Atlantic States Marine Fisheries Commission

American Lobster Management Board

November 7, 2022
9:45 – 11:45 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)*	9:45 a.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from August 2022	9:45 a.m.
3.	Public Comment	9:50 a.m.
4.	Update on North Atlantic Right Whale Court Cases	10:00 a.m.
5.	Review Annual Data Update of American Lobster Indices *(K. Reardon)*	10:15 a.m.
6.	Consider Next Steps on Draft Addendum XXVII on Increasing Protection of Spawning Stock Biomass of the Gulf of Maine/ Georges Bank Stock *(C. Starks)* **Possible Action**	10:30 a.m.
7.	Update from Work Group on Implementation of Addendum XXIX on Electronic Vessel Tracking for Federal Permit Holders *(C. Starks)*	11:00 a.m.
8.	Discuss the Trap Transfer Tax for the American Lobster Fishery *(D. McKiernan)*	11:10 a.m.
9.	Progress Update on Jonah Crab Benchmark Stock Assessment *(J. Kipp)*	11:25 a.m.
10.	Consider Fishery Management Plan Reviews and State Compliance for American Lobster and Jonah Crab for 2021 Fishing Year *(C. Starks)* **Action**	11:30 a.m.
11.	Other Business/Adjourn	11:45 a.m.

The meeting will be held at The Ocean Place Resort (1 Ocean Boulevard, Long Branch, NJ 07740; 732.571.4000) and via webinar; click here for details

MEETING OVERVIEW

American Lobster Management Board
November 7, 2022
9:45 – 11:45 a.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: August 2, 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 August 2, 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. Update on North Atlantic Right Whale Court Cases (10:00-10:15 a.m.)

Background

- U.S. District Court Judge James E. Boasberg's ruling in Center for Biological Diversity versus Secretary Raimondo and the Maine Lobstermen's Association was released in the July 8, 2022 opinion.
- The ruling concluded that aspects of the 2021 Biological Opinion and the 2021 final rule violated federal law: NOAA Fisheries violated the Endangered Species Act by failing to satisfy the Marine Mammal Protection Act's (MMPA) "negligible impact" requirement before setting the authorized level of lethal take in its incidental take statement, and that NOAA Fisheries breached the time requirements mandated by the MMPA in the 2021 final rule.
- Additional briefing hearings to determine the action(s) the agency must take moving forward have been held in recent months.

Presentations

- Update on North Atlantic Right Whale Court Cases

5. Review Annual Data Update of American Lobster Indices (10:15-10:30 a.m.)

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: young-of-year settlement indicators, trawl survey indicators, and ventless trap survey sex-specific abundance indices.
- 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) was determined relative to the percentiles of the stock assessment time series (i.e., data set start year through 2018) **(Briefing Materials).**

Presentations

- Annual Data Update of American Lobster Indices by K. Reardon

6. Consider Next Steps on Draft Addendum XXVII on Increasing Protection of Spawning Stock Biomass of the Gulf of Maine/Georges Bank Stock (10:30-11:00 a.m.) Possible 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 Board approved Draft Addendum XXVII for public comment in January 2022. 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 **(Briefing Materials).**
- The Board paused development of the Draft Addendum to allow time to better understand other challenges facing the fishery. At its August 2022 meeting the Board discussed concerns regarding the potential implications of the management proposed measures in the Draft Addendum for international trade. The Board tasked the PDT to discuss this issue and suggest possible paths forward and potential impacts.

Presentations

- Next Steps on Draft Addendum XXVII for Public Comment by C. Starks

Board Actions for Consideration at the Meeting

- Determine next steps for development of Draft Addendum XXVII

7. Update from Work Group on Implementation of Addendum XXIX on Electronic Vessel Tracking for Federal Permit Holders (11:00-11:10 a.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 is in the process of evaluating the quotes submitted.

Presentations

- Update on Implementation of Addendum XXIX by C. Starks

8. Discuss the Trap Transfer Tax for the American Lobster Fishery (11:10-11:25 a.m.)

Background

- In the early 2000s several Addenda were implemented to establish a 10% conservation tax for trap transfers in the LCMAs within the Southern New England (SNE) as part of a broader effort to reduce exploitation of the SNE lobster stock.
- After significant effort reductions in the SNE fishery, the conservation tax on the trap transfer program only removes a small amount of traps from the system as transactions are very limited.
- Some Board members are concerned that the conservation tax is now resulting in unintended consequences by altering reporting behavior due to a reluctance to transfer trap allocations, and therefore lose traps because of conservation tax.

Presentations

- Review of Trap Transfer Tax in the Lobster Fishery by D. McKiernan

9. Progress Update on Jonah Crab Benchmark Stock Assessment (11:25-11:30 p.m.)

Background

- Work on the first Jonah crab benchmark stock assessment was initiated in early 2022.
- A Data Workshop was held virtually June 13-15, 2022, and a Methods Workshop was held virtually October 3-5, 2022.
- The assessment is scheduled for completion in the fall of 2023.

Presentations

- Progress Update on Jonah Crab Benchmark Stock Assessment by J. Kipp.

10. Consider Fishery Management Plan Reviews and State Compliance for American Lobster and Jonah Crab for 2021 Fishing Year (11:30-11:45 a.m.)
Background • State compliance reports for American lobster and Jonah crab were due August 1, 2022. • The Plan Review Teams reviewed state compliance reports and compiled the annual FMP Reviews for lobster and Jonah crab for the 2021 Fishing Year (Briefing Materials; Supplemental Materials) **(Briefing Materials)**. • Delaware, Maryland, and Virginia have requested and meet the requirements for de minimis in the lobster and Jonah crab fisheries.
Presentations • FMP Reviews for American Lobster and Jonah Crab for the for the 2021 Fishing Year by C. Starks
Board Actions for Consideration at the Meeting • Approve FMP Reviews, state compliance reports, and *de minimis* requests

11. Other Business/Adjourn

American Lobster and Jonah Crab TC Task List

Activity level: High

Committee Overlap Score: Medium

Committee Task List
Lobster TC • Fall 2022: Annual data update of lobster abundance indices *Jonah Crab TC* • Fall 2022: Development of methods for Jonah crab stock assessment

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

ATLANTIC STATES MARINE FISHERIES COMMISSION

AMERICAN LOBSTER MANAGEMENT BOARD

The Westin Crystal City
Arlington, VA

August 2, 2022
Hybrid Meeting

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

TABLE OF CONTENTS

INDEX OF MOTIONS

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

2. **Move to approve Proceedings of March 31, 2022** by consent **(**Page 1).

3. **Move to postpone consideration of public hearings on Draft Addendum XXVII 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 on dealers and processors. The LEC should also review new language that may be suggested by the PDT** (Page 10). Motion by Pat Keliher; second by Cheri Patterson. Motion carried (11 in favor) (Page 13).

4. **Move to approve Advisory Panel nominations for Eric Lorentzen and Todd Alger from Massachusetts, and Chris Welch from Maine** (Page 26). Motion by Dan McKiernan; second by Pat Keliher. Motion carried (Page 27).

5. **Move to elect Commissioner Pat Keliher of Maine as Vice-Chair of the American Lobster Management Board** (Page 27). Motion by Dan McKiernan; second by Emerson Hasbrouck. Motion carried (Page 27).

6. **Move to adjourn** by consent (Page 27).

ATTENDANCE

Board Members

Mike Armstrong, MA, proxy for D. McKiernan (AA)
Pat Keliher, ME (AA)
Stephen Train, ME (GA)
Cherie Patterson, NH (AA)
Ritchie White, NH (GA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Dan McKiernan, MA (AA)
Raymond Kane, MA (GA)
Sarah Ferrara, MA, proxy for Rep. Peake (LA)
Jason McNamee, RI (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Colleen Bouffard, CT, proxy for J. Davis (AA)
Bill Hyatt, CT (GA)
Jim Gilmore, NY (AA)
Emerson Hasbrouck, NY (GA)
Joe Cimino, NJ (AA)
Peter Clarke, NJ, proxy for T. Fote (GA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Mike Luisi, MD, Administrative proxy
Russell Dize, MD (GA)
Pat Geer, VA, proxy for J. Green (AA)
Allison Murphy, NOAA

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

Ex-Officio Members

Kathleen Reardon, Technical Committee Chair

Staff

Bob Beal
Toni Kerns
Maya Drzewicki
Tina Berger
Kristen Anstead
Pat Campfield
Lisa Carty
Emilie Franke
Lisa Havel
Chris Jacobs
Jeff Kipp
Dustin Colson Leaning
Adam Lee
Sarah Murray
Joe Myers
Mike Rinaldi
Julie Defilippi Simpson
Caitlin Starks

Guests

Katie Almeida
Jordan Andrews, *Press Herald*
Pat Augustine, Coram, NY
Rachel Barrales, Cape Cod CFA
John Bello
Alan Bianchi, NC DENR
Jeff Brust, NJ DEP
James Burns
Josh Carloni, NH FGD
Beth Casoni, MLA
Danielle Chesky, Embassy of Canada
Matt Cieri, ME DMR
Noah Cluster
Colleen Coogan, NOAA
Heather Corbett, NJ DEP
Nicole Lengyel Costa, RI DEM
Caitlin Craig, NYS DEC
Maria Fenton, NOAA
Marianne Ferguson, NOAA
James Fletcher
Erica Fuller, CLF
Brian Galvez, NOAA
Marty Gary, PRFC
Lewis Gillingham, VMRC
Jennifer Goebel, NOAA
Caroline Good, NOAA
Melanie Griffin, MA DMF
Catherine Fede, NYS DEC
Jon Hare, NOAA
Amalia Harrington, Univ. ME
Marin Hawk, MSC
Heidi Henninger, AOLA
Jay Hermsen, NOAA
Matthew Heyl, NJ DEP
Jesse Hornstein, NYS
Jeff Kaelin, Lund's Fisheries
Ellen Keane, NOAA
Kiana Kekoa, Ofc. Sen. Reed, RI

Guests (continued)

Joelle Kilchenmann, Univ. ME
Nancy Koenig
Rob LaFrance, Quinnipiac Univ
Chip Lynch, NOAA
J A Macfarlan, RI DEM
John Maniscalco, NYS DEC
Eric Matzen, NOAA
Kim McKown, NYS DEC
Conor McManus, RI DEM
Meredith Mendelson, ME DMR
Steve Meyers
Henry Milliken, NOAA
Jack Molmud, NewsCenter, ME
Lorraine Morris, ME DMR
Gunda Narang
Lindsey Nelson, NOAA
Virginia Olsen, Local 207
Scott Olszewski, RI DEM
Michael Pentony, NOAA
Nick Popoff, US FWS
Chad Power, NJ DEP
Tracy Pugh, MA DMF
Brad Schondelmeier, MA DMF
Amanda Small MD DNR
Melissa Smith, ME DMF
Somers Smott, VMRC
Rep. Elizabeth Snyder, AK
Renee St. Amand, CT DEEP
Terry Stackhouse, WMTV
Lauren Staples, NH FGD
David Stormer, DE DFW
Jason Surma, Woods Hole Grp
Pam Thames, NOAA
Andrea Tomlinson
Corinne Truesdale, RI DEM
Mike Waine, ASA
Jessica Waller, ME DMR
Megan Ware, ME, DMR
Craig Weedon, MD DNR
Ashley Weston, NOAA
Kelly Whitmore, MA DMF
Erin Wilkinson, ME DMR
Chris Wright, NOAA
Jordan Zimmerman, DE DFW
Erik Zlokovitz, MD DNR
Renee Zobel, NH F&G

The American Lobster Management Board of the Atlantic States Marine Fisheries Commission convened in the Jefferson Ballroom of the Westin Crystal City Hotel, Arlington, Virginia, via hybrid meeting, in-person and webinar; Tuesday, August 2, 2022, and was called to order at 10:35 a.m. by Chair Jason McNamee.

CALL TO ORDER

CHAIR JASON McNAMEE: While we're waiting for folks to settle in here in the room, just one announcement. We're going to have a series of discussions on right whales, and I know there are some folks that may be in the back of the room from some of the southern states, that aren't necessarily on the Lobster Board.

But we welcome you to come up to the table and ask questions during that point in the agenda, if you wish. Just a reminder of that opportunity, if folks have questions about the speed rule or the ropeless work that's going on. Okay, looks like everybody is mostly settled in here, so why don't we get going with the agenda.

Welcome everybody! This is a meeting of the Lobster Management Board. We have kind of a hybrid thing going on here. It looks like most folks are in the room, but I know we have a couple of folks online as well. I think when we get to points of asking questions, and things of that nature, I'm going to look to the room first, and then follow up with the folks online, if that is okay.

APPROVAL OF AGENDA

CHAIR McNAMEE: With that, first I'll ask the question about the agenda. Are there any changes to the agenda that anybody wishes to make? Okay, no hands here in the room. Anybody online? No hands online, so we will call the agenda approved as submitted.

APPROVAL OF PROCEEDINGS

CHAIR McNAMEE: Next up are the proceedings from the last meeting. Are there any additions, changes, edits? Looking in the room here for any edits.

Not seeing any, anyone online? Nobody online either, so we will consider the proceedings approved as submitted. Great, thanks everybody.

PUBLIC COMMENT

CHAIR McNAMEE: Now is a point in time when we can take some public comment for things that aren't on the agenda. Are there any public in the room that wish to speak?

Did anybody sign up or anything like that, Caitlin? Okay. Nobody here in the room, anybody online that wishes to speak to anything not on the agenda? Okay, not seeing any hands, so we will keep moving along.

UPDATE ON JUDGE JAMES BOASBERG RULING IN THE U.S. DISTRICT COURT FOR THE DISTRICT OF COLUMBIA IN CENTER FOR BIOLOGICAL DIVERSITY VERSUS SECRETARY RAIMONDO AND THE MAINE LOBSTERMEN'S ASSOCIATION

CHAIR McNAMEE: Next up is a Discussion on the Judge Boasberg Ruling, and I believe we have Chip Lynch from NOAA here to talk us through that agenda item. Whenever you're ready, Chip.

MR. CHIP LYNCH: Hi everybody, Chip Lynch with NOAAs Office of General Counsel. As many of you are aware, we received an opinion from the Court on July 8th, identifying defects in NOAAs recent biological opinion and in its final rule from 2021. But in order to, I think better frame the conversation, I would like to take everybody back to 2017, because that is really when this all began.

As you recall, in 2017 scientists and other individuals started noticing a series of mortalities and serious injuries to right whales. It was unusual at the time, because in 2017 the prevailing belief

was that right whales were on a positive trajectory. NOAA and the states had implemented a number of rules in the past, protective measures, sinking ground line.

Massachusetts did its Bay closure, etcetera. It looked as though the population was responding positively. But in 2017 there was a number of these whale mortalities that undermined that belief. NOAA at that time convened the Take Reduction Team, which is a team that is created or identified under the Marine Mammal Protection Act.

It's a team of advisors, industry experts, scientists, managers. The charge was to look at this unusual mortality event. I mean that's what it was called. It had been termed a UME or an unusual mortality event, and to look at the condition of the species, and to come up with some ideas.

Around this same time, a number of environmental organizations brought suit, challenging against NOAA, essentially saying that NOAA needed to do more, and needed to do more faster. One of the ways in which this challenge took effect was to challenge NOAAs earlier biological opinion from 2014, sort of called a batched biological opinion, because it looks not only at lobster and Jonah crab, but at a number of fisheries up and down the coast.

That biological opinion concluded that it did not contain an incidental take statement, which is sort of a term of ours created by the Endangered Species Act. The case, which was brought by Center for Biological Diversity, I believe the Humane Society, Conservation Law Foundation, Defenders of Wildlife. That proceeded along, lawyers and everybody kind of had their own nomenclature on naming cases.

Center for Biological Diversity just happened to be the first name in the caption, so it's called the Center for Biological Diversity Case, even though it encompasses all those others, or the CBD case. That case proceeded along, the TRT proceeded along, coming up with ideas to decrease whale mortality.

Then the Court, the CBD Court rule in April of 2020, and then a little bit after in August of 2020, and fond that NOAAs earlier biological opinion was defective, because it lacked an incidental take statement. The judge in that case is Judge Boasberg. That is why you will all hear people talk about the Boasberg Opinion. That is what they are referring to.

The Court found NOAAs biological opinion defective, and gave NOAA time to cure that defect, which it did. In May of 2021, NOAA issued a new biological opinion, again it looked at impacts from Maine all the way down to Florida. It included not only lobster and Jonah crab, but other species such as bluefish, squid, mackerel, butterfish, scup, summer flounder, black sea bass, spiny dogfish, groundfish. It's a big, biological opinion, it's not just about lobster and Jonah crab. The opinion looked at what was at that time NOAAs intended plan to bring back whales, bring back the right whales.

That plan at the time was a phased approach to recover the right whale. There was a first phase, which was intended to be, at that time was going to be a rule. It turned out to be the September, 2021 rule, where NOAA and the states would implement regulations to achieve about a 60 percent risk reduction to the northeast trap fisheries, lobster, Jonah crab.

Phase 2 approach was going to achieve by 2023, was to achieve a 60 percent risk reduction in all the other fisheries, gillnet, Mid-Atlantic, trap pot fisheries, sort of leveled the playing field. Everybody gets a 60 percent risk reduction. Then there was going to be a third phase that was going to again look at all of the fisheries once again, and achieve additional risk reductions, and actually bring down mortality in whales or biological removal (you know, mortality) from fishing to about one.

That was scheduled for 2025. Then a further rulemaking that would bring the number of whales well below one, or 0.136 or something like that by 2030. That was the plan. The biological opinion looked at that plan, said there was no jeopardy, good to go. NOAA then issued its Final Rule on the Phase 1 fishery, Phase 1 measures. That happened in September of 2021, so a little less than a year ago.

Those are the measures that you're all familiar with, the weak rope, the breakable links, some seasonal closures. Soon after that the environmental plaintiffs, most of them, renewed their challenge to the now new biological opinion, the 2021 batch biological opinion. It also challenged the 2021 rule.

We can get into it if you want, but for the purposes of this discussion, we'll simplify it to say that the challenge was that NOAA needed to do more, and needed to do more faster. At the same time, industry was involved in the case, but it had also brought its own case, Maine Lobstermen's Association, Massachusetts Lobstermen's Association, etcetera, essentially arguing the flip side of this same coin, challenging the biological opinion and the rule for some of the assumptions, the technical assumptions and math that NOAA did.

That case is also before Judge Boasberg, and we refer to that case as the MLA Case for Maine Lobstermen's Association, because they were the first in the caption. Those cases were proceeding forward, and we briefed the matter in the spring, and we got a decision from the Court this past July.

The July 8th ruling, is only a partial ruling. The ruling essentially states, the Court ruled in two parts, one part on the biological opinion, and one part on the 2021 rule. As to the biological opinion, the Court, and I have to clarify it's the judge sitting in with jurisdiction over the CBD case. The judge also has jurisdiction over the MLA case, again, flip side of the same coin, hasn't ruled on that. But as far as the CBD case, the judge ruled and said, NOAAs biological opinion is again defective. Essentially the reason is because NOAA issued an incidental take statement, but the incidental take allowed was 0, and the Court said, you can't allow a fishery with a 0 ITS when your own documents say that the fishery is going to take something greater than 0, 2.65 I think is the number. As to the rule itself, the Court said, you need to get to PBR, which I'll define in a minute, within six months of the rule.

PBR is a term of art. It's a term under the Marine Mammal Protection Act, its potential biological removal, and essentially what it means is, how many whales can the fishery seriously injure or kill. That is a standard under the MMPA, and still allow the fishery to be at sustainable levels. The rule, scientists say that the current PBR, or at least the PBR at the time, was 0.7, so 0.7 whales per year.

I have to say that when we're talking about numbers, the numbers are great to add so it is not so esoteric. You're dealing with hard numbers. But they are only a snapshot at the time. The whale population, the models show the numbers altering slightly as you put more inputs and different inputs, but basically for the purposes of this discussion, PBR, potential biological removal for whales is 0.7.

The final rule that came out, or the plan being proposed by NOAA had this Phase 1, which would lower PBR all the way down from 4.5 to approximately 2.5, so almost cutting it in half. Then by the time you're getting down to this Phase 2, it's down to a little bit under 2.5. Phase 3 it's down to 1. Phase 4 at 2030 is, again as I mentioned before, down to 0.136.

The Court said, you need to get to PBR within six months of your rule, and if PBR is 0.7, then you need to get to 0.7 within six months of your rule, and this rule did not do so. The rule, again, was part of a plan to get to that number, but it didn't get to that number within six months. The Court said, these are the defects, we need to figure out what to do about this.

It set up a further round of briefing, which we call the Remedy Briefing, you know the okay, now what briefing. We were just in front of the Court, and the Court set up a schedule and said that the environmental plaintiffs have to submit their remedy briefing by August 12. NOAAs is going to be September 19.

Some of the intervener defendants, such as Lobstermen's Association, will have their chance at briefing in early October, and the Plaintiffs get the final say on or around October 21st. What that means is the Court will be in a position to render a decision sometime after October 21st. The Court in its original opinion July 8th, did make note of how difficult a problem this is, and how there are tremendous impacts on all parties involved, including the fisheries in the coastal communities in New England.

I don't think it would be, if the briefing is done on October 21st, I don't think the Court will be able to round up an opinion by the 22nd, so we're talking probably an opinion a month or two after that, probably a holiday season. It could be later, but that is probably, consistent with past practices by this judge, that is where it would go.

There is one other intervening issue here though. Again, as I mentioned, the MLA case being brought by industry is still pending. The Court has not ruled on it. I mean you can't look at the CBD end of this case and not have a sense of where the judge is going. But nevertheless, there are important questions being raised in the MLA case that could bear on what the parties would say in the briefing on remedy in the CBD case. For example, the MLA case, the challenge there has been to some of the assumptions that NOAA has made in its modeling, and an allegation that NOAA is relying too much on the worse case scenarios to come up to its numbers.

Many would say we need to know what the Court thinks of that, because that will inform where we need to go forward, how we need to go forward in the CBD case. The Court understood that and said, okay, the judge said that he would take briefing on that particular topic by August 5th, which is a couple of days from now.

We are waiting, or we will be waiting to hear from the Court, to see what it's going to do with the MLA case, and options would include. The judge could say, we will stay the case until sometime in the future, maybe even after the final decision in the CBD case, or even a rule that may come out by NOAA.

The idea being that depending on what the parties do here, it could obviate the need for the Court to rule in MLA. It could moot things out, or the Court could say, I agree there needs to be an opinion, and here it is, just issues its opinion in MLA, or the Court could say, we'll stay the briefing schedule until after it issues an opinion in the MLA case, which would happen probably forthwith. There may be other options that I haven't even thought about.

But that is pending, and that is what we're working on now. That which I've spoken to you is obviously generalized and probably over simplified in a way. But there are many moving pieces. There is a lot going on. There are even other cases involving whales. I'm happy to answer any questions you have on them to the extent that I can, to the extent that I know. But with that, I think that encapsulates where we all are in the process here.

CHAIR McNAMEE: Awesome, thanks so much, Chip, really complicated stuff. I think you boiled it down in a way that was understandable. Thanks for that. Why don't we take some questions for Chip, if anybody has any? I'm looking around the room. Okay, I'll go to you first, Pat.

MR. PATRICK C. KELIHER: Chip, that was a thorough presentation and there is a lot there. If you're not involved in it day to day, minute to minute, it might seem like this is something that is workable in many ways. But I'm wondering, and if it's too much to ask, I understand. But I'm wondering if you could put a finer point on the seriousness of the issues

related to, not PBR, but to negligible impact, and whether that can be reached. Because I think it's important for this Board in particular to understand the potential ramifications of this decision and where it's going.

MR. LYNCH: I can answer some of that. I can certainly give you my understanding of where we come up with this negligible impact thing. A negligible impact determination is a phrase of art. It's something that is in the law. You'll hear people talk about a NID all the time. That's what it is. It's the negligible impact determination. The negligible impact determination is the crosswalk from between the ESA, the Endangered Species Act and the Marine Mammal Protection Act. It comes up in this case, because one of the chief criticisms, or a criticism of the Court was that NOAA did not, originally, did not include an incidental take statement, which is a term under the ESA, in its biological opinion. Then NOAA put in a 0 incidental take statement in its biological opinion.

The crosswalk is that in order to issue an incidental take statement for whales, the Agency needs to make a determination that the continued action that it is consulting on will have a negligible impact on the survivability or the status of the stock in a sustainable way moving forward. It's not so simple as coming up with a rule that gets to achieve PBR, or this potential biological removal within six months.

The issue also involves being able to determine that the fishery, in getting to PBR, will have a negligible impact all the while. Now, PBR, and this is where I got out of my league, because I am not a scientist. PBR is a number that is, excuse me negligible impact determination number is a number that is equal to or less than the number for PBR.

I've seen scenarios where the negligible impact determination number is 50 percent of PBR. It can be 30 percent of PBR, it can be 10 percent of PBR. I don't have a precise number as to what it is here. But suffice it to say, in order to get to negligible impact, well I mean let's just use common sense.

The word is what it says it is, it's a negligible impact, and it's something that the scientists would calculate as to what that number is. It's likely to be at, and quite potentially below PBR, maybe even significantly below PBR. Does that answer your question, Pat? I'm not sure I can get to.

MR. KELIHER: It does, but this is my perception, and if you believe I'm wrong you can tell me, but just for the Board's understanding. We believe that the potential to reach PBR is there to continue this fishery. We don't believe this fishery will be able to continue if we have to reach a negligible impact. That's where we are with this lobster fishery, an either/or scenario. We've got two steps. We've got an interim step for remedy, and then a final rule that then moves us out to PBR.

The timeframe on those things, you know are going to be argued in the Court. But I just want to make sure that this Board is clearly understanding the seriousness that this fishery faces, a billion-dollar industry on the east coast. The most valuable single-species fishery in this country could be closed, because of this tie between the Endangered Species Act and the Marine Mammal Protection Act. This has been my worst nightmare, and it's moving in that direction.

CHAIR McNAMEE: Go ahead, Chip.

MR. LYNCH: To underscore the gravity. I hope I didn't misdirect the Board. There will be a briefing remedy, and there will be a Court ruling. I don't know what the Court is going to say. The last time the Court found NOAAs biological opinion to be defective, the Court gave us time to correct it, and allowed the biological opinion to continue to exist in the meantime. My personal opinion notwithstanding, the reasonableness and necessity of such an approach. It's possible the Court could be even more draconian than that, meaning the Court could vacate the biological opinion. It's

possible. I didn't want to mislead anybody here to think that the Court is going to give time. It might.

CHAIR McNAMEE: Thanks for that. Jim Gilmore, go ahead.

MR. JAMES J. GILMORE, JR.: I'm not sure if this is a question to either Pat or Chip. Pat just said, so if they can't reach the NID it's a complete closure of the fishery, there is no option for? Not that it's a good solution, but I mean a reduction. Say if you said, well, if you reduced harvest by 50 percent hypothetically. That's not an option? You either have to have a fishery or no fishery? It sounds a little bizarre to me. But anyway.

CHAIR McNAMEE: Go ahead, Chip, if you feel like you can answer.

MR. LYNCH: I don't know that I can. I quickly get out over my skis when we talk about the specifics here. But suffice it to say that the severity of a potential result is not being overstated.

CHAIR McNAMEE: Thanks for that. John Clark.

MR. JOHN CLARK: Thank you for the explanation, Chip. Is this a uniquely bad situation because of the interaction of the Marine Mammal Protection Act and the ESA, and as such may be limited in its precedent, or could this just be the start of more draconian interpretations of these laws, and if so, is there any thought of appealing this? Who would appeal this? Would NOAA appeal this if it is as extreme as Pat is saying, where the fishery is closed, or would that have to be a state appealing this, or the Lobstermen's Association?

MR. LYNCH: Any party to the lawsuit can appeal the result. When you have in the CBD Case combined with the MLA Case, there is state, there are numerous industry groups, there are environmental organizations. Any of them could appeal any potential result. As to the novelty of the situation, it is different, because it involves the interplay between the MMPA, the Marine Mammal Protection Act, and the Endangered Species Act.

Were this only an Endangered Species Act issue, we would be talking about that which could, the standard would be federal actions that jeopardize the continued existence of the species, and we could issue a biological opinion based thereon, and reasonable and prudent measures or alternatives, depending on the finding, and we would issue an incidental take statement. With the Marine Mammal Protection Act there is this additional hoop to jump through. In this instance it does complicate matters.

CHAIR McNAMEE: Good, John? Okay, next up I have Dan McKiernan, and this will be the last question on this, and we're going to move on to the next agenda item. Go ahead, Dan.

MR. DAN McKIERNAN: Thanks, Chip, great summary. I do have a question on a technical level. The biological opinion only dealt with the federal waters permit holders fishing in federal waters. Where does that leave the state fisheries, legally, in all of these deliberations?

MR. LYNCH: That is going to take a lot longer to answer, Mr. Chairman. The most acute issue would relate to the federal fisheries, or fisheries in federal waters, because that is what is at bar. There would not need be very many ripples from where the stone falls to eventually hit the state fishers. Right, I mean everything is related.

We're talking, and everything is related in perhaps my oversimplified version of, at the end of the day we are talking about ways to preserve the resource. By that I mean the right whale resource, and how and when and means and methods to do that is something that I just would not be in a position to be able to talk about. I just don't know about it. But I think the gist of your question, Dan, is that would there be reverberations. Yes, I can't imagine how there would not be.

CHAIR McNAMEE: Okay, thank you very much, Chip, that was a tough one. Good job doing the best you could to answer the questions. We really appreciate the opportunity. We're going to move on to, sorry, go ahead, Steve.

MR. STEPHEN TRAIN: It's not your fault, I've been holding my tongue, because I'm afraid once I get started, I may have trouble stopping here. Chip, I appreciate every bit that you said, and when I ask these or make these statements, it is not out of ignorance or stupidity nor anger. What I'm trying to understand, and I guess I'm saying it now so it is on the record.

The goal of both of these federal acts is to make sure we don't kill whales. Essentially this is what it comes down to. That is what is being applied, that's why there is a lawsuit. In over 25 years of research by your own Agency and studies, there has never been a case of a fatality caused by Maine lobster gear, not one documented case.

To the best of my knowledge, there have only been two entanglements, and they were freed or released. I understand the law is not specific. I understand the ESA has the term pose risk. But all of this is done to accomplish a goal, that it appears we have already met, and there is the overlying threat of closing a fishery to meet it.

I don't see how we have defense for this. I mean I understand why you're in this position you're in at NOAA, when it appears we've done what we've had to do to accomplish the end goal. Yet we're being challenged again by one agency or another, or one NGO or another, by a judge who is required to enforce the law.

I guess what I'm leading to with all of this. I told you I might go too long. How do you see this working forward in the next two or three months? I mean I know 5,000 families whose income depend on this fishery, that we've managed very sustainably, and we get something thrown from the stands instead of the outfield.

CHAIR McNAMEE: Chip, do you want to take a shot at it?

MR. LYNCH: I'm not sure I can say a whole lot more than, I hear you. This is an extraordinarily difficult situation for all people to be in. I hear you. Whales are in the ocean. It's unlike documenting what happens to a species that is terrestrial. There are few sightings of whales that can be attributed to any one state. I think that is part of the problem. I can understand Maine people saying that they haven't seen a whale. It hasn't been documented mortality from Maine gear. I think most states can say that though, because whales don't have gear that can be attributed to a particular fishery or area, sometimes they're dying out at sea.

But it makes it extraordinarily difficult. As to where this is headed in the future. Tough to say, because so much is going to be dependent on what the Court says next. I can tell you that the Agency, NOAA, is committed to moving forward, because there is no other option. What that looks like remains to be seen. I wish I could give you a better answer than that. I know it's not fulfilling, but I think that is about as much as I can say.

CHAIR McNAMEE: All right, thank you, Chip, let's move on to the next item.

DISCUSS IMPLICATIONS OF PROPOSED MEASURES OF DRAFT ADDENDUM XXVII ON INCREASING PROTECTION OF SPAWNING STOCK BIOMASS OF THE GULF OF MAINE/GEORGES BANK STOCK

CHAIR McNAMEE: The next item on the agenda is a discussion on Addendum XXVII, which is focused on Increasing Protection of Spawning Stock Biomass of the Gulf of Maine/Georges Bank Stock. Caitlin has a brief presentation, and then we'll get to our discussion. Caitlin, whenever you're ready, take it away.

MS. CAITLIN STARKS: I'm just going to go over where we currently stand with Draft Addendum XXVII, which is on increasing the protection of the spawning stock in the Gulf of Maine and Georges Bank. I'll start off with some background quickly,

and then review the proposed management options in the document.

Then I'm going to outline some of the concerns that have been brought forward, related to the proposed gauge sizes in the document. Then lead the Board into discussion on how to move forward. Just to recap really quickly the history on this. The Board initially initiated this Addendum in August, 2017, and that was in response to concerns about decreasing trends in Maine's larval settlement survey, and the potential for future declines in recruitment and landings.

At that time the Addendum focused on standardizing management measures across the lobster conservation and management areas or LCMAs within the stock. Then draft Addendum XXVII was put on hold for a few years, as the Board had to prioritize work related to right whale risk reduction efforts.

Then in February, 2021, after approving the 2020 benchmark stock assessment, the Board reinitiated work on this Addendum with a new motion that changed the focus of it to consider a trigger mechanism, such that upon reaching that trigger, measures would be automatically implemented to improve the biological resiliency of the Gulf of Maine and Georges Bank stock.

That was responding to trends since the Addendum was initially started, which have continued to be a concern with the settlement surveys over the past five years remaining below the 75th percentile of their time series. We've also seen declines in recruit abundance in the ventless trap survey and trawl surveys for the Gulf of Maine and Georges Bank stock since that 2020 assessment.

Considering all that information, the Board updated the objective of this Addendum to this statement on the screen, which focuses in that trigger mechanism that when we reach that trigger, it would automatically implement measures to increase the protection of spawning stock biomass. After we reinitiated this in February, 2021, the Board did approve the draft Addendum for public comment in January of 2022. But at that same meeting the Policy Board decided to delay the release of the document for public comment, because there were concerns that upcoming actions and information could impact the ability to get useful public comments.

In particular, thinking about upcoming information on the stock condition from data updates that could impact the trigger index in the draft Addendum, and also some potential management related to right whales, which we've been talking about this morning. The states also wanted the opportunity to hold safely some in-person hearings before any Commission hearings.

That is where we left off with this Addendum, and then I quickly want to refresh everyone's memory, and go through the proposed management options in the Addendum. This Addendum has two separate issues in it. Issue 1 is addressing the standardization of a subset of management measures within the LCMAs and across the Gulf of Maine and Georges Bank stock.

Then Issue 2 considers applying either a trigger mechanism, or a predetermined schedule for implementing biological management measures that would be expected to provide increased protection to the spawning stock biomass. Just for reference, these are the current measures for the areas within the Gulf of Maine and Georges Bank stock, which are Area 1, 3, and Outer Cape Cod.

As you can see here, there are differences between each of the areas for pretty much each of the measures. Then under Issue 1, the two main options are Option A, status quo, or Option B, which is to implement some standardized measures upon approval of the Addendum. Option B has four sub-options to define what those standardized measures would be.

B1 would be standardizing measures only within LCMAs where there are current discrepancies, B2

includes standardizing the V-notch requirement across the LCMAs. B3 would standardize the V-notch possession definition, and B4 would standardize the regulations for issuing additional trap tags for trap losses.

It's important to note here that the Board could choose multiple of these sub-options from the list, depending on which issues they would want to address. Then Issue 2 focuses on implementing management measures to increase the protection of spawning stock biomass. The proposed options under Issue 2, consider changes to the minimum and maximum gauge sizes, along with corresponding vent sizes for the LCMAs within the stock.

Those would be expected to both increase the spawning stock biomass, and result in the minimum gauge size increasing to meet or exceed the size at 50 percent maturity for each LCMA. The vent sizes would then change according to the final minimum gauge size that gets implemented in each area.

There are two proposed approaches again for implementing these changes to the gauge sizes. The first approach is to establish a trigger mechanism that would have a predetermined set of management measures that would be implemented upon reaching a defined trigger level based on changes in recruit abundance indices. Then the second approach would be to establish a predetermined schedule for future changes to the management measures. Options A through D, which I'll go through, use that first approach with the trigger mechanism, and Option E uses the second. These are the five options under Issue 2.

We have Option A, no additional changes to the measures, B is the gauge size changes would be triggered by a 17 percent decline in the trigger index, and then additional changes would be triggered by a 32 percent decline in the index. Option C is that gauge sizes would be triggered by a 20 percent decline, and then additional changes triggered by a 30 percent decline, and D is that a 17 percent decline in the index would trigger a series of gradual changes in the gauge sizes over several years.

Then lastly, Option E considers changes to the minimum gauge size in LCMA 1 only, on a predetermined schedule, as opposed to being triggered by the index. I'm going to run through these fairly quickly, because they are in the document and we've seen them before. But these are the proposed measures that would be implemented, if each of the two triggers is reached under Option B.

You see the minimum gauge size at LCMA 1 increasing to 3 and 5/16 of an inch in the first trigger set of measures, and then in the second trigger you have a change to the minimum gauge to 3 and 3/8 of an inch, and also the maximum gauge size in LCMA 3 and Outer Cape Cod. Option C is identical to Option B with the exception of what the trigger levels are.

Whereas it was 17 and 32, these are 20 percent and 30 percent declines in the index that would trigger these measures. Then Option D considers implementing the gradual changes in gauge sizes, which would be triggered by a 17 percent decline in the trigger index, to start. The minimum gauge size would increase in 1/16 of an inch increments, and the maximum gauge size would decrease in increments of 1/4 inch.

The first gauge size again, would be triggered by 17 percent decline. Then after that first set of changes, the incremental changes to the gauge sizes would occur every other year as shown in the table. Then the vent size in LCMA 1 would be adjusted only once, to correspond with the final minimum gauge size change in Year 5. This is a reminder of what the trigger index that is being proposed to trigger these management measures looks like.

The combined index is shown in the upper left panel, and the other panels show the three datasets that go into that combined index, and this is for the available time series through 2020. Each of the

proposed trigger levels considered in this Addendum are shown with the horizontal dashed lines. We've got 17 percent to 32 percent shown there. Then this is our last option, Option E, which is to establish a schedule for changes to the minimum gauge size in LCMA 1 only.

This would increase the minimum gauge size from its current size to 3 and 5/16 of an inch in the 2023 fishing year, which is how it was proposed back in January, when this was approved. Then two years after that the final adjustment would be made to the minimum gauge size in Area 1 to 3 and 3/8 of an inch, and the vent sizes would also be adjusted according to that.

Since the Board met last in March, and this Addendum was approved for public comments, a concern has been raised about the minimum size that was proposed for LCMA 1 in the Addendum options in Issue 2, and implications that they could have for commerce. Specifically, the options proposed an increase in the minimum size in Area 1 from 3 and 1/4 of an inch to 3 and 5/16 of an inch. But Magnuson-Stevens Act, as written, prohibits the import and sale of lobster smaller than the minimum possession size, in effect under the Commission's FMP.

Since Area 1 has the smallest minimum gauge size, the concern is that increasing it would result in lobsters under 3 and 5/16 of an inch not being able to be imported from Canada any longer. This could obviously have potential impacts on the market and supply chain. As we just heard from Chip Lynch, there is a likelihood the states might need to implement changes to the fishery in the near-term, to address right whale serious injury and mortality.

We're not sure what impacts those might have on the stock and the fishery at this time. These are two concerns that have been brought forward, and the Board may want to discuss today. Given those, I'm looking to the Board for some discussion and guidance on how to proceed with Draft Addendum XXVII at this time. That is my last slide, so I can take any questions.

CHAIR McNAMEE: Great, thanks so much, Caitlin. Nice presentation, and you got through that quickly, so nice work. I'm going to give an opportunity for questions for Caitlin, but first I just wanted to lead in here a little bit to say, so we have this document that we've been working on. This is a possible action item on the agenda, so we've got a couple to pass. There are probably more than a couple.

But at the highest level we could conceivably dispense with this document today and get it out, or think about delaying based on some of the concerns that have been brought up. If we can kind of focus on those two paths, at least to start, hopefully that will kind of get us to, we only have about 20 minutes for this agenda item, so we can't spend too, too much time on it. With that I will go to questions, and I saw Dan McKiernan's hand first. Go ahead, Dan.

MR. McKIERNAN: My question is a technical one regarding Magnuson. Is it unique to lobster that there is a prohibition on imported undersized animals from out of country? In other words, do we allow the import of undersized, say cod or halibut under Magnuson?

MS. STARKS: I can attempt to answer. I believe it is specific to lobster. Bob, if you know more, please jump in. But the language that I'm looking at specifically says for Homarus americanus.

CHAIR McNAMEE: Okay. Other heads were nodding in the room, so I believe that is correct. Other questions for Caitlin, before we get into the discussion here. Is there anyone online, Caitlin? Just sort of multitasking at this point. Okay, no hands online. Pat.

