resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell).

		Maximum Gauge Size						None
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	
Minimum Gauge Size	3.25in / 83mm	0.00%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%
	3.31in / 84mm	-2.00%	-1.80%	-1.80%	-1.80%	-1.80%	-1.80%	-1.80%
	3.38in / 86mm	-3.60%	-3.30%	-3.30%	-3.30%	-3.30%	-3.30%	-3.30%
	3.47in / 88mm	-8.50%	-8.10%	-8.00%	-8.00%	-8.00%	-8.00%	-8.00%
	3.53in / 90mm	-9.50%	-9.00%	-9.00%	-9.00%	-9.00%	-9.00%	-9.00%
	3.594in / 91mm	-11.30%	-10.80%	-10.70%	-10.70%	-10.70%	-10.70%	-10.70%

Table 3. LCMA1 projected relative changes to Spawning Stock Biomass resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell).

		Maximum Gauge Size						
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
Minimum Gauge Size	3.25in / 83mm	0.00%	-16.50%	-18.30%	-18.50%	-18.50%	-18.60%	-18.60%
	3.31in / 84mm	19.00%	-1.40%	-3.60%	-3.80%	-3.90%	-3.90%	-3.90%
	3.38in / 86mm	38.00%	13.90%	11.30%	11.00%	10.90%	10.90%	10.90%
	3.47in / 88mm	98.00%	61.00%	56.90%	56.60%	56.50%	56.40%	56.40%
	3.53in / 90mm	117.00%	75.80%	71.30%	70.90%	70.70%	70.70%	70.70%
	3.594in / 91mm	151.00%	101.70%	96.40%	95.90%	95.70%	95.70%	95.60%

Table 4. LCMA1 projected relative changes to Exploitation resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell).

		Maximum Gauge Size						
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
Minimum Gauge Size	3.25in / 83mm	0.00%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%
	3.31in / 84mm	-8.50%	-7.70%	-7.60%	-7.60%	-7.60%	-7.60%	-7.60%
	3.38in / 86mm	-14.40%	-13.60%	-13.50%	-13.50%	-13.50%	-13.50%	-13.50%
	3.47in / 88mm	-29.40%	-28.40%	-28.30%	-28.30%	-28.30%	-28.30%	-28.30%
	3.53in / 90mm	-32.10%	-31.00%	-30.90%	-30.90%	-30.90%	-30.90%	-30.90%
	3.594in / 91mm	-36.50%	-35.40%	-35.30%	-35.20%	-35.20%	-35.20%	-35.20%

Table 5. LCMA3 projected relative changes to Weight of Landings resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell).

		Maximum Gauge Size						
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
Minimum Gauge Size	3.25in / 83mm	-31.30%	-14.60%	-6.30%	-4.20%	-2.80%	-2.10%	-0.80%
	3.31in / 84mm	-31.20%	-14.30%	-6.00%	-3.80%	-2.40%	-1.60%	-0.40%
	3.38in / 86mm	-31.20%	-14.00%	-5.60%	-3.40%	-2.00%	-1.20%	0.00%
	3.47in / 88mm	-31.10%	-13.60%	-5.00%	-2.70%	-1.30%	-0.50%	0.80%
	3.53in / 90mm	-31.40%	-13.40%	-4.60%	-2.30%	-0.90%	0.00%	1.30%
	3.594in / 91mm	-31.70%	-13.20%	-4.10%	-1.70%	-0.30%	0.60%	1.90%

Table 6. LCMA3 projected relative changes to Number of lobsters Landed resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell).

		Maximum Gauge Size						
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
Minimum Gauge Size	3.25in / 83mm	-11.10%	-0.80%	3.20%	4.00%	4.50%	4.70%	5.00%
	3.31in / 84mm	-12.20%	-1.70%	2.30%	3.20%	3.70%	3.90%	4.20%
	3.38in / 86mm	-13.20%	-2.60%	1.50%	2.30%	2.80%	3.10%	3.40%
	3.47in / 88mm	-15.20%	-4.20%	-0.10%	0.80%	1.30%	1.50%	1.80%
	3.53in / 90mm	-17.10%	-5.90%	-1.70%	-0.80%	-0.30%	0.00%	0.30%
	3.594in / 91mm	-19.50%	-7.90%	-3.60%	-2.60%	-2.10%	-1.90%	-1.50%

Table 7. LCMA3 projected relative changes to Spawning Stock Biomass resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell).