MR. KELIHER: Mr. Chairman, if you don't have any more questions, I would be happy to put a motion onto the board.

CHAIR McNAMEE: Okay, one last pass through the room here for hands. Not seeing any; so Pat, if you would like to make a motion to kick us off here, please do.

MR. KELIHER: Great, and I believe staff have this, if they wanted to load it up. Thank you, and if I get a second, I'll give some additional rationale. But I think after today's conversations you probably all understand it. **Move to postpone the consideration of the public hearings on Draft Addendum XXVII 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 on dealers and processors. The LEC should also review new language that may be suggested by the PDT.**

CHAIR McNAMEE: Okay, thank you. We have a motion on the table and looking for a second. I see multiple hands; I saw Cheri's first. Cheri Patterson gets the second. Let's open it up for discussion. Pat, do you want to speak to your motion?

MR. KELIHER: Yes, thank you, Mr. Chairman. I mean clearly the Magnuson issue is raised within the motion itself. I've spent a lot of time talking to dealers and processors who live in Maine that probably handle between 50 and 75 percent of the product that come through, and learned clearly what the impact would be on those businesses, especially in the springtime of the year.

It doesn't seem like a lot when you're talking about a gauge size change of 16th of an inch, but if they are not allowed to bring that product in at certain times of the year, especially considering the increased yield that they have out of those harder shell lobsters. It's a massive economic hit to them, so it reverberates through the market chain.

For those reasons, I believe we need to make sure we understand exactly what the ramifications are, and if there is a way around it. I believe looking at harvest vs. possession, because the Magnuson Act is specific to possession. There may be a solution here. I want to make sure it's clear. My goal is not to continue to kick the can down the road on this Addendum. We need this Addendum, from a resource standpoint.

But we need to resolve these other issues. Lastly, I will just say, without belaboring the issues. We heard a lot about whales today. Understanding at least the direction that the Agencies may be going in with remedy, and what the ramifications are, and what that means to the lobster harvest itself. That may play into, I know we don't like to use resiliency anymore, but it may play into the stock resiliency, and certainly benefit the spawning stock biomass. With that I'll end my conversation.

CHAIR McNAMEE: Cheri, do you wish to add anything?

MS. CHERI PATTERSON: Pat definitely covered most of it. I think the one thing I just wanted to add is, without having clarity for law enforcement with this MSA concern. I think we just need to wait until this gets resolved, so that it's actually something that is enforceable in the future, if need be.

CHAIR McNAMEE: Others wishing to discuss. Go ahead, Dan McKiernan.

MR. McKIERNAN: I hope that we would entertain discussing with Canada the potential for them to increase their minimum size along with us, because I recall when the Mitchell Bill, I guess this is my Tom Fote imitation. When the Mitchell Bill was enacted back in the early nineties, I think it was in response to the industry being upset about the small Canadian imports being on the market.

It seems like if we do survive the hurricane that is the litigation on right whales, I could foresee a very similar outcome. I think it would be prudent to at least consider requesting Canada, since we do share

to some degree that Gulf of Maine stock with them, to see if they would consider going up with us, and make our lives that much simpler.

CHAIR McNAMEE: Is there anyone on line, Caitlin?

MS. STARKS: Alli Murphy.

CHAIR McNAMEE: Alli Murphy from NOAA, go ahead, Alli.

MS. ALLISON MURPHY: I just wanted to say, I think that this is a reasonable path forward here. I've been a part of the Addendum XXVII PDT, and look forward to continuing discussions with this, and pulling in other NMFS folks as needed to work through this issue. Thank you.

CHAIR McNAMEE: Thank you, Alli. I've got another online, David Borden. Go ahead, David.

MR. DAVID V. BORDEN: If it's an MSA problem, then is it going to require a Congressional action to change the language? That is one question. The other concern I've got about this. We started this Resiliency Addendum, I think in 2017, if my memory is correct, for a very good reason. We wanted to avoid a situation like the situation that developed in southern New England. The longer we go with this, the more difficult it's going to be to do this. I'm also getting more and more concerned about these indices, which continue to trend down.

If that continues, what you're going to find is, based on the experience from southern New England, is that the industry will get their backs up much more on even minor changes, because the changes will have really pronounced negative economic impacts. As I have echoed at prior Board meetings, the time to do this is when the resource is in relatively good shape, when it's in horrible shape, like the southern New England resource, it becomes that much more painful.

CHAIR McNAMEE: Thanks for the comment, David, and I think we have an answer to your initial question there, so Caitlin, go ahead.

MS. STARKS: I believe that the way the language is written in MSA, is it prohibits transfer, offer for sale, selling, purchase of any whole live lobster smaller than the minimum possession size in affect under the American lobster FMP. I believe if we thought about changing the language to a harvest size, rather than a possession size in the FMP, that we could avoid this. But that is my initial read, so I think it would be worthwhile to have the PDT take a closer look and discuss it.

CHAIR McNAMEE: Good Dave, okay great. Maybe I'll ask a quick question first, and looking to my colleagues here at the Commission. We have this motion to delay; it is to kind of investigate this MSA concern. We think there is a potential path here that Caitlin just offered. But is there a mechanism between now and annual meeting to kind of sort through this? Is there a plan there?

MS. TONI KERNS: Jay, we can work with NOAA Fisheries and the PDT, to the extent to try to resolve this, as long as there is a path forward to do so. I just don't want to guarantee it.

CHAIR McNAMEE: Understood. At least the mechanism was just the ability to kind of get whoever together, to see if there is a way, so that we have something to report in October or November, whenever the annual meeting is. Okay, great. Steve Train, go ahead, Steve.

MR. TRAIN: I'm going to support the motion to delay, not because I want to delay this action. Dave Borden said that very well. The indices are turning the wrong way. I'm going to support the motion to delay, because it's an enforcement issue that needs to be done. It needs to be straightened out before this can happen. I do think convoluting this with possible whale action is the wrong reason not to do it.

I think we need to move forward with this, if we see those triggers. This doesn't mean it's mandatory, it

doesn't mean it's going to have to happen. But to have the opinion that there is too much hitting us at once, when there are separate issues, and this is a resource health issue, doesn't sit well with me. I think we need to separate the issues. I'm glad that that is how this deals with this, it's enforcement, not other issues hitting us.

CHAIR McNAMEE: Eric, go ahead.

MR. ERIC REID: I just had a question about process. If this motion passes today, we're going to find out the results of the investigation, let's call it an investigation, in, when is our annual meeting, beginning of November, right? What happens then? If there is a way forward, whether it's changing the language in the plan, is that a framework? What does that look like, and then what does that do to the underlying efforts timeline?

CHAIR McNAMEE: Good question, Eric. Is there a response? Caitlin.

MS. STARKS: Yes, I can take a stab at that. I believe that in November, we could come to the meeting, we the PDT, with some recommendations for how to modify this document, specifically to address this issue. At that time, if those modifications are possible and completely resolve the problem, and the Board is comfortable moving forward.

Then we could just take the document out for public comment after the November meeting, so probably during holiday season, and maybe come back before the Board at the February or late January winter meeting for considering it for final approval. If I could just add one more bit of information that might help. The index that I showed earlier is through 2020, and the TC is currently working on updating that through 2021. I think we would have a better idea of where the index stands, in relation to the trigger points that have been identified in the document. If the Board wished to, I think modifying those trigger points would be within the prerogative of the Board, based on where we are with that trigger in 2021.

CHAIR McNAMEE: Thanks, Caitlin, are you good, Eric? Okay, Dan McKiernan, go ahead.

MR. McKIERNAN: Caitlin, as a follow up to Eric's question. It seems to me like there are three different paths forward. One is modification to Magnuson, which is statutory, which sounds pretty challenging. Modification to federal regulations, which could be done, but it would take longer. But then modification to the Addendum itself, regarding possession, etcetera. Are all three of those going to be sort of examined by the staff in the interim? Is that the thought?

CHAIR McKIERNAN: Go ahead, Bob.

EXECUTIVE DIRECTOR ROBERT E. BEAL: Maybe I'll take those in reverse order. Yes, definitely the staff and the PDT will look at the Addendum modifications. We can talk with NOAA, your second option, about federal regulatory modification and the timeline associated there.

I think modifying Magnuson, everything that we're hearing right now is there is probably going to be no motion on modifying Magnuson, you know, unless there is something tucked into another bill that Congress is moving forward. That is usually risky, and with something as big as Magnuson.

It often doesn't go very well, just trying to get one or two sentences modified in another Congressional action. We can investigate that a little bit. But I think that option of updating Magnuson to either remove this language about the import size limit. I wouldn't count on that one being a viable option, or a very timely option either.

CHAIR McKIERNAN: Are you good, Dan? Okay. All right, looking around the table, not seeing anybody with hands up here, online is there any hands? No hands online. Maybe I'll take a moment to see if there is any public that wishes to offer, before we dispense with this motion, any comments or

questions? Nobody in the room here, no hands popping up online.

All right, so let's get to calling the question then. We've got a motion on the board, it's been seconded. All those in favor of the motion, oh, time out. Sorry, you've got it, Eric. We're going to call the question, so let's take a two-minute caucus, and we'll come back. I've got 11:48, we'll be back at about ten of. Thanks for slowing me down, Eric.

Okay, so the time limit is up. Does anybody need a little more time? Flag me down here at the table, or raise your hand online if you need a little more time. Not seeing any. All right, because we have sort of two parallel universes operating here, what we're going to do is, I'm going to call the question for the folks in the room, and then I'll do the same for the folks online. We'll tally all of those. All at once, oh, okay. We're going to go simultaneously. When I call the question, folks in the room please raise your hand, and folks online also, please raise your virtual hand. Oh, we've got a timeout, go ahead, Dan.

MR. McKIERNAN: I think that's a little bit of a challenge, because one of our members of our delegation is not present, so I think you only want one hand from Massachusetts, for example. I don't think you want a third member of the delegation to vote.

MS. KERNS: What I'm just saying is that like for example, Alli is not here, so Alli will be raising her hand online. But I assume that the delegations have worked out who will be raising their hand for their state. I will call your state name. Please do not lower your hand until after I've said your name.

CHAIR McNAMEE: I made the same assumption, and we know who you all are, so we'll know if somebody is trying to trick us. Back to the question. **All those in favor of the motion, please raise your hand.**

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

CHAIR McNAMEE: Okay, anyone opposed to the motion, please raise your hand. Okay, no hands, any abstentions, please raise your hand? No hands, and finally any null votes, please raise your hand. No hands. **We had 11 in favor, no one opposed, no abstentions, no null votes. The motion passes.** We will be talking about this again in early November. Thanks for that everybody.

UPDATE FROM NOAA FISHERIES ON ONGOING ACTIONS RELATED TO NORTH ATLANTIC RIGHT WHALES

CHAIR McNAMEE: All right, so we're going to move on with the agenda. The next agenda item is another discussion on North Atlantic Right Whales. There are two components of this discussion. I'm not sure who all is speaking to it, so I apologize for not recognizing. Oh, I do have that.

PROPOSED RULE NORTH ATLANTIC RIGHT WHALE VESSEL SPEED REGULATIONS

CHAIR McNAMEE: All right, so if it's okay, we would like to talk about the Speed Rule first, and I believe Caroline Good will be giving that information to us. Caroline, are you ready?

MS. CAROLINE GOOD: I am indeed, thank you.

CHAIR McNAMEE: Okay great, take it away.

MS. GOOD: Today I'm going to be talking to you about a new proposed rule that we actually just released yesterday. This has to do with modifying the current North Atlantic right whale vessel speed regulations along the U.S. East Coast. Just to start off, I wanted to review the current speed rule regulations for everyone.

The current rules were put in place in 2008, following a series of events of right whale strikes along the U.S. coast. These restrictions place mandatory 10 knot speed limits on most vessels

equal to or greater than 65 feet in length in these specified seasonal management areas along the U.S. coast. They are collectively effective between November 1st and July 31st every year, although as you'll see, they turn on and off at different times, depending on when right whales are likely present in those areas. The speed regulations also include a special safety deviation provision, whereby vessels may exceed the 10-knot speed limit if they encounter conditions that may severely impact vessel maneuverability, and they make a special notation in the vessel log book.

There are also on certain vessel types and categories that are exempt, including military vessels, federally owned or operated vessels, vessels that are engaged in active search and rescue, or enforcement activities as well. We conducted a broadscale evaluation of the compliance with the current rule, and found that current compliance levels exceeded 81 percent, and they had essentially gone up year after year since 2008, when the rule was first put in place.

This is a very busy, active vessel transit corridor. We documented more than a million nautical miles of transit distance each year within these active, just during the periods of the year seasons, when these seasonal management areas were active. I'll also note too that the vessel types that we found that most frequently were exceeding that 10-knot speed limit, tended to be ones, unsurprisingly, that are designed for speed, and included container ships and pleasure vessels, so these could be large luxury yachts, they could be large sportfishing vessels, that sort of thing.

Again, these are all vessels that are designed for speed, and are also racking up a lot of, again, transit distance within these areas. I also want to comment briefly on our current voluntary speed programs as well. We will right now declare voluntary dynamic management areas or slow zones along the coast, when either three right whales are detected in proximity, or right whales are acoustically detected outside of those active seasonal management areas.

We will declare a DMA or slow zone boundary around those for usually 15 days, and request that vessels transit at 10 knots through those areas or avoid those areas. In 2021, just to give you an idea, we had 67 such DMAs or slow zones declared along the coast. You can see on the map here.

But the key takeaway I want to highlight about this voluntary program, is that cooperation with this program is fairly poor. Despite our efforts to get the word out, to ensure that mariners are aware of this, we just are not seeing a level of cooperation that we need to really get sufficient conservation benefits for the whales from this program.

I'll also note too that this program was released in 2008, concurrently with the mandatory speed restrictions, and at the time this did indicate that if mariners did not cooperate at significant levels with this program, that the Agency would likely look at making something similar to this mandatory.

That brings us to today, and the proposed changes to the rule. We have four primary types of changes that are included. The first and probably most significant, are changes to the seasonal management area boundaries, both temporal and spatial boundaries, and also, we're going to be renaming the two seasonal speed zones, and that is just really to make it a little bit more obvious what they are, since a seasonal management area, they said oh, it could be anything. These changes would really substantially expand the spatial footprint of these areas. It almost doubles the area that would be covered under the rule. Most of that expansion is occurring in the Northeast and Mid-Atlantic, with more modest changes in the Southeast. But these changes are being put in place to address that misalignment that we are seeing between areas of elevated lethal vessel strike risk for right whales, and where the current boundaries are found.

Second thing the proposed regulation change would do is add additional vessel size classes into the vessels that are currently regulated. We would add

vessels that are between 35 and 65 feet in length, and this is to address an ongoing problem with strike risk from this smaller vessel size class. We've had six lethal collisions that are documented in U.S. waters since 2006, involving this size class.

Third, we would create a new mandatory speed zone framework. This is somewhat similar to the DMA and Slow Zone program, but we would have different protocols for determining where these would be. But again, these would be again, temporary speed zones established when right whales are detected outside of the new seasonal speed zones, and they would be in place for a limited period of time.

We have some new protocols that I'll talk about later, about how those would be determined as well. Finally, we will also be making some updates to the safety deviation provision, and this is to enhance our ability both to monitor the rule, enforce the rule, and for safety of mariners. These updates would now require mariners who use the safety deviation exemption to report in electronically to NMFS within 48 hours of doing so, and to fill out some information.

Very similar to what is required right now in the vessel logbook entries, just so that we understand when and where vessels are needing to use that safety deviation. We would also be expanding the definition to, obviously the deviation to include medical emergencies, so if somebody has a heart attack or something, they need to speed in. That would also be included.

Then finally, because we're adding vessels that are smaller in size, we're also adding a special exemption for severe weather conditions for vessels that are less than 65 feet. Vessels that would be subject to regulation but transiting in areas where there is an active gale or hurricane warning or similar wind warning, would be exempt from those speed requirements, again for safety purposes.

As you can see here, the map on the right shows you in the light colors, are the new boundaries for the proposed seasonal speed zones. The dotted lines show you the current seasonal management area boundaries. Just to walk you through this very briefly. As you see up off Massachusetts, there is actually a combination of changes going on here.

We actually have some spatial and temporal contraction east of Cape Cod, with some areas we feel are no longer needed, based on our updated risk assessment model. But in other areas in the Mid-Atlantic, and again off Massachusetts, there is also spatial expansion in other areas where we are seeing that elevated risk.

As you move down the coast there is less expansion in the southeast region, and we do have a little bit again of a temporal contraction off South Carolina that will now be turning off April 15, as opposed to April 30, again, based on the data that we have. There is a new area added southeast of the current southeast SMA in Florida, extending down to Cape Canaveral. Again, due to areas where we are seeing potential elevated vessel strike risks in that zone. Another thing I just want to point out here is, all of these boundaries were based on a new coastwide risk assessment model that we developed, looking at the latest information we have on vessel traffic, and whale distribution and habitat use in that area.

It was aimed at addressing, along with the dynamic mandatory program, in excess of 90 percent of the risk that accrues from these vessels transiting at high speed, so over 10 knots in this area. I also want to note to that we did, as we looked at this, consider other ongoing factors that we know are coming up, such as for example, future wind development, also the U.S. Coast Guard has proposed new offshore fairways as well.

We did also look at that when we were identifying some of these boundaries. But in many cases what we found, interestingly enough, is areas that have elevated vessel strike risk right now, even before there is any offshore wind development, for example, would just essentially have additional development in that area.

This would cover those future activities as well. Then regarding the addition of the 35-to-65-foot vessels. We've had a number of collisions in U.S. waters involving vessels within this size class, including again, as I mentioned earlier, six lethal events since 2005. We also have, in addition to that six, additional collisions that have been reported in volving vessels between 35 and 65 feet, where the species of the whale was unknown, but the location and timing is potentially consistent with right whales.

We may have even more events that we don't actually understand involve the right whale. In many cases, especially with these smaller vessels, the vessel sustained significant damage. In a couple cases vessels have sunk, and in most cases, you have seven of the eight cases where the vessel operators do not see these whales prior to impact. This is really an issue of safety, both for the whale and as well for the vessel operators, when you're talking about vessels in this smaller size class.

Additionally, all of the other restrictions, regarding the exemption of military federal vessels, enforcement vessels, etcetera, would also apply to this size class, so they would not be included in vessels that would be included under the mandatory restrictions. Then with regards to these dynamic speed zones. These are designed to protect areas of right whale aggregation or extended presence in these discreet areas of limited time periods that would not be covered by the seasonal areas.

As you can imagine, there are certain times and places along the coast where right whale presence is more ephemeral, more unpredictable, or there is a more moderate risk, because the type of traffic transiting or the amount of traffic transiting is either not very fast, or there is the lower density of traffic.

These zones are established to address that risk where and when it's needed, without having to do a greater expansion of the seasonal speed zones. These again would be triggered either by visual or acoustic detections outside the proposed mandatory seasonal speed zones. When we determine that there is a greater than 50 percent likelihood that the whales will remain within the zones, so this is an important new component that is different from the current voluntary program, because we want to ensure that the nature of the data that we have is consistent with whales likely to remain in the same spot.

There is no point in us requiring vessels to slow down if we think we have a situation where whales may just be heading through, and are going to be gone in two days. If that doesn't help the whales, then it puts an unnecessary burden on the regulated community. Also, what has triggered these dynamic areas would be announced via our official website.

We would also put out the announcement either through U.S. Coast Guard notices, National Weather Service Alerts, Apps, e-mail notification list, etcetera. We would also publish a notice in the Federal Register as well, because again, these are mandatory. We anticipate that most of these dynamic areas will occur in the Mid-Atlantic and Northeast.

If you look at this map here on the right, the zones that I've highlighted in pink are dynamic areas, based on the 2021 voluntary areas that were declared, that would have been declared had the SSZs been in effect already. We sort of tried to evaluate where they are most likely to occur. Again, we are mostly seeing a likelihood of those types of dynamic areas need to be in the Mid-Atlantic and the Northeast.

I also want to touch on some of the economic impacts to the regulated community. Based on our assessment, we estimate that just under 16,000 vessels could potentially be affected by the proposed amendments, at an estimated cost of approximately 46 million dollars per year. The majority of the affected vessels, about 60 percent, were recreational or pleasure boats.

With about 22 percent large commercial ships, and 19 percent other types of commercial ships, industrial or other vessel types. I do want to note that when it came to evaluating the impact on vessels under 65 feet in length, particularly the large number of recreational vessels in this category. We overall aim to be more conservative, and overestimate rather than underestimate. But because many of these vessels lack AIS, we had to use some different methods to be able to evaluate how many vessels this may include. We likely overestimated that total number.

I'll also point out too that overall, even though we are including vessels within this size class. The vast majority of recreational boaters are likely to be not impacted by this, because most recreational boats are well under 35 feet in length, based on registration data between Florida and Maine. Finally, I'll highlight too that commercial ships would bear the majority of cost from these amendments, along with passenger vessels and industrial work vessels.

We also expect that certain types of vessels, including commercial fishing vessels and sailing vessels, although they are subject to speed restriction, would likely be less impacted by the restrictions, because the majority transit at speeds around or under 10 knots. Just because a vessel is subject to the speed restriction, doesn't mean they're going to be impacted by it depending on their normal, usual traveling speeds.

Finally, there is also some geographic differences, in terms of cost accrual, so about 89 percent of the cost we anticipate according to vessels operating in the Northeast and Mid-Atlantic, and this just has to do mainly with the enormous density of vessel activity in that area, relative to the Southeast averages. Just to sum up, the Rule is out as of yesterday morning. It is going to be open for public comment until September 30, and obviously we very much welcome comments on the proposed rule. There are definitely a lot of changes in the rule, and so we are eager to hear from members of the regulated community in particular.

Also, we are working very hard to finalize the Rule before the end of the calving season next year, to provide additional protection to the mother/calf pairs, which are some of our most vulnerable members of the right whale population, especially from a vessel strike perspective. We'll be working very quickly to get this Rule into a final stage. That's about it, thank you.

CHAIR McNAMEE: Excellent, thanks so much, Caroline, great presentation. Just a quick time check here. We're a bit behind. I'm going to give an opportunity to ask Caroline some questions. I'm just asking that folks be succinct with their questions. Then we'll roll into the next presentation from John Hare. Questions from the Board for Caroline, and I saw Senator Miner, go ahead.

SENATOR CRAIG A. MINER: My question is, who provides enforcement of this Rule? If this was a speeding enforcement on a highway, and it came in at 81 percent, someone would be doing enforcement. I'm just curious as to how the enforcement is done.

MS. GOOD: Certainly. NOAAs Office of Law Enforcement is the primary enforcement agency. They bring official enforcement cases for the Rule. We do also receive assistance from the U.S. Coast Guard as well. We are actually in the process right now of doing really a top to bottom evaluation of both our current enforcement methods, as well as looking at potential changes needed for enforcement moving forward, particularly with the addition of the smaller vessel size class, between 35 and 65 feet.

We have very heavily relied, although not exclusively, on AIS data for a lot of the Rule enforcement. But only about, from our best estimates, about a third of vessels in the 35-to-65-foot class are currently using AIS. We've already taken some steps to prepare for some of these challenges. We are upgrading, you know our

capabilities for tracking vessel speed at sea. We've initiated research into some new vessel tracking technologies. We're investigating land and aerial based monitoring options as well.

We've also had conversations with the U.S. Coast Guard. They've already actually stepped up some of their assistance for our current enforcement actions, as well as indicated additional assistance coming in the future as well, so that is very helpful. We've also had some early conversations with U.S. Coast Guard too, about potential expansion of the U.S. Coast Guard AIS on vessel requirements that might include vessels of smaller length as well.

CHAIR McNAMEE: Senator, okay? Next up I have Eric Reid, go ahead, Eric.

MR. REID: Part of your last answer helped me out a little bit. But when it comes to AIS, it's over 65 feet within 12 miles, so maybe that is going to change. My concern is about the unit itself, whether or not it has to be an AIS-A or an AIS-B unit, because of the range of the unit itself. Those are my quick questions, thank you.

MS. GOOD: Yes, so as many people know, fishing vessels and other vessels currently are only required to have a Class B AIS unit, which essentially means it transmits location a little less frequently than a Class A unit, which would be required on most large commercial ships, and other types of industrial ships.

Either of those for our purposes is fine. Either would provide sufficient information. Moreover, we are finding that there are both the official U.S. Coast Guard regulations regarding who has to have AIS. Then we also find that there are many vessels that may not be required to have AIS, but do so anyway, either because they are part of companies that require AIS, they have insurance policies that require AIS.

Also, they voluntarily use AIS for their own purposes for safety or interest, and just wanting to be able to track vessels in their fleet, etcetera. There is a variety of reasons why people may use it, but we're well aware that not all vessels have it, and we already have been working for months on looking at additional options for tracking the speeds of vessels, and being able to enforce the speed rule, most importantly, on vessels that may not carry AIS.

CHAIR McNAMEE: Good with that, Eric? Okay, thank you, Caroline. We have one question from the public online. I have a question from Virginia Olsen, so go ahead, Virginia.

MS. VIRGINIA OLSEN: Thank you. My question is, how do you enforce ships that are flagged under foreign countries, and how would that change if this was mandatory? Thank you.

MS. GOOD: Sure, we currently enforce the speed rule on foreign flagged vessels all the time, and many vessels that come to U.S. ports for commerce and for trade are foreign flagged vessels, so that is a very common occurrence. They are still beholden to our federal regulations when they are transiting within U.S. Federal waters.

CHAIR McNAMEE: Great, thank you very much. Okay, I don't see any more hands up around the table or online, so thank you very much, Caroline. I appreciated the presentation.

OVERVIEW OF DRAFT ROPELESS ROADMAP STRATEGY TO DEVELOP ON-DEMAND FISHING

CHAIR McNAMEE: Let's move on now to the second topic, which is on ropeless gear, and I believe Jon Hare will be giving that presentation. Jon, whenever you are ready, feel free to take it away.

DR. JON HARE: Great, thank you very much, Dr. McNamee. I've just got a quick overview of the draft Ropeless Roadmap Strategy to develop on-demand fishing. Just sort of an overview, you know the intent of the roadmap, why a Ropeless Roadmap. The intent is to provide a unified vision of on-demand fishing gear adoption throughout fixed gear fisheries in our region.

It's to help align partners and stakeholders, in understanding the technological and regulatory changes that are needed to implement the roadmap. We had committed, the Agency, NOAA Fisheries, had committed to producing a Ropeless Roadmap within one year of the batched fishery's biological opinion published in May 27, 2021. We're putting it out now, in July, now August, to receive public comment. One just sort of conversation on, you know Ropeless Roadmap, a strategy for on-demand fishing. You know those two sorts of ropeless and on-demand are synonyms, but they do sort of have different specific meaning. Ropeless implies no ropes at all, on-demand implies the gear is available on demand with or without rope, so we're using both currently, just to sort of make sure that the intent is understood. The next steps that we see for this strategy, again we put it out for public comment, so we're going to collect feedback from partners and stakeholders.

We're presenting at the Marine Mammal Biennial Conference, which is happening this week. We're also presenting at the Atlantic Large Whale Take Reduction Team meeting in August. Then we'll be talking about it at upcoming New England and Mid-Atlantic Fisheries Management Council meetings, and happy to spend more time talking about it, sort of going through it at a future Atlantic States Marine Fisheries Commission meeting, if there is interest.

Then we will refine the roadmap based on public feedback. We really see this as a living document. That term can be overused, but we continue seeing sort of editing and updating this roadmap as we make progress, and as we learn more about it. First draft is out, open for public comment. But then our vision is to work with all of you to continue to update this roadmap as we move forward.

What's in the roadmap itself? First it defines sort of on-demand fishing gear. It lays out the case for why on-demand fishing gear is needed, and you heard about some of that earlier in this meeting. It talks about the current availability of on-demand fishing gear. It then lays out how on-demand fishing gear can be used. It touches on the regulatory requirements, and identifies sort of the stages of development of on-demand fishing gear operationally being used.

Step 1 is technological developing and testing. Step 2 is resolving gear conflict between fixed gear and mobile gear and other types of gear. Step 3 is expanding the experimental fishing, both to test the technology, and to test sort of ways that have been developed to resolve gear conflicts, and then Step 4 would be FMP and other regulatory changes needed to implement on-demand fishing gear throughout the region.

Again, why is on-demand, where is on-demand fishing gear needed? The roadmap does some evaluation of the decision support tool that is being used to decrease entanglement risk, to identify the proportion of vertical lines that pose the highest relative risk to North Atlantic right whales, and those areas could be sort of an emphasis for on-demand gear development and application. That is laid out in more detail in the strategy.

Then the other piece is, how do we locate gear that is deployed on demand, so no surface marker? Sort of the roadmap itself discusses the current developments in geolocation technology. It also lays the groundwork in a statement advocating for sort of an open-source nonproprietary technologies to be used in this space.

It can be a much more collective community development, as opposed to a one group developing and then selling the technology. That is just a quick outline of the roadmap itself. Again, we're asking for your comments. There is the link to our code, link to it or the link itself, it will take you to a questionnaire, where you can insert your comments. We're happy to come back to Atlantic States Marine Fisheries Commission in the future, and spend more time going through this if that is helpful. With that I'll stop and take any questions.

CHAIR McNAMEE: Thank you, Dr. Hare. Let's have any questions for Dr. Hare. Jim Gilmore, go ahead, Jim.

MR. GILMORE: Hey Jon, I hope you're doing well. Are there any cost estimates that you guys are putting in for either retrofitting existing gear, or what those new gears would cost? Obviously, with some of the statements this morning about shuttering an entire fishery that we're talking big numbers, billions of dollars, so that might be helpful. Thanks.

DR. HARE: I don't think we have explicit cost estimates. I think there is some cost information about specific units. But you know at some point, understanding what the cost would be sort of fishery wide, that is a good suggestion, thank you. We have some people who are working on it, I'm just not quite sure where they are with their analysis.

CHAIR McNAMEE: Okay, thank you for that. Other questions, Megan.

MS. MEGAN WARE: Thank you, I'm contributing for Pat here for a second. I was curious, and Jon, this may be more a question for someone at GARFO. But I'm curious if there are any plans to have a bit of a coordination meeting between GARFO and the states, regarding more of the regulatory or EFP aspects of ropeless. We recently had a meeting with Science Center staff about ropeless, and I think that was a really fruitful conversation. But likely something on the regulatory side is also needed.

MR. HARE: Yes, thank you very much, Megan. You know we can certainly, we heard the comment, and I think useful, we kind of split regulatory and sort of science. But I think it would be good for us to start having sort of more just conversations that include all the parties. I certainly will make note of that and see if we can make that happen.

MS. WARE: Okay, great. Yes, I think there has been a couple EFPs that have come through the Federal Register recently. I think those have maybe shown some light on areas where we could improve communication. I think that would be great if we can organize something like that.

MR. HARE: Thank you for the comment.

CHAIR McNAMEE: Next up I have an online hand, David Borden. Go ahead, David.

MR. BORDEN: Jon, good report. I'm just curious about the gear conflict aspect of it. Are the NOAA staff looking at who is responsible for losses when they incur, if ropeless gear is being used? We've gotten to the point, at least with the offshore lobster industry, where 50 pot lobster trawls now cost almost $22,000.00. If we get into a situation where there are no buoys on it, and there is some kind of interaction between fixed and mobile gear. Who pays the cost? Who is responsible for paying the compensation for the lost gear? Are your attorneys looking at that?

MR. HARE: It's a good question. I don't know, David, I can look into it and get back to you. I'll be at the Commission meeting tomorrow and Thursday. But that brings up, it's similar to Megan's point as well. There is a technological and science, but there are also the regulatory and legal pieces of this that we all need to make sure we're moving forward on sort of the same pace and taking steps together.

That is in part why the roadmap is out there, to help us coordinate around one document, one way forward. I'll see if I can touch base with GC before I get down to the Commission meeting tomorrow. But certainly, who is responsible for costs is an important question to ask.

MR. BORDEN: Thank you very much.

CHAIR McNAMEE: Just a quick time check. We're at time now. Toni said we can go to 12:50 without impacting the rest of the day, so try not to go that far, but just to give folks an idea of the slack that I'm

looking at for this meeting. With that we have public question from Andrea Tomlinson. Andrea, go ahead.

MS. ANDREA TOMLINSON: Yes, hi, thank you so much, and thanks Dr. Hare for that presentation. I'm the recent founder of the New England Young Fishermen's Alliance, and I'm happy to report we had Zach Cliver from Blue Planet Strategies come down to our Deck Hand to Captain Training Program two weeks ago tomorrow, and do some demonstration on the ropeless gear work that he's doing in the Gulf of Maine.

My understanding through Zach is he has an EFP for the entire Gulf of Maine, and he's doing some hybrid research with the lobster industry from basically Northern Massachusetts up to Downeast Maine, with both ropeless and single vertical line gear. I just wanted everyone here on the meeting, to understand that we do have some reservations, obviously, from the young lobster fishermen that I found really revelatory, in that they are very concerned about, basically their reputation and their safety amongst the industry if they are participating in this research.

They wanted to ensure that there was full confidentiality if they were to participate in it. That was something I found quite striking, and just thought it would be interesting to share today. Then speaking with Zach Cliver from Blue Planet Strategies about that further. He did indicate that every participant in the program was very concerned about their confidentiality.

Basically, what my young lobstermen are saying is they feel as though there would be a target on their back, sadly, if they were to participate in this hybrid research project. That said, the major question from the trainees that are involved in the Deckhand to Captain training, six of them, four of which are young lobster sternmen being trained with business management strategies and other strategies, to get into the captain's wheelhouse.

They are very concerned. Dr. Hare, to just touch on the previous comment, about the cost to their pocket. The industry cost to ropeless gear, because they were gasping when Zach shared that you know, he was using the bag inflatable model, they were gasping, you know their first question of course was, how much does this cost, and can we use 1-per-20 trap trawl, can we use 1-for-40 trap trawls. Zach was sharing that it cost 10 to 15 thousand dollars currently. I ensured them that would not be the cost in the future, if this were to be implemented in policy. Could you touch on what you see for financial compensation for the industry moving forward, if this were to go into effect?

DR. HARE: Yes, I don't want to sort of get ahead of myself. The industry financial compensation, there are conversations around that aspect at high levels. The other piece you touched on it as well is, sort of as the technology continues to develop, and more units are produced and sold. The anticipation is that the cost will go down. At this point we're still in an exploratory stage, trying to figure it out. In the future, the hope and intent are that it will cost less to deploy.

CHAIR McNAMEE: Okay, thanks for the discussion. At this point, I know there are other hands raised online. I will offer that both of the previous two presentations indicated how you could offer comments online, and into the process. I'll just sort of direct folks to that opportunity at this point. I did have one more hand from the Board, Steve Train. Go ahead, Steve.

MR. TRAIN: I don't think I've talked this much here in one day in years. I'm not against the concept that is presented here. It appears to do a lot of good, as far as the entanglement risk. What I'm against right now is the hopes that this is going to save us any time soon, because in practice this is currently extremely impractical.

The cost aside, David Borden once again hit the nail on the head. If a trawler doesn't know where my

gear is, it's going to trawl it up. They tell us that we'll have something on the boat that will tell us where these things are, because they'll be marked and they will be transmitting. But if every other gear type doesn't have that, it's not going to matter.

We are going to have ghost gear on the Gulf of Maine like you have never seen, with this type of thing. If it's a small dragger that doesn't have the capabilities of a scallop of one of the 90 footers. He'll be lucky to get his own gear back, let alone get our gear back. Those boats don't have that kind of power.

We're talking about stuff that is going to cost multiple industries hundreds of thousands, if not millions of dollars in gear conflict. The gear conflict between lobster boats. I don't know how these things are going to work on our boats. I don't know what the range is going to be. I don't know if when you go over the thing it's going to see it, or if it's going to tell you from four miles away.

But when you're fishing 40 and 50 trap trawls, if it doesn't show up on the screen and you start setting yours, you may be setting over here in 50, 80, 100 fathom or more of water. These boats aren't designed to get two 50 trap trawls aboard at the same time, especially when half of them are hanging down. This may work, but don't get your hopes up that it's going to be something we can do in the next two to five years to save this industry from the whale issue.

CHAIR McNAMEE: Thanks, Steve, any reaction to that, Jon?

DR. HARE: No, thank you very much, Steve. I know Henry Milliken and Eric Matzen are on, they are actively working on the ropeless, and sort of hearing from you where the bottlenecks are, as it were, just is very useful for us. Because I do agree, I think we all agree the gear conflict is at this point in time the hardest part of the technological problem that we're trying to address.

CHAIR McNAMEE: Okay, thanks for that discussion. Okay, Jon, thank you very much, good presentation. Thanks for fielding those questions. Before we move on to the next item, just looking around to the Board. We have two topics here with opportunities for public comment. Is there any desire from the Board to develop comments from the Commission to submit?

I'm not suggesting we try and wrangle that language together here at the table, but if we get a sense of whether there is a desire to do that, we can work after the meeting to kind of pull that together. Looking around, is there anyone who wants to comment on whether there is an interest? Pat.

MR. KELIHER: Yes, I'm assuming, Mr. Chairman, that most every state is going to submit some kind of comments. I know we're going to have lengthy comments. We appreciate some of the direction that the Agency is going here. But maybe a small workgroup of states that are going to compile comments. We could get together on a quick phone call, share our comments, and then craft something more general from the Commission.

CHAIR McNAMEE: Great, thanks, Pat. Go ahead, Toni.

MS. KERNS: Just to make sure that we're recognizing. The Speed Rule will need those comments faster, and it does impact all states. We can also reach out to some of the southern states that are not here right now, and see if they have any additional information, outside of just the Lobster Board.

CHAIR McNAMEE: Great, so it seems like there is interest, and we will figure out a mechanism to kind of pull those comments together after the meeting. Thanks to both Caroline and Jon for the presentations, those were great. All right, let's move on. Jeff, we are going to bump you from the agenda. I know you're broken up about that. I do apologize. We'll get you next time, we promise.

UPDATE ON FEDERAL RULEMAKING TO IMPLEMENT EFFORT CONTROL MEASURES AND HARVESTER REPORTING (ADDENDA XXI, XXII, AND XVI PROVISIONS)

CHAIR McNAMEE: We're going to skip the update on Jonah crab for this meeting, and go right to Alli Murphy, who is going to give us an update on another piece of federal rulemaking that is out for comment right now. Alli, whenever you're ready, take it away.

MS. MURPHY: We published a proposed rule a few weeks ago now, proposing measures that complement Addenda XXI, XXII, and XXVI. I'm going to use the next couple slides to kind of go into the details on what we proposed. Through this presentation, as well as the memo that Caitlin sent around, I'm also going to highlight some of the differences with what we proposed, and what was in those Addenda.

I figured I would start with perhaps the more easy one, which is harvester reporting. We're going to require, or we've proposed to require that all federal lobster permit holders submit electronic vessel trip reports, using the same form and timing that all of our other GARFO permit holders are being held to. In addition to that, at the request of Addendum XXVI and the subsequent Data Working Group, we were requested to collect several additional data elements. We're proposing 5 new data elements listed in that table.

In going through the process of developing the proposed rule and the Paperwork Reduction analysis, we identified three of those items that were recommended as duplicative, with information we already collect on the VTR. We have not proposed to collect those items. We welcome comment on this proposal.

We also welcome comment on the Paperwork Reduction analysis and burden estimates associated with this measure. One final thing to note here is that we propose to begin collecting this information no earlier than January 1st. I had hoped to get this rule out a little bit faster than it actually did.

As we move into the final rule, we'll need to be thinking about workable implementation dates, you know balancing sufficient time for industry to get the technology and the appropriate Apps to comply with the reporting requirements, as well as balance that with need for the data. If there are comments on when to implement these measures, we would welcome those comments as well.

For Area 2, I'm going to try to be a little bit more purposeful in my wording, than perhaps I was in the explanatory section of the proposed rule. I know that caused some confusion. I've gotten some phone calls, where folks had some questions. We are proposing to cap Area 2 entities at a limit of 800 traps per entity.

Those who were over that 800-trap cap as of the time of the proposed rule, we are proposing to allow them to retain their current trap allocations, but not acquire any additional traps afterwards. We're also proposing to implement that on May 1, 2024, consistent with the 2-year sunset provision that had been in Addendum XXI.

The real big difference here is that we are not proposing, well two things, we're not proposing to place limits on the number of permits that could be owned, and then the second difference is, we are not proposing the single ownership cap or banking, what I will parochially call bank it, trap banking. We viewed the banking provisions as a mitigation measure for the trap reductions.

Others were taking place between 2016 and 2021, and with trap reductions over, we saw the banking provisions as no longer necessary. One last thing I'll point out is, you know this measure or these proposed measures really put a pin in the fishery as it is today. It captures the fishery in its status quo state, so no major impacts were anticipated from this.