		Maximum Gauge Size						None
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	
Minimum Gauge Size	3.25in / 83mm	56.00%	19.00%	3.00%	-1.50%	-3.80%	-5.20%	-6.90%
	3.31in / 84mm	57.00%	20.00%	3.00%	-0.80%	-3.10%	-4.50%	-6.20%
	3.38in / 86mm	59.00%	21.00%	4.00%	0.00%	-2.40%	-3.70%	-5.50%
	3.47in / 88mm	61.00%	23.00%	6.00%	1.50%	-0.90%	-2.30%	-4.10%
	3.53in / 90mm	64.00%	25.00%	8.00%	3.80%	1.40%	0.00%	-1.80%
	3.594in / 91mm	69.00%	29.00%	11.00%	6.70%	4.20%	2.80%	1.00%

Table 8. LCMA3 projected relative changes to Exploitation resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell).

		Maximum Gauge Size						None
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	
Minimum Gauge Size	3.25in / 83mm	-20.40%	-0.30%	8.40%	10.30%	11.40%	11.90%	12.50%
	3.31in / 84mm	-22.30%	-2.40%	6.30%	8.10%	9.20%	9.70%	10.30%
	3.38in / 86mm	-24.10%	-4.40%	4.10%	6.00%	7.00%	7.50%	8.10%
	3.47in / 88mm	-27.40%	-8.10%	0.30%	2.20%	3.10%	3.70%	4.30%
	3.53in / 90mm	-30.60%	-11.60%	-3.30%	-1.50%	-0.50%	0.00%	0.60%
	3.594in / 91mm	-34.20%	-15.60%	-7.50%	-5.70%	-4.80%	-4.20%	-3.70%

Table 9. OCC projected relative changes to Weight of Landings resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell), based on (A) LCMA1 or (B) LCMA3 parameterizations.

A.

		Maximum Gauge Size						None
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	
Minimum Gauge Size	3.25in / 83mm	-5.60%	-5.00%	-4.90%	-4.90%	-4.90%	-4.90%	-4.90%
	3.31in / 84mm	-2.70%	-2.00%	-1.90%	-1.90%	-1.90%	-1.90%	-1.90%
	3.38in / 86mm	-0.90%	-0.10%	0.00%	0.00%	0.00%	0.00%	0.00%
	3.47in / 88mm	6.60%	7.80%	8.00%	8.00%	8.00%	8.00%	8.00%
	3.53in / 90mm	7.40%	8.80%	8.90%	8.90%	8.90%	8.90%	8.90%
	3.594in / 91mm	9.30%	11.00%	11.20%	11.20%	11.20%	11.20%	11.20%

B.

		Maximum Gauge Size						None
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	
Minimum Gauge Size	3.25in / 83mm	-30.40%	-13.50%	-5.20%	-3.00%	-1.60%	-0.80%	0.00%
	3.31in / 84mm	-30.30%	-13.20%	-4.80%	-2.60%	-1.20%	-0.40%	1.00%
	3.38in / 86mm	-30.30%	-13.00%	-4.40%	-2.20%	-0.80%	0.00%	1.00%
	3.47in / 88mm	-30.30%	-12.50%	-3.80%	-1.50%	-0.10%	0.70%	2.00%
	3.53in / 90mm	-30.60%	-12.40%	-3.40%	-1.10%	0.40%	1.20%	3.00%
	3.594in / 91mm	-30.90%	-12.10%	-2.90%	-0.50%	1.00%	1.90%	3.00%

Table 10. OCC projected relative changes to Number of lobsters Landed resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell), based on (A) LCMA1 or (B) LCMA3 parameterizations.

A.

		Maximum Gauge Size						None
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	
Minimum Gauge Size	3.25in / 83mm	3.40%	3.60%	3.60%	3.60%	3.60%	3.60%	3.60%
	3.31in / 84mm	1.30%	1.60%	1.60%	1.60%	1.60%	1.60%	1.60%
	3.38in / 86mm	-0.30%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	3.47in / 88mm	-5.40%	-4.90%	-4.90%	-4.90%	-4.90%	-4.90%	-4.90%
	3.53in / 90mm	-6.40%	-5.90%	-5.90%	-5.90%	-5.90%	-5.90%	-5.90%
	3.594in / 91mm	-8.30%	-7.70%	-7.70%	-7.70%	-7.70%	-7.70%	-7.70%

B.

		Maximum Gauge Size						None
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	
Minimum Gauge Size	3.25in / 83mm	-13.80%	-3.70%	0.10%	0.90%	1.40%	1.60%	1.90%
	3.31in / 84mm	-14.80%	-4.60%	-0.70%	0.10%	0.60%	0.80%	1.10%
	3.38in / 86mm	-15.80%	-5.50%	-1.50%	-0.70%	-0.20%	0.00%	0.30%
	3.47in / 88mm	-17.70%	-7.10%	-3.10%	-2.20%	-1.70%	-1.50%	-1.20%
	3.53in / 90mm	-19.60%	-8.70%	-4.60%	-3.70%	-3.20%	-3.00%	-2.70%
	3.594in / 91mm	-21.90%	-10.70%	-6.40%	-5.50%	-5.00%	-4.80%	-4.50%

Table 11. OCC projected relative changes to Spawning Stock Biomass resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell), based on (A) LCMA1 or (B) LCMA3 parameterizations.

A.

		Maximum Gauge Size						
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
Minimum Gauge Size	3.25in / 83mm	-9.80%	-24.70%	-26.40%	-26.50%	-26.60%	-26.60%	-26.60%
	3.31in / 84mm	7.00%	-11.10%	-13.10%	-13.30%	-13.30%	-13.30%	-13.30%
	3.38in / 86mm	24.30%	2.70%	0.30%	0.10%	0.00%	0.00%	0.00%
	3.47in / 88mm	78.20%	45.10%	41.50%	41.20%	41.10%	41.00%	41.00%
	3.53in / 90mm	95.50%	58.50%	54.40%	54.00%	53.90%	53.90%	53.90%
	3.594in / 91mm	126.20%	81.80%	77.00%	76.60%	76.50%	76.40%	76.40%

B.

		Maximum Gauge Size						
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
Minimum Gauge Size	3.25in / 83mm	63.00%	24.00%	7.00%	2.00%	-0.10%	-1.50%	-3.30%
	3.31in / 84mm	64.00%	25.00%	7.00%	3.00%	0.60%	-0.70%	-2.60%
	3.38in / 86mm	65.00%	26.00%	8.00%	4.00%	1.40%	0.00%	-1.80%
	3.47in / 88mm	67.00%	27.00%	10.00%	5.00%	2.90%	1.50%	-0.30%
	3.53in / 90mm	71.00%	30.00%	12.00%	8.00%	5.30%	3.90%	2.00%
	3.594in / 91mm	75.00%	34.00%	15.00%	11.00%	8.30%	6.80%	4.90%

Table 12. OCC projected relative changes to Exploitation resulting from alternative minimum and maximum options, relative to the current regulations (yellow cell), based on (A) LCMA1 or (B) LCMA3 parameterizations.

A.

		Maximum Gauge Size						None
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	
Minimum Gauge Size	3.25in / 83mm	15.60%	16.50%	16.50%	16.50%	16.50%	16.50%	16.50%
	3.31in / 84mm	5.80%	6.70%	6.80%	6.80%	6.80%	6.80%	6.80%
	3.38in / 86mm	-1.10%	-0.10%	0.00%	0.00%	0.00%	0.00%	0.00%
	3.47in / 88mm	-18.40%	-17.30%	-17.10%	-17.10%	-17.10%	-17.10%	-17.10%
	3.53in / 90mm	-21.50%	-20.20%	-20.10%	-20.10%	-20.10%	-20.10%	-20.10%
	3.594in / 91mm	-26.70%	-25.30%	-25.20%	-25.20%	-25.20%	-25.20%	-25.20%

B.

		Maximum Gauge Size						None
		5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	
Minimum Gauge Size	3.25in / 83mm	-26.00%	-7.30%	0.80%	2.60%	3.60%	4.10%	4.60%
	3.31in / 84mm	-27.70%	-9.20%	-1.20%	0.60%	1.50%	2.00%	2.60%
	3.38in / 86mm	-29.40%	-11.10%	-3.20%	-1.40%	-0.50%	0.00%	0.60%
	3.47in / 88mm	-32.50%	-14.50%	-6.70%	-5.00%	-4.10%	-3.60%	-3.00%
	3.53in / 90mm	-35.40%	-17.70%	-10.00%	-8.40%	-7.50%	-7.00%	-6.50%
	3.594in / 91mm	-38.80%	-21.50%	-13.90%	-12.30%	-11.40%	-10.90%	-10.40%

Appendix C. Trigger Mechanism Analysis and Recommendation

Recruit (71-80 mm carapace length) indices are used as model-free indicators of recruitment to the lobster fishery in the following year. During the 2020 stock assessment, recruit indicators were found to be correlated with the stock assessment model estimates of reference abundance (78+ mm carapace length), providing a reliable means to track abundance changes and potential need for management response more frequently than through intermittent stock assessments. There are eight GOM/GBK stock recruit indicators updated for each assessment: spring and fall indices for each of the ME/NH, MA DMF, NEFSC GOM, and NEFSC GBK bottom trawl surveys. The NEFSC indicators in the GOM and GBK regions are considered to be indicators of offshore recruitment which differs from the GOM/GBK stock-wide recruitment dynamics. Therefore, the American Lobster Technical Committee (TC) recommended using only the inshore surveys (ME/NH and MA DMF) where the bulk of the population and fishery occur, which are assumed to be more representative of stock-wide recruitment. These trawl surveys employ similar methodologies and, along with selectivity and swept area calibration factors, can be combined into two indices, a spring index and a fall index. Additionally, the TC recommends using the standardized index from the Ventless Trap Survey as an indicator of recruitment during the summer.