For Area 3 we have two interacting measures. I have tables on the next slide that kind of help show

this a little bit better. But I wanted to walk through this, and give you a similar explanation as I did for Area 2. First, we're proposing to lower the maximum trap cap per vessel that can be the maximum number of traps that can be fished, from 1945 traps to 1548 traps over three years. This is a slight difference from the Addendum that recommended that reduction schedule over five years. Secondly, we're proposing an aggregate ownership cap. This relates to the maximum trap cap, but the ultimate cap after three years will be 7,740 traps per entity. Again, like with Area 2, those who are over that at final aggregate ownership cap, we're proposing to allow them to retain their traps, but not acquire additional traps.

Then next slide, I'll just summarize a few more things. The top table is what we proposed for measures for Area 3, and then the bottom table is a summary of what was recommended in the two Addenda. Again, I pointed out that this was recommended to take place over five years. You will note that the maximum aggregate permit cap is different between the two.

This is, I think, because the Addenda included banking provisions, and then allowed permit holders or entities to have five times the number of traps as the individual permit cap. We're trying to stay consistent with that thought by the Commission, and so we're proposing that entities can retain five times the maximum trap cap, because we're not proposing banking.

You'll see in the top table over three years the aggregate ownership cap will go down, consistent with the maximum trap cap reductions. I have a link in this presentation for how to comment. We welcome comments from the Commission, our state partners, the regulated and interested public.

That link will bring you right to this top page, and that little blue comment box brings you to another web page, where you can submit comments. I'm happy to take any questions on this rulemaking. Oh, I should also point out that the deadline for submitting comments is next week, August 10th. Thank you, Mr. Chair.

CHAIR McNAMEE: Thanks for that, Alli. We have another opportunity for comment, potentially from the Commission if we wish. This one is pretty tight for the turnaround. Just given the time that we're at here, I'm looking over toward Toni or Bob, to see if this is another, if we can sort of follow the same procedure we followed with the last items. If there is something we can kind of get together offline. I'm just wondering if there is a mechanism. I don't think we're going to have time to gather comments here today.

MS. KERNS: I know we won't have time to gather comments here today. Caitlin, did you get any comments? Caitlin did ask for comments earlier in the week on this document, and we did not receive any. One, we received one. David Borden, I know that you had told me you were wanting to send us some comments, but I don't know if we got those in yet or not.

It will be hard for us to get a group together, because finding the time for that group will be difficult. We will try. But it might be that we need you to send Caitlin your comments no later than Friday, and then we can turn them around and put a letter together, and have the Lobster Board Chair and the Commission Chair and Vice-Chair review that letter.

If that is something that is acceptable to the Board. If there is anybody else that wants to see those comments at the same time as Jason, we can do that for those individuals. But having a lot of cooks in the kitchen editing the letter with this tight timeframe, will be difficult.

CHAIR McNAMEE: Thanks for that, Toni, okay. That seems like a good path forward, unless anyone disagrees around the table. David, yes, go ahead, David.

MR. BORDEN: I know you're trying to move this along. A couple of points. I've already talked to Alli,

and she actually clarified some of the issues that I was concerned about. Before I forget it, I would like to complement both Alli and I think Chip had involvement with this. This is a proposal that the Commission made ten years ago to NOAA, and there has been a whole series of delays on this.

But finally, these two individuals have done their due diligence, and gotten it to us. The problem is that in the intervening period, the factual situation has really radically changed. When this was proposed, we only had one individual in the entire Area 3 group who was over the ownership cap. At this point we're in a situation where the Area 3 industry, 56 percent of the industry is owned by four companies.

These regulations, although really well intended and well designed by the industry when we first put them together, have really been superseded by the delays. These delays have allowed changes in the industry. I'm leading up to a question of Alli, I realize the timing issue. I think NOAA has to move forward really rapidly. That is one of the reasons they have such a short comment period.

Do we have the option, Alli, of for instance, approving this, but asking for a delay or an extension on the Area 2 and Area 3 component of it? In other words, in my own case, I have no objections to what NOAA has approved with the bulk of the changes that they've included. But I don't fully understand all of the nuances of those Area 2, Area 3 regulations. I would also point out quickly that there has been almost no industry feedback on this.

You couldn't pick a worse time to put out a proposed rule, because the offshore boats are fishing 10 days a week, 2 days onshore, and they are literally racing around loading boats, getting ready to go back out, and the inshore boats are doing the same thing, different schedule. Is it possible, Alli, for us to endorse the concept in what you proposed, but ask for an extension of the comment timeline on the Area 2 and Area 3 component? If it is, I can make a suggestion, Mr. Chairman.

CHAIR McNAMEE: Response, Alli?

MS. MURPHY: Chip, if I get myself into trouble here, I'll look to you to bail me out from within the room. You know I think that, Mr. Borden, if that is a comment that you or the Commission wish to make, I think that is a perfectly reasonable comment, and we would consider that in the development of our Final Rule.

MR. BORDEN: Okay, so that is very helpful. I would suggest, Jason, to simplify the staff task, that we basically recommend approval of the proposed rule as it was written by NOAA, with the exception of the two parts on the Area 2, Area 3 regulations. In regard to those two sections, simply ask that they extend the comment period until the next meeting of the Commission, to allow us time to solicit input from the industry, and put together comments. I'm not making that as a motion, in the interest of time, but if you need a motion, I would be happy to do that.

CHAIR McNAMEE: We have a suggestion from David, does anybody have any comments around the table here about that? Dan.

MR. McKIERNAN: I would support David's suggestion for such a motion.

CHAIR McNAMEE: Toni.

MS. KERNS: You have Mike Pentony from NOAA Fisheries on the webinar with his hand up. I think we should hear from him.

CHAIR McNAMEE: We're going past 12:50 everyone. Go ahead, Mike, whenever you're ready.

MR. MICHAEL PENTONY: I'm just trying to get clarification on the intent, because I'm not clear on it. I think if there is going to be a motion or a request, it would be really good to be crystal clear on this. I think there are a couple of things that I heard. One was, approve the proposed rule as

proposed, but extend the comment period on part of it.

Those are kind of contradictory. We could approve the rule, but delay implementation. We do that on occasion. You could request us to extend the comment period on the proposed rule before we make a decision to approve and implement it, or theoretically at least, we could, if this is your request. We could split the rule, and approve and implement one piece of it, and either disapprove or potentially.

I don't even know the mechanism by which we could do this. But it's something we could look at if this is your desire. Delay implementation or defer implementation or decision on the other part of the rule. Just because I want to be really clear what you're asking, so that we know how to respond and react. Thank you.

CHAIR McNAMEE: Toni, go ahead.

MS. KERNS: From my understanding in conversations with David, and you can correct me if I'm wrong. What we're looking for is to split the rule, because we understand the need for speed on the data collection portion, because we want that to happen for January 1. The Area 2, 3 cap measures are what we're trying to get additional time to provide a more thorough comment on.

CHAIR McNAMEE: Yes, that also makes sense to me. David, I think that is where you were trying to go there.

MR. BORDEN: Yes, that is exactly, Mr. Chairman, what Toni just said and what the Regional Administrator just said, is what my intent is, split the rule. We in essence approve it, let it go forward, but they split out those two parts, and take additional public comments on it, extend the comment deadline, which will give us the ability to get better comments from the industry, and talk to the industry about this. Thanks, Mike, for making that suggestion.

CHAIR McNAMEE: Yes, thanks for that, good discussions. Mike, does that make sense what was just kind of wrapped up there.

MR. PENTONY: Yes, thank you very much.

CHAIR McNAMEE: Okay, I think we have a plan. We have a plan, are there any objections to moving forward in that manner? Looking around the table for hands. Not seeing any. Any hands online? Go ahead, Alli.

MS. MURPHY: Thank you, Mr. Chair, I just abstained from any comments coming to NOAA Fisheries. Thanks.

CHAIR McNAMEE: All right, so we have two more items to go here. Thanks everybody for that, thank you, Alli, I appreciated that. Just trying to move us along here.

REVIEW AND POPULATE ADVISORY PANEL MEMBERSHIP

CHAIR McNAMEE: Moving on we've got an Advisory Panel topic here, and I'm hoping Tina is online. Tina, whenever you are ready, go ahead.

MS. TINA L. BERGER: I offer for the Board's consideration or approval three nominees to the American Lobster AP, and those are Chris Welch, commercial trapper from Maine, Todd Alger, a recreational diver from Massachusetts, and Eric Lorentzen, a commercial trapper from Massachusetts as well. You were provided their nomination forms in your main meeting materials.

CHAIR McNAMEE: Thank you, Tina, does anybody want to make that motion? Go ahead, Dan.

MR. McKIERNAN: **Yes, I'll make that motion.**

CHAIR McNAMEE: Motion made by Dan McKiernan, seconded by Pat Keliher. Anyone object to the motion, please raise your hand? Any hands online? **Okay, with no objections, the motion stands approved.** Thanks for that.

ELECTION OF VICE-CHAIR

Then the final item of business here is to elect a Vice-Chair. Does anybody wish to make a nomination? Dan McKiernan, go ahead.

MR. McKIERNAN: Yes, I would like to nominate Maine Commissioner Pat Keliher as the Vice-Chair of the American Lobster Board.

CHAIR McNAMEE: Okay, nomination made by Dan McKiernan, seconded by Emerson Hasbrouck. Any objections, and you can't object, Pat. **Any objections to that nomination? Looking for hands around the table, any hands online. No objection, so that nomination stands approved, and congratulations, Pat.** I'm looking forward to you taking over this role.

ADJOURNMENT

CHAIR McNAMEE: That concludes the agenda, with the exception of Other Business. Is there any other business, I hope not, to come before the Board. Seeing no hands, we stand adjourned. Thanks everybody for hanging in.

(Whereupon the meeting adjourned at 12:55 p.m. on Tuesday, August 2, 2022)

Atlantic States Marine Fisheries Commission

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

MEMORANDUM

TO: **American Lobster Management Board**

FROM: **American Lobster Technical Committee**

DATE: **October 21, 2022**

SUBJECT: **2022 American Lobster Data Update**

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	< 25th percentile	Between 25th and 75th percentile	> 75th 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	0.15	0.18	0.51	0.23	0.08
median	0.22	0.34	1.26	0.63	0.33
75th	0.42	0.60	1.60	1.09	0.67

Figure 1. GOM abundance indicators: YOY indices.

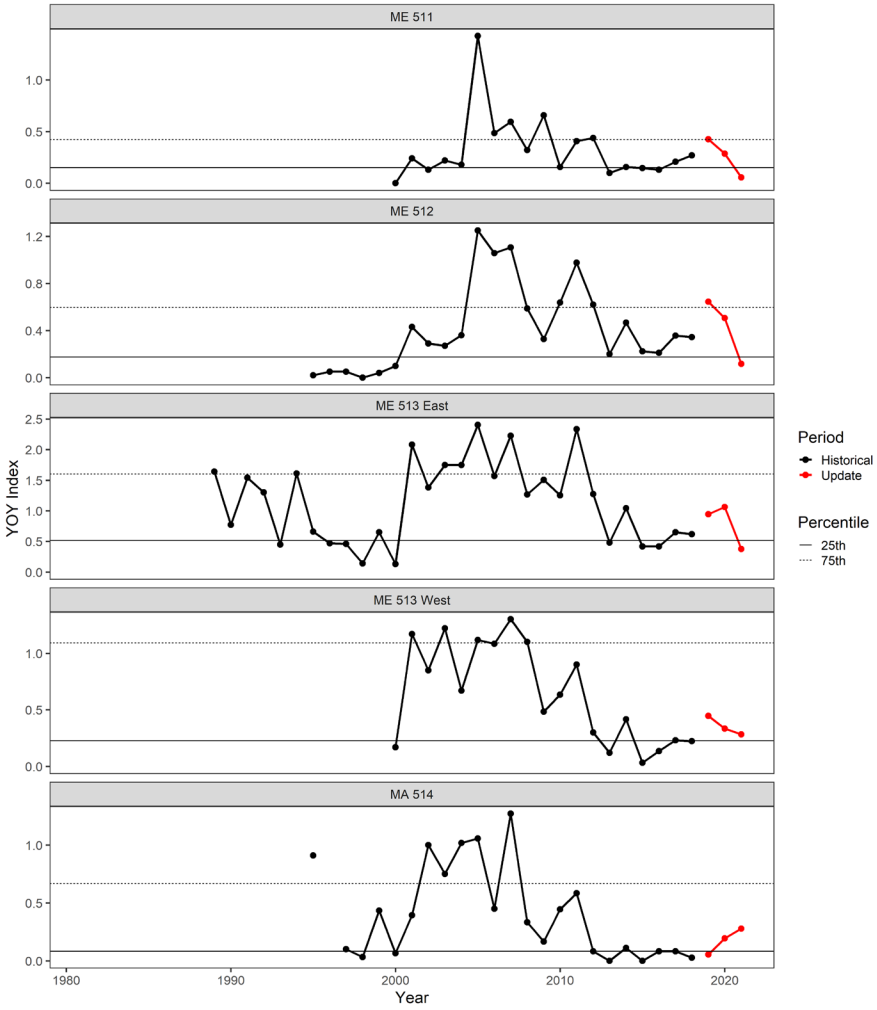

Table 2. GOM abundance indicators: trawl survey recruit abundance.

RECRUIT ABUNDANCE (SURVEY)						
Abundance of lobsters 71 - 80 mm CL (sexes combined)						
Survey	*NEFSC*		*ME/NH*		*MA 514*	
	Spring	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*
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		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				34.65		
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	0.30	1.21	17.72	20.37	2.73	4.30
median	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.

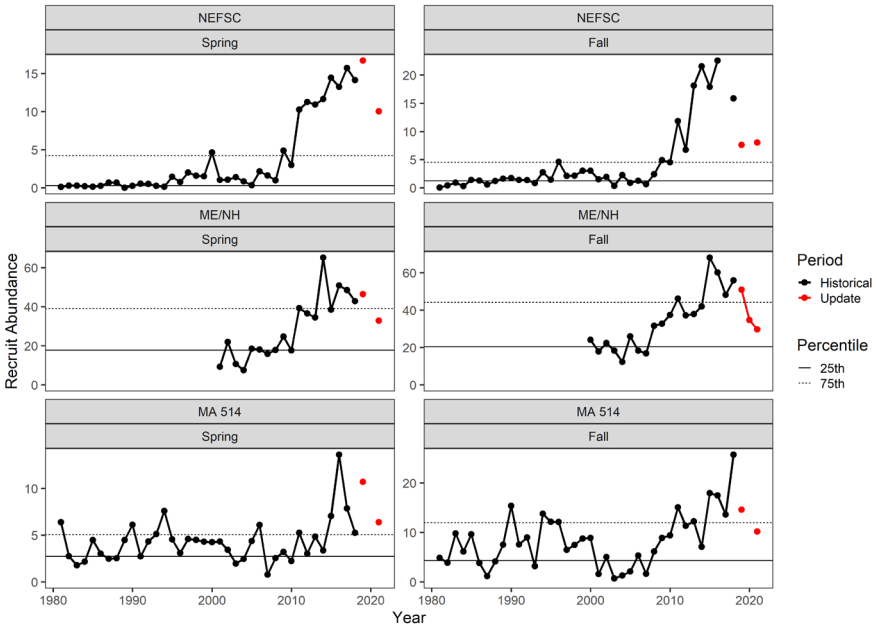

Table 3. GOM abundance indicators: trawl survey encounter rate.

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		0.99	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				0.96		
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	0.41	0.35	0.93	0.89	0.78	0.72
median	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.

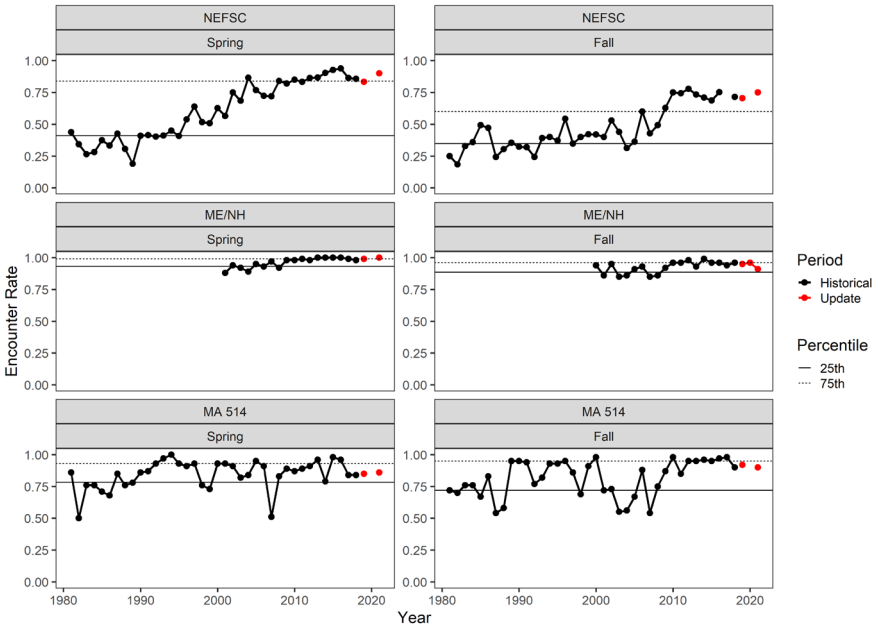

Table 4. GOM abundance indicators: ventless trap survey abundance.

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	5.66	3.91	6.87	5.38	6.61	4.97	2.76	2.41
median	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.

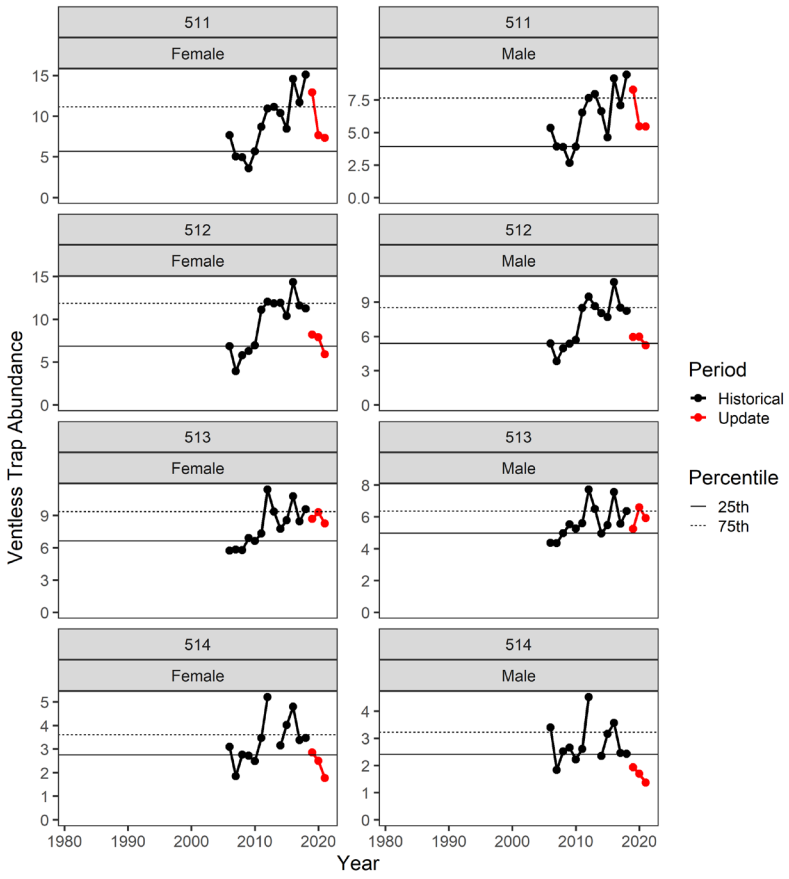

Table 5. GBK abundance indicators: trawl survey recruit abundance.

RECRUIT ABUNDANCE (SURVEY)		
Abundance of lobsters 71 - 80 mm CL (sexes combined)		
Survey	*NEFSC*	
	Spring	*Fall*
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	0.06	0.18
median	0.11	0.29
75th	0.25	0.40

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

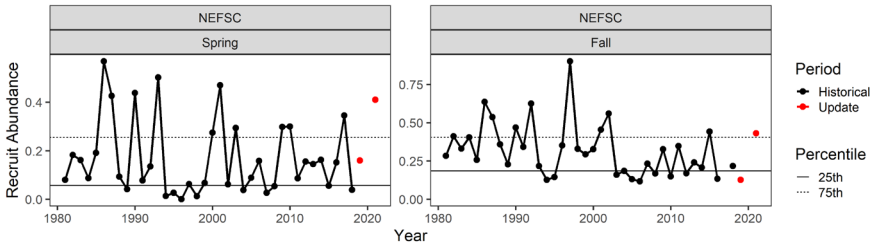

Table 6. GBK abundance indicators: trawl survey encounter rate.

SURVEY LOBSTER ENCOUNTER RATE		
Proportion of postive tows		
Survey	***NEFSC***	
	Spring	***Fall***
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	
2018	0.29	0.59
2014-2018 mean	0.36	0.58
2019	0.36	0.57
2020		
2021	0.41	0.48
2017-2021 mean	0.37	0.54

25th	0.18	0.40
median	0.23	0.48
75th	0.29	0.55

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

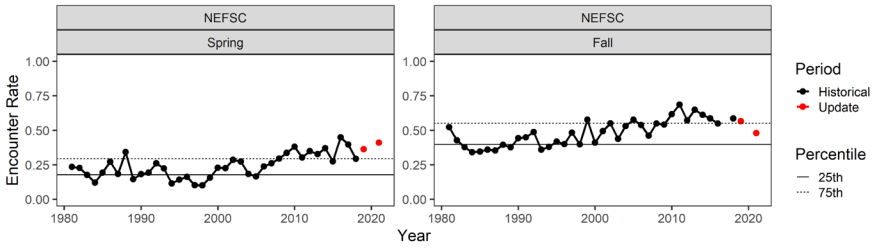

Table 7. SNE abundance indicators: YOY indices.

YOUNG-OF-YEAR INDICES			
Survey	***MA***	***RI***	***CT / ELIS Larvae***
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	0.00	0.14	0.26
median	0.06	0.34	0.45
75th	0.17	0.63	0.76

Figure 7. SNE abundance indicators: YOY indices.

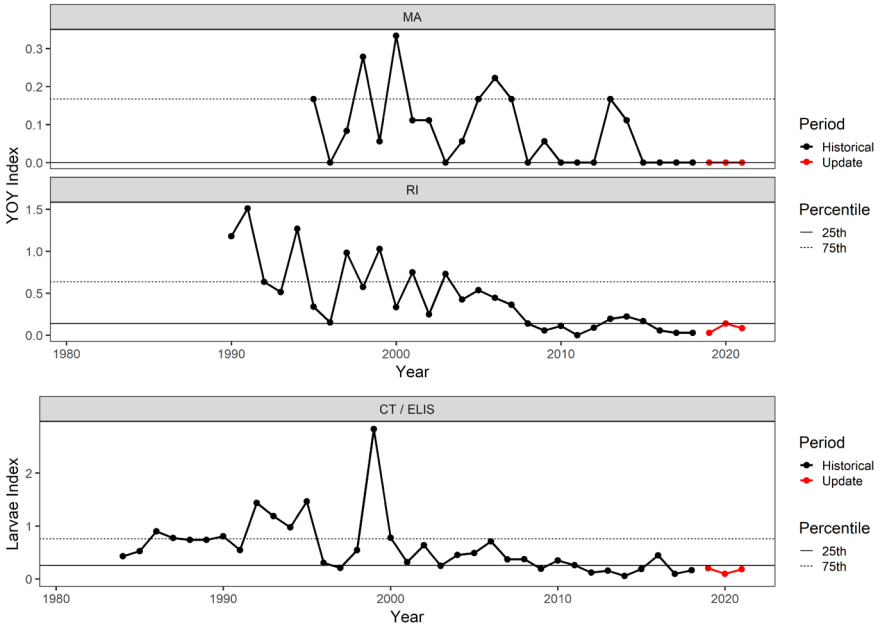

Table 8. SNE abundance indicators: trawl survey recruit abundance.

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	0.11	0.38	0.08	0.02	0.42	0.78	1.23	1.16
median	0.23	0.61	0.17	0.10	0.91	1.65	2.93	4.48
75th	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.

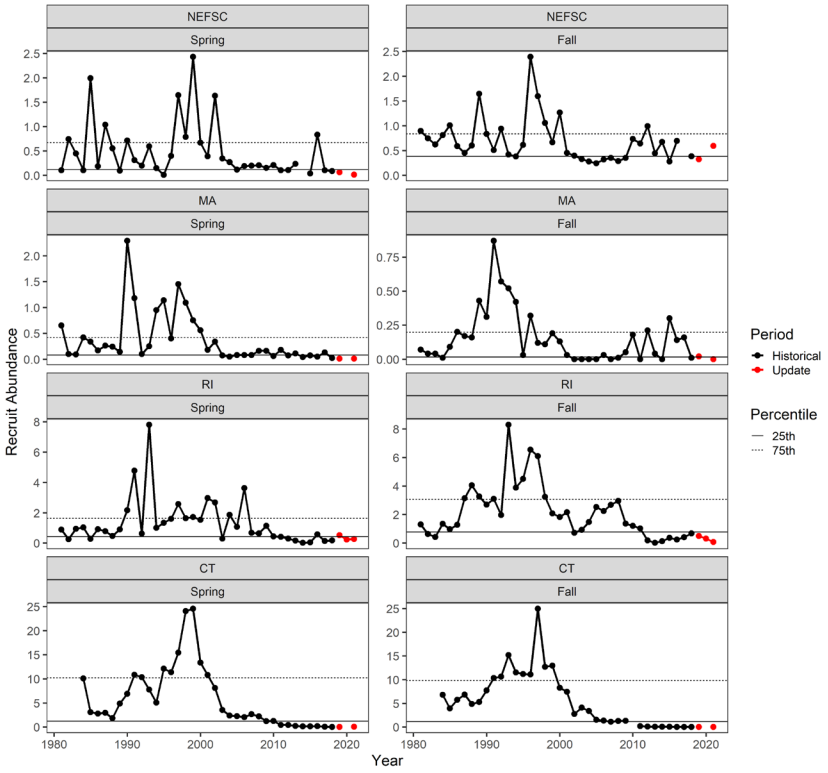

Table 9. SNE abundance indicators: trawl survey encounter rate.

SURVEY LOBSTER ENCOUNTER RATE Proportion of postive 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	0.10	0.25	0.21	0.09	0.32	0.40	0.52	0.52
median	0.13	0.28	0.34	0.16	0.51	0.49	0.65	0.64
75th	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.

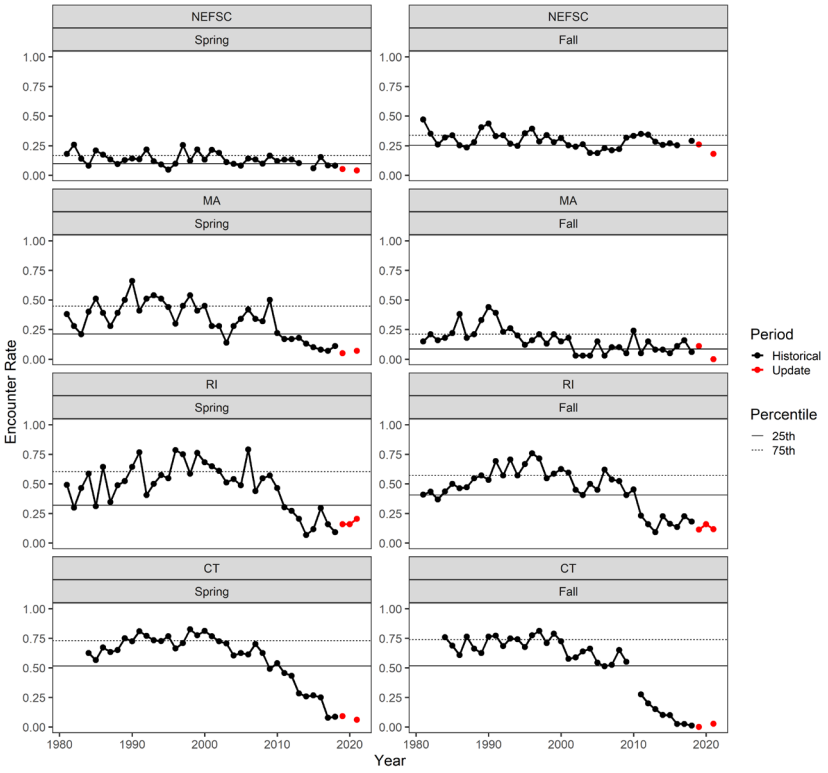

Table 10. SNE abundance indicators: ventless trap survey abundance.

VENTLESS TRAP ABUNDANCE				
Abundance of lobsters ≥ 53 mm CL				
Survey	*538*		*539*	
	Female	*Male*	*Female*	*Male*
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
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2000				
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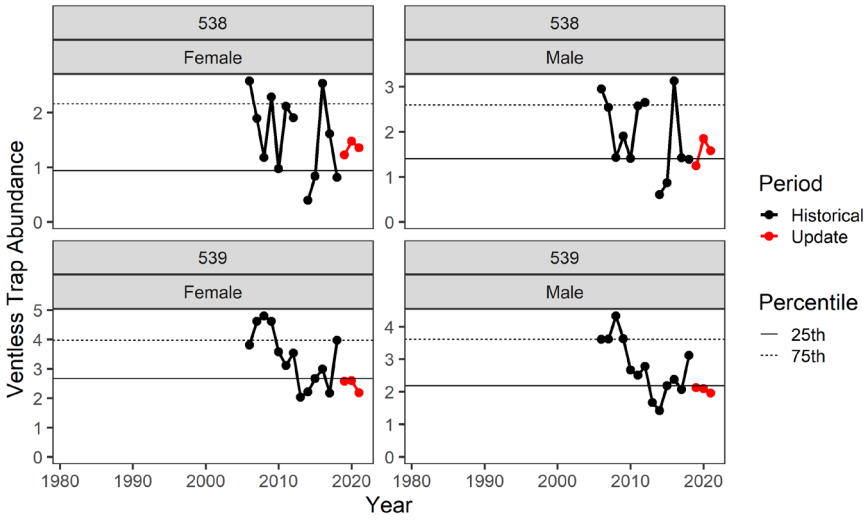
2002				
2003				
2004				
2005				
2006	2.58	2.95	3.81	3.60
2007	1.89	2.54	4.61	3.61
2008	1.18	1.43	4.80	4.32
2009	2.29	1.90	4.61	3.62
2010	0.97	1.41	3.57	2.67
2011	2.12	2.58	3.11	2.50
2012	1.90	2.65	3.53	2.77
2013			2.03	1.67
2014	0.40	0.61	2.22	1.42
2015	0.84	0.87	2.66	2.18
2016	2.53	3.13	2.99	2.38
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	0.94	1.40	2.66	2.18
median	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.



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

January 2022

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

American Lobster Draft Addendum XXVII for Public Comment

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. 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. This management action was initially in response to signs of reduced settlement and the combining of the GOM and GBK stocks following the 2015 Stock Assessment, and more recently in response to a continuation of those trends observed in the 2020 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 2022 at 5:00 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
Fax: (703) 842-0741

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

May – Dec 2021	Draft Addendum for Public Comment Developed
January 2022	Board Approved Draft Addendum for Public Comment
TBD	Public Comment Period Including Public Hearings
TBD	Board Reviews Public Comment, Selects Management Measures, Final Approval of Addendum XXVII
TBD	Implementation of Addendum XXVII Provisions

Table of Contents

American Lobster Draft Addendum XXVII for Public Comment

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 Outer Cape Cod (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 protect the GOM/GBK spawning 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 million pounds in 2016. Maine landings have declined slightly but were still near time-series highs at 101.8 million and 96.6 million in 2019 and 2020, 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 and juvenile lobster, can be used to track populations and 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 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. In 2016, the at-the-dock value of the American lobster fishery peaked at $670.4 million dollars, representing the highest ex-vessel value of any species landed along the Atlantic coast that year. Ex-vessel value has since declined slightly 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 and the continuation of reduced settlement observed in the 2020 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.

2.0 Overview

2.1 Statement of Problem

While 2016 landings in the GOM/GBK lobster fishery were the highest on record, settlement surveys over the past 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 value recorded for the fishery and the highest valued fishery along the Atlantic coast in 2016. While landings and ex-vessel value have both declined slightly from peak levels in 2016, they remain near all-time highs. Coastwide landings and ex-vessel value for 2017-2020 averaged 133.2 million pounds and $591.5 million, respectively.

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; young-of-year (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°C at several temperature monitoring stations and the prevalence of epizootic shell disease in the population 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 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 first annual data update was completed in 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 and 2020 YOY indices were below the 75th percentile of their time series throughout all statistical areas sampled. In New Hampshire, sustained low levels of settlement have been seen from 2012 through 2020. In Massachusetts, the 2019 index was below the 25th percentile of its time series and rebounded slightly in 2020, but remained well 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 eight 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 Southern New England (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 potential 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 Fall Trawl Survey, which was the only trawl survey to sample in 2020, showed a decline in recruit lobster abundance, while 2019 indices for other trawl surveys remained at high levels and were above the previous year for spring surveys but consistently below the 2018 levels for the fall surveys.

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 (79% in 2020). The landings and value peaked in 2016 with more than 132 million pounds harvested and provided more than $540 million dollars in ex-vessel value[1]. The lobster harvester sector includes more than 5,770 license holders of which 4,200 are active license holders who complete more than 270,000 trips a year selling to 240 active lobster dealers (Maine DMR, unpublished data). The lobster distribution supply chain contributes an additional economic impact of $1 billion annually ("Lobster to Dollars", 2018). 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 $35 million in 2019, the last year prior to the economic impacts of the COVID-19 pandemic, and over $25 million in 2020. The value of lobster landed accounted for over 94% 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 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 450 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 $85 million per year on average for 2015-2019. On average, landings from the GOM/GB stock make up 93% of the total lobster landings for Massachusetts; 70% of this comes from LCMA 1, 14% from LCMA 3, and 8% 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 2019 and 2020, approximately 30% of Rhode Island's commercial landings (2019: 604,459 pounds, 2020: 497,705 pounds) came from statistical areas in GOM/GBK. The estimated ex-vessel value for lobsters from this stock was approximately $3.8 million in 2019 and $2.9 million in 2020.

2.5 Current Management Measures in the GOM/GBK Stock

Lobster are currently managed under Amendment 3, and its 26 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

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

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 $3^{3}/_{8}$" in LCMA OCC and $3^{17}/_{32}$" in LCMA 3. 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 mutation and LCMA 3 defines a v-notch as greater than $^{1}/_{8}$" with or without setal hairs while OCC has different definitions for federal permits (similar to LCMA 3) state only permits (> ¼" 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.

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 lobsters 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 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 LCMAs. 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 Benefits 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 LCMAs 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 LCMAs do not align with the biological boundaries of the stocks (GOM/GBK vs. SNE). This is particularly challenging 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, no Commission addendum has included a recommendation that Federal permits delineate 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. In this case, management measures targeting the GOM/GBK stock would also be applied to all LCMA 3 harvesters regardless of location and stock fished.

2.7.2 Improve Enforcement

A 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 enforceable standard once product leaves the dock. In addition, regulatory inconsistencies decrease the likelihood of successful prosecution of violators.

2.7.3 Interstate Shipment of Lobsters

Increasing consistency in regulations may also 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 LCMAs, 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.

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 SSB.

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.

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 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 eggers 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 LCMAs 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

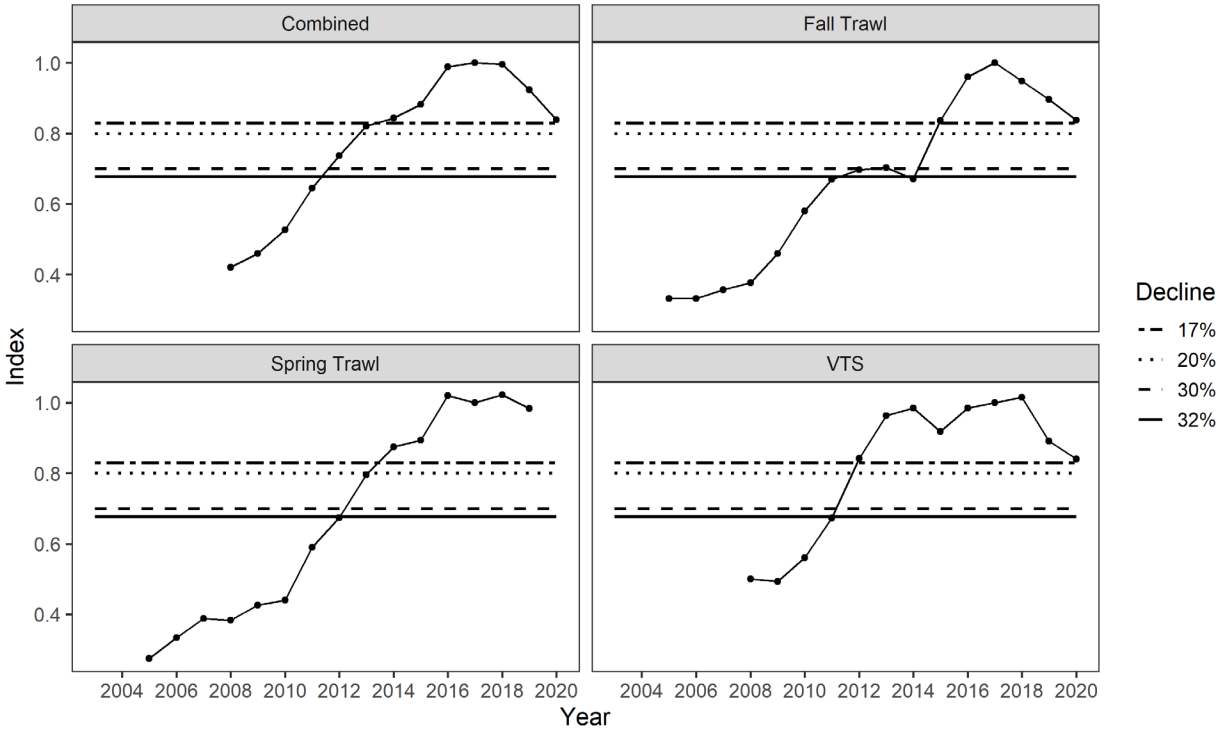
The primary objective of this action is to increase the protection of SSB in the GOM/GBK stock. The proposed options consider changes to the minimum and maximum gauge sizes along with corresponding vent sizes for the LCMAs within the stock. The proposed measures are expected to 1) increase SSB, and 2) 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 A 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 up to two management triggers 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.

Each 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 1 (top left panel) shows the calculated trigger index compared to the four 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 proactive in nature and addresses the issue of growth overfishing by increasing the minimum legal size while the stock conditions are favorable.

Figure 1. Scaled survey-specific indices and combined trigger index compared to proposed trigger levels. Top-left: combined trigger index which 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 LCMAs within the GOM/GBK stock beyond the option selected under Issue 1.

Option B: Gauge size changes triggered by 17% decline, and 32% decline in trigger index
This option would establish two triggers based on observed changes in indices of recruit abundance compared to the reference level of the trigger index. The first trigger point would be a change in the recruit abundance indices greater than or equal to a 17% decline from the reference abundance level (equal to the average of the index values from 2016-2018). Upon this trigger level being reached, the minimum gauge size for LCMA 1 would increase by $^{1}/_{16}$" from the current size (3¼") to $3^{5}/_{16}$" for the following fishing year. All other measures would remain status quo unless triggered by a change in recruit abundance indices. The second trigger point would be a change in the recruit abundance indices greater than or equal to a 32% decline from the reference abundance level. Upon this trigger level being reached, the minimum gauge size for LCMA 1 would increase again by $^{1}/_{16}$" from the $3^{5}/_{16}$" to $3^{3}/_{8}$" for the following fishing year, and the maximum gauge size in LCMA 3 and OCC would decrease to 6". The table below lists the management measures that would be automatically implemented when each trigger point is reached, with changes from the current measures in bold. The vent size in LCMA 1 would be adjusted once, corresponding with the final minimum gauge size

change associated with Trigger 2. The final gauge and vent size changes are expected to maintain similar retention rates of legal lobsters and protection of sub-legal sizes to the current gauge and vent sizes. The final vent size is also consistent with the current vent size used in SNE for the same minimum gauge size of $3\frac{3}{8}$".

Option B	LCMA 1	LCMA 3	OCC
Trigger 1 (17% decline)	**Minimum gauge: 3 $\frac{5}{16}$" (84 mm)** Maximum gauge: status quo, 5" Vent size: status quo	Minimum gauge: status quo, 3 $\frac{17}{32}$" (90 mm) Maximum gauge: status quo, 6 ¾" (171 mm) Vent size: status quo	Minimum gauge: status quo, 3 $\frac{3}{8}$" (86 mm) Max: status quo, 6 ¾" (171 mm) Vent size: status quo
Trigger 2 (32% decline)	**Minimum gauge: 3 $\frac{3}{8}$" (86 mm)** Maximum gauge: status quo **Vent size: 2 x 5 $\frac{3}{4}$" rectangular; 2 $\frac{5}{8}$" 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 increases to the minimum gauge sizes in LCMA 1 and OCC are expected to increase the proportion of the population protected from harvest 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 size changes triggered by 20% decline, and 30% decline in trigger index
This option is identical to Option B above, with the exception of the trigger levels that would result in changes to the management measures. Under this option, the first trigger point would be a change in the recruit abundance indices greater than or equal to a 20% decline from the reference abundance level (equal to the average of the index values from 2016-2018), and the second trigger point would be a change in the recruit abundance indices greater than or equal to a 30% decline from the reference abundance level. The measures that would be implemented when each trigger level is reached are shown in the table below.