To calculate a trigger index, each of the three individual indices were scaled to their 2017 reference levels so they are on the same scale. The one year lag expected between recruit indices and reference abundance due to growth results in 2017 recruit indices mapping to the terminal year reference abundance used in the 2020 stock assessment status determination (2018). The TC recommended linking the trigger index to the reference abundance in this way so the trigger index is an indication of proportional changes to the reference abundance since the 2020 stock assessment. Proportional changes in the trigger index are compared directly to proportional changes between the terminal year reference abundance and abundance reference points established in the assessment to provide an early indication of reference abundance falling below the reference points. Scaled indices were then averaged across surveys to generate a single trigger index. The final trigger index value represents proportional change from 2017 recruitment (and, therefore, expected proportional change from the reference abundance one year later in 2018 - the terminal year of the stock assessment). A value of one indicates no change, a value greater than one indicates an increase (e.g., 1.2 indicates a 20% increase), and a value less than one indicates a decrease (e.g., 0.8 indicates a 20% decrease).

During the 2020 stock assessment, the peer review panel supported using a smoothing algorithm, such as the running average used in past assessments, to determine stock status, but also recommended exploring alternatives (e.g., running median) to evaluate the robustness of status determinations. To evaluate performance of different methods for a trigger mechanism, akin to evaluating stock status in a stock assessment, a simulation analysis was conducted using the trigger index annual point value, three-year running average, and three-year running median to identify need for management action. For each method, all three individual indices

were scaled to a 2017 reference level calculated with the same method used to calculate the index. That is, the 2017 reference level was the 2017 point value for the annual index trigger method, the 2015-2017 average for the three-year running average trigger method, and the 2015-2017 running median for the three-year running median trigger method. The scaled individual and combined indices are compared to various trigger points related to assessment abundance reference points in Figure 1.

The TC treated 0.68 (i.e., a 32% decline) as the trigger for action in the simulation analysis. This decline represents the proportional change between the terminal year stock assessment reference abundance level and the boundary between the high and moderate abundance regimes. Each individual index was projected from 2018 to 2025 following a steady decline that reflected a 32% decline from the observed 2017 index value in 2021. This projected trend is hypothetical to evaluate the performance of the three calculation methods being considered and does not necessarily reflect the true status or projection of the population. It was unclear what impacts the method used to calculate the starting point of the projected trend would have on performance of each trigger mechanism, so declines projected from the (1) 2017 point value, (2) 2015-2017 running average, and (3) 2015-2017 running median were evaluated in three separate scenarios. Indices were then sampled from these simulated trends with CVs equal to the average CV over the respective index's time series, assuming a lognormal error structure. These simulations only consider observation error and do not account for process error. Indices were scaled to their reference level as described above, averaged across surveys, and the combined trigger index was evaluated for whether or not it would trigger action (≤ 0.68) in each year of the projection period. This was repeated 1,000 times for each scenario and action determinations were tallied by year for each of the methods.

Results show similar patterns between the scenarios using a simulated decline from the 2017 point value and from the 2015-2017 average (Table 1; Figures 2-3). The 2015-2017 running median was equal to the 2017 point value for all indices, so the results with a simulated decline from this value were identical to the 2017 point value scenario (Table 2; Figure 4). Incorrect action is triggered very infrequently (< 3% of the time) by the annual and running median methods in the first two years of the projection period and never by the running average method. On average, the annual and running median methods incorrectly triggered action about 9% of the time and about 15 times more frequently than the running average method the year before the decline reached the threshold (2020), but also correctly triggered action $\approx 38\%$ of the time and roughly twice as frequently as the running average method in the year when the threshold was met (2021). The running average method then tended to perform as well as or better than the other methods from 2022-2025, albeit generally at smaller margins of difference, as all methods tended to perform relatively well in these later years when the decline is exacerbated. The delayed response of the running average method can be seen in Figures 5-7, where the median trigger index value across simulations tends to be slightly higher than the annual and running median methods. The variance in index values, however, is lower for the running average method resulting in more consistency across simulations in terms of

guidance for management action, whereas the other methods result in mixed guidance for some of the more extreme simulations in more years than the running average method. Based on these results, the trigger mechanisms using the annual point value and the running median may be considered precautionary methods that perform better for an immediate trigger, on average, but with more variable guidance than the running average method. The running average method may provide a less responsive trigger mechanism that is less likely to incorrectly trigger premature action, and performs well and more consistently after the initial risk of not triggering action when first needed.

The TC recommended the running average method for calculating the trigger index. The individual surveys display interannual variation that might be related to environmental impacts on catchability (for example), an issue that was identified in the stock assessment and is expected to continue to impact these indices index data sets into the future. This simulation analysis suggests the running average method is more robust to interannual variation than the other methods and therefore can be interpreted with higher confidence.