Option C	LCMA 1	LCMA 3	OCC
Trigger 1 (20% decline)	**Minimum gauge: 3 $\frac{5}{16}$" (84 mm)** Maximum gauge: status quo, 5" Vent size: status quo	Minimum gauge: status quo, 3 $\frac{17}{32}$" (90 mm) Maximum gauge: status quo, 6 ¾" (171 mm) Vent size: status quo	Minimum gauge: status quo, 3 $\frac{3}{8}$" (86 mm) Max: status quo, 6 ¾" (171 mm) Vent size: status quo

Trigger 2 (30% 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 17% 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 ¼". The first change would be triggered by a change in the recruit abundance indices greater than or equal to a 17% 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 once, corresponding with the final minimum gauge size change in year 5. The final gauge and vent size changes are expected to maintain similar retention rates of legal lobsters and protection of sub-legal sizes to the current gauge and vent 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 (Year 0)	Minimum gauge: 3 ¼" Maximum gauge: 5" Vent size: status quo	Minimum gauge: 3 17/32" Maximum gauge: 6 ¾" Vent size: status quo	Minimum gauge: 3 3/8" Maximum gauge: 6 ¾" Vent size: status quo
Trigger 1 (17% decline) (Year 1)	**Minimum gauge: 3 5/16" (84 mm)** Maximum gauge: status quo Vent size: status quo	Minimum gauge: status quo **Maximum gauge: 6 ½"** Vent size: status quo	Minimum gauge: status quo **Maximum gauge: 6 ½"** Vent size: status quo
Intermediate gauge sizes (Year 3)	**Minimum gauge: 3 3/8" (86 mm)** Maximum gauge: status quo Vent size: status quo	Minimum gauge: status quo **Maximum gauge: 6 ¼"** Vent size: status quo	Minimum gauge: status quo **Maximum gauge: 6 ¼"** Vent size: status quo
Final gauge and vent sizes (Year 5)	Minimum gauge: 3 3/8" 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 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 $^{1}/_{16}$" to $3^{5}/_{16}$" for the 2023 fishing year. In the final year of adjustments, the minimum gauge size in LCMA 1 would be increased to $3\ ^{3}/_{8}$" for the 2025 fishing year. The vent size in LCMA 1 would also be adjusted once, at the same time the final gauge size is implemented in 2025. The final gauge and vent size changes are expected to maintain similar retention rates of legal lobsters and protection of sub-legal sizes to the current gauge and vent sizes.

Option E	LCMA 1	LCMA 3	OCC
2023 fishing year measures	**Min: $3\ ^{5}/_{16}$" (84 mm)** Max: status quo Vent size: status quo	Min: status quo Max: status quo	Min: status quo Max: status quo
2025 fishing year measures	**Min: 3-3/8 (86 mm)** Max: status quo **Vent size: 2 x $5\ ^{3}/_{4}$" rectangular; $2\ ^{5}/_{8}$" 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 encompasses the GOM/GBK stock (see Section 2.8 Stock Boundaries for additional information), any 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.

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 selected measures to only the GOM/GBK portion of LCMA 3 would create a significant administrative burden to appropriately divide LCMA 3 in a way to minimize impacts and issue permits and enforce measures based on this division. In addition, dividing LCMA3 creates potential for confusion and noncompliance among LCMA 3 permit holders, particularly as there are other ongoing activities in this area affecting a permit holder's fishing plans, including closures for protected species, development of other ocean uses, and the overlap with the Jonah crab fishery. To date, there have been no Commission addenda that included a recommendation that Federal permits specify the stock area in which an LCMA 3 harvester is eligible to fish.

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 (Addendum XVIII) 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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Steneck, R. S., Hughes, T. P., Cinner, J. E., Adger, W. N., Arnold, S. N., Berkes, F., Boudreau, S. A., Brown, K., Folke, C., Gunderson, L., Olsson, P., Scheffer, M., Stephenson, E., Walker, B., Wilson, J., and B. Worm. 2011. Creation of a Gilded trap by the High Economic Value of the Maine Lobster Fishery. *Conservation Biology,* 25(5):904-912.

7.0 Tables and Figures

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 ¼"	6 3/4"	5 ¼"	5 ¼"	5 ¼"	State Waters none Federal Waters 6 3/4"
Season Closure				April 30-May 31[2]	February 1-March 31[3]	Sept 8-Nov 28[4]	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	272.06	487.57	4015.00	1355.03	242.26	149.27
median	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	755.91	124.47
median	1040.64	310.45
75th	2443.64	1045.56

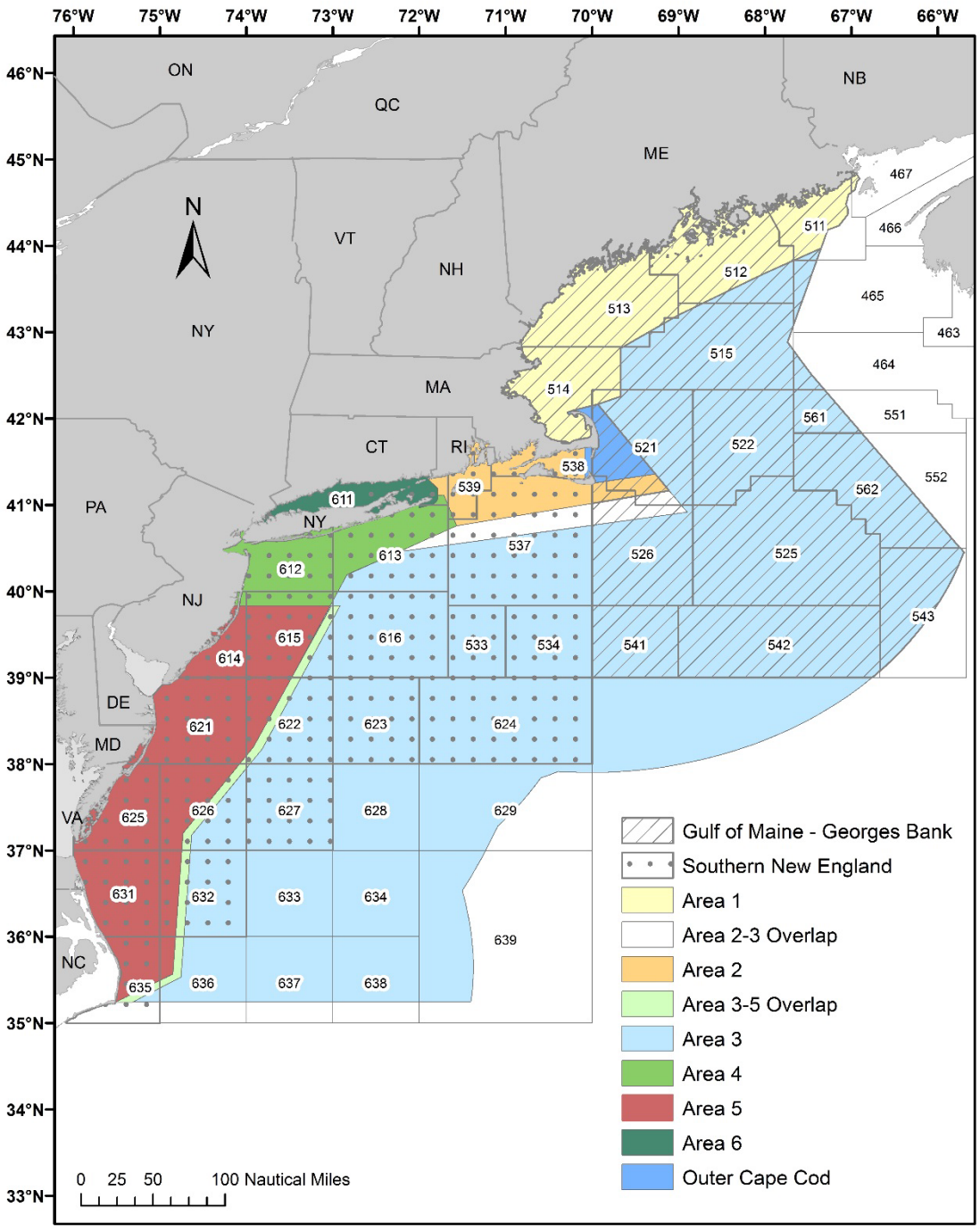

Figure 1. Lobster conservation management areas (LCMAs) in the American lobster fishery. LCMAs 1, 3, and OCC make of the majority of the GOM/GBK stock.

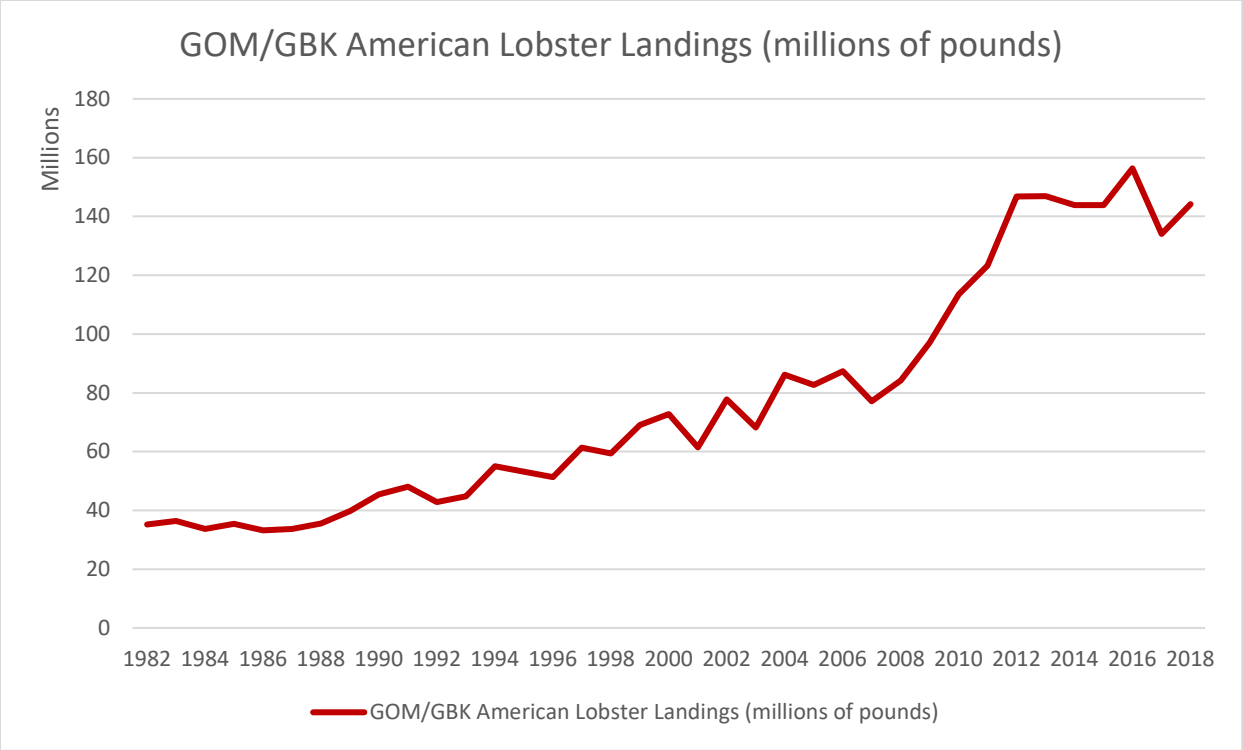

Figure 2. Landings in the GOM/GBK stock (1982-2018). Stock specific landings are updated during each benchmark stock assessment.

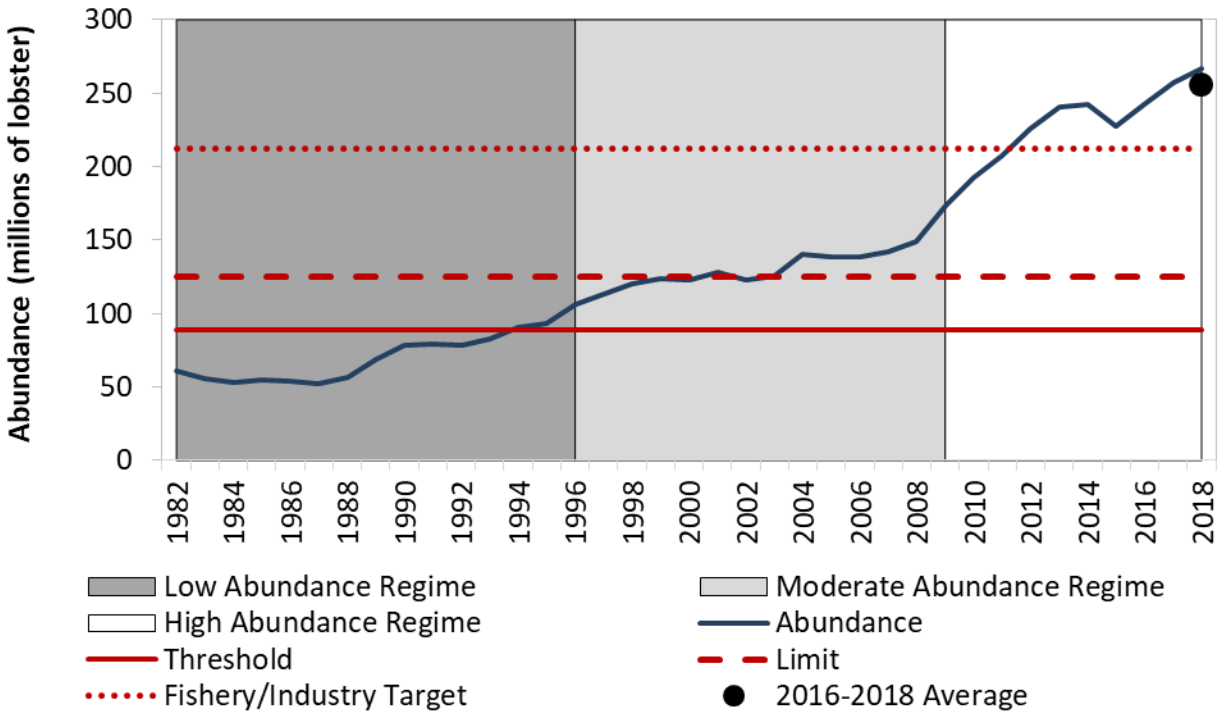

Figure 3. Stock abundance

Appendix A. 2021 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 recommended for this process were 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 model-based abundance indices (53 mm+ carapace length lobsters)

For this first Data Update, data sets were updated with data since the stock assessment (i.e., 2019 and 2020). 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	< 25th percentile	Between 25th and 75th percentile	> 75th 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 the new years of data. This treatment of data is consistent with the stock indicators provided during stock assessments (see Section 5 in the stock assessment report for more detail) with two important notes. First, the ventless trap survey abundance indices have not been presented as stock indicators in past assessments due to concerns that the short time series is not representative of the stock's productivity potential. These indices are included in this Data Update, along with the other data sets, specifically to show changes in stock conditions since the 2020 stock assessment. The Technical Committee recommended these indices be presented as indices by NOAA statistical area. Stratification of the ventless trap survey was designed around these statistical areas, unlike the trawl surveys, and these indices provide better spatial resolution to examine abundance trends within the stock boundary. The ventless trap survey index model developed during the stock assessment was structured to estimate stockwide indices and has not been evaluated for estimating indices by statistical area, so these indices are design-based calculations as opposed to model-based indices originally recommended for the Data Update process. Second, the covid-19 pandemic had substantial impacts on data collection in 2020 and many of the trawl surveys providing these data sets did not sample which impacts the updated five year means provided in the results. Below are the results of the data updates by sub-stock.

Results

Gulf of Maine (GOM)

- YOY conditions showed improvements, but were still not positive (Table 1 and Figure 1).

  - Updated five year means were all neutral, whereas two of five were negative during the stock assessment.
  - All 2019 and 2020 values were neutral except the MA 514 value in 2019 which was negative.
- Trawl survey recruit abundance indicators showed positive conditions similar to conditions during the stock assessment (Table 2 and Figure 2).
  - Five of six indicators were not available for 2020 due to covid-19 sampling restrictions.
  - Updated five year means were all positive, as they were during the stock assessment.
  - The only value available for 2020 (ME/NH Fall) was the first neutral annual value observed since 2015.
  - Fall indicators tended to show declining trends in the last few years of available data that were not apparent in spring indicators.
- Trawl survey encounter rates were similar to conditions during the stock assessment, but did show some deterioration from positive to neutral conditions (Table 3 and Figure 3).
  - Five of six indicators were not available for 2020 due to covid-19 sampling restrictions.
  - Three of six updated five year means were neutral, whereas only one was neutral during the stock assessment. All others were positive.
- Ventless trap survey indices showed abundance declining since the stock assessment (Table 4 and Figure 4).
  - Six of eight updated five year means were neutral, whereas only four of eight were neutral during the stock assessment. All others were positive.
  - The two positive updated five year means were for the two sexes in the northern-most statistical area (511). Despite the positive means, the 2020 values for both sexes showed strong declines to neutral conditions.
  - The female survey value in 2020 and the male value in 2019 and 2020 in the southern-most statistical area (514) were negative, the first negative values observed in the stock since 2014.

Georges Bank (GBK)

- Trawl survey recruit abundance indicators showed deteriorating conditions since the stock assessment (Table 5 and Figure 5).
  - No indicators were available for 2020 due to covid-19 sampling restrictions.
  - Updated means for one of the two indicators changed from neutral to negative. Both were neutral during the stock assessment.
  - 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 were positive and similar to conditions during the stock assessment (Table 6 and Figure 6).
  - No indicators were available for 2020 due to covid-19 sampling restrictions.
  - Updated means for both indicators were positive. This is unchanged from the stock assessment.

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		1.01
1996		0.05	0.47		0.00
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	0.43
2002	0.13	0.29	1.38	0.85	1.00
2003	0.22	0.27	1.75	1.22	0.78
2004	0.18	0.36	1.75	0.67	1.13
2005	1.59	1.36	1.77	0.82	1.11
2006	0.58	1.13	0.84	0.82	0.46
2007	0.84	1.34	2.01	1.27	1.38
2008	0.42	0.83	1.08	0.97	0.33
2009	0.69	0.48	1.25	0.45	0.17
2010	0.28	0.72	0.80	0.47	0.50
2011	0.41	1.10	2.33	0.67	0.64
2012	0.53	0.73	1.06	0.22	0.09
2013	0.10	0.20	0.48	0.12	0.00
2014	0.16	0.43	0.83	0.33	0.11
2015	0.11	0.22	0.43	0.05	0.00
2016	0.13	0.21	0.47	0.12	0.08
2017	0.16	0.36	0.70	0.20	0.08
2018	0.27	0.32	0.71	0.20	0.03
2014-2018 mean	0.17	0.31	0.63	0.18	0.06
2019	0.42	0.61	1.03	0.35	0.06
2020	0.29	0.49	1.17	0.25	0.19
2016-2020 mean	0.25	0.40	0.82	0.23	0.09
25th	0.15	0.18	0.52	0.20	0.08
median	0.24	0.34	0.84	0.47	0.25
75th	0.48	0.72	1.59	0.84	0.67

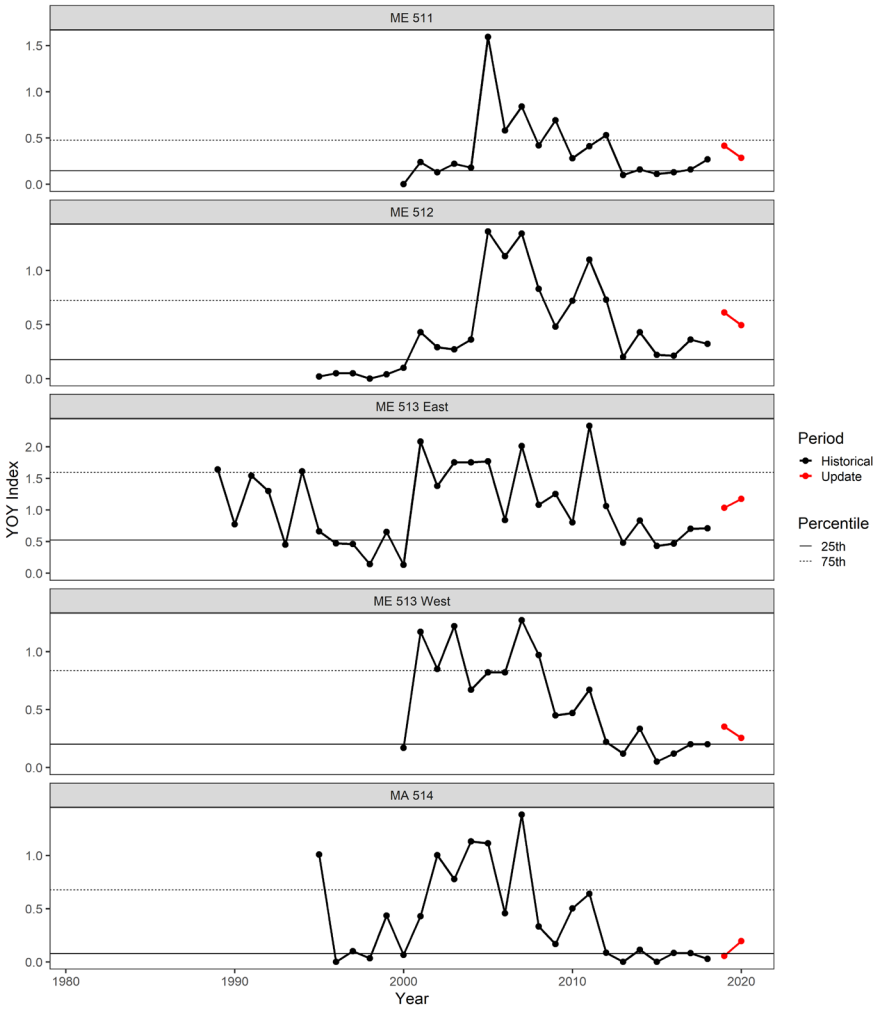

Figure 1. GOM abundance indicators: YOY indices.

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

RECRUIT ABUNDANCE (SURVEY)						
Abundance of lobsters 71 - 80 mm CL (sexes combined)						
Survey	*NEFSC*		*ME/NH*		*MA 514*	
	Spring	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*
1981	0.13	0.06			6.43	4.80
1982	0.29	0.42			2.77	3.89
1983	0.28	0.90			1.77	9.71
1984	0.20	0.31			2.17	6.13
1985	0.14	1.41			4.44	9.50
1986	0.27	1.29			2.99	3.83
1987	0.67	0.57			2.42	1.17
1988	0.67	1.21			2.50	4.14
1989	0.00	1.61			4.45	7.53
1990	0.27	1.76			6.12	15.36
1991	0.55	1.41			2.74	7.55
1992	0.50	1.37			4.32	9.01
1993	0.25	0.86			5.14	3.20
1994	0.15	2.75			7.54	13.87
1995	1.45	1.44			4.55	12.18
1996	0.76	4.59			3.11	11.96
1997	2.02	2.12			4.59	6.48
1998	1.59	2.16			4.52	7.54
1999	1.51	3.01			4.25	8.73
2000	4.64	3.01		24.09	4.25	8.89
2001	1.05	1.51	9.28	17.81	4.31	1.59
2002	1.08	1.91	22.00	22.41	3.41	5.00
2003	1.41	0.36	10.65	18.32	1.96	0.67
2004	0.84	2.26	7.55	12.29	2.47	1.30
2005	0.34	0.87	18.51	25.90	4.40	2.12
2006	2.17	1.27	18.07	18.30	6.09	5.29
2007	1.62	0.64	15.91	16.82	0.77	1.58
2008	0.99	2.41	17.88	31.61	2.54	6.14
2009	4.88	4.90	24.72	32.67	3.20	8.91
2010	2.98	4.53	17.66	37.35	2.20	9.53
2011	10.27	11.83	39.25	46.09	5.24	14.98
2012	11.25	6.74	36.55	37.12	3.03	11.35
2013	10.93	18.12	34.50	37.86	4.82	12.16
2014	11.66	21.54	50.79	41.95	3.35	7.05
2015	14.44	17.89	38.51	67.99	7.09	17.86
2016	13.25	22.54	50.83	60.07	13.58	17.41
2017	15.74		48.42	48.13	7.85	13.63
2018	14.15	15.87	42.77	55.84	5.25	25.62
2014-2018 mean	13.84	19.46	46.27	54.80	7.43	16.31
2019	16.69	7.62	46.37	50.85	10.78	14.61
2020				34.65		
2016-2020 mean	14.95	15.34	47.10	49.91	9.37	17.82
25th	0.30	1.21	17.72	20.36	2.75	4.30
median	1.07	1.76	23.36	32.67	4.28	7.55
75th	4.23	4.53	39.07	44.02	5.06	11.81

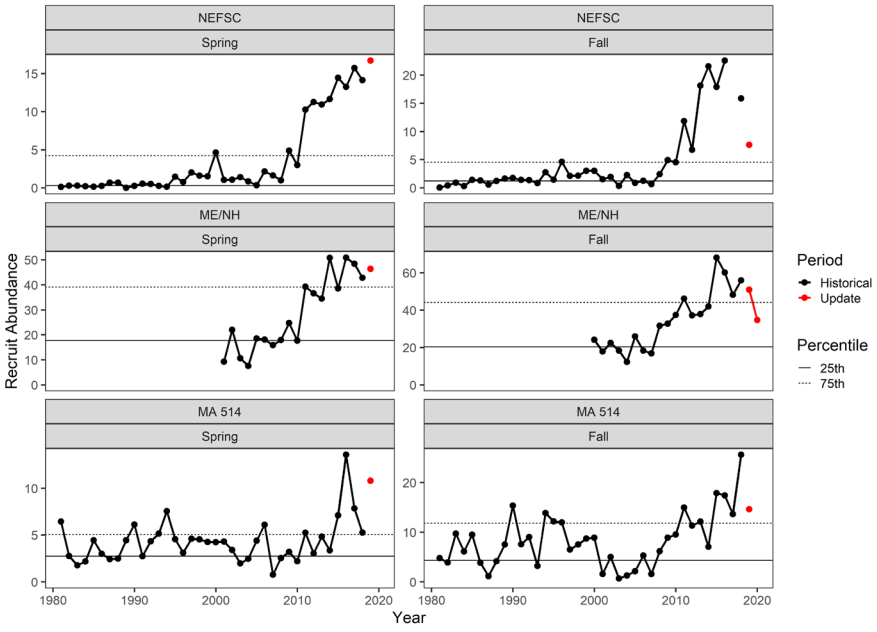

Figure 2. GOM abundance indicators: trawl survey recruit abundance.

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	0.73
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	0.96
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	0.96
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		0.99	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	0.93
2020				0.96		
2016-2020 mean	0.87	0.72	0.99	0.95	0.87	0.94
25th	0.41	0.35	0.93	0.89	0.78	0.72
median	0.60	0.42	0.98	0.94	0.86	0.86
75th	0.84	0.60	0.99	0.96	0.93	0.95

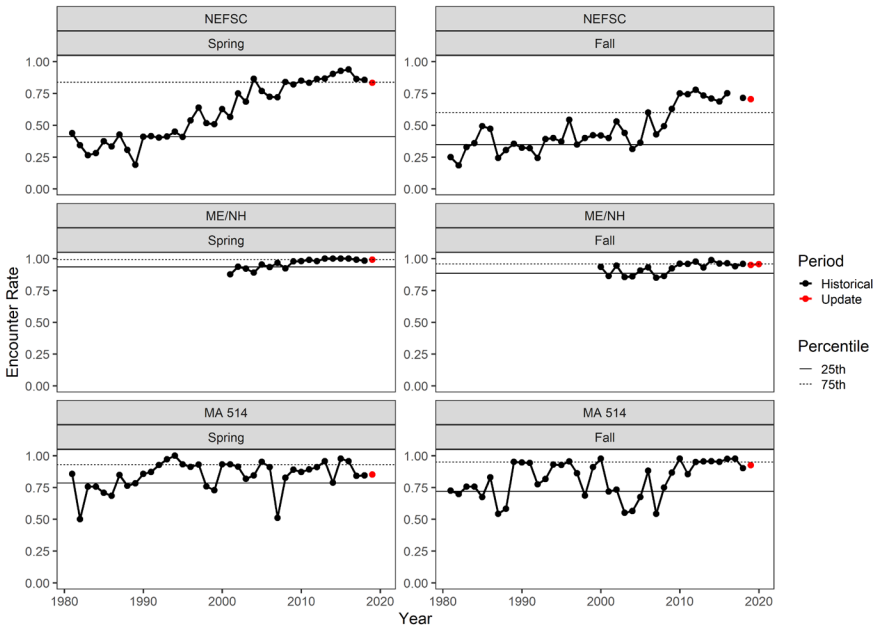

Figure 3. GOM abundance indicators: trawl survey encounter rate.

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								
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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	8.57	5.50	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	8.23	5.96	8.59	5.20	2.85	1.93
2020	7.65	5.44	7.95	5.95	9.29	6.61	2.50	1.69
2016-2020 mean	12.39	7.87	10.68	7.88	9.34	6.26	3.40	2.41
25th	5.66	3.91	6.87	5.38	6.61	4.97	2.76	2.41
median	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

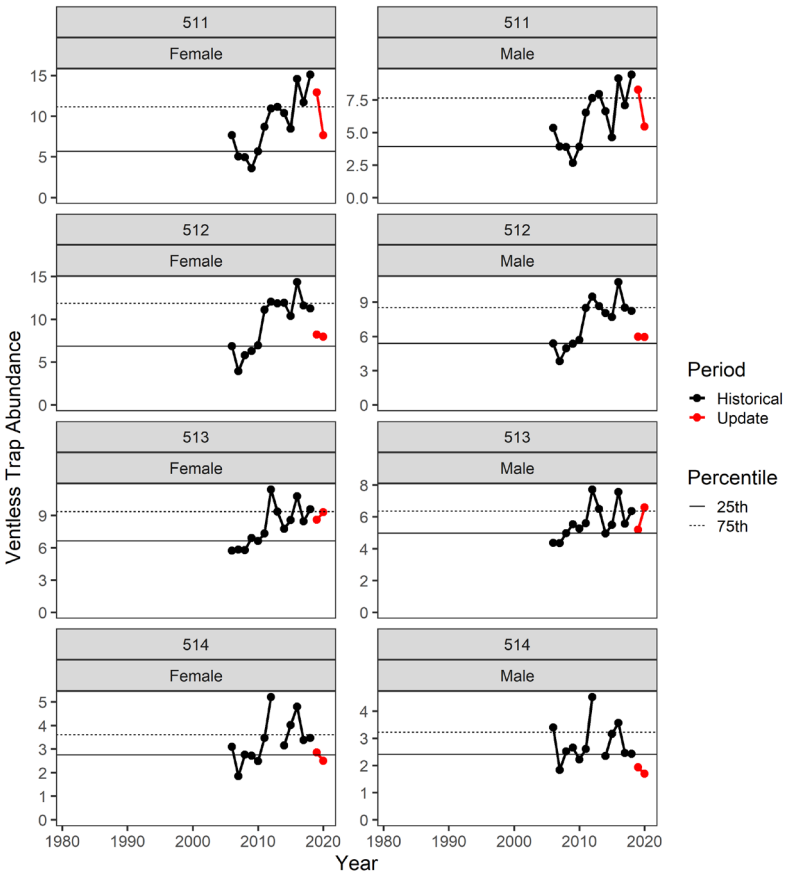

Figure 4. GOM abundance indicators: ventless trap survey abundance.

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

RECRUIT ABUNDANCE (SURVEY)		
Abundance of lobsters 71 - 80 mm CL (sexes combined)		
Survey	*NEFSC*	
	Spring	*Fall*
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		
2016-2020 mean	0.17	0.16

25th	0.06	0.18
median	0.11	0.29
75th	0.25	0.40

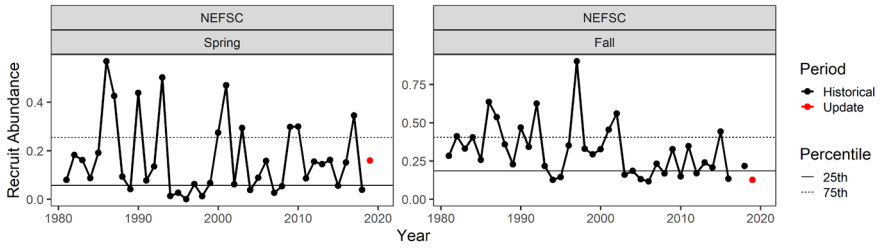

Figure 5. GBK abundance indicators: trawl survey recruit abundance.

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

SURVEY LOBSTER ENCOUNTER RATE		
Proportion of postive tows		
Survey	*NEFSC*	
	Spring	*Fall*
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	
2018	0.29	0.59
2014-2018 mean	0.36	0.58
2019	0.36	0.57
2020		
2016-2020 mean	0.37	0.57

25th	0.18	0.40
median	0.23	0.48
75th	0.29	0.55

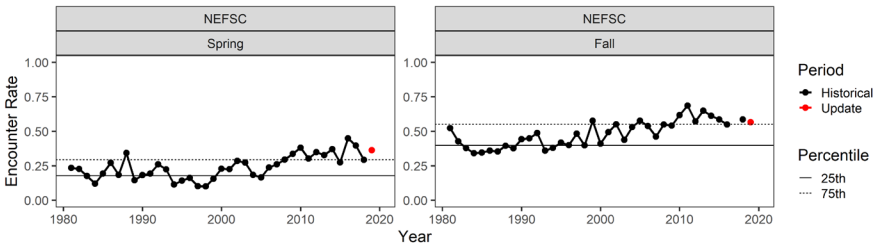

Figure 6. GBK abundance indicators: trawl survey encounter rate.

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 decreases 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 rage 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 LCMAs. 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 LCMAs, with the upper portion of length compositions overlapping proposed alternative maximum sizes.

This analysis for LCMA3 matches previous analysis conducted for inshore LCMAs, 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.

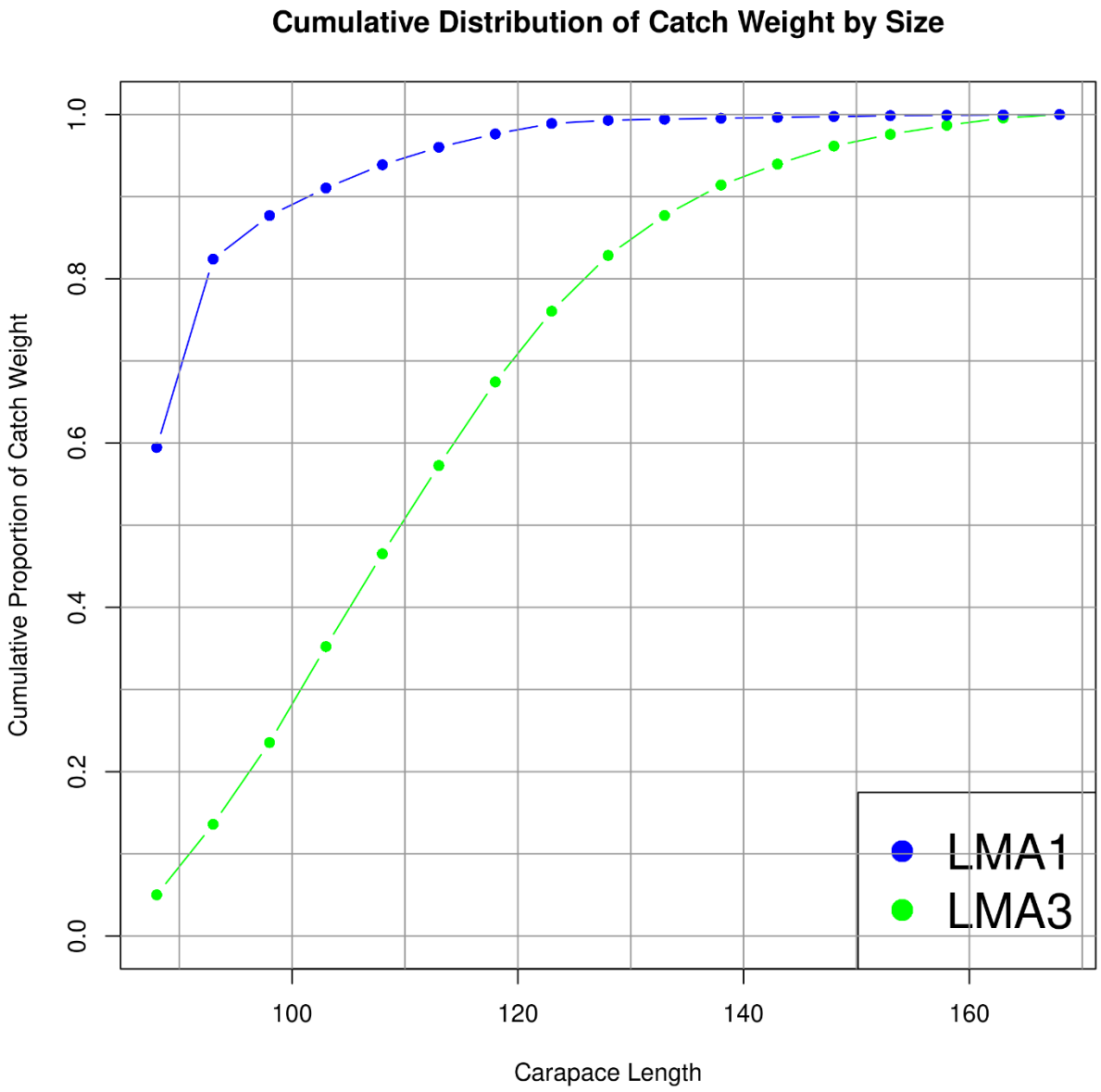

Figure 1. Cumulative proportion of catch weight by carapace length. To interpret, lobsters less than 90mm constitute approximately 8% of landings, while lobsters less than 130mm constitute approximately 85% of landings.

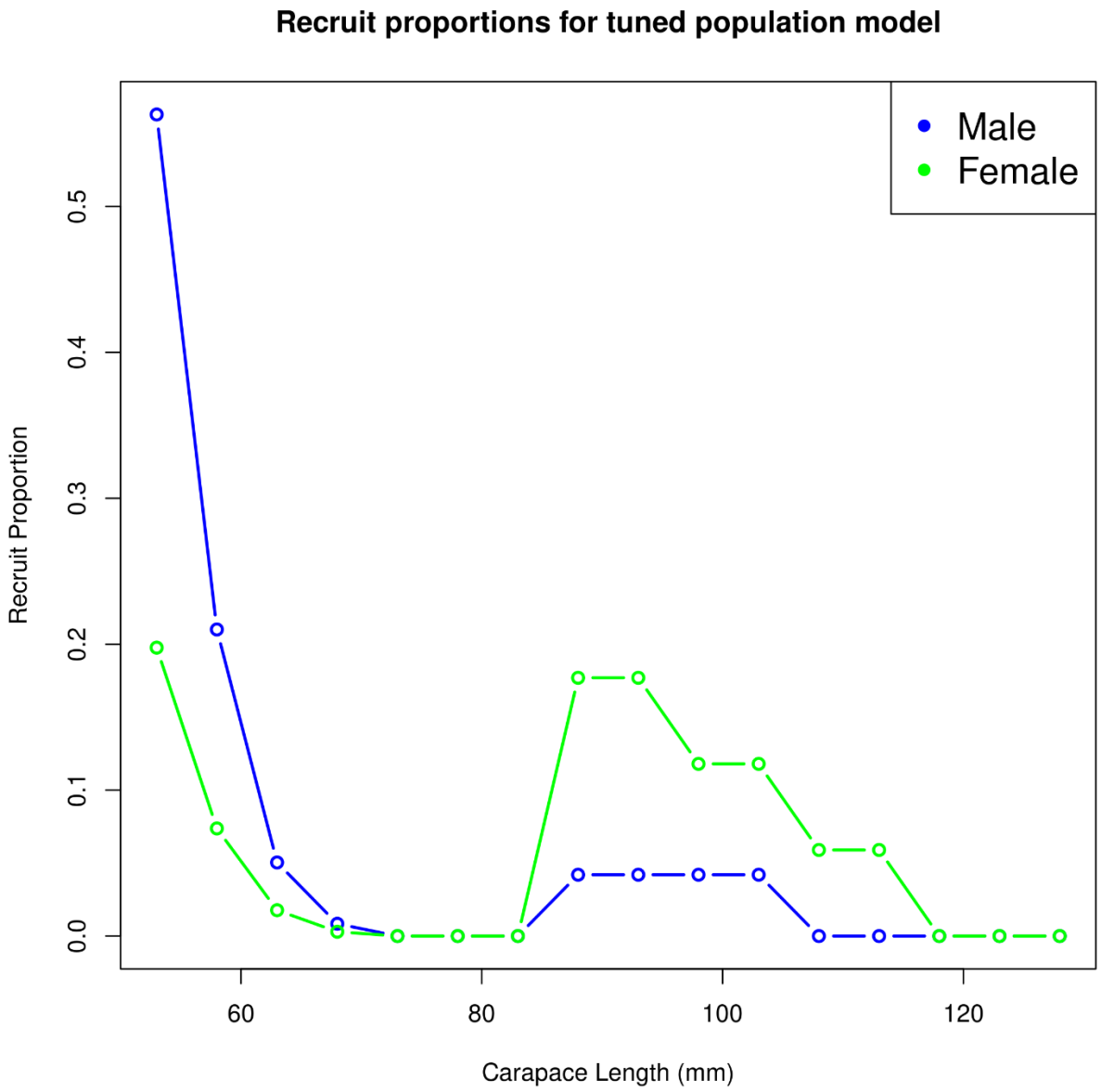

Figure 2. Tuned recruitment length compositions for the fitted model. The bi-modal length distribution suggests a combination of recruitment by growth (individuals <70mm) and migration (individuals >85 mm) with males primarily recruiting by growth and females primarily recruiting by migration as mature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

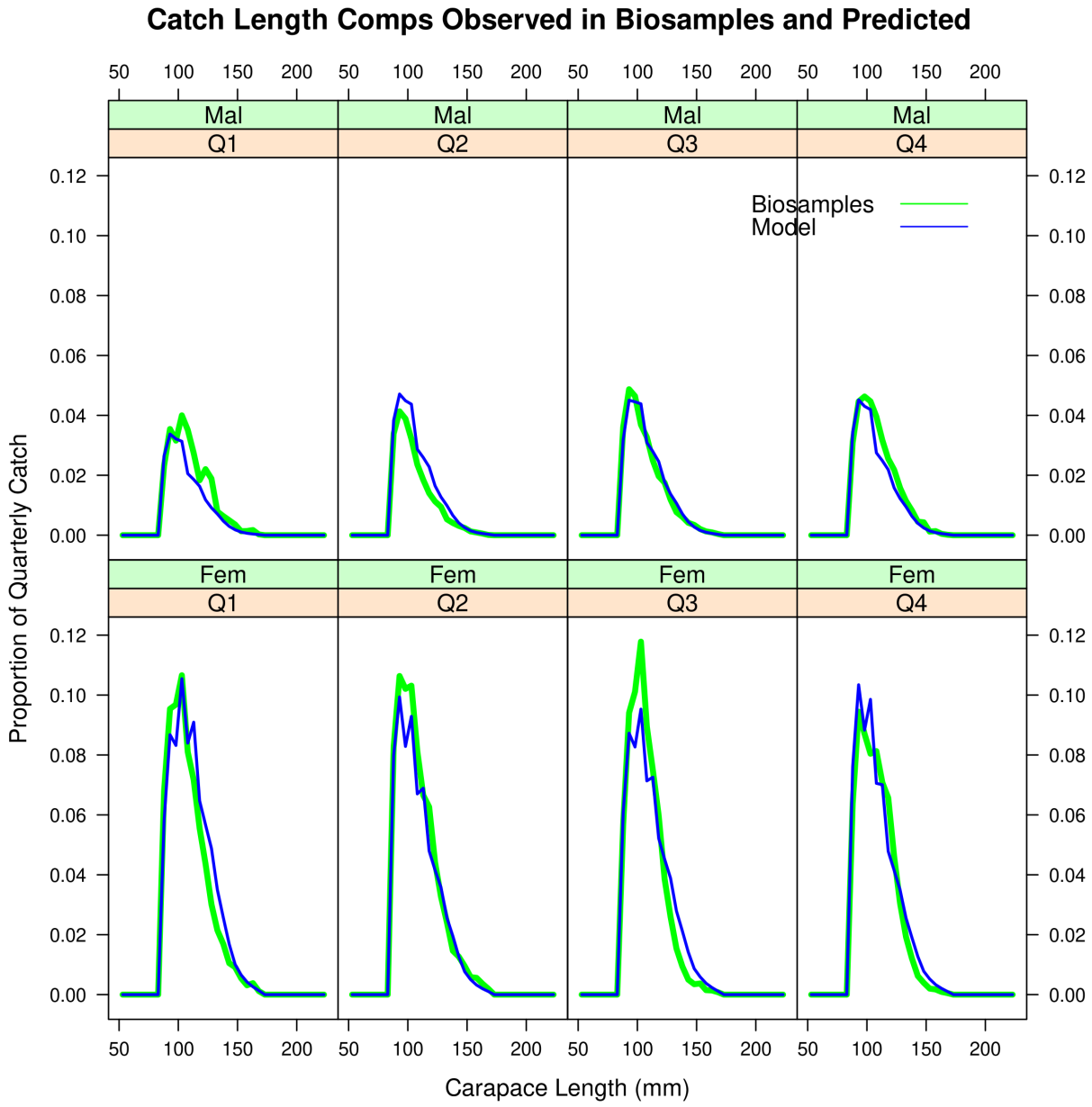

Figure 3. LCMA 3 catch length compositions by sex and quarter based on biosampling and from the tuned population model.

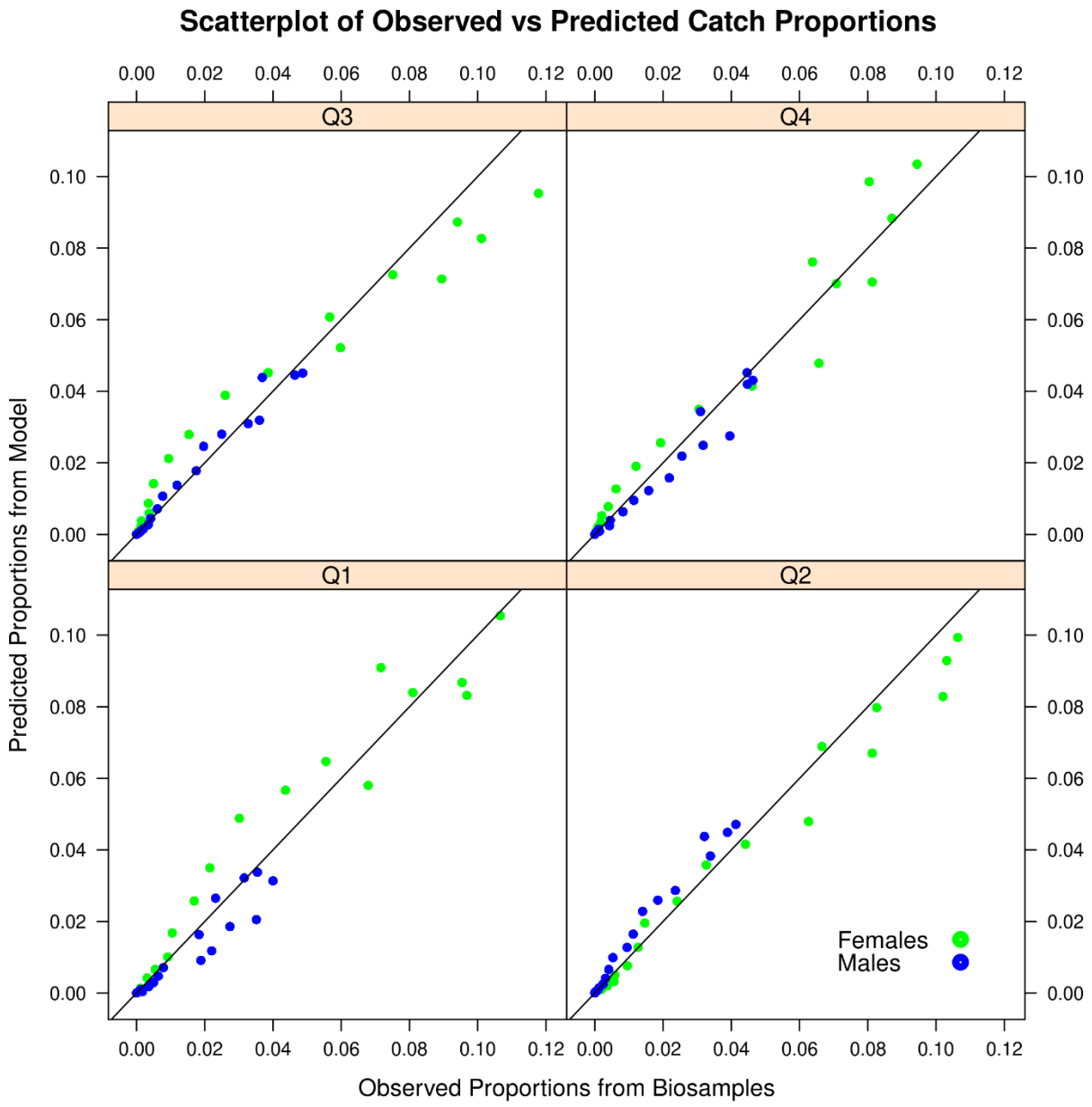

Figure 4. Relationship between length composition proportions observed in biosamples and predicted in the tuned population model by quarter and sex. The diagonal 1:1 line shows an ideal fit between the data sets.

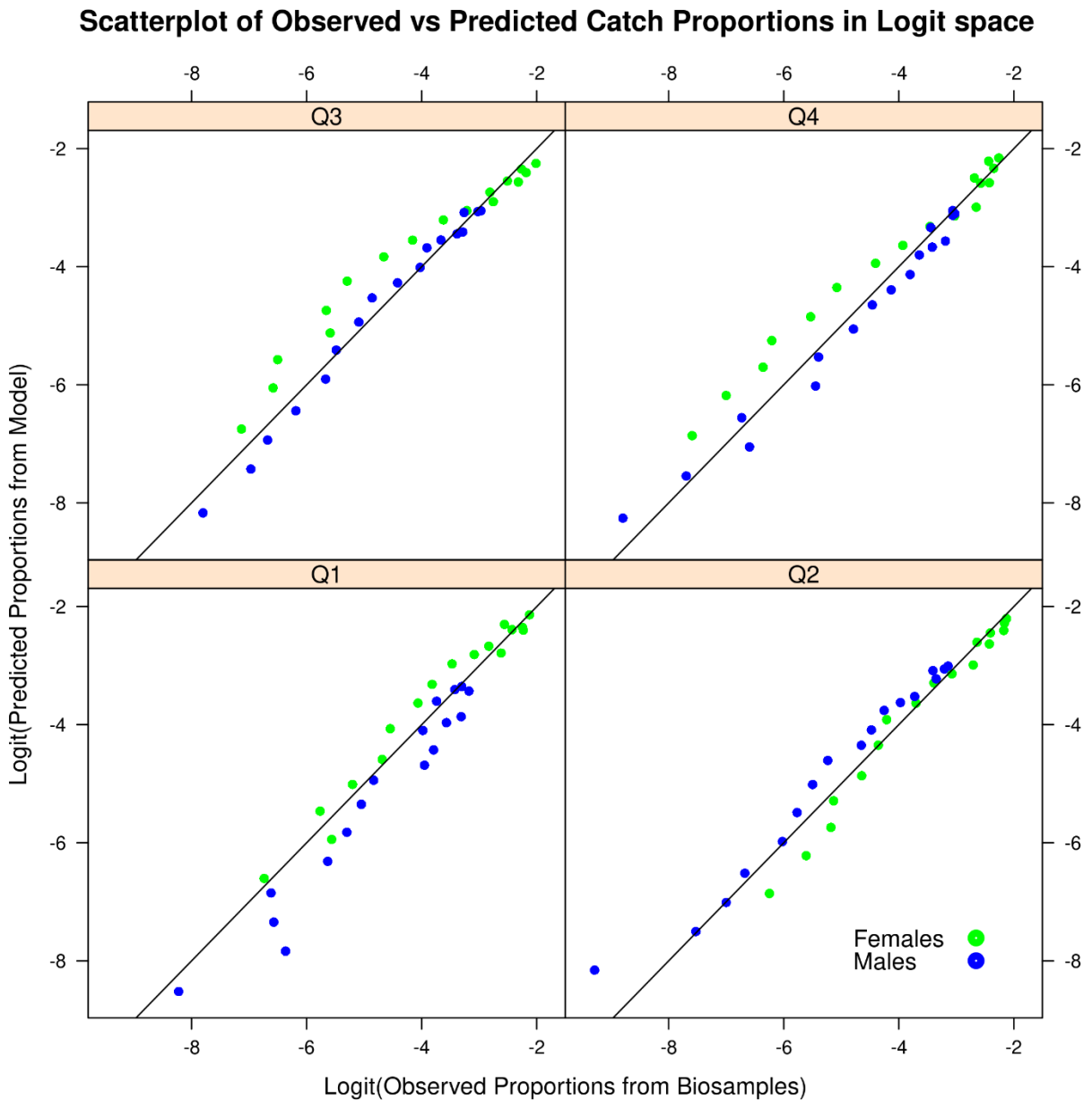

Figure 5. Relationship between length composition proportions observed in biosamples and predicted in the tuned population model by quarter and sex. Data points are logit-transformed to emphasize fit to lengths that occur in low proportions. The diagonal 1:1 line shows an ideal fit between the data sets.

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

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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).

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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).

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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).

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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).

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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).

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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).

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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).

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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 paramerizations.

A.

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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.

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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 paramerizations.

A.

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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.

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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 paramerizations.

A.

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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.

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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 paramerizations.

A.

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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.

Minimum Gauge Size \ Maximum Gauge Size	5in / 127mm	5.5in / 140mm	6in / 152mm	6.25in / 159mm	6.5in / 165mm	6.75in / 171mm	None
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 ($\leq$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 ≈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%**

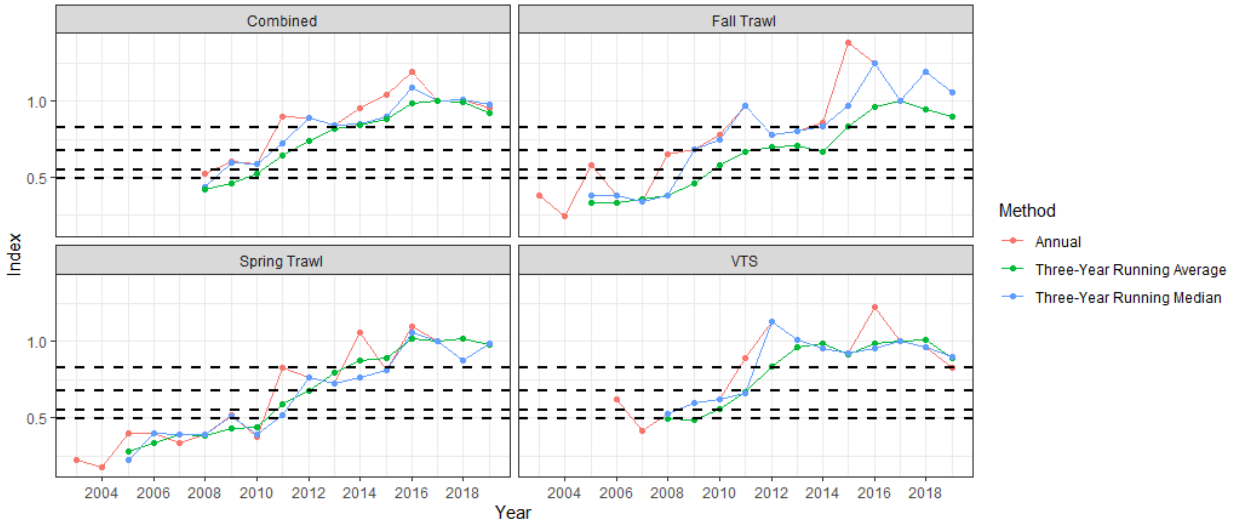

Figure 1. Scaled individual and combined indices using three calculation methods compared to four trigger levels (0.83 – Fishery/Industry Target, 0.68 – Moderate/High Abundance Regime Shift Level, 0.55 – Abundance Limit, 0.49 – Abundance Threshold) identified from potential reference abundance declines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

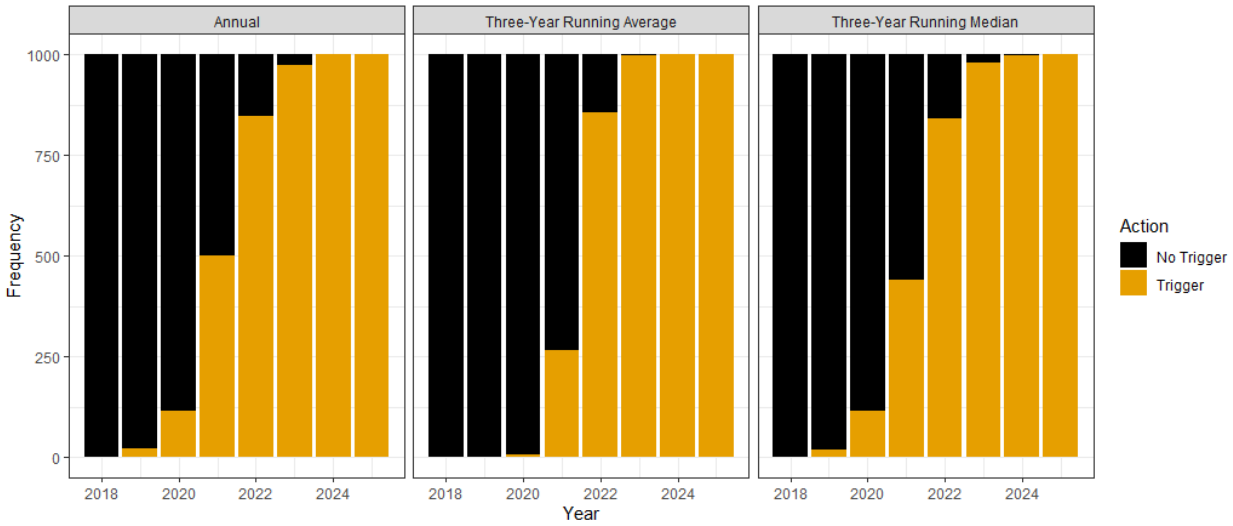

Figure 2. Annual action determinations by method from 1,000 simulated indices with the simulated population declining from the 2017 point value. The simulated stock was projected to decline 32% in 2021.

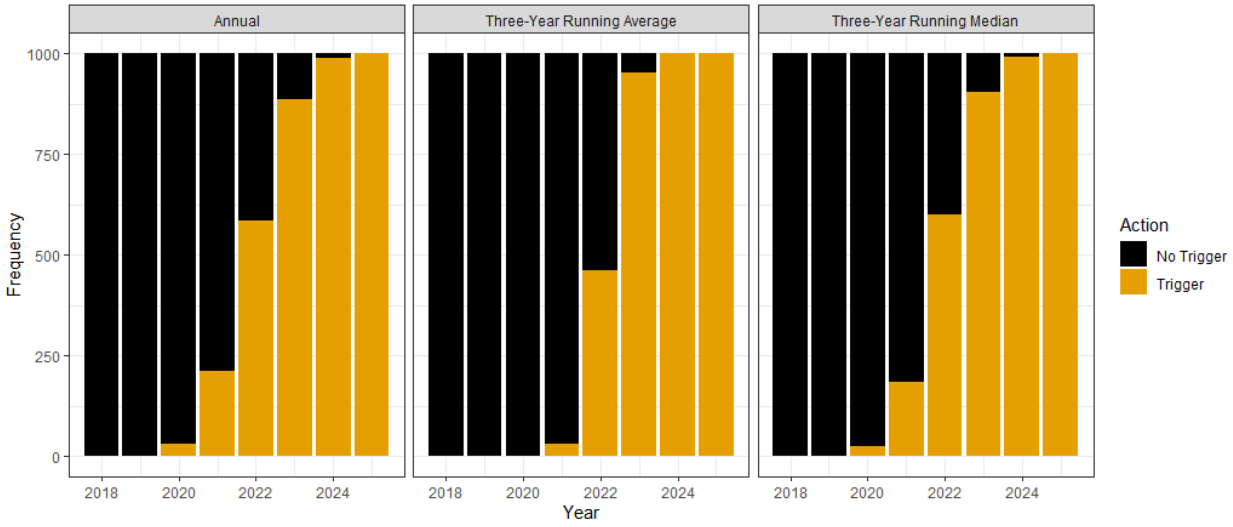

Figure 3. Annual action determinations by method from 1,000 simulated indices with the simulated population declining from the 2015-2017 average. The simulated stock was projected to decline 32% in 2021.

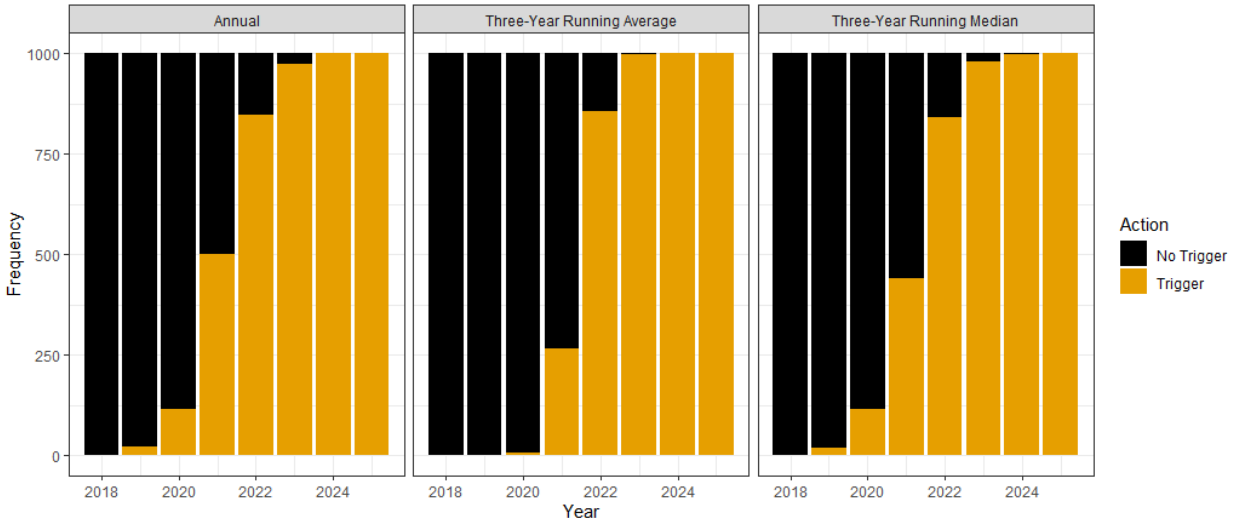

Figure 4. Annual action determinations by method from 1,000 simulated indices with the simulated population declining from the 2015-2017 median. The simulated stock was projected to decline 32% in 2021.

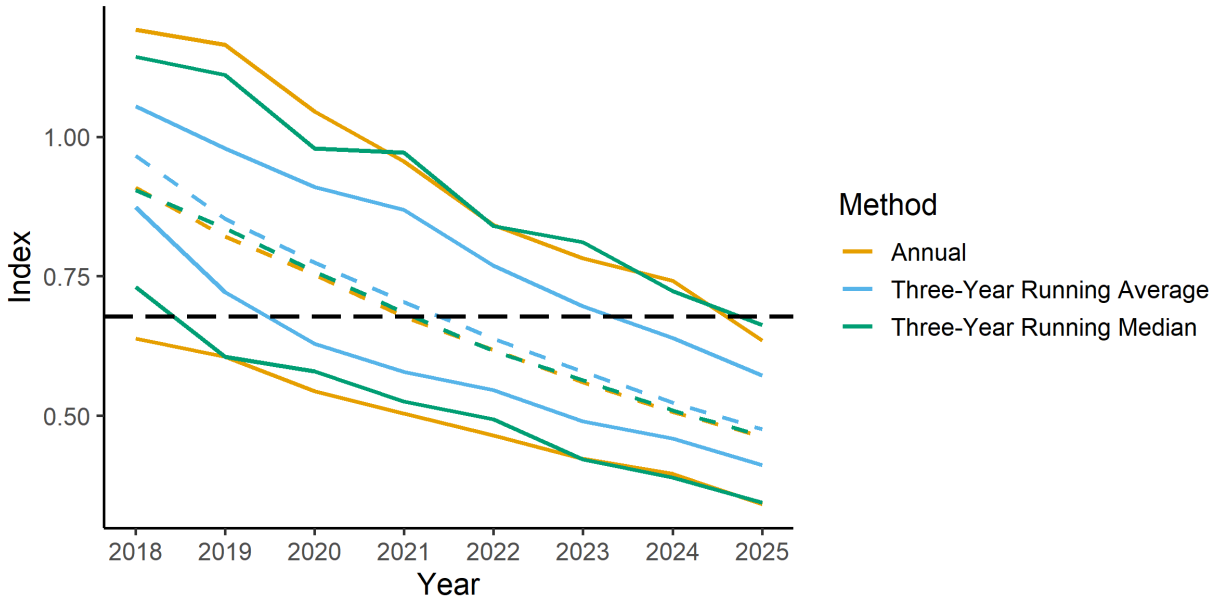

Figure 5. Distribution of index values by method from 1,000 simulations with the simulated population declining from the 2017 point value. The dashed colored lines are the median index values across simulations, the solid color lines are the minimum and maximum index values across simulations, and the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

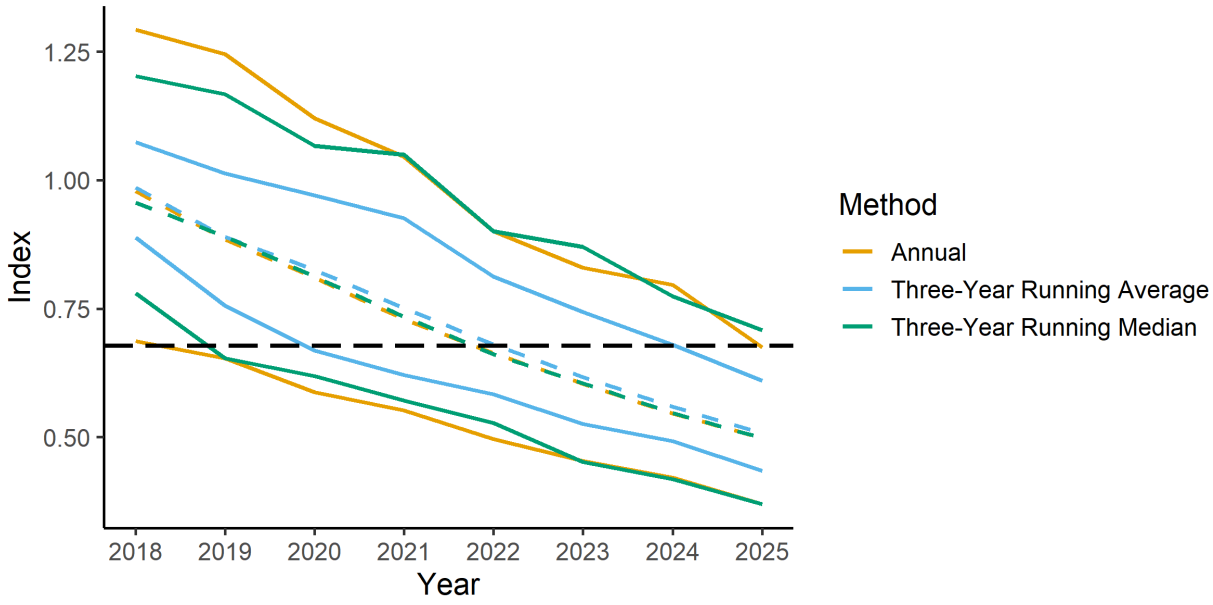

Figure 6. Distribution of index values by method from 1,000 simulations with the simulated population declining from the 2015-2017 running average. The dashed colored lines are the median index values across simulations, the solid color lines are the minimum and maximum index values across simulations,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

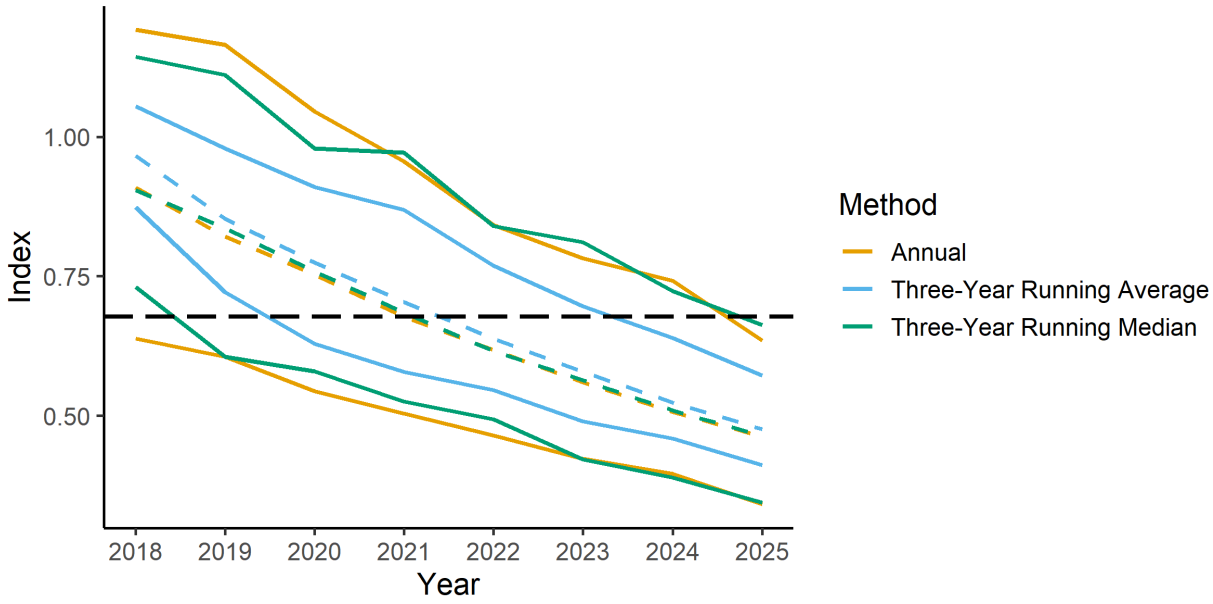

Figure 7. Distribution of index values by method from 1,000 simulations with the simulated population declining from the 2015-2017 running median. The dashed colored lines are the median index values across simulations, the solid color lines are the minimum and maximum index values across simulations,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

DRAFT FOR BOARD REVIEW

ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

FOR AMERICAN LOBSTER
(*Homarus americanus*)

2021 FISHING YEAR

Prepared by the Plan Review Team

October 2022

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

DRAFT FOR BOARD REVIEW

Table of Contents

DRAFT FOR BOARD REVIEW

***This document covers fishery activities in 2020 as well as a summary of trap transfers that took place ahead of the 2022 fishing year*.**

1.0 Status of the Fishery Management Plan

Year of ASMFC Plan's Adoption:	Amendment 3 (1997)
Plan Addenda:	
Addendum II (2001)	Addendum XV (2009)
Addendum III (2002)	Addendum XVI (2010)
Addendum IV (2003)	Addendum XVII (2012)
Addendum V (2004)	Addendum XVIII (2012)
Addendum VI (2005)	Addendum XIX (2013)
Addendum VII (2005)	Addendum XX (2013)
Addendum VIII (2006)	Addendum XXI (2013)
Addendum IX (2006)	Addendum XXII (2013)
Addendum X (2007)	Addendum XXIII (2014)
Addendum XI (2007)	Addendum XXIV (2015)
Addendum XII (2008)	Addendum XXVI (2018)
Addendum XIII (2008)	Addendum XXIX (2022)
Addendum XIV (2009)	
Management Unit:	Maine through North Carolina
States with a Declared Interest:	Maine through Virginia (Excluding Pennsylvania and DC)
Active Committees:	American Lobster Management Board, Technical Committee, Lobster Conservation Management Teams, Plan Development Team, Plan Review Team, Advisory Panel, Electronic Reporting Subcommittee, Electronic Tracking Subcommittee, Stock Assessment Subcommittee

2.0 Status of the Fishery

2.1 Commercial Fishery

The lobster fishery has seen incredible expansion in landings over the last 40 years. Between 1950 and 1975, landings were fairly stable around 30 million pounds; however, from 1976 to 2008 the average coastwide landings tripled, exceeding 98 million pounds in 2006. Landings continued to increase until reaching a high of 159 million pounds in 2016 (Table 1). In 2021, coastwide commercial landings were approximately 134 million pounds, a 10% increase from 2020 landings of 121.9 million pounds. The largest contributors to the 2021 fishery were Maine and Massachusetts with 82% and 13% of landings, respectively. The ex-vessel value for all lobster landings in 2021 was nearly $875 million, the highest value on record for the American lobster fishery.

Historically, Lobster Conservation Management Area (LCMA) 1 has had the highest landings, and accounted for 80% of total harvest between 1981 and 2012. This is followed by LCMA 3 which accounted for 9% of total landings during the same time period. In general, landings have increased in LCMA 1 and have decreased in LCMAs 2, 4, and 6. According to state compliance reports, in 2021, approximately 92% of the total landings came from LCMA 1, while the remaining 8% were contributed by the other LCMAs. A map of the LCMAs is found in Figure 1.

Landings trends between the two biological stocks have also changed, as a greater percentage of lobster are harvested from the Gulf of Maine/Georges Bank (GOM/GBK) stock. In 1997, 26.3% of coastwide landings came from the Southern New England (SNE) stock. However, as the southern stock declined and abundance in the Gulf of Maine increased, proportional harvest has significantly changed. In 2000, only 15.6% of landings came from the SNE stock and by 2006, this declined to 7%. In 2021, approximately 1.8% of coastwide landings came from the SNE stock. In 2021 the GOM/GBK stock accounted for 131.8 million pounds while the SNE stock accounted for 2.4 million.

2.2 Recreational Fishery

Lobster is also taken recreationally with pots, and in some states, by hand while SCUBA diving. While not all states collect recreational harvest data, some do report the number of pounds landed recreationally and/or the number of recreational permits issued. In 2021, New Hampshire reported 5,512 pounds of lobster harvested recreationally and New York reported 4,901 pounds. Maine, Rhode Island, and Connecticut do not collect information on the number of pounds recreationally harvested. For 2021, Rhode Island issued 535 lobster licenses, and lobster licenses sold in Connecticut declined to 222 in 2021. Massachusetts has not provided recreational landings data in recent years, but for the past five years that data were available (2011-2015) recreational lobster landings represented an average of 1.4% of the total state landings.

3.0 Status of the Stock

The recent 2020 American Lobster Benchmark Stock Assessment presents contrasting results for the two American lobster stock units, with record high abundance and recruitment in the Gulf of Maine and Georges Bank stock (GOM/GBK) and record low abundance and recruitment in the Southern New England stock (SNE) in recent years.

The assessment found that abundance estimates for the GOM/GBK stock show an increasing trend beginning in the late 1980s. After 2008, the rate of increase accelerated to a record high abundance level in 2018, the terminal year of the assessment. 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 2). Current spawning stock abundance and recruitment and are near record highs. Exploitation (commercial landings relative to stock abundance) declined in the late 1980s and has remained relatively stable since.

The GOM/GBK stock is in favorable condition based on the new recommended reference points adopted by the Board (Table 2). The average abundance from 2016-2018 was 256 million lobster, which is greater than the fishery/industry target of 212 million lobster. 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.

In contrast to GOM/GBK, model results for SNE show a completely different picture of stock health. Abundance estimates in SNE have declined since the late 1990s to record low levels. Model estimates of recruitment and spawning stock biomass have also declined to record low levels. Analysis of these estimates indicates a declining trend in stock productivity, indicating reproductive rates are insufficient to sustain a stable population at current exploitation rates. Exploitation of the SNE stock was high and stable through 2002, declined sharply in 2003, and has remained lower and stable since.

Based on the new abundance threshold reference point, the SNE stock is significantly depleted. The average abundance from 2016-2018 was 7 million lobster, well below the threshold of 20 million lobster (Table 2, Figure 3). However, according to the exploitation reference points the SNE stock is not experiencing overfishing. The average exploitation from 2016-2018 was 0.274, falling between the exploitation threshold of 0.290 and the exploitation target of 0.257.

The assessment and peer review panel recommended significant management action be taken to provide the best chance of stabilizing or improving abundance and reproductive capacity of the SNE stock.

4.0 Status of Management Measures

4.1 Implemented Regulations

Amendment 3 established regulations which require coastwide and area specific measures applicable to commercial fishing (Table 3). The coastwide requirements from Amendment 3 are summarized below; additional requirements were established through subsequent Addenda.

Coastwide Requirements and Prohibited Actions

- Prohibition on possession of berried or scrubbed lobsters
- Prohibition on possession of lobster meats, detached tails, claws, or other parts of lobsters by fishermen
- Prohibition on spearing lobsters
- Prohibition on possession of v-notched female lobsters
- Requirement for biodegradable “ghost” panel for traps
- Minimum gauge size of 3-1/4”
- Limits on landings by fishermen using gear or methods other than traps to 100 lobsters per day or 500 lobsters per trip for trips 5 days or longer
- Requirements for permits and licensing
- All lobster traps must contain at least one escape vent with a minimum size of 1-15/16” by 5-3/4”
- Maximum trap size of 22,950 cubic inches in all areas except area 3, where traps may not exceed a volume of 30,100 cubic inches.

Amendment 3 to the Interstate Fishery Management Plan for American Lobster (December 1997)

American lobster is managed under Amendment 3 to the Interstate FMP for American Lobster. Amendment 3 establishes seven lobster management areas. These areas include the: Inshore Gulf of Maine (LCMA 1), Inshore Southern New England (LCMA 2), Offshore Waters (LCMA 3), Inshore Northern Mid-Atlantic (LCMA 4), Inshore Southern Mid-Atlantic (LCMA 5), New York and Connecticut State Waters (LCMA 6), and Outer Cape Cod (OCC). Lobster Conservation Management Teams (LCMTs) comprised of industry representatives were formed for each management area. The LCMTs are charged with advising the Lobster Board and recommending changes to the management plan within their areas.

Amendment 3 also provides the flexibility to respond to current conditions of the resource and fishery by making changes to the management program through addenda. The commercial fishery is primarily controlled through minimum/maximum size limits, trap limits, and v-notching of egg-bearing females.

Addendum I (August 1999)

Establishes trap limits in the seven LCMAs.

Addendum II (February 2001)

Establishes regulations for increasing egg production through a variety of LCMT proposed management measures including, but not limited to, increased minimum gauge sizes in LCMAs 2, 3, 4, 5, and the Outer Cape.

Addendum III (February 2002)

Revises management measures for all seven LCMAs in order to meet the revised egg-rebuilding schedule.

Technical Addendum 1 (August 2002)

Eradicates the vessel upgrade provision for LCMA 5.

Addendum IV (January 2004)

Changes vent size requirements; applies the most restrictive rule on an area trap cap basis without regard to the individual's allocation; establishes LCMA 3 sliding scale trap reduction plan and transferable trap program to increase active trap reductions by 10%; and establishes an effort control program and gauge increases for LCMA 2; and a desire to change the interpretation of the most restrictive rule.

Addendum V (March 2004)

Amends Addendum IV transferability program for LCMA 3. It establishes a trap cap of 2200 with a conservation tax of 50% when the purchaser owns 1800 to 2200 traps and 10% for all others.

Addendum VI (February 2005)

Replaces two effort control measures for LCMA 2 – permits an eligibility period.

Addendum VII (November 2005)
Revises LCMA 2 effort control plan to include capping traps fished at recent levels and maintaining 3 3/8" minimum size limit.

Addendum VIII (May 2006)
Establishes new biological reference points to determine the stock status of the American lobster resource (fishing mortality and abundance targets and thresholds for the three stock assessment areas) and enhances data collection requirements.

Addendum IX (October 2006)
Establishes a 10% conservation tax under the LCMA 2 trap transfer program.

Addendum X (February 2007)
Establishes a coastwide reporting and data collection program that includes dealer and harvester reporting, at-sea sampling, port sampling, and fishery-independent data collection replacing the requirements in Addendum VIII.

Addendum XI (May 2007)
Establishes measures to rebuild the SNE stock, including a 15-year rebuilding timeline (ending in 2022) with a provision to end overfishing immediately. The Addendum also establishes measures to discourage delayed implementation of required management measures.

Addendum XII (February 2009)
Addresses issues which arise when fishing privileges are transferred, either when whole businesses are transferred, when dual state/federal permits are split, or when individual trap allocations are transferred as part of a trap transferability program. In order to ensure the various LCMA-specific effort control plans remain cohesive and viable, this addendum does three things. First, it clarifies certain foundational principles present in the Commission's overall history-based trap allocation effort control plan. Second, it redefines the most restrictive rule. Third, it establishes management measures to ensure history-based trap allocation effort control plans in the various LCMAs are implemented without undermining resource conservation efforts of neighboring jurisdictions or LCMAs.