Table 1. Percentage of 1,000 simulated indices that triggered action for three simulated decline starting point scenarios, and the averages of these scenarios. The simulated stock was projected to decline 32% in 2021.

Simulated Decline Starting Point	Index Calculation Method	2018	2019	2020	2021	2022	2023	2024	2025
2017 Point Value	Annual	0%	2%	12%	50%	85%	97%	100%	100%
	Three-Year Running Average	0%	0%	1%	27%	86%	100%	100%	100%
	Three-Year Running Median	0%	2%	12%	44%	84%	98%	100%	100%
2015-2017 Average	Annual	0%	0%	3%	21%	59%	89%	99%	100%
	Three-Year Running Average	0%	0%	0%	3%	46%	95%	100%	100%
	Three-Year Running Median	0%	0%	3%	19%	60%	90%	99%	100%
2015-2017 Running Median	Annual	0%	2%	12%	50%	85%	97%	100%	100%
	Three-Year Running Average	0%	0%	1%	27%	86%	100%	100%	100%
	Three-Year Running Median	0%	2%	12%	44%	84%	98%	100%	100%
Average	Annual	0%	2%	9%	40%	76%	94%	100%	100%
	Three-Year Running Average	0%	0%	1%	19%	73%	98%	100%	100%
	Three-Year Running Median	0%	1%	9%	36%	76%	95%	100%	100%

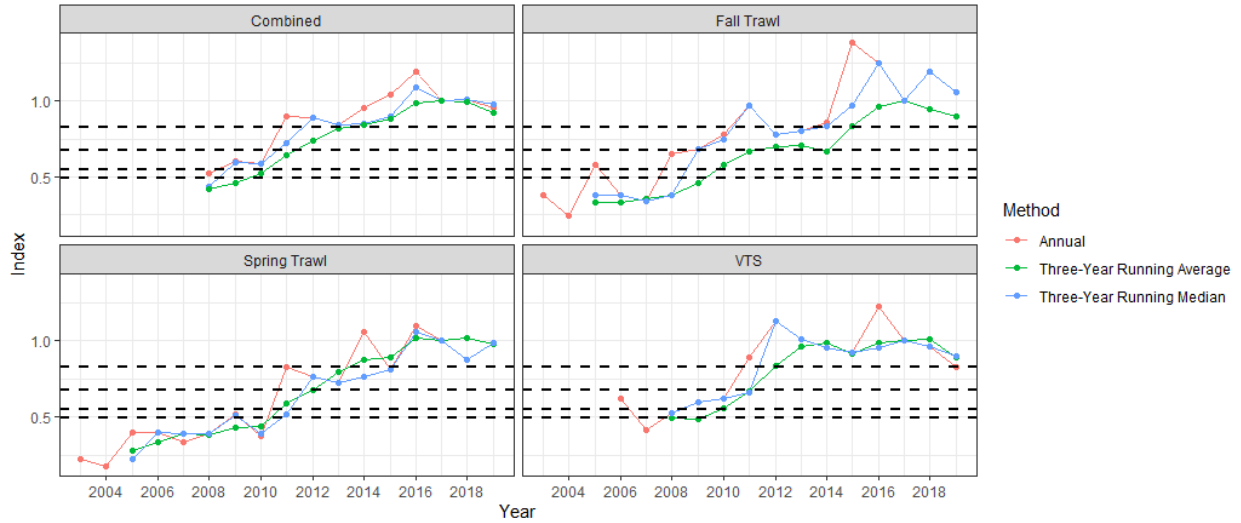


Figure 1. Scaled individual and combined indices using three calculation methods compared to four trigger levels (0.83 – Fishery/Industry Target, 0.68 – Moderate/High Abundance Regime Shift Level, 0.55 – Abundance Limit, 0.49 – Abundance Threshold) identified from potential reference abundance declines (dashed lines).