Addendum XIII (May 2008)
Solidifies the transfer program for OCC and stops the current trap reductions.

Addendum XIV (May 2009)
Alters two aspects of the LCMA 3 trap transfer program. It lowers the maximum trap cap to 2000 for an individual that transfers traps. It changes the conservation tax on full business sales to 10% and for partial trap transfers to 20%.

Addendum XV (November 2009)
Establishes a limited entry program and criteria for Federal waters of LCMA 1.

Addendum XVI: Reference Points (May 2010)
Establishes new biological reference points to determine the stock status of the American lobster resource (fishing mortality and abundance targets and thresholds for the three stock assessment areas). The addendum also modifies the procedures for adopting reference points to allow the Board to take action on advice following a peer reviewed assessment.

Addendum XVII (February 2012)
Institutes a 10% reduction in exploitation for LCMAs within Southern New England (2, 3, 4, 5, and 6). Regulations are LCMA specific but include v-notch programs, closed seasons, and size limit changes.

Addendum XVIII (August 2012)
Reduces traps allocations by 50% for LCMA 2 and 25% for LCMA 3.

Addendum XIX (February 2013)
Modifies the conservation tax for LCMA 3 to a single transfer tax of 10% for full or partial business sales.

Addendum XX (May 2013)
Prohibits lobstermen from setting or storing lobster traps in Closed Area II from November 1 to June 15 annually. Any gear set in this area during this time will be considered derelict gear. This addendum represents an agreement between the lobster industry and the groundfish sector.

Addendum XXI (August 2013)
Addresses changes in the transferability program for LCMAs 2 and 3. Specific measures include the transfer of multi-LCMA trap allocations and trap caps.

Addendum XXII (November 2013)
Implements Single Ownership and Aggregate Ownership caps in LCMA 3. Specifically, it allows LCMA 3 permit holders to purchase lobster traps above the cap of 2000 traps; however, these traps cannot be fished until approved by the permit holder's regulating agency or once trap reductions commence. The Aggregate Ownership Cap limits LCMA fishermen or companies from owning more traps than five times the Single Ownership Cap.

Addendum XXIII (August 2014)
Updates Amendment 3's habitat section to include information on the habitat requirements and tolerances of American lobster by life stage.

Addendum XXIV (May 2015)
Aligns state and federal measure for trap transfer in LCMA's 2, 3, and the Outer Cape Cod regarding the conservation tax when whole businesses are transferred, trap transfer increments, and restrictions on trap transfers among dual permit holders.

Addendum XXVI (February 2018)
Advances the collection of harvester and biological data in the lobster fishery by improving the spatial resolution of data collection, requiring harvesters to report additional data elements, and establishing a deadline that within five years, states are required to implement 100% harvester reporting. The Addendum also improves the biological sampling requirements by establishing a baseline of ten sampling trips per year, and encourages states with more than 10% of coastwide landings to conduct additional sampling trips. Required reporting of additional data elements went into effect on January 1, 2019. The Addendum XXVI requirement for commercial harvesters to report their fishing location by 10 minute longitudinal/latitudinal square was implemented in 2021.

Addendum XXIX (2022)
Implements electronic tracking requirements for federally-permitted vessels in the American lobster and Jonah crab fisheries to collect high resolution spatial and temporal effort data. Specifically, electronic tracking devices will be required for vessels with commercial trap gear area permits for LCMAs 1, 2, 3, 4, 5, and Outer Cape Cod. Requirements will become effective in 2023.

4.2 On-Going Management Actions
In response to signs of reduced settlement in the GOM/GBK, the Board initiated Draft Addendum XXVII in August 2017 to increase resiliency through considering the standardization of management measures in the GOM/GBK stock. Due to the prioritization of actions in response to the Atlantic Large Whale Take Reduction Team recommendations, development of this addendum stalled. Following its review of the 2020 Benchmark Stock Assessment and Peer Review Report, the Board reinitiated development of Draft Addendum XXVII. The Board revised the objective of the addendum given persistent low settlement indices and recent decreases in recruit indices in recent years. The Board specified that 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.

5.0 Trap Reductions
Addendum XVIII established a series of trap reductions in LCMAs 2 and 3, with the intent of scaling the size of the SNE fishery to the size of the resource. Specifically, a 25% reduction in year 1 followed by a series of 5% reductions for five years was established in LCMA 2; a series of 5% reductions over five years was established in LCMA 3. The fifth year of reductions took place at the end of the 2019 fishing year and affect trap allocations in the 2020 fishery. The sixth year of reductions for LCMA 2 took place at the end of the 2020 fishing year and affects trap allocations in the 2021 fishery. Trap reductions for LCMA 2 and 3 are now complete. Per Addendum XVIII, states with fishermen in LCMAs 2 and 3 are required to report on the degree of consolidation that has taken place. It is important to note that trap reductions also occur as the result of trap transfers as, per Addendum XIX, there is a 10% conservation tax on trap allocation transfers between owners. The series of federal trap reductions is summarized in Tables 4 and 5.

6.0 Fishery Dependent Monitoring

The following provisions of Addendum XXVI went into effect January 1, 2019:

- Required reporting of additional data elements;
- Requirement to implement 100% harvester reporting within five years;
- Baseline biological sampling requirement of ten sea and/or port sampling trips per year.

The Addendum XXVI requirement for commercial harvesters to report their fishing location by 10 minute longitudinal/latitudinal square will not be implemented until 2021. Table 5 describes the level of reporting and monitoring programs by each state. *De minimis* states are not required to conduct biological sampling of their lobster fishery.

In 2021, all states except Connecticut and New Jersey completed the 10 required sea and/or port sampling trips for fishery dependent monitoring. Due to the COVID-19 pandemic, at sea observer trips were suspended in New Jersey for 2021. New Jersey continues to monitor the situation and has started to develop protocol for a safe return to normal field operations. No fishery dependent sampling has been conducted by Connecticut since 2014 due to reductions in funding and staffing levels.

7.0 Status of Fishery Independent Monitoring

Addendum XXVI also requires fishery independent data collection by requiring statistical areas be sampled through one of the following methods: annual trawl survey, ventless trap survey, or young-of-year survey.

7.1 Trawl Surveys

Maine and New Hampshire: The Maine-New Hampshire Inshore Trawl survey began in 2000 and covers approximately two-thirds of the inshore portion of Gulf of Maine. The spring survey began May 5, 2021 in Portsmouth, NH and ended on June 6, 2021 off of Lubec, Maine. 118 out of 120 scheduled tows were completed, resulting in a 98% completion rate. A total of 15,347 lobsters were caught and sampled, with 7,524 females, 7,821 males and 2 unsexed caught and measured (Figure 4). The fall survey began September 27, 2021 in Portsmouth, NH and ended on October 29, 2021 off of Lubec, Maine. 89 out of 120 scheduled tows were completed, resulting in a 74% completion rate. A total of 11,589 lobsters were caught and sampled, with 5,663 females, 5,893 males and 28 unsexed caught and measured (some lobsters were missed due to faulty recording of data) (Figure 5).

Massachusetts: Since 1978, the Division of Marine Fisheries has conducted spring and autumn bottom trawl surveys in the territorial waters of Massachusetts. For the first time since 1978, neither the spring nor fall bottom trawl surveys were conducted in 2020 due to the COVID-19 pandemic, but the survey resumed in 2021. After low levels observed in the GOM during the early to mid 2000s, relative abundance indices have increased over the last decade. While legal abundance has remained high relative to the time series median for 2019 and 2021, sublegal-sized abundance was close to the median in those two years. In SNE, relative abundance from the spring and fall surveys remains low (Figure 6).

Rhode Island: The Rhode Island DFW Trawl Survey program conducted seasonal surveys in the spring and fall, as well as a monthly survey. In 2021, 44 trawls were conducted in the Spring and 43 in the Fall. The Monthly Survey includes monthly trawls throughout Narragansett Bay. In 2021 156 trawls were performed as part of the Monthly program. Spring 2021 mean CPUEs were 0.05 and 0.61 for legal and sublegal lobsters (respectively), where Fall 2021 CPUE was 0.02 for legal lobsters and 0.21 for sublegal lobsters. The 2021 mean Monthly trawl CPUEs were 0.04 and 0.54 per-tow for legal and sublegal lobsters, respectively (Figure 7).

Connecticut and New York: Juvenile and adult abundance are monitored through the Long Island Sound Trawl Survey during the spring (April, May, June) and the fall (September, October) cruises all within NMFS statistical area 611. Due to the COVID-19 pandemic, the spring and fall 2020 Long Island Sound Trawl Surveys were not conducted; an estimated index is shown as the average of 2019 and 2021. The spring 2021 lobster abundance index (geometric mean = 0.04 lobsters/tow) was the third lowest in the time series. Spring abundance in the last nine years (2011-2021) remains less than 1.0. All indices from 2004-2021 are below the time series median (3.10). The fall 2021 lobster abundance index (geometric mean = 0.02 lobsters/tow) was a slight improvement from 2019 when no lobsters were caught in September and October. The fall time series median (3.33) has not been exceeded since 2004. Both legal and sublegal size lobster abundance has declined with a similar trajectory (Figure 8).

New York: New York initiated a stratified random trawl survey in the near shore ocean waters off the south shore of Long Island in 2018 from the Rockaways to Montauk Point and the New York waters of Block Island Sound. Three sampling cruises were conducted in 2021 during the winter (February), spring (June), and summer (August). The summer cruise was cut short due to boat issues. These same boat issues were the reason the fall survey was not completed. Twenty, twenty-seven, and twelve stations were sampled respectively. Four lobsters were caught during the 2021 surveys.

New Jersey: An independent Ocean Trawl Survey is conducted from Sandy Hook, NJ to Cape May, NJ each year. The survey stratifies sampling in three depth gradients, inshore (18'-30'), mid-shore (30'-60'), offshore (60'-90'). The mean CPUE is calculated as the sum of the mean number of lobsters per size class collected in each sampling area weighted by the stratum area. Due to the COVID-19 pandemic, the survey did not take place for 2020 and 2021 and CPUE and indices were not obtained (Figure 9).

Maryland: Maryland conducted a 16-foot otter trawl survey in the coastal bays and has not encountered an American lobster in this survey (1989 - 2021).

7.2 Young of Year Index

Several states conduct young-of-year (YOY) surveys to detect trends in abundance of newly-settled and juvenile lobster populations. These surveys attempt to provide an accurate picture of the spatial pattern of lobster settlement. States hope to track juvenile populations and generate predictive models of future landings.

Maine: There are currently 40 fixed stations along the Maine coast. Of these 40 stations 38 have been sampled consistently since 2001 with two additional sites added to Zone D, off midcoast Maine, in 2005. In recent years, these sites are sampled October to December. A new R script was developed in 2022 to pull the data directly from Maine's MARVIN archive database to create a replicable and transparent data query, but these numbers differ slightly from past data pulled. Cut-off values for YOY vary by year. This data query process is still being vetted (Figure 10).

New Hampshire: New Hampshire Fish and Game conducted a portion of the coastwide American Lobster Settlement Index (ALSI). In 2021, a total of 32 juvenile lobsters were sampled from three sites; 21 older juveniles, seven YOY lobster, and four one-year-old (Y+). Figure 11 depicts the CPUE (#/m2) of all sampled lobsters, YOY and Y+, for all New Hampshire sites combined from 2008 through 2021. For each of these indices, CPUE shows a general upward trend to a time series high in 2011 with sustained moderate to low levels from 2012 through 2021.

Massachusetts: Annual sampling for early benthic phase/juvenile (EBP) lobsters was conducted during August and September, 2021. Prior to 2019, sampling was completed at 21 sites spanning 7 regions in Massachusetts coastal waters. In 2019 changes to the survey were made discontinuing four locations in SNE (two in Buzzards Bay and both Vineyard Sound sites) and five sites in GOM (two South Shore locations and all three Cape Cod Bay locations). As of 2021, suction sampling is conducted in the GOM stock unit at 10 sites from Cape Ann to the south shore area, and in the SNE stock unit at 4 sites in Buzzards Bay. Data for those sites included in the 2020 stock assessment are presented. In 2021 densities of YOY lobsters remained low compared to the time series average in Boston Harbor and Salem Sound, but densities in 2021 were higher in Salem Sound than any years since 2011 (Figure 12). In SNE there were again no YOY lobsters found in the Buzzards Bay sampling locations.

Rhode Island: In 2021, the RI DEM DMF YOY Settlement Survey (Suction Sampling) was conducted at six fixed stations with twelve randomly selected 0.5 m2 quadrats sampled at each survey station. The survey stations are located outside of Narragansett Bay along the southern Rhode Island coast, from Sachuest Point (east) to Point Judith (west). The index represents the average annual densities for YOY (≤ 13mm) and total lobsters caught (Figure 13). The 2021 YOY Settlement Survey index was 0.08 lobsters/m2, and with all lobsters was 0.14/m^2.

Connecticut: The CT DEEP Larval Lobster Survey in western Long Island Sound was discontinued after 2012. Alternative monitoring data are available for the eastern Sound from the Millstone Power Station entrainment estimates of all stages of lobster larvae. Abundance indices in both programs are delta mean density of larvae per 1000 cubic meters of water, entrained into the power plant in the case of the Millstone program and stage 4 only captured in surface plankton samples in the CT DEEP program. Both programs show a protracted decline in recruitment following the 1999 die-off (correlation between programs: R=0.35, p=0.066) (Figure 14).

7.3 Ventless Trap Survey

To address a need for a reliable index of lobster recruitment, a cooperative random stratified ventless trap survey was designed to generate accurate estimates of the spatial distribution of lobster length frequency and relative abundance while attempting to limit the biases identified in conventional fishery dependent surveys.

Maine: The Maine Ventless Trap Survey changed strategies in 2015 to cover more area by eliminating the vented traps at each site. This change allowed the survey to double the number of sites with ventless traps and increase the sampling coverage spatially to 276 sites. Traps were set during the months of June, July, and August. The stratified mean was calculated for each area using depth and statistical area for ventless traps only. Compared to the previous years, in 2021 there were decreases in the number of sublegal (<83 mm CL) lobsters in all areas and legal sized (≥ 83 mm CL) lobsters caught in the NH-Friendship (513) areas. There were increases in the number of legal sized (≥ 83 mm CL) lobsters caught in the Schoodic Point to Friendship (512) and the Schoodic Pt-Cutler (511) areas (Figure 15).

New Hampshire: Since 2009, NHF&G has been conducting the coastwide Random Stratified Ventless Trap Survey in state waters (statistical area 513). A total of six sites were surveyed twice a month from June through September in 2021. Catch per unit effort (stratified mean catch per trap haul) from 2009 through 2021 is presented in Figure 16. Annual stratified mean catch per trap haul values varied without significant positive or negative trend throughout the time series.

Massachusetts: The coast-wide ventless trap survey was initiated in 2006 and expanded in 2007 with the intention of establishing a standardized fishery-independent survey designed specifically to monitor lobster relative abundance and distribution. The survey was not conducted in 2013 due to a lack of funding; however, starting in 2014 the survey has been funded with lobster license revenues and will continue as a long-term survey.

Due to lack of interested participants in the SNE survey area (Area 538) in 2021, the SNE survey footprint was reduced, the number of hauls was reduced to one per month, and the time frame was reduced by one month to just June through August. These changes to the SNE survey necessitated re-analysis of the abundance time series to adjust to the reduced survey design. The data presented in Figure 17and Figure 18 are the results of the new analysis. The entire SNE time series now represents June – August only, first haul of the month, and only those stations that occurred in the newly reduced footprint.

The time series of relative abundance for sublegal (< 83 mm CL) and legal-sized (≥ 83 mm CL) lobsters for Area 514 (part of LMA 1) is shown in Figure 17 as the stratified mean CPUE (± S.E.). Note that the index includes data from vented and non-vented traps, and includes all four survey months (June – Sept). The average catch of sublegal lobsters is much higher than the catch of legal-sized lobsters, and generally increased from 2006 through 2016 but has been declining since, with values from the last three years (2019-2021) falling below the time series

average of 4.60 lobsters/trap. The stratified mean catch per trap of legal-sized lobsters in 2021 was 0.54 (± 0.01), and was below the time series average of 0.57.

The time series of relative abundance (stratified mean CPUE ± S.E.) for sublegal (<86 mm CL) and legal-sized (≥ 86 mm CL) lobsters in the Area 538 (MA SNE survey area) is shown in Figure 18. The mean sublegal CPUE in 2021 was 1.43 (± 0.19), below the time series average of 1.95 lobsters/trap haul. The CPUE of legal-sized lobsters in 2021 was 0.34 (±0.05), similar to the time series average of 0.34 lobsters/trap haul. The re-analysis of the time series to account for the reduced time period and survey area resulted in a similar trend over time for both sublegal and legal-sized lobster abundance, but a slight increase in the scale.

Rhode Island: In 2021, the Ventless Trap Survey was conducted during the months of June-August over 24 sampling sites. Over the 18 trips and 846 pots (ventless and vented) hauled, 2,695 lobsters were sampled. The depth-stratified abundance index of sublegal lobsters in the 2021 survey, 4.10 lobsters per ventless trap, remains below the time series mean of 5.96 lobsters per ventless trap (Figure 19). The abundance index for legal-sized lobsters, at 0.52, was above the time series mean of 0.37 lobsters per ventless trap (Figure 20). Region-specific indices vary- catch of sublegal lobsters in Block Island Sound and Narragansett Bay have generally fallen below the time series mean, while catches in Rhode Island Sound generally fell above the time series mean for the region.

Delaware: A pilot study was initiated in 2018 to assess the population structure of structure-oriented fish in the lower Delaware Bay and nearshore Atlantic Ocean. Sampling was conducted in the lower Delaware Bay and the nearshore Atlantic Ocean using commercial-sized ventless fish pots during April through December 2021. Four American lobsters were caught in lower Delaware Bay and 594 American lobsters in the nearshore Atlantic Ocean with a ratio of 58% males, 36% female and 6% egg laden. The sampled Atlantic Ocean lobsters ranged in length from 52 mm to 138 mm.

8.0 State Compliance

States are currently in compliance with all required biological management measures under Amendment 3 and Addendum I-XXIV; however, the Plan Review Team (PRT) notes that Connecticut and New Jersey and did not conduct sea/port sampling in 2021, as required by Addendum XXVI. Due to the COVID-19 pandemic, some states had to cancel or limit the amount of surveys conducted. The states' reasons for not meeting the requirement are provided in Section 6.0.

9.0 De Minimis Requests

The states of Virginia, Maryland, and Delaware have requested *de minimis* status. According to Addendum I, states may qualify for *de minimis* status if their commercial landings in the two most recent years for which data are available do not exceed an average of 40,000 pounds. Delaware, Maryland, and Virginia meet the *de minimis* requirement.

10.0 Regulatory Changes

New Hampshire

- Changes were made to weak link and gear marking for NH state waters.

Massachusetts

- 3/5/21 – DMF established a number of new regulations affecting commercial fixed gear fisheries, including the American lobster trap fishery, to further protect right whales from entanglement risks. These changes included:
    1. Extending the February 1 – April 30 commercial trap gear closure in both space and time to include all state waters north and east of Cape Cod and to have it remain in effect until May 15 unless otherwise rescinded or extended by DMF based on the presence and absence of right whales.
    2. Establishing a November 1 – May 15 closed season for recreational lobster and crab trap gear. Previously, there was no closed season for this fishery.
    3. Adopting a 1,700-pound buoy line breaking strength requirement for all commercial trap gear. This can be achieved by fishing "weak rope" that has a tensile strength of 1,700 pounds or less or rigging conventional buoy lines with approved weak contrivances once every 60'. Approved weak contrivances include certain 2' segments of weak rope spliced into the buoy line or so-called "south shore sleeves" connecting a parted piece of buoy line.
    4. Implementing a maximum buoy line diameter for all trap gear. For recreational lobster and crab trap gear the maximum buoy line diameter is 5/16" and for commercial trap gear the maximum buoy line diameter is 3/8".
    5. Capping the maximum number of commercial Student Lobster Permits DMF may issue in a single calendar year at 150.
- 7/09/21 – DMF adopted new buoy line marking requirements for all commercial trap gear, including lobster and edible crab traps. These buoy line marking requirements are consistent with those required by the Atlantic Large Whale Take Reduction Plan.

11.0 Enforcement Concerns

Maine

- In 2021 Maine Marine Patrol Officers documented 383 lobster-related violations, with 62 being summonses. Our highest profile cases for the year were 5 individuals being charged with molesting lobster gear and one individual found in possession of 19 undersized lobsters. Officers documented a considerable effort inspecting lobster gear throughout the year; between gear being hauled from our fleet of large patrol vessels, and documented vessel boardings at-sea, Marine Patrol inspected an estimated 25,000 lobster traps in 2021. The majority of the violations detected were for possessing illegal lobsters, protected resource violations and fishing untagged lobster gear.

Massachusetts

- The Rushnak (2020) scrubbed lobster incident was settled administratively with a 3-month suspension and a 3-year probationary period. The criminal case was settled with a plea deal.
- The Birarelli (2020) incident was not handled administratively and the criminal matter is ongoing. This case dealt with v-notch, mutilated v's and shorts.
- The Roche (2021) incident went to administrative hearing and the coastal lobster permit was revoked. The criminal matter is ongoing. This case dealt with trap tag violations, trawl length violations, and whale safe buoy line violations.
- The Hamilton (2021) incident was settled administratively with a two-year suspension of Offshore Lobster Permit. There was a companion criminal summons, which is ongoing. This case dealt with possession of lobsters in excess of the gillnet bycatch allowance rules and reporting violations to conceal these overages.

12.0 Research Recommendations

The full list of research recommendations can be found in the 2020 Stock Assessment Report. Below is a summarized list of the high priority research recommendations from the 2020 Stock Assessment that were compiled by the Lobster Technical Committee (TC) and Stock Assessment Subcommittee (SAS).

Port and Sea Sampling - The quality of landings data has not been consistent spatially or temporally. Limited funding, and in some cases, elimination of sea sampling and port sampling programs will negatively affect the ability to characterize catch and conservation discards, limiting the ability of the model to accurately describe landings and stock conditions. It is imperative that funding for critical monitoring programs continues, particularly for offshore areas from which a large portion of current landings originate in SNE. Sea sampling should be increased in Long Island Sound (statistical area 611), and in the statistical areas in federal waters, particularly those fished by the LCMA 3 fleet, via a NMFS-implemented lobster-targeted sea sampling program.

Commercial Data Reporting – Finer resolution spatial data are paramount in understanding how landings align between statistical area and LCMAs. Vessel tracking is recommended for federal vessels. Once in place, the new spatial data should be analyzed for comparison to current spatial understanding of harvest. The growing Jonah crab fishery in SNE continues to complicate the differentiation of directed lobster versus Jonah crab effort. More sea sampling and landings data must be collected to better differentiate the two fisheries' activities.

Ventless Trap Survey - Calibration work to determine how catch in the ventless trap surveys relates to catch in the bottom trawl surveys remains an important and unaddressed topic of research. Ventless traps may be limited in their ability to differentiate between moderately high and extremely high abundance, and calibration with bottom trawl surveys may help to clarify how q might change with changes in lobster density.

NEAMAP Trawl Survey Protocols - The SAS recommends that the NEAMAP Trawl Survey sampling protocol be modified for all lobsters caught to be sorted by sex. If a subsample is

necessary, subsamples be taken by sex for additional biological data (size, egg presence and stage, vnotch, etc.) This modification would align the biological sampling methodology with other trawl surveys used in the assessment, and perhaps allow the survey to not be collapsed by sex into survey slots.

Time Varying Growth - Growth of American lobster has been found to change through time (McMahan et al. 2016), yet the ability to incorporate this dynamic in the assessment model currently is unavailable. Accounting for interannual changes in the growth matrix, including those in increment, probability, and seasonality, is imperative for model convergence. Modification to the assessment model is needed to allow for time varying growth matrices to be used to reflect changing growth in the stocks.

Expansion of Growth Matrices - Exploration of expanding the model size structure to smaller sizes could allow the SAS to better capture changes in recruitment for the population by incorporating < 53mm lobster abundances from the surveys currently used, as well as incorporating additional surveys that currently are not model inputs for the assessment, such as those from the young of year settlement surveys. Due to decreased recruitment in SNE and some areas in GOMGBK, available survey data should be evaluated to determine whether current data sources for small sizes are sufficient for expanding the size structure and growth matrices.

Temperature-Molt Dynamics - Understanding how the timing for molting, molt increments, and probability by size vary with temperature for all stocks would allow for more accurate and realistic depictions of growth via updated annual growth matrices. The work of Groner et al. (2018) should be expanded by using the Millstone data to specifically analyze how molt frequency and increment has changed seasonally and interannually.

Larval Ecology - Spatial expansion of larval surveys and further testing is warranted, particularly in areas like the eastern GOM and GBK that lack any studies of this nature. Studies that explore greater spatial coverage of larval sampling and examine lobster larval diets, in situ development time in current conditions, larval interactions with well-mixed versus stratified water columns, and varying growth and mortality with temperature would allow for greater context on these variables' influence on recruitment.

Deepwater Settlement - There is a need to determine settlement success in habitat not currently sampled and its contribution to overall stock productivity. Research needs to explore the levels of detectability, impact of stratification, and interannual temperature effects on the indices. Additionally, it will be important to understand whether there are differences in growth and survival in these deeper habitats, particularly relative to the desire to expand the growth matrix into smaller size ranges for modeling purposes.

SNE Recruitment Failure - The direct cause of the precipitous declines in recruitment under less variable spawning stock biomass is largely unknown. Research designed to understand the causes driving recruitment failure is vital for any efforts toward rebuilding the SNE stock. In

addition, being able to predict similar conditions in GOMGBK could allow management the opportunity to respond differently.

Stock Structure Working Group - The SAS recommends that a workshop on stock boundaries be convened prior to the initiation of the next assessment to review results of any new research and re-evaluate appropriate stock boundaries. Inclusion of Canadian researchers at this workshop would be beneficial to share data and knowledge on this shared resource.

Spatial Analyses of Fisheries-Independent Data – Northeast Fisheries Science Center (NEFSC) trawl survey data remains one of the richest data sources to understand abundance and distribution patterns through time for lobsters by size and sex. Formal analyses of NEFSC trawl survey and the ME/NH trawl survey and should be performed. The Ecosystem Monitoring (EcoMon) Program's larval lobster information should also be considered.

Reevaluate Baseline Natural Mortality Rate - Intensive hypothesis-driven sensitivity analyses should be conducted to evaluate the base mortality rate for both stocks by season and year. Canadian tagging data should be examined to determine how natural mortality rates derived from these data compare to the assumptions used currently in the model and sensitivity analyses. Exploration of additional time series representing natural mortality hypotheses (e.g. sea temperature, shell disease prevalence, predators) should be continued to either inform time-varying natural mortality or correlate to rates produced in sensitivity analyses.

Predation Studies - It is suspected that a given predator's role in lobster natural mortality has changed through time. Predation laboratory studies and gut content analyses would provide greater guidance on individual species' roles in lobster natural mortality. With this information, predation-indices as a function of predator annual abundances and their contribution to stock-specific lobster mortality would be immensely valuable, particularly in SNE.

Management Strategy Evaluation - Developing a true management strategy evaluation tool that can iteratively project and refit the operating model would best inform future management discussions on rebuilding the SNE stock or providing resiliency for the GOM stock and fishery.

Economic Reference Points - Economic analyses considering landings, ex-vessel value, costs, associated economic multipliers, number of active participants, and other factors are imperative to truly discern how declines in the population would impact the GOMGBK industry. The SAS strongly recommends a thorough economics analysis be conducted by a panel of experts to more properly inform economic-based reference points, and ultimately provide resiliency to both the GOMGBK stock and fishery.

13.0 Plan Review Team Recommendations

During their review of the state compliance reports, the PRT noted the following issues:

- Massachusetts was unable to provide compliance reports by the August 1 deadline. This

has been a recurring issue over the last few years due to delays in data availability and limited staff resources.

- In 2021, New Jersey and Connecticut did not meet the Addendum XXVI minimum requirement of ten sea/port sampling trips; no trips were completed by either state. The compliance report for New Jersey explains that sampling was impeded by the COVID-19 pandemic. For Connecticut, no reason was provided. Fishery dependent sampling has not been conducted by since 2014 because reductions in funding and staffing levels have hindered our ability to resume these activities.

The PRT Recommends the Board approve the *de minimis* requests of DE, MD, and VA. Other than the issues noted above, all states appear to be in compliance with the requirements of the FMP.

The following are general recommendations the PRT would like to raise to the Board:

- The PRT recommends the Board consider reviewing the monitoring requirements in SNE given the status of the stock and the difficulty obtaining sea sampling trips in a fishery with reduced effort. The TC has discussed the need for additional sampling trips in federal waters as the fishery has shifted offshore.
- The PRT recommends the TC discuss the best way to present state index information in the annual compliance reports to provide more detailed resolution of adult and juvenile abundance and size composition of the stock.
- The PRT recommends the Board engage with the Committee on Economic and Social Sciences (CESS) to consider available socioeconomic data to develop metrics that could be used to characterize changes in the fishery.

14.0 Tables

Table 1. Landings (in pounds) of American Lobster by the states of Maine through Virginia. Source: ACCSP Data Warehouse for 1981-2019 landings; state compliance reports for 2020 landings. *C= confidential data.*

	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	Total
1981	22,631,614	793,400	11,420,638	1,871,067	807,911	890,218	593,801	55,700	63,108	2,173	**39,129,630**
1982	22,730,253	807,400	11,265,840	3,173,650	880,636	1,121,644	846,215	90,700	64,788	4,713	**40,985,839**
1983	21,976,555	1,310,560	12,867,378	5,114,486	1,654,163	1,207,442	769,913	56,700	76,192	20,619	**45,054,008**
1984	19,545,682	1,570,724	12,446,198	5,259,821	1,796,794	1,308,023	927,474	103,800	98,876	37,479	**43,094,871**
1985	20,125,177	1,193,881	13,702,702	5,140,131	1,381,029	1,240,928	1,079,723	118,500	82,295	42,881	**44,107,247**
1986	19,704,317	941,100	12,496,125	5,667,940	1,253,687	1,416,929	1,123,008	109,000	57,593	93,105	**42,862,804**
1987	19,747,766	1,256,170	12,856,301	5,317,302	1,571,811	1,146,613	1,397,138	84,100	49,820	60,241	**43,487,262**
1988	21,739,067	1,118,900	12,977,313	4,758,990	1,923,283	1,779,908	1,557,222	66,200	22,966	53,696	**45,997,545**
1989	23,368,719	1,430,347	15,645,964	5,786,810	2,076,851	2,344,932	2,059,800	76,500	17,502	45,107	**52,852,532**
1990	28,068,238	1,658,200	16,572,172	7,258,175	2,645,951	3,431,111	2,198,867	68,300	24,941	58,260	**61,984,215**
1991	30,788,646	1,802,035	15,998,463	7,445,172	2,673,674	3,128,246	1,673,031	54,700	26,445	7,914	**63,598,326**
1992	26,830,448	1,529,292	14,969,350	6,763,087	2,534,161	2,651,067	1,213,255	21,000	27,279	753	**56,539,692**
1993	29,926,464	1,693,347	14,350,595	6,228,470	2,177,022	2,667,107	906,498	24,000	46,650	2,940	**58,023,093**
1994	38,948,867	1,650,751	16,176,551	6,474,399	2,146,339	3,954,634	581,396	8,400	7,992	460	**69,949,789**
1995	37,208,324	1,834,794	15,903,241	5,362,084	2,541,140	6,653,780	606,011	25,100	26,955	5,210	**70,166,639**
1996	36,083,443	1,632,829	15,312,826	5,295,797	2,888,683	9,408,519	640,198	20,496	28,726	C	**71,311,517**
1997	47,023,271	1,414,133	15,010,532	5,798,529	3,468,051	8,878,395	858,426	C	34,208	2,240	**82,487,785**
1998	47,036,836	1,194,653	13,167,803	5,617,873	3,715,310	7,896,803	721,811	1,359	19,266	1,306	**79,373,020**
1999	53,494,418	1,380,360	15,875,031	8,155,947	2,595,764	6,452,472	931,064	C	41,954	6,916	**88,933,926**
2000	57,215,406	1,709,746	14,988,031	6,907,504	1,393,565	2,883,468	891,183	C	62,416	C	**86,051,319**
2001	48,617,693	2,027,725	11,976,487	4,452,358	1,329,707	2,052,741	579,753	C	31,114	C	**71,067,578**
2002	63,625,745	2,029,887	13,437,109	3,835,050	1,067,121	1,440,483	264,425	C	20,489	C	**85,720,309**
2003	54,970,948	1,958,817	11,321,324	3,561,391	C	946,449	209,956	C	22,778	C	**72,991,663**
2004	71,574,344	2,851,262	11,675,852	3,059,319	646,994	996,109	370,536	13,322	14,931	27,039	**91,229,708**
2005	68,729,623	C	11,291,145	3,174,852	713,901	1,154,470	369,003	C	39,173	21,988	**85,494,155**
2006	75,419,802	2,612,389	12,090,423	3,949,299	806,135	1,252,146	470,878	3,706	26,349	28,160	**96,659,287**
2007	63,987,073	2,468,811	10,046,120	2,299,744	568,696	911,761	334,097	C	26,804	C	**80,643,106**
2008	69,910,434	2,568,088	10,606,534	2,782,000	427,168	712,075	304,479	C	32,932	C	**87,343,709**
2009	81,124,201	2,986,981	11,789,536	2,842,088	412,468	731,811	C	6,064	30,988	21,472	**99,945,239**
2010	96,244,299	3,648,004	12,772,159	2,928,688	441,622	813,513	692,869	C	29,989	16,345	**117,586,675**
2011	104,957,224	3,919,195	13,385,393	2,754,067	198,928	344,232	697,883	8,879	41,077	12,879	**126,320,059**
2012	127,464,332	4,229,227	14,486,344	2,706,384	247,857	550,441	919,351	C	65,813	10,823	**150,680,338**
2013	128,015,530	3,817,707	15,158,509	2,155,762	127,420	496,535	660,367	C	62,522	9,061	**150,503,413**
2014	124,941,217	4,374,656	15,312,852	2,412,875	127,409	222,843	526,368	26,330	57,414	11,099	**148,013,063**
2015	122,685,803	4,721,826	16,450,414	2,315,708	205,099	147,414	445,060	22,894	29,284	9,474	**147,032,976**
2016	132,750,484	5,782,098	17,784,921	2,260,335	254,346	218,846	349,880	C	29,254	2,854	**159,433,017**
2017	112,170,139	5,513,999	16,493,125	2,031,143	130,015	150,317	409,062	32,364	29,136	1,630	**137,091,350**
2018	121,226,213	6,199,365	17,697,243	1,905,689	110,580	112,685	344,547	C	24,893	2,727	**147,623,943**
2019	101,987,215	6,093,615	17,029,462	1,795,212	111,573	112,107	291,072	C	C	1,840	**127,422,095**
2020	97,910,036	5,013,785	15,711,553	1,695,279	159,173	111,678	309,197	C	10,176	C	**120,920,877**
2021	109,528,524	5,709,116	17,051,592	1,352,470	95,993	119,990	323,205	C	12,816	2,917	**134,196,623**

Table 2. Above: Current (2016-2018) reference abundance estimates (millions), current target and threshold abundance (millions), and new recommended abundance reference points for both stocks. Below: Current (2016-2018) exploitation, current target and threshold exploitation, and new recommended target and threshold exploitation for both stocks.

Quantity	GOMGBK	SNE
Current (2016-2018 average)	256	7
Current Target	119	32
Current Threshold	58	25
Fishery/Industry Target	212	NA
Abundance Limit	125	NA
Abundance Threshold	89	20

Quantity	GOMGBK	SNE
Current (2016-2018 average)	0.459	0.274
Current Target	0.457	0.379
Current Threshold	0.510	0.437
Recommended Target	0.461	0.257
Recommended Threshold	0.475	0.290

Table 3. 2021 LCMA specific management measures

Management Measure	LCMA 1	LCMA 2	LCMA 3	LCMA 4	LCMA 5	LCMA 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 ¼"	6 3/4"	5 ¼"	5 ¼"	5 ¼"	State Waters none Federal Waters 6 3/4"
Season Closure				April 30-May 31[2]	February 1-March 31[3]	Sept 8-Nov 28[4]	February 1-April 30

[1] A v-notched lobster is defined as any female lobster that bears a notch or indentation in the base of the flipper that is at least as deep as 1/8", with or without setal hairs. It also means any female which is mutilated in a manner that could hide, obscure, or obliterate such a mark.

[2] Pots must be removed from the water by April 30 and un-baited lobster traps may be set one week prior to the season reopening.

[3] During the February 1 – March 31 closure, trap fishermen will have a two week period to remove lobster traps from the water and may set lobster traps one week prior to the end of the closed season.

[4] Two week gear removal and a 2 week grace period for gear removal at beginning of closure. No lobster traps may be baited more than 1 week prior to season reopening.

Table 4. Summary of Area 2 Trap Transfers, Annual Reductions, and Conservation Tax, 2015-2020*

Application Year	Total Trap Allocation	Annual Trap Reductions	Number of Traps Transferred Out	10% Tax on Trap Transfers	Number of Traps Transferred In	Trap Loss from Cap Limits, Renew or Lose, or Leveling	Balance at the Start of the Next Fishing Year
2015	118,188	29,524	7,050	705	6,345	0	87,959
2016	87,959	4,339	4,140	414	3,726	8	83,198
2017	83,198	4,067	4,020	402	3,618	5	78,724
2018	78,724	3,865	1,780	178	1,602	100	74,581
2019	74,581	3,729	3,694	369	3,325	0	70,483*
2020	70,483*	3,524	1,320	132	1,188	0	66,827*
2021	66,827	N/A	2,651	264	2,387	0	66,563
Grand Total	N/A	49,048	24,655	2,464	22,191	113	N/A

* Prior calculation errors were identified and corrected. These numbers will differ from past information provided.

Table 5. Summary of Area 3 Trap Transfers, Annual Reductions, and Conservation Tax, 2015-2020*

Application Year	Total Trap Allocation	Annual Trap Reductions	Number of Traps Transferred Out	10% Tax on Trap Transfers	Number of Traps Transferred In	Trap Loss from Cap Limits, Renew or Lose, or Leveling	Balance at the Start of the Next Fishing Year
2015	145,433	7,201	13,612	1,363	12,249	1	136,868
2016	136,868	6,779	11,650	1,165	10,485	14	128,910
2017	128,910	6,391	7,130	713	6,417	0	121,806
2018	121,806	6,036	2,820	282	2,538	9	115,479
2019	115,479	5,774	4,060	406	3,654	0	109,299*
2020	109,299*	N/A	2,430	243	2,187	9	109,047*
2021	109,047	N/A	5,054	505	4,549	0	108,542
Grand Total	N/A	32,181	46,756	4,677	42,079	33	N/A

* Prior calculation errors were identified and corrected. These numbers will differ from past information provided.

Table 6. 2020 sampling requirements and state implementation. All states have 100% active harvester reporting except for Maine which has 10% harvester reporting. Sufficient sea sampling can replace port sampling. *De minimis* states (denoted by *) are not required to conduct biological sampling of their lobster fishery.

State	100% Dealer Reporting	10% Harvester Reporting	Sea Sampling	Port Sampling	Ventless Trap Survey	Settlement Survey	Trawl Survey
ME	✓	✓ (10%)	✓		✓	✓	✓
NH	✓	✓	✓	✓	✓	✓	✓
MA	✓	✓	✓		✓	✓	[a]
RI	✓	✓	[a]	✓	✓	✓	✓
CT	✓	✓	[b]	[b]		[c]	✓
NY	✓	✓	✓	✓			✓
NJ	✓	✓	[a]				[a]
DE*	✓	✓			✓		✓
MD*	✓	✓					✓
VA*	✓	✓					

[a] Sampling hindered or not completed due to the COVID-19 pandemic

[b] No fishery dependent sampling has been conducted by CT since 2014 due to reductions in funding and staffing levels.

[c] Larval data are available for the eastern Sound (ELIS) from the Millstone Power Station entrainment estimates of all stages of lobster larvae (Dominion Nuclear CT, Annual Report 2016).

Table 7. 2021 sea and port sampling trips and samples by state. *De minimis* states (denoted by *) are not required to conduct biological sampling of their lobster fishery.