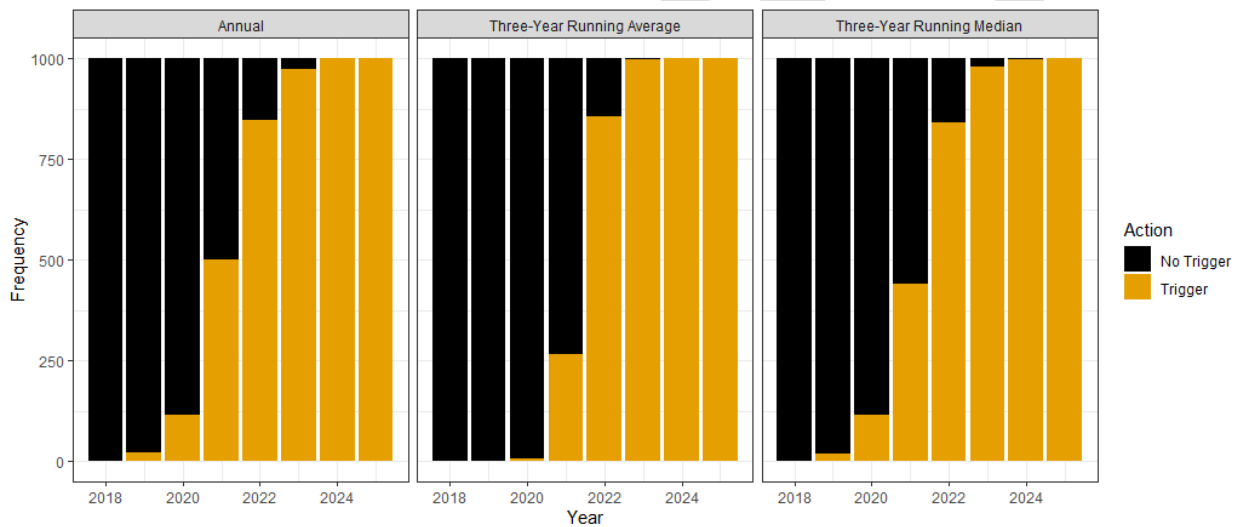


Figure 2. Annual action determinations by method from 1,000 simulated indices with the simulated population declining from the 2017 point value. The simulated stock was projected to decline 32% in 2021.

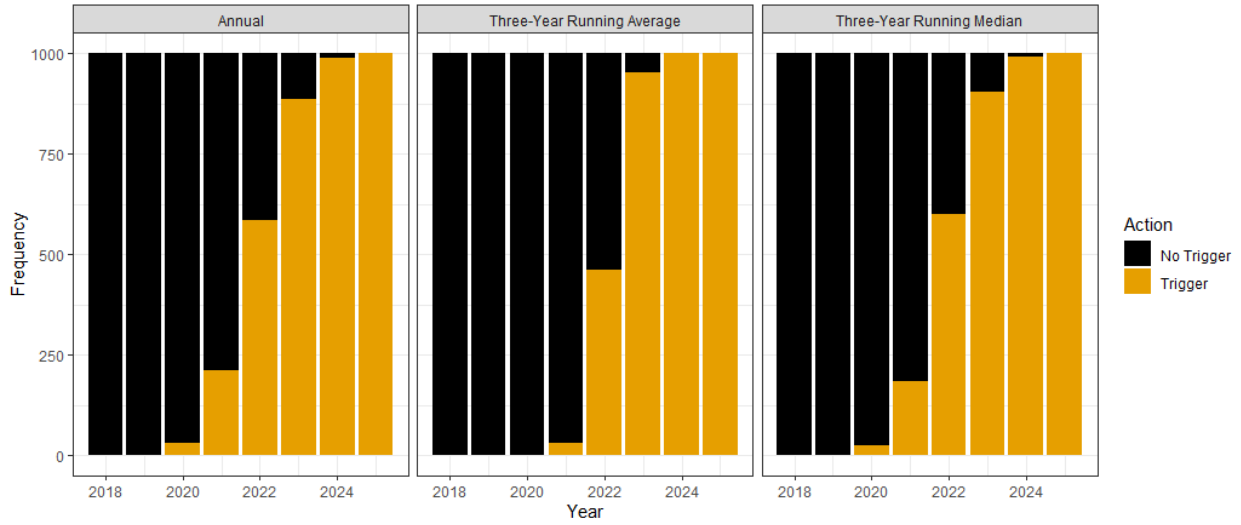


Figure 3. Annual action determinations by method from 1,000 simulated indices with the simulated population declining from the 2015-2017 average. The simulated stock was projected to decline 32% in 2021.

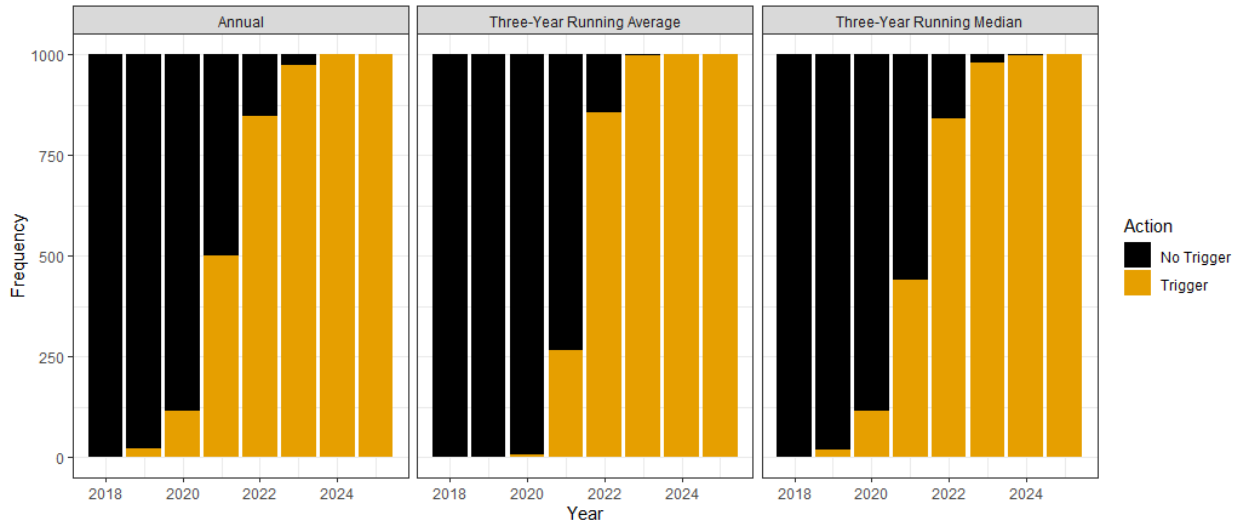


Figure 4. Annual action determinations by method from 1,000 simulated indices with the simulated population declining from the 2015-2017 median. The simulated stock was projected to decline 32% in 2021.

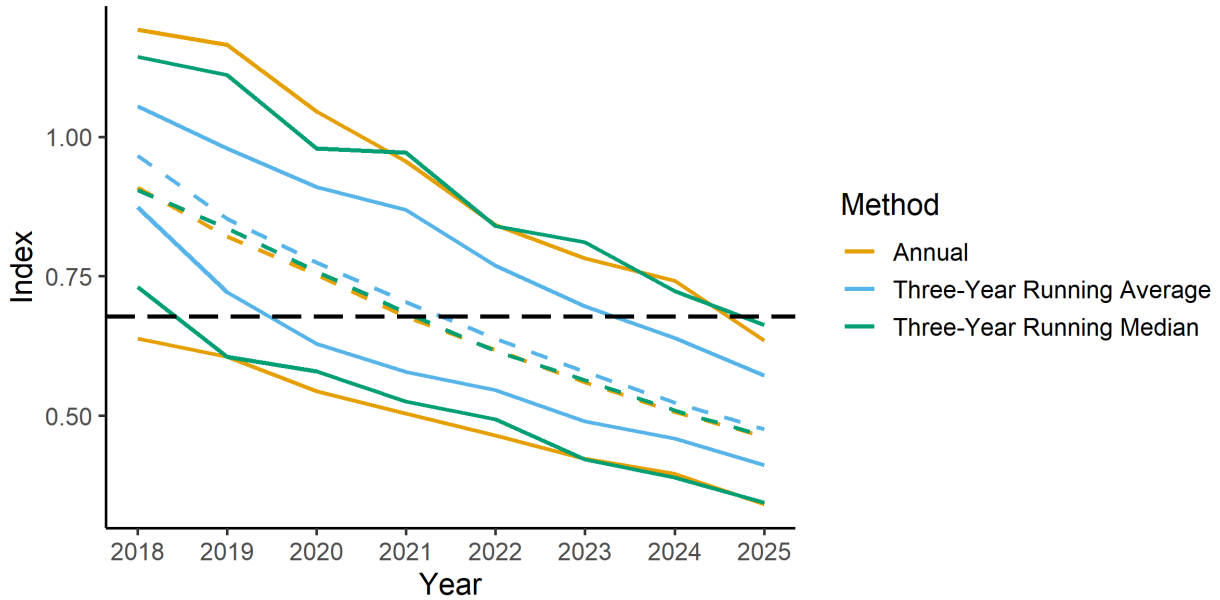


Figure 5. Distribution of index values by method from 1,000 simulations with the simulated population declining from the 2017 point value. The dashed colored lines are the median index values across simulations, the solid color lines are the minimum and maximum index values across simulations, and the dashed black line is the trigger level. The simulated stock was projected to decline 32% in 2021.