State	**Sea Sampling**			**Port Sampling**		**Market Sampling**		**Totals**	
	Trips	Samples	Traps	Trips	Samples	Trips	Samples	Trips	Samples
ME	149	183,154	183,154					149	183,154
NH	13	7,252		11	1,100			24	8,352
MA	57	22,604		0	0	0	0	57	22,604
RI	2	1,073		9	2,115			11	3,188
CT	0	0	0	0	0	0	0	0	0
NY	0	0	0	18	1,838			18	1,838
NJ	0	0	0	0	0	0	0	0	0
DE*	NA	NA	NA	NA	NA	NA	NA	0	0
MD*	NA	NA	NA	NA	NA	NA	NA	0	0
VA*	NA	NA	NA	NA	NA	NA	NA	0	0
Total	221	214,083	183,154	38	5,053	0	0	259	219,136

15.0 Figures

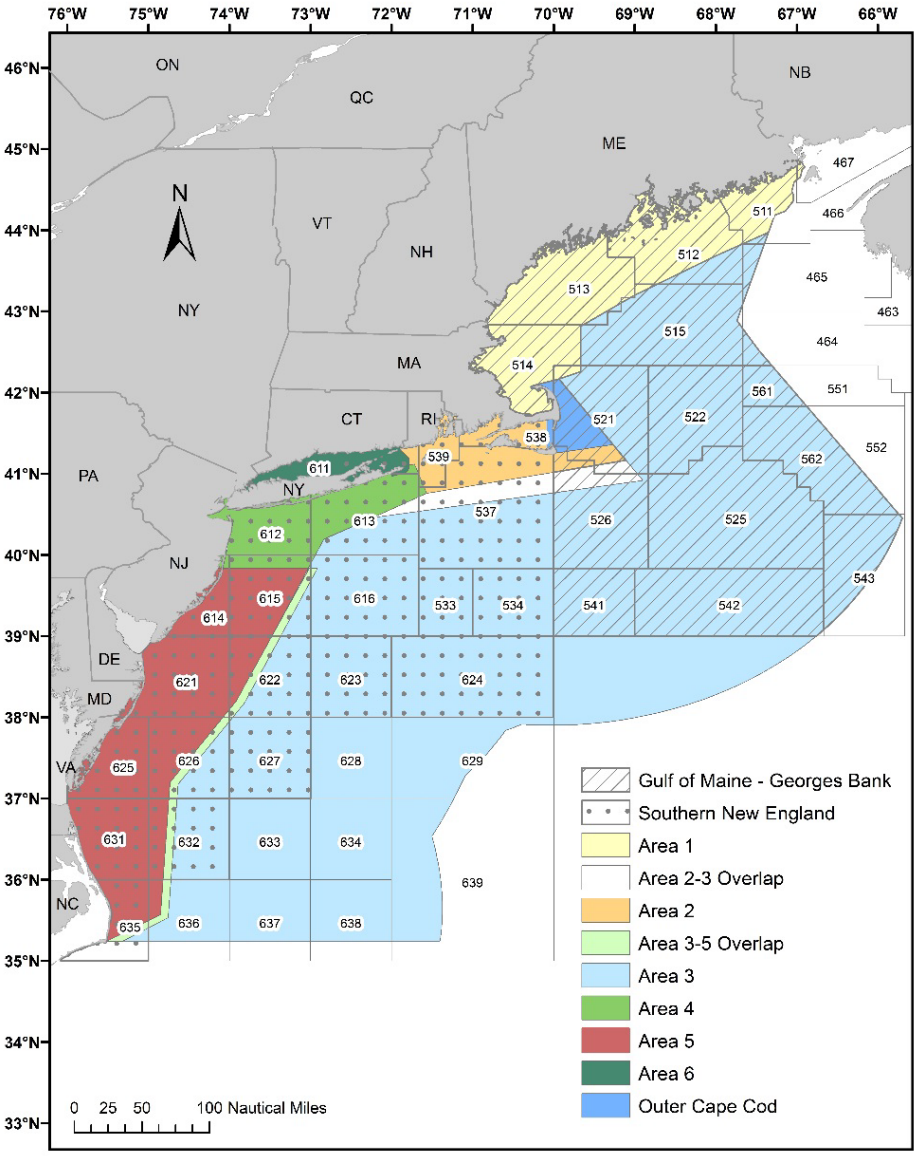

Figure 1. Lobster Conservation Management Areas (LCMAs) and stock boundaries for American lobster.

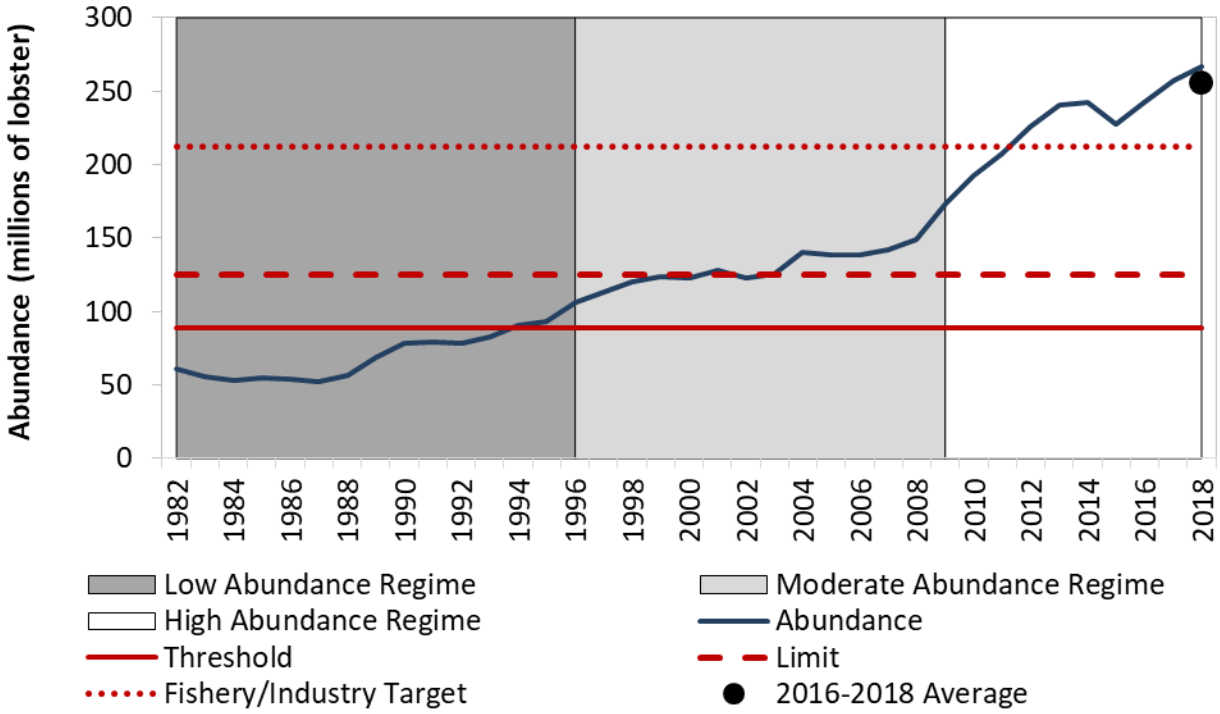

Figure 2. Abundance for GOM/GBK Relative to Reference Points. Source: 2020 Benchmark Stock Assessment for American Lobster.

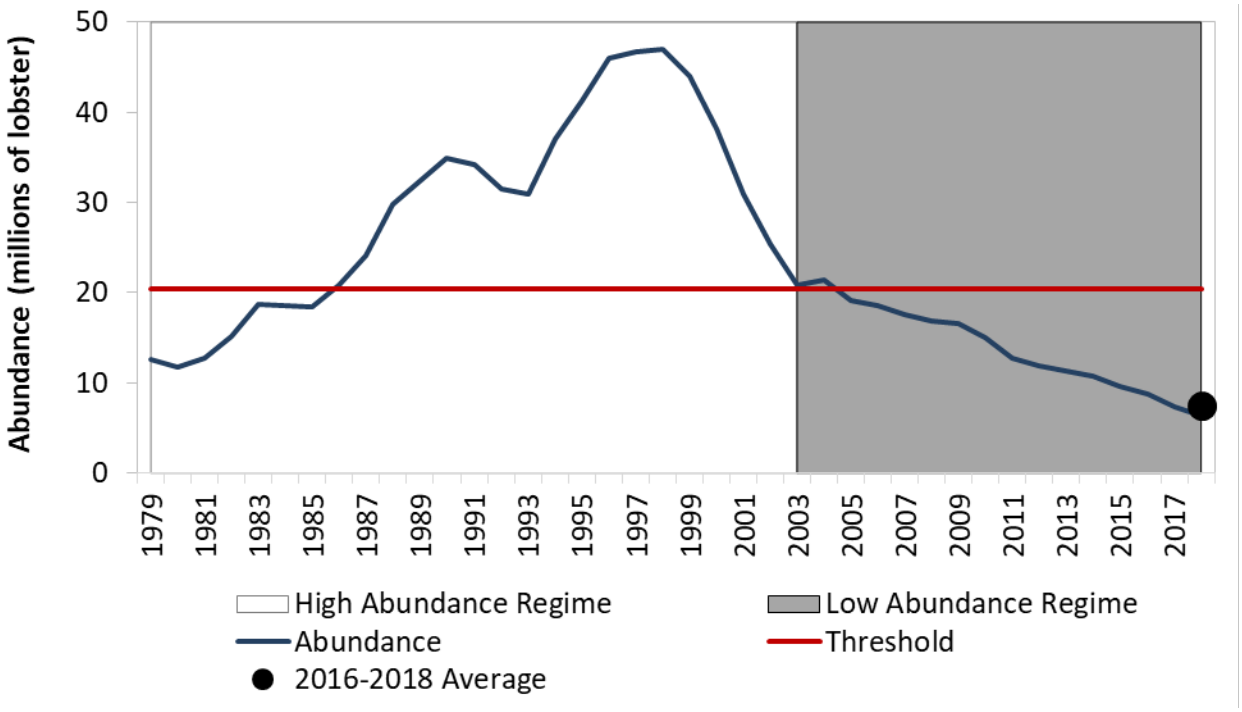

Figure 3. Abundance for SNE Relative to Reference Points. Source: 2020 Benchmark Stock Assessment for American Lobster.

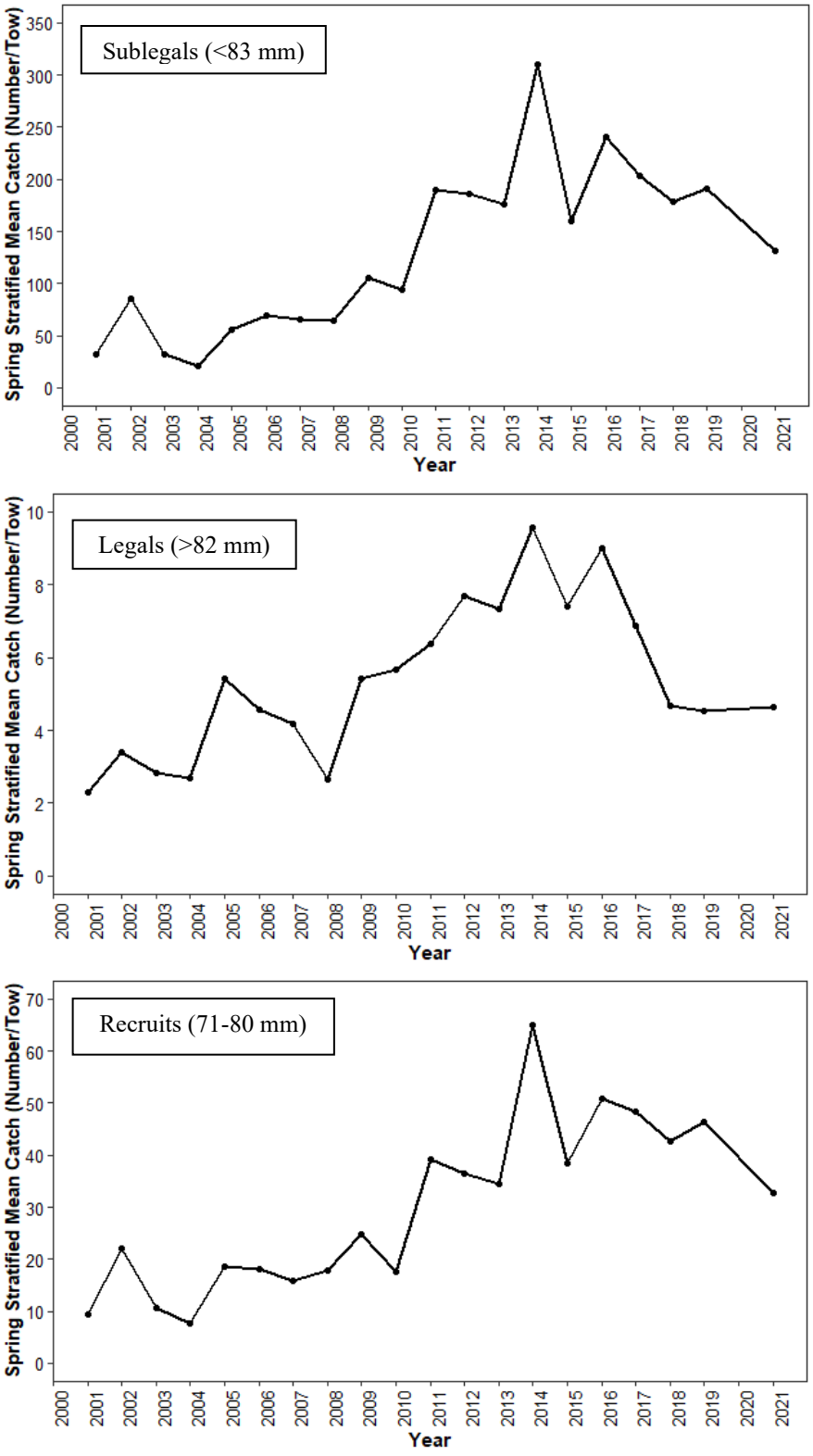

Figure 4. Stratified mean catch and recruit abundance for American lobster on the Spring ME/NH Inshore Trawl Survey (2000-2021).

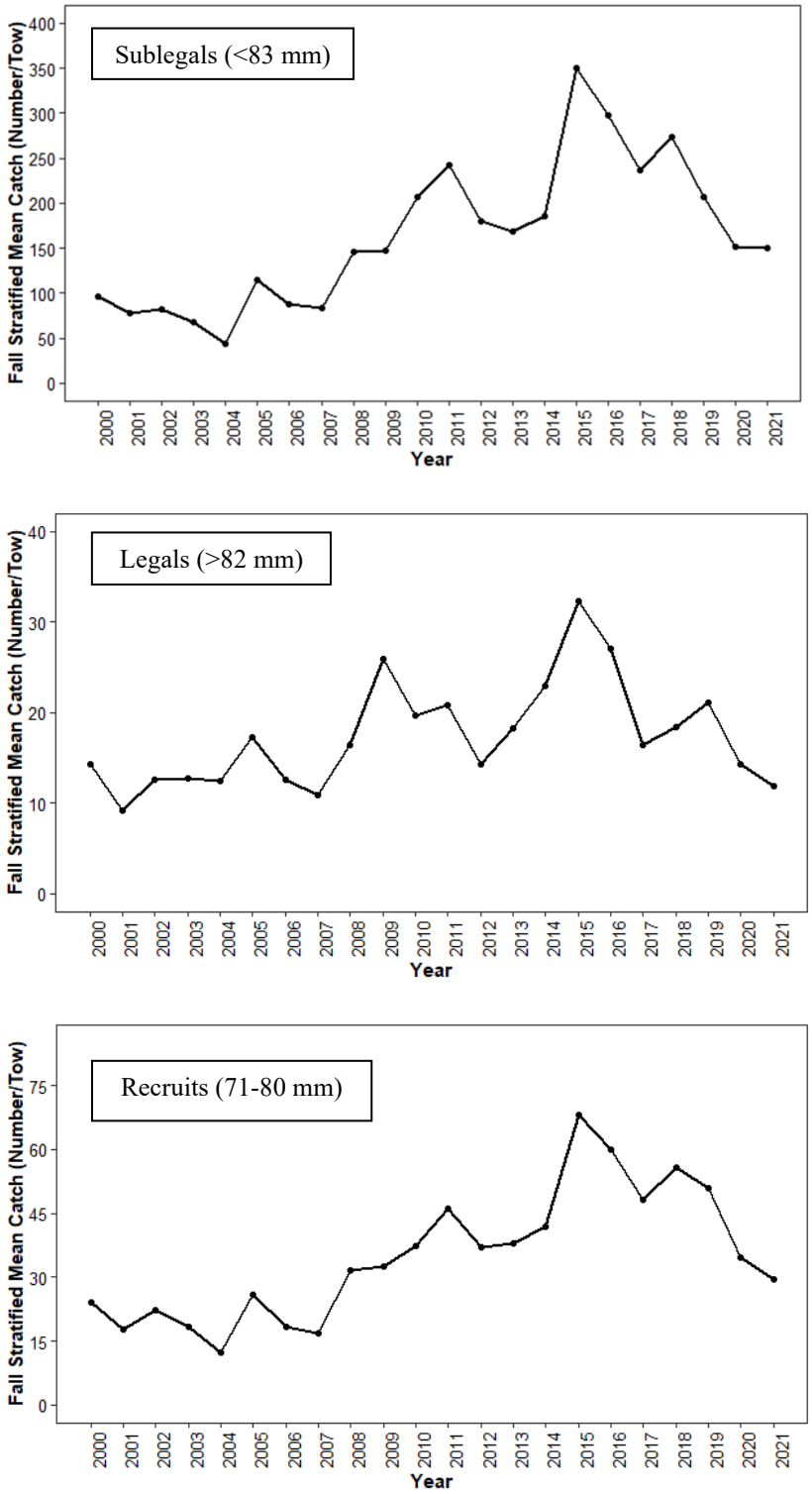

Figure 5. Stratified mean catch and recruit abundance for American lobster on the Fall ME/NH Inshore Trawl Survey (2000-2021).

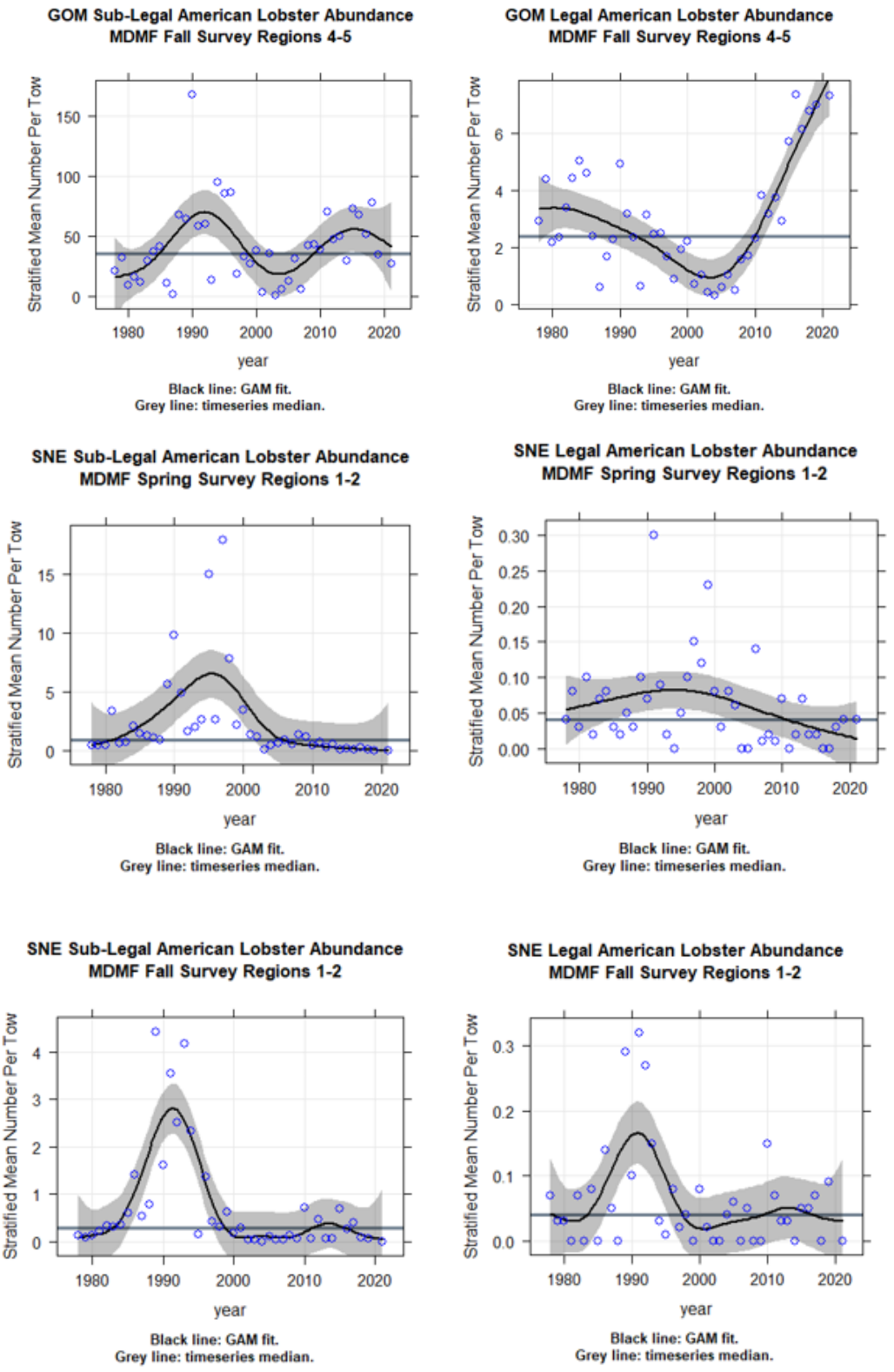

Figure 6. MADMF Fall Trawl Survey sublegal (left) and legal (right) indices from 1978-2019 sexes combined. The top two charts are from Gulf of Maine and the bottom four charts are from Southern New England.

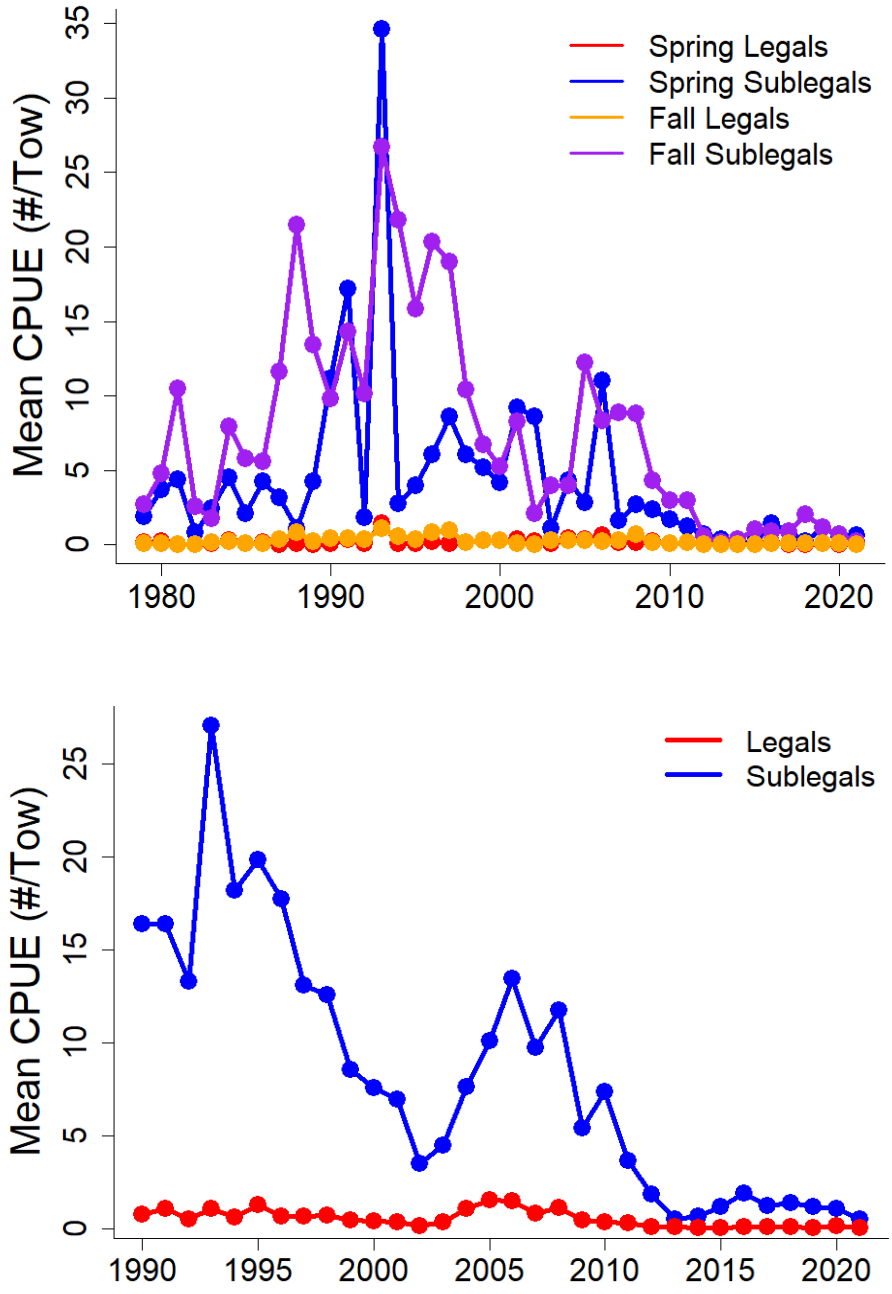

Figure 7. RIDFW Seasonal (spring and fall) Trawl lobster abundances (top) and Monthly Trawl lobster abundances (bottom). CPUE is expressed as the annual mean number per tow for sub-legal (<85.725mm CL) and legal sized (>=85.725mm CL) lobsters.

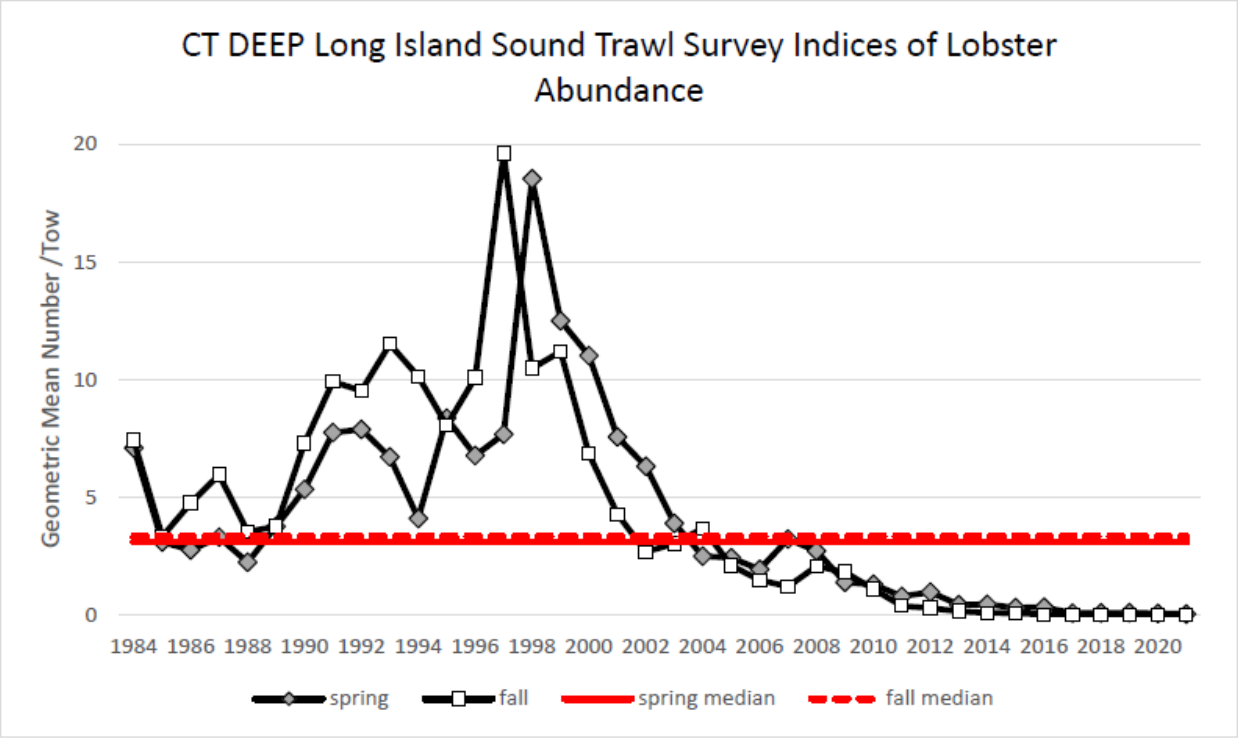

Figure 8. Results of the Long Island Sound Trawl Survey during spring (April-June) and fall (September-October) within NMFS statistical area 611.

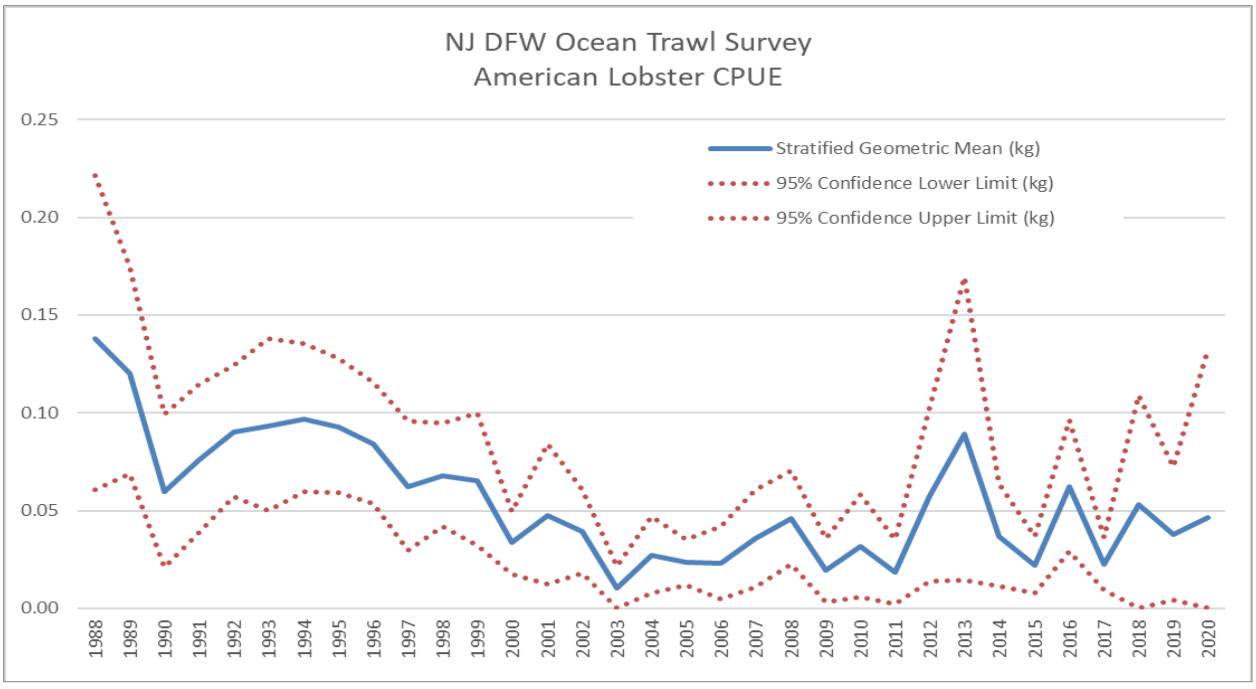

Figure 9. Stratified mean CPUE of all lobsters collected aboard the NJDFW Ocean Trawl Survey. *NOTE: No April 2019 Survey was conducted due to Research vessel mechanical issues. Due to the COVID-19 pandemic, 2020 and 2021 CPUE and indices were not obtained.

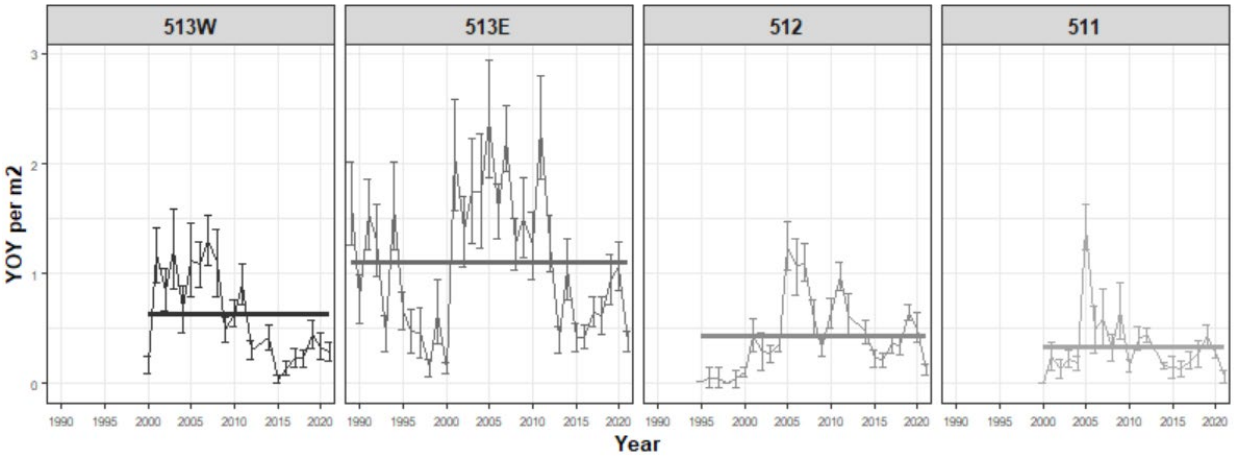

Figure 10. Maine Settlement Survey index 1989-2021 for each statistical area with series average (solid horizonal line) for each region with standard error bars.

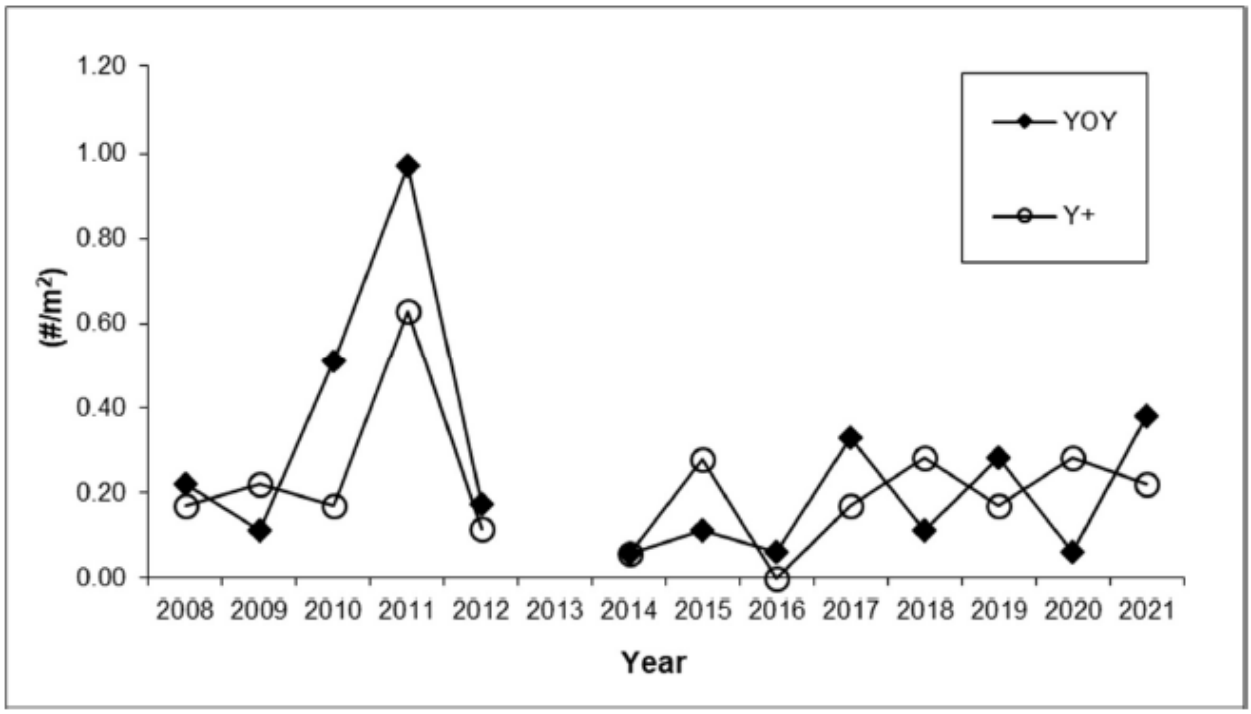

Figure 11. Catch per unit effort (#/m2) of young-of-year (YOY), one-year-olds (Y+), YOY and Y+ combined, and all lobsters during the American Lobster Settlement Index, by location, in New Hampshire, from 2008 through 2021.

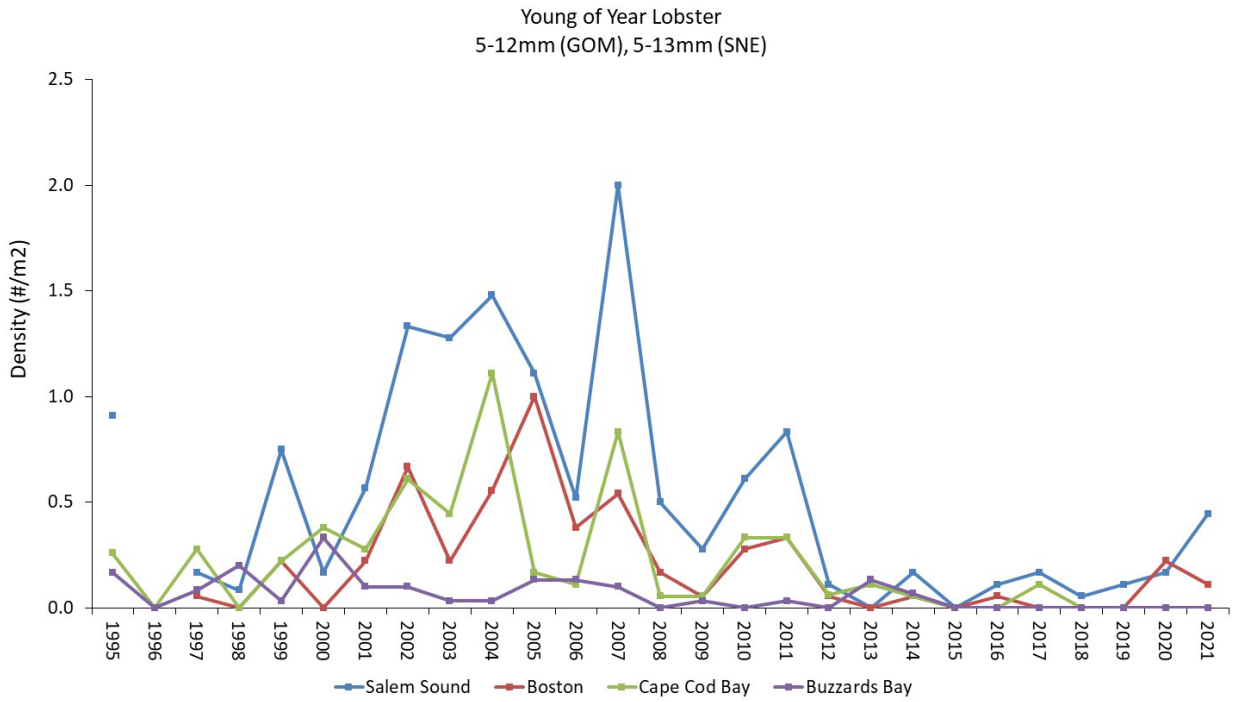

Figure 12. Young-of-year lobster density in four Massachusetts regions used in the stock assessment; LCMA 1 – Salem Sound, Boston, Cape Cod Bay, LCMA 2 - Buzzards Bay. Note that Cape Cod Bay sites were discontinued in 2019 due to white shark risk.

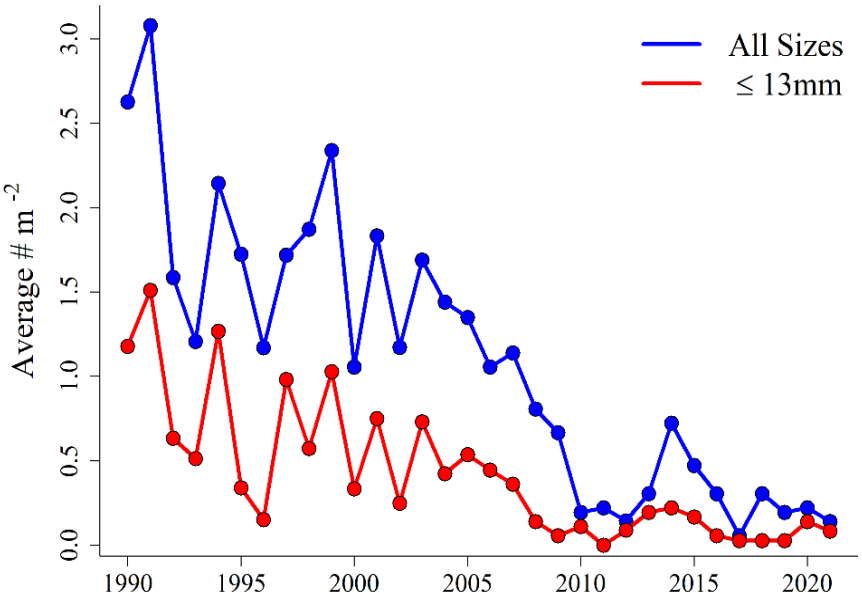

Figure 13. Average abundance of American lobster in Rhode Island suction sampling sites. Abundances are presented for YOY lobsters 12mm and smaller (red line) and all sizes (blue line).