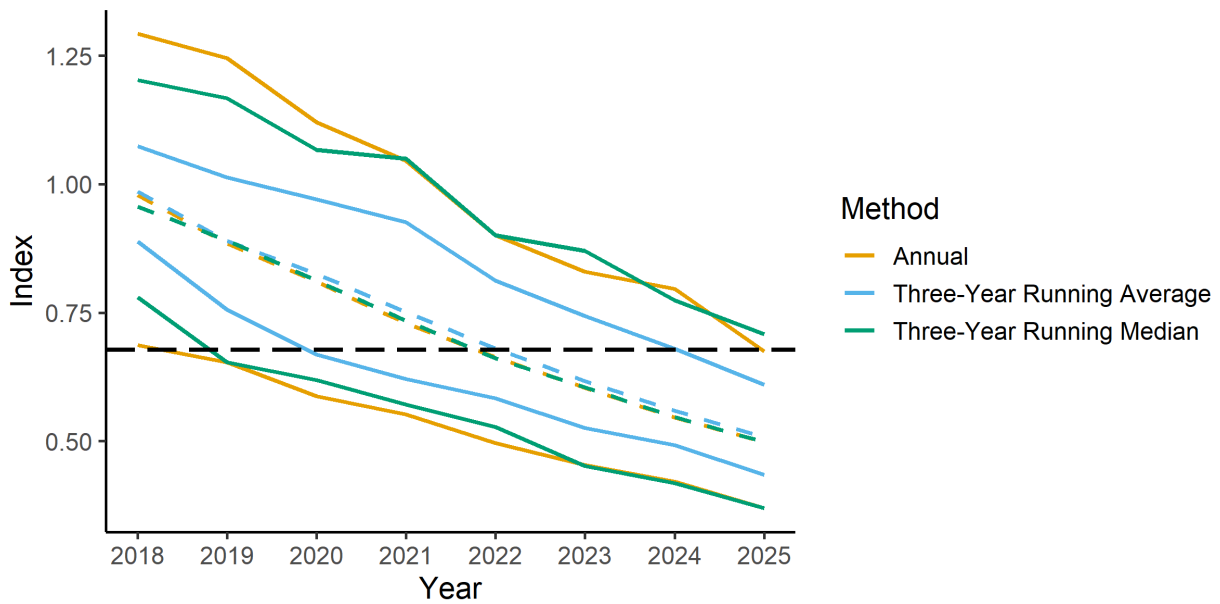


Figure 6. Distribution of index values by method from 1,000 simulations with the simulated population declining from the 2015-2017 running average. The dashed colored lines are the median index values across simulations, the solid color lines are the minimum and maximum index values across simulations, and the dashed black line is the trigger level. The simulated stock was projected to decline 32% in 2021.

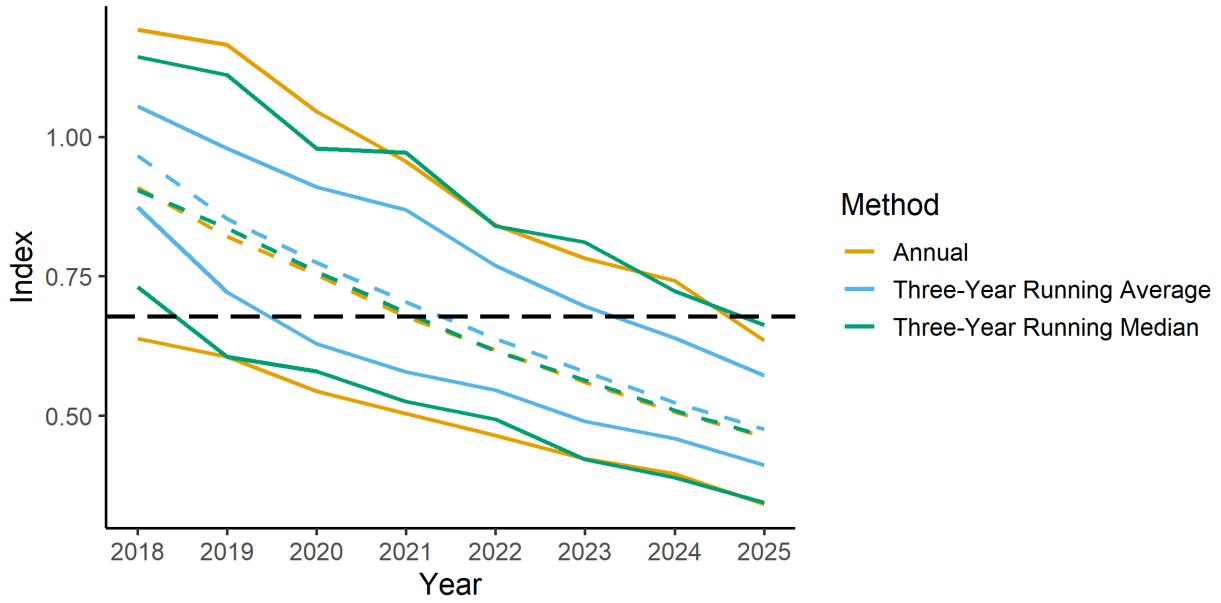


Figure 7. Distribution of index values by method from 1,000 simulations with the simulated population declining from the 2015-2017 running median. The dashed colored lines are the median index values across simulations, the solid color lines are the minimum and maximum index values across simulations, and the dashed black line is the trigger level. The simulated stock was projected to decline 32% in 2021.