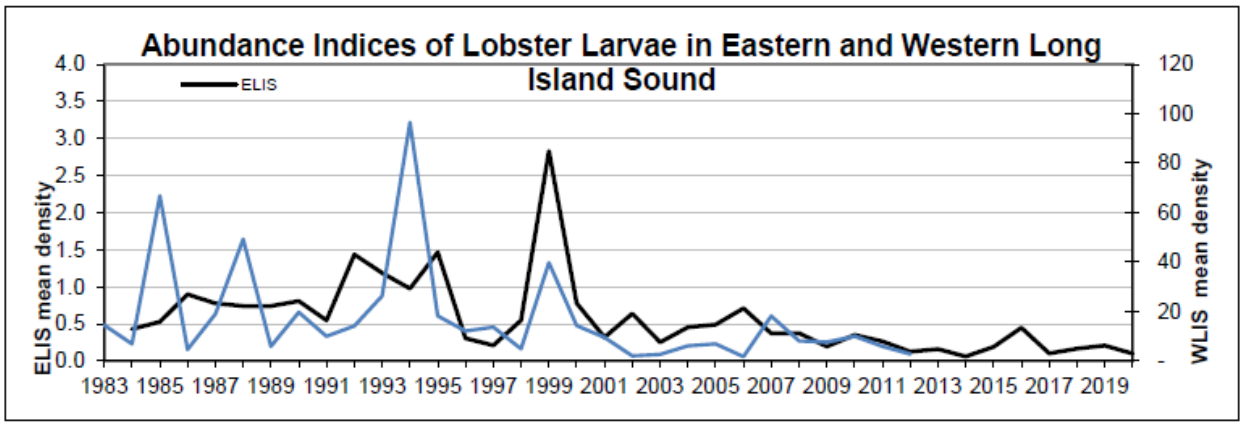

Figure 14. Abundance indices of lobster larvae from the Connecticut DEEP Larval Lobster Survey in western Long Island Sound and from the Millstone Power Station entrainment estimates in eastern Long Island Sound. The Connecticut DEEP survey was discontinued in 2013.

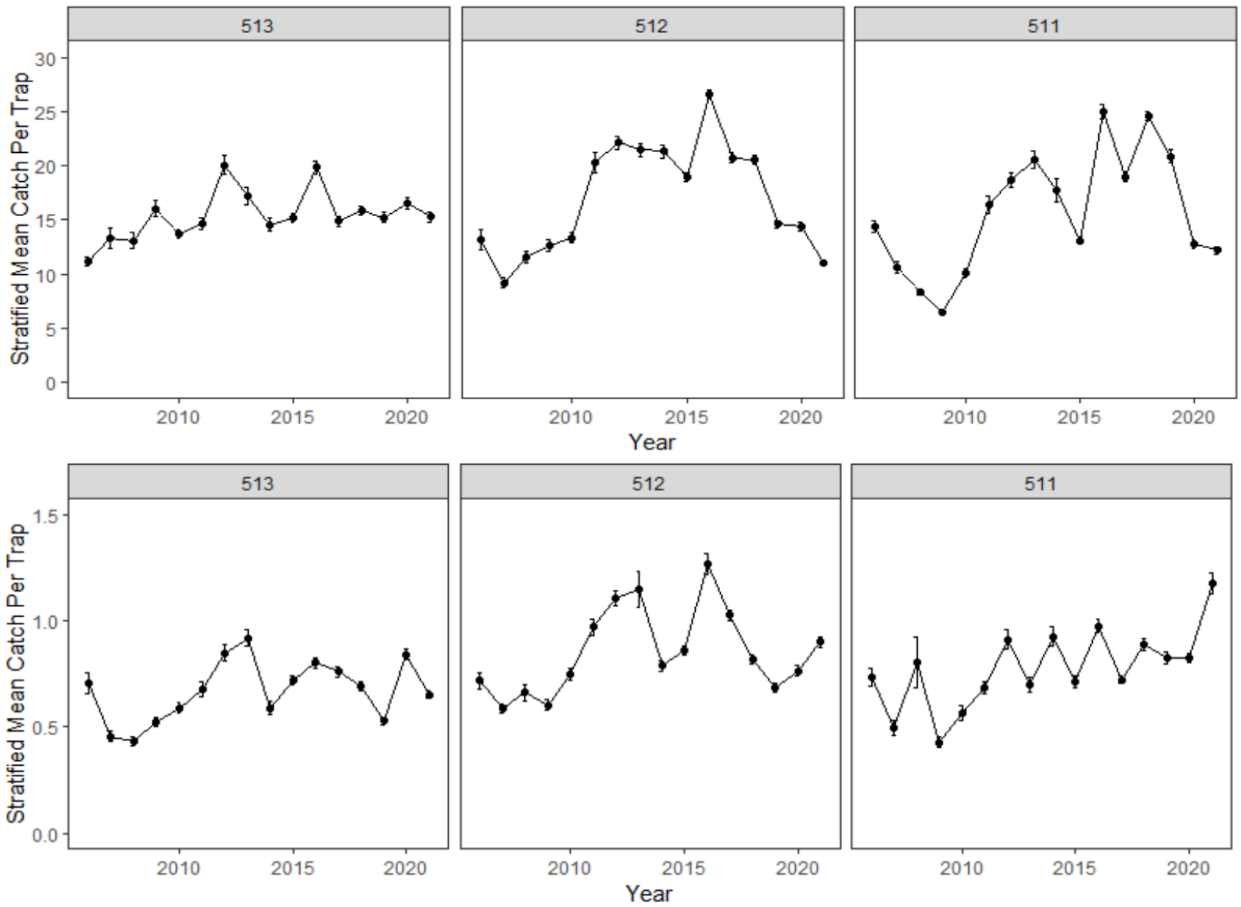

Figure 15. Stratified mean catch per trap for sublegal (top) and legal (bottom) sized lobsters from Maine's Ventless Trap Survey 2006-2021 by statistical area from ventless traps only. Standard error is shown.

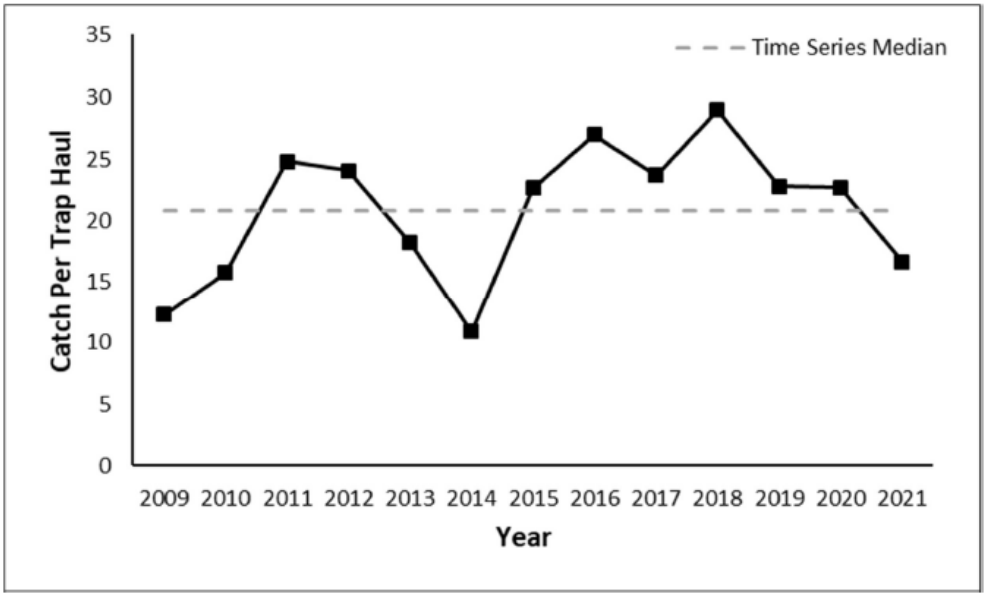

Figure 16. Stratified mean catch per trap haul (ventless traps only) for all lobsters captured during the coast-wide random stratified Ventless Trap Survey in New Hampshire state waters from 2009 through 2021.

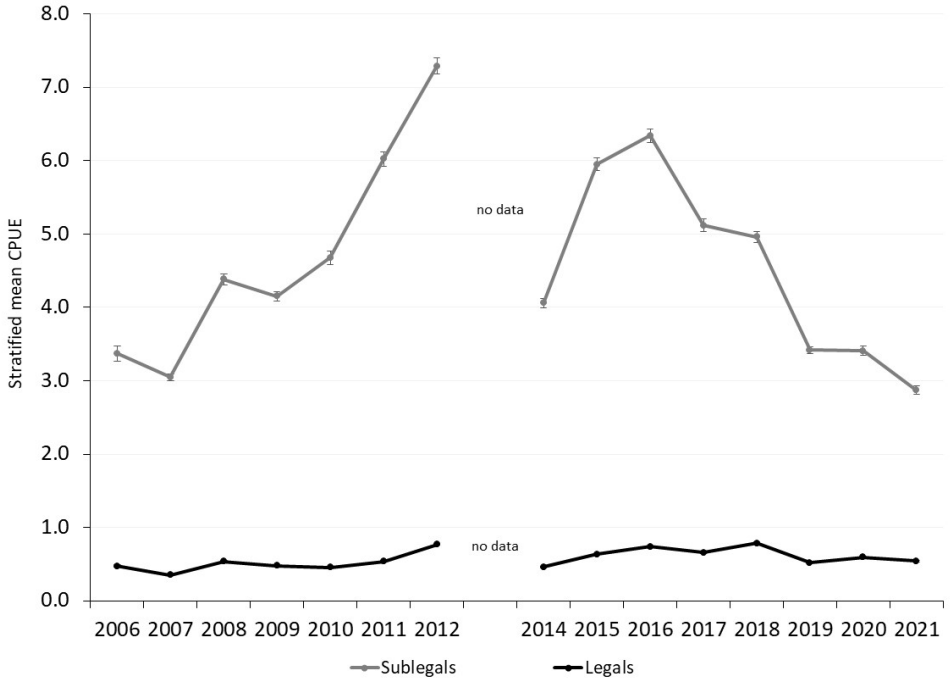

Figure 17. Stratified mean catch per trap haul (±S.E.) of sublegal (< 83 mm, grey line) and legal (≥ 83 mm, black line) lobsters in NMFS Area 514 from MADMF ventless trap survey from 2006-2021.

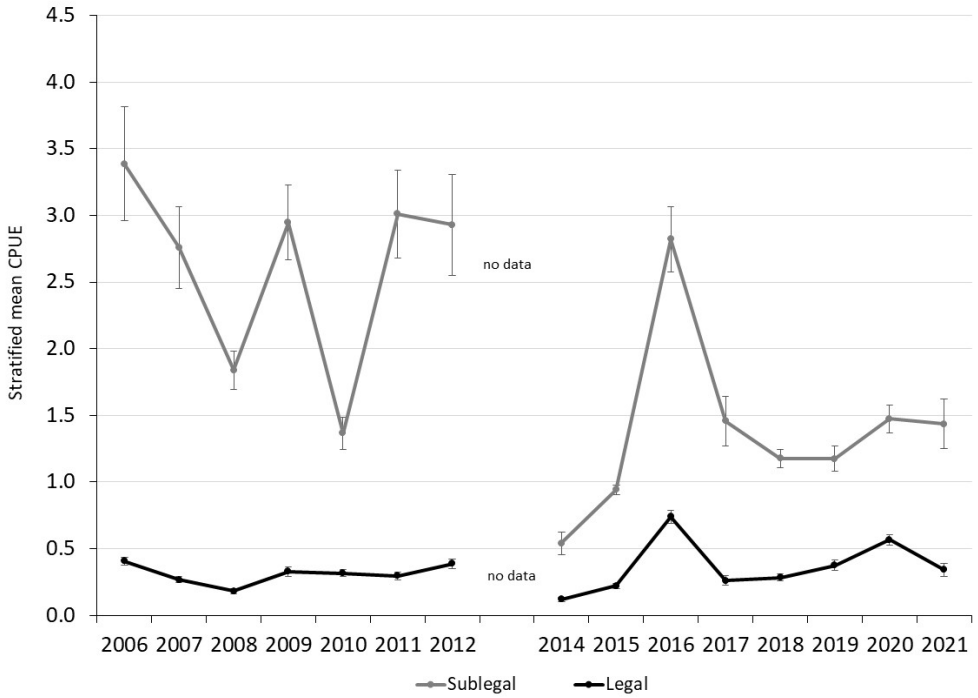

Figure 18. Stratified mean catch per trap haul (±S.E.) of sublegal (< 86 mm, grey line) and legal (≥ 86 mm, black line) lobsters in the reduced MA SNE survey area, Area 538.

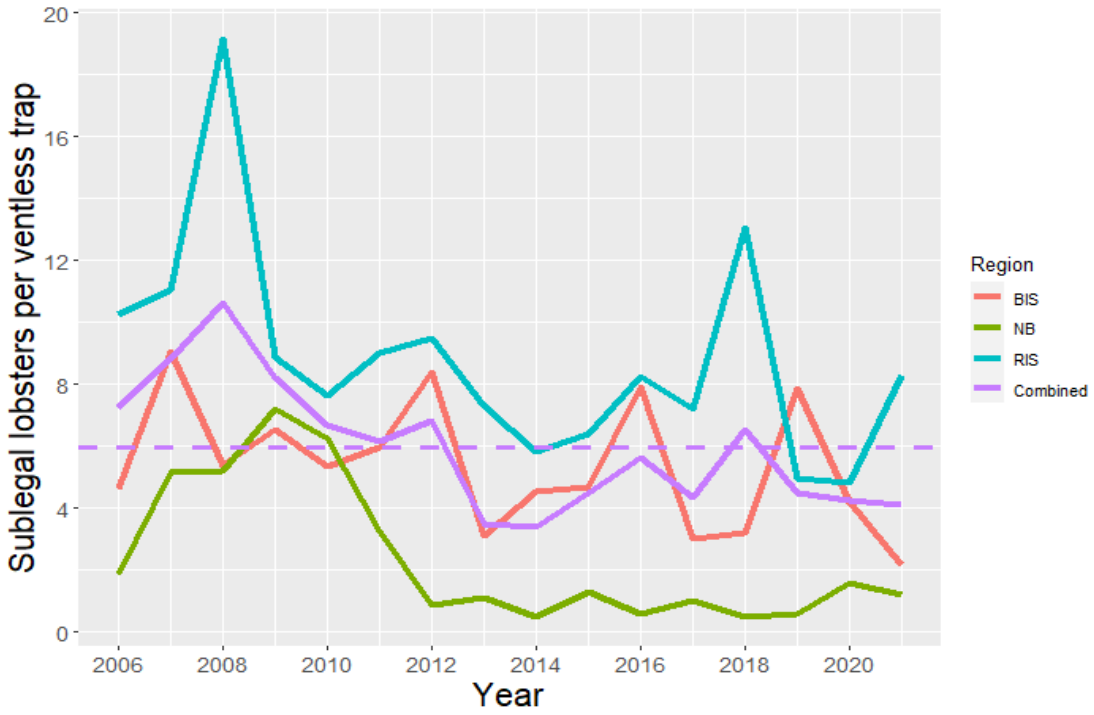

Figure 19. Depth-stratified mean catch of sublegal lobsters in the RIDEM DMF ventless trap survey, 2006-2021.

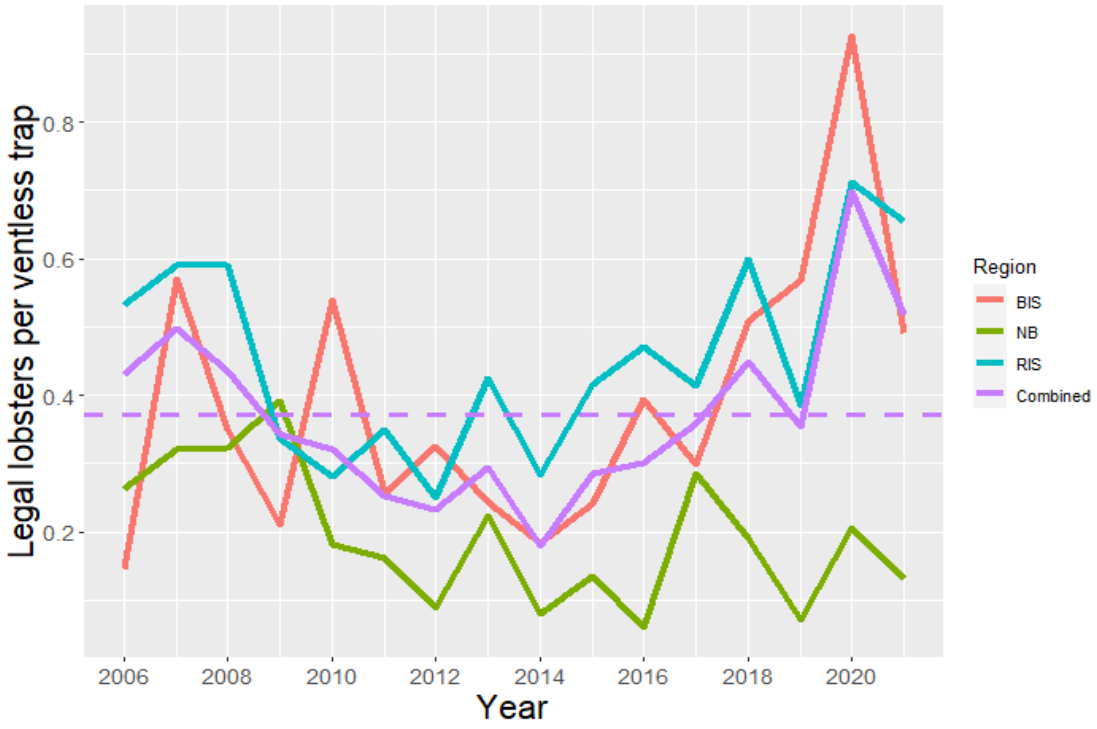

Figure 20. Depth-stratified mean catch of sublegal lobsters in the RIDEM DMF ventless trap survey, 2006-2021.

DRAFT FOR BOARD REVIEW

ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

For Jonah Crab
(*Cancer borealis*)

2021 FISHING YEAR

Prepared by the Plan Review Team

October 2022

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Table of Contents

REVIEW OF THE ATLANTIC STATES MARINE FISHERIES COMMISSION FISHERY MANAGEMENT PLAN FOR JONAH CRAB (*Cancer borealis*)

2021 FISHING YEAR

1.0 Status of the Fishery Management Plan

Year of ASMFC Plan's Adoption:	FMP (2015)
Framework Adjustments:	Addendum I (2016) Addendum II (2017) Addendum III (2018) Addenudm IV (2022)
Management Unit:	Maine through North Carolina
States with a Declared Interest:	Maine through Virginia (Excluding Pennsylvania and DC)
Active Committees:	American Lobster Management Board, Technical Committee, Plan Review Team, Advisory Panel, Electronic Reporting Subcommittee, Electronic Tracking Subcommittee

2.0 Status of the Fishery

2.1 Commercial Fishery

Historically, Jonah crab was taken as bycatch in the lobster fishery; however, in recent years a directed fishery has emerged causing landings to rapidly increase. Throughout the 1990s, landings fluctuated between approximately 2 and 3 million pounds, and the overall value of the fishery was low. In the early 2000's landings began to increase, with over 7 million pounds landed in 2005. By 2014, landings had almost tripled to 17 million pounds and a value of nearly $13 million. This rapid increase in landings can be attributed to an increase in the price of other crab (such as Dungeness), creating a substitute market for Jonah crab, as well as a decrease in the abundance of lobsters in Southern New England, causing fishermen to redirect effort on Jonah crab. It should be noted that there is some uncertainty in the landings data—especially prior to 2008—due to species misidentification issues as well as underreporting of landings before the implementation of reporting requirements. Despite the uncertainty, the overall trend in landings is likely accurate.

Today, Jonah crab and lobster are considered a mixed crustacean fishery in which fishermen can target lobster or crab at different times of the year based on slight gear modifications and small shifts in the areas in which the traps are fished. While the majority of Jonah crab landings is harvested as whole crabs, fishermen from several states, including New York, Maryland and Virginia, land claws. Jonah crab claws are relatively large and can be an inexpensive substitute for stone crab claws. As a result, they can provide an important source of income for fishermen.

Along the Delmarva Peninsula, small boat fishermen have historically harvested Jonah crab claws because they do not have seawater storage tanks on board to store whole crabs.

In 2021, landings along the Atlantic Coast totaled approximately 12.3 million pounds of Jonah crab, representing $12.6 million in ex-vessel value. Landings decreased 9% from 2020 landings of 13.5 million pounds. The states of Massachusetts (53%), Maine (21%), and Rhode Island (17%) were the largest contributors to landings. Over 99% of 2020 coastwide landings came from trap gear.

2.2 Recreational Fishery

The magnitude of the Jonah crab recreational fishery is unknown at this time; however, it is believed to be quite small in comparison to the size of the commercial fishery.

3.0 Status of the Stock

Jonah crab are distributed in the waters of the Northwest Atlantic Ocean primarily from Newfoundland, Canada to Florida. The life cycle of Jonah crab is poorly described, and what is known is largely compiled from a patchwork of studies that have both targeted and incidentally documented the species. Female crab (and likely some males) are documented moving inshore during the late spring and summer. Motivations for this migration are unknown, but maturation, spawning, and molting have all been postulated. It is also generally accepted that these migrating crab move back offshore in the fall and winter. Due to the lack of a widespread and well-developed aging method for crustaceans, Jonah crab size-at-age, and age-at-maturity are poorly described.

The status of the Jonah crab resource is relatively unknown and no range-wide stock assessment has been conducted. Massachusetts, Rhode Island, Maine, and New Hampshire conduct inshore state water trawl surveys, and NOAA Fisheries conducts a trawl survey in federal waters which collects data on Jonah crab abundance and distribution. In addition, several studies are on-going (Section 7.0) to gather more information on the species. A Data Workshop took place in 2020 to evaluate all available data sources and determine whether enough data of sufficient quality are available to conduct a stock assessment. Based on the results of this workshop, in August 2021 the Board initiated a stock assessment for Jonah crab to be completed in 2023.

4.0 Status of Management Measures

Interstate Fishery Management Plan for Jonah Crab (2015)

Jonah crab is managed under the Interstate Fishery Management Plan (FMP) which was approved by the American Lobster Management Board in August 2015. The goal of the FMP is to promote conservation, reduce the possibility of recruitment failure, and allow for the full utilization of the resource by the industry. The FMP lays out specific management measures in the commercial fishery. These include a 4.75” minimum size and a prohibition on the retention of egg-bearing females. To prevent the fishery from being open access, the FMP states that participation in the directed trap fishery is limited to lobster permit holders or those who can prove a history of crab-only pot fishing. All others must obtain an incidental permit. In the

recreational fishery, the FMP sets a possession limit of 50 whole crabs per person per day and prohibits the retention of egg-bearing females. Due to the lack of data on the Jonah crab fishery, the FMP implements a fishery-dependent data collection program. The FMP also requires harvester and dealer reporting along with port and/or sea sampling.

Addendum I (2016)

Addendum I establishes a bycatch limit of 1,000 crabs per trip for non-trap gear (e.g., otter trawls, gillnets) and non-lobster trap gear (e.g., fish, crab, and whelk pots). In doing so, the Addendum caps incidental landings of Jonah crab across all non-directed gear types with a uniform bycatch allowance. While the gear types in Addendum I make minimal contributions to total landings in the fishery, the 1,000 crab limit provides a cap to potential increases in effort and trap proliferation.

Addendum II (2017)

Addendum II establishes a coastwide standard for claw harvest. Specifically, it permits Jonah crab fishermen to detach and harvest claws at sea, with a required minimum claw length (measured along the forearm of the claw) of 2.75" if the volume of claws landed is greater than five gallons. Claw landings less than five gallons do not have to meet the minimum claw length standard. The Addendum also establishes a definition of bycatch in the Jonah crab fishery, whereby the total pounds of Jonah crab caught as bycatch must weigh less than the total amount of the targeted species at all times during a fishing trip. The intent of this definition is to address concerns regarding the expansion of a small-scale fishery under the bycatch limit.

Addendum III (2018)

Addendum III improves the collection of harvester and biological data in the Jonah crab fishery. Specifically, the Addendum improves the spatial resolution of harvester data collection by requiring fishermen to report via 10 minute squares. It also expands the required harvester reporting data elements to collect greater information on gear configurations and effort. In addition, the Addendum established a deadline that within five years, states are required to implement 100% harvester reporting, with the prioritization of electronic harvester reporting development during that time. Finally, the Addendum improves the biological sampling requirements by establishing a baseline of ten sampling trips/year, and encourages states with more than 10% of coastwide landings to conduct additional sampling trips.

Addendum IV (2022)

Addendum IV expands on reporting improvements by establishing electronic tracking requirements for federally-permitted vessels in the American lobster and Jonah crab fisheries. Specifically, electronic tracking devices will be required for vessels with commercial trap gear area permits for Lobster Conservation Management Areas (LCMAs) 1, 2, 3, 4, 5, and Outer Cape Cod to collect high resolution spatial and temporal effort data.

5.0 Fishery Monitoring

The provisions of Addendum III went into effect January 1, 2019. Specifically, Addendum III requires reporting of additional data elements, the implementation of 100% harvester

reporting within five years, and the completion of a minimum of ten sea and/or port sampling trips per year for biological sampling of the lobster/Jonah crab fishery. The Addendum III requirement for commercial harvesters to report their fishing location by 10 minute longitudinal/latitudinal square was implemented in 2021. *De minimis* states are not required to conduct fishery-independent sampling or port/sea sampling.

Overviews of the states' port and sea sampling in 2021 are as follows:

- Maine: Maine conducted 149 sea sampling trips, 23 of which had Jonah crab measurements, for a total of 865 sampled Jonah crabs. Types of information collected included: shell width, sex, discards, egg bearing status, cull status, shell hardness, and whether landings are whole crabs or parts. Maine's lobster port sampling program was suspended in 2011.
- New Hampshire: Staff sampled 66 Jonah crab on 13 sea sampling trips and collected information on sex, the presence of eggs, cull condition, molt stage, and carapace length. NH initiated a quarterly port sampling program in late 2016. Quarterly sampling took place at shellfish dealers, where an interview with the captain occurred and a biological sample was taken. A total of 605 Jonah crab were sampled (sexed, measured for carapace width, and weighed when feasible).
- Massachusetts: Massachusetts made 11 port sampling trips and sampled 4,504 Jonah crab from seven different boats. Data collected include carapace width, sex, egg bearing status, cull status, and shell hardness. No Jonah crab sea sampling trips were conducted.
- Rhode Island: Rhode Island did not conduct sea sampling for Jonah crab in 2021, due to funding and staff limitations. Six port sampling trips were conducted in 2021, measuring 1,308 Jonah crabs caught in two different Statistical Areas. Types of information collected included: carapace width, sex, egg bearing status, cull status, shell hardness, and shell disease condition.
- Connecticut: No sea sampling or port sampling trips were conducted for Jonah crab.
- New York: Staff conducted 13 market sample trips, sampling 665 male and 1 female Jonah crab. No sea sampling trips were conducted for Jonah crab in 2021.
- New Jersey: No sea or port sampling trips were conducted for Jonah crab in 2021.
- Delaware: No sea or port sampling trips were conducted for Jonah crab in 2021.
- Maryland: No sea or port sampling trips were conducted for Jonah crab in 2021.
- Virginia: No sea or port sampling trips were conducted for Jonah crab in 2021.

6.0 Status of Surveys

The FMP for Jonah crab encourages states to expand current lobster surveys (i.e. trawl surveys, ventless trap surveys, settlement surveys) to collection biological information on Jonah crab. The following outlines the fishery-independent surveys conducted by each state.

Maine

A. Settlement Survey

The Maine settlement survey was primarily designed to quantify lobster young-of-year (YOY), but has also collected Jonah crab data from the sites throughout the survey. Jonah crab

information collected includes carapace width, sex (when large enough), ovigerous condition, claw status, shell hardness, and location. The density of YOY Jonah crab increased over the past two decades with high values in 2012 and 2016, then declined slightly in recent years (Figure 1). In 2020, density of YOY Jonah crab increased from 2019 (Figure 1).

B. State Trawl Survey

The ME/NH Inshore Trawl Survey began in 2000 and is conducted biannually (spring and fall) through a random stratified sampling scheme. Jonah crab data has been collected since 2003. The 2021 spring survey ran from May to June and completed 118 out of 120 scheduled tows. A total of 170 Jonah crabs were caught and sampled, with 63 females, 106 males, and 1 unsexed caught and measured. The 2021 fall survey completed 89 out of 120 scheduled tows; a total of 65 Jonah crabs were caught and sampled, with 31 females, 33 males and 1 unsexed caught and measured. Abundance indices for Jonah crab have been declining since 2016 (Figure 2).

C. Ventless Trap Survey

Maine began its Juvenile Lobster Ventless Trap Survey in 2006. Since the beginning of the survey, Jonah crab counts were recorded by the contracted fishermen, but the confidence in early years of this data is low because of the confusion between the two *Cancer* crabs (Jonah crab vs. rock crab) and similar common names. In 2016, the survey began collecting biological data for Jonah crab including carapace width, sex, ovigerous condition, claw status, shell hardness, and location. In 2021 Jonah crab catch in the survey increased in all areas from 2020. Concentrations of Jonah crab were highest in Statistical Area 511 and decrease to the southwest (Figure 3).

New Hampshire

A. Settlement Survey

Since 2009, species information has been collected on Jonah crab in the New Hampshire Fish and Game portion of the American Lobster Settlement Index. Figure 4 depicts the CPUE (#/m^2) of Jonah crab for all NH sites combined, from 2009 through 2021. The time series shows a general upward trend with a time series high in 2020 and slight decline in 2021.

B. Ventless Trap Survey

Since 2009, New Hampshire Fish and Game has been conducting the coastwide Random Stratified Ventless Trap Survey in state waters (statistical area 513). A total of six sites were surveyed twice a month from June through September in 2021. Beginning in 2016, all Jonah crabs were evaluated for sex, carapace width (mm), cull condition, and molt stage. A total of 8 Jonah crab over 8 trips were measured during the 2021 sampling season.

Massachusetts

A. Settlement Survey

The Juvenile Lobster Suction Survey has consistently identified *Cancer* crabs to genus level since 1995, and Jonah crab have been consistently identified to species in the survey since 2011. The mean number of Jonah crab observed in the MA DMF Settlement Survey in the GOM region has generally been increasing since the survey consistently began collecting information on Jonah

crab in 2011 (Figure 5).

B. Ventless Trap Survey

The Massachusetts Division of Marine Fisheries (MA DMF) Ventless Trap Survey is conducted in MA territorial waters of NMFS statistical areas 514 and 538. Stratified mean catch per trawl haul (CPUE) for the survey is standardized to a six-pot trawl with three vented and three ventless traps. Bycatch data from the 2021 MA DMF Ventless Trap Survey is still being entered and QA/QC'ed due to limited staffing and is currently unavailable. The 2020 data point was the third highest of the time series (Figure 6).

C. Trawl Survey

The MA DMF Trawl Survey data are divided into two regions, Gulf of Maine (survey regions 4 and 5), and Southern New England (survey regions 1-3). Except for the fall survey in the GOM region, Jonah crabs are infrequently caught in the MA DMF Trawl Survey. Since generally increasing in abundance since the mid-1990's, the last couple of years of the fall survey in the GOM have been closer to the time series median (Figure 7). The 2020 spring and fall MA DMF bottom trawl surveys were canceled due to COVID-19.

Rhode Island

A. Settlement Survey

The RI DEM lobster YOY Settlement Survey (Suction Sampling) intercepts Jonah crabs. In 2021, the Jonah crab index was 0.08 Jonah crabs per quadrat, below the time series mean (Figure 8).

B. Ventless Trap Survey

Since its inception in 2006, the RI Ventless Trap Survey (VTS) has recorded counts of Jonah crab per pot. Carapace width, sex, ovigerous condition, and location data have been collected for all Jonah crabs encountered in the survey since 2015; prior to this, only counts of Jonah crab were recorded. Catch per ventless trap of Jonah crab in 2021, at 1.63, was higher than the time series mean of 1.32 crabs per ventless trap (Figure 9).

B. Trawl Survey

RI DEM has conducted spring and fall trawl surveys since 1979, and a monthly trawl survey since 1990. However, the survey did not begin counting Jonah crab specifically until 2015. Jonah crabs are rarely encountered in this survey, and abundance indices are variable yet low. In 2021, the RIDEM DMF Trawl program conducted a monthly trawl survey within state waters, with 156 total trawls performed. The mean monthly CPUE for Jonah crabs was 0.03 crabs per tow, slightly lower that the time series mean of 0.04 crabs per tow.

Connecticut

A. Trawl Survey

Jonah crab abundance is monitored through the Long Island Sound Trawl Survey (LISTS) during the spring (April, May, June) and fall (September and October) cruises, all within NMFS statistical area 611. The survey documents the number of individuals caught and total weight per haul by survey site in Long Island Sound. The LISTS caught one Jonah crab in the fall 2007

survey and two in the fall 2008 survey. Both observations occurred in October at the same trawl site in eastern Long Island Sound. No trawl survey sampling was conducted in 2020 due to restrictions on field sampling caused by the global COVID-19 pandemic. No Jonah crabs were observed in the 2021 spring or fall surveys.

New York

A. Trawl Survey

New York initiated a stratified random trawl survey in the near shore ocean waters off the south shore of Long Island in 2018 from the Rockaways to Montauk Point and the New York waters of Block Island Sound. Three sampling trips were completed in February, June, and August of 2021. Sixteen to 30 stations were sampled each trip. A total of seven male and one female Jonah crab were caught during the 2021 survey year. The male crabs ranged from 20 to 131 mm, with an average shell width of 59 mm. The female crab measured 37 mm shell width. Date, location, carapace width, and weight are collected for each Jonah crab sampled, and environmental information is recorded for each station sampled on this survey.

New Jersey

A. Trawl Survey

A fishery-independent Ocean Trawl Survey is conducted from Sandy Hook, NJ to Cape May, NJ each year. The survey stratifies sampling in three depth gradients, inshore (18'-30'), mid-shore (30'-60'), and offshore (60'-90'). The mean CPUE, which is calculated as the sum of the mean weight of Jonah crab collected in each sampling area weighted by the stratum area, has remained low throughout the time series, but increased slightly in 2019. A cruise was not conducted in April 2019. Due to the COVID-19 pandemic, 2020 and 2021 CPUE and indices were not obtained (Figure 10).

7.0 Recent and On-Going Research Projects

A. Declawing Study

NH F&G, Wells National Estuarine Research Reserve, and the University of New Hampshire have been conducting a variety of collaborative research on Jonah crabs since 2014. Two of those studies were published in 2021. Goldstein and Carloni (2021) assessed the implications of live claw removal, and Dorrance et al. (2021) conducted follow-up research on that study to better understand the sublethal effects of declawing. These manuscripts provide estimates of mortality for declawed animals, and information on the effects of claw removal on feeding, movement and mating.

In addition to the above-mentioned publications, an acoustic telemetry study was conducted in 2018 and 2019 by same collaborators to assess the movement patterns of both controls and declawed animals. These data are currently the basis for Maureen Madray's thesis (Furey lab-UNH) and will be finalized in the coming months.

B. Growth and Fishery Dependent Data

In 2019, two collaborative studies between the University of Rhode Island and Rhode Island

DEM were published. The first of these was a growth study, which described molt increments for adult females and males and molting seasonality and molt probabilities for adult males in Rhode Island Sound. The second was an interview study in which fifteen in-person interviews were conducted with Jonah crab fishermen to collect their knowledge concerning Jonah crab biology and fishery characteristics. The interviews provided insight into aspects of the species biology and life history that have not been characterized in the literature (e.g., seasonal distribution patterns); identified topics requiring further study (e.g., stock structure and spawning seasonality); and highlighted predominant concerns related to fishery management (e.g., inshore-offshore fleet dynamics).

New Hampshire Fish and Game, Wells National Estuarine Research Reserve and the University of New Hampshire conducted research on growth rates of crabs held at ambient and controlled temperatures for sizes ranging from 5 mm (YOY) to 100 mm. These data are currently being analyzed, and will be available for population assessment purposes.

C. CFRF Research Fleet

The Commercial Fisheries Research Foundation (CFRF) has expanded its lobster commercial research fleet to sample Jonah crab. Biological data collected include carapace width, sex, shell hardness, egg status, and disposition. As of December 2021, 105,894 Jonah crabs have been sampled through the program.

8.0 State Compliance

All states except New York have implemented the provisions of the Jonah Crab FMP and associated addenda. The implementation deadline for the Jonah Crab FMP was June 1, 2016; the implementation deadline for Addendum I was January 1, 2017; the implementation deadline for Addendum II was January 1, 2018; and the implementation deadline for Addendum III was January 1, 2019 (with the exception of the 10 minute square reporting requirement).

- NY is in the process of implementing the full suite of management measures required under the Jonah Crab FMP or Addendum I and II. Specifically, the regulations to limit the directed trap fishery to lobster permit holders only and the 1,000 crab bycatch limit have not yet been implemented. This is because NY crab legislation had to be revised to require a lobster permit for the directed trap fishery and adopt regulations to allow a 1,000 crab daily bycatch to crab permit holders. On June 30th, 2022 the NY Legislature amended NY Environmental Conservation Law § 13-0331 with subdivision 1-a which authorizes NYSDEC to adopt by regulation measures for the management of Jonah Crab. NYSDEC is now in the process of a rulemaking which will limit participation in the Jonah crab directed trap fishery to those vessel and permit holders which already hold a lobster permit, or those who can prove prior participation in the crab fishery before the control date of June 2, 2015. This rulemaking will also establish a bycatch limit for Jonah crab of no more than 1,000 crabs per trip for non-trap gear and non-lobster trap gear.

9.0 De Minimis Requests

The states of Delaware, Maryland, and Virginia, have requested *de minimis* status. According to the Jonah crab FMP, states may qualify for *de minimis* status if, for the preceding three years for which data are available, their average commercial landings (by weight) constitute less than 1% of the average coastwide commercial catch. Delaware, Maryland, and Virginia meet the *de minimis* requirement.

10.0 Research Recommendations

A stock assessment for Jonah crab is scheduled for completion in 2023. Research recommendations will be made by the Stock Assessment Subcommittee and Peer Review Panel.

11.0 Plan Review Team Recommendations

The following are recommendations from the Plan Review Team:

- The PRT recommends the Board approve the *de minimis* requests of DE, MD, and VA.
- The PRT notes that MA has been unable to meet the August 1 deadline for compliance reports for the last several years.
- The PRT recommends that jurisdictions with crab-only fishermen report on the number of these fishermen, their collective number of traps fished, and the rules governing their fishing activity.
- The PRT recommends the LEC review compliance in the Jonah crab fishery, given it is a fairly new fishery management plan and lessons may be learned.

12.0 Tables

Table 1. Landings (in pounds) of Jonah crab by the states of Maine through Virginia. 2010-2020 landings were provided by ACCSP based on state data submissions. 2021 landings were submitted by the states as a part of the compliance reports and should be considered preliminary. *C= confidential data*

	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	Total
2010	1,093,962	C	5,689,431	3,720,440	C	968,122	30,441		17,845	C	11,690,787
2011	1,096,592	C	5,379,792	3,213,119	C	69,440	27,025		92,401	C	9,947,142
2012	556,675	C	7,540,510	3,774,300	2,349	410,349	68,606		C	C	12,552,537
2013	379,073	340,751	10,109,590	4,651,796	51,462	371,713	8,143		C	C	16,075,636
2014	348,295	404,703	11,904,611	4,435,934	49,998	83,060	33,156		153,714	C	17,413,503
2015	312,063	C	9,128,876	4,298,894	C	207,424	68,116	C	39,750	C	14,253,327
2016	602,206	150,341	10,660,653	4,224,092	C	165,427	261,287	C	14,656	C	16,084,217
2017	1,042,807	114,155	11,698,342	4,111,281	C	158,231	433,132	C	23,564	C	17,594,666
2018	1,054,489	22,434	13,250,803	4,665,701	C	231,642	880,192	C	60,628	C	20,175,488
2019	763,760	70,818	9,674,107	4,222,305	C	125,391	1,061,194	C	47,829	C	15,968,414
2020	696,309	31,658	8,576,592	3,319,652	C	105,841	975,522	C	35,606	C	13,744,904
2021	2,574,059	123,729	6,492,162	2,143,795	C	149,918	827,340	C	34,327	C	12,345,330

13.0 Figures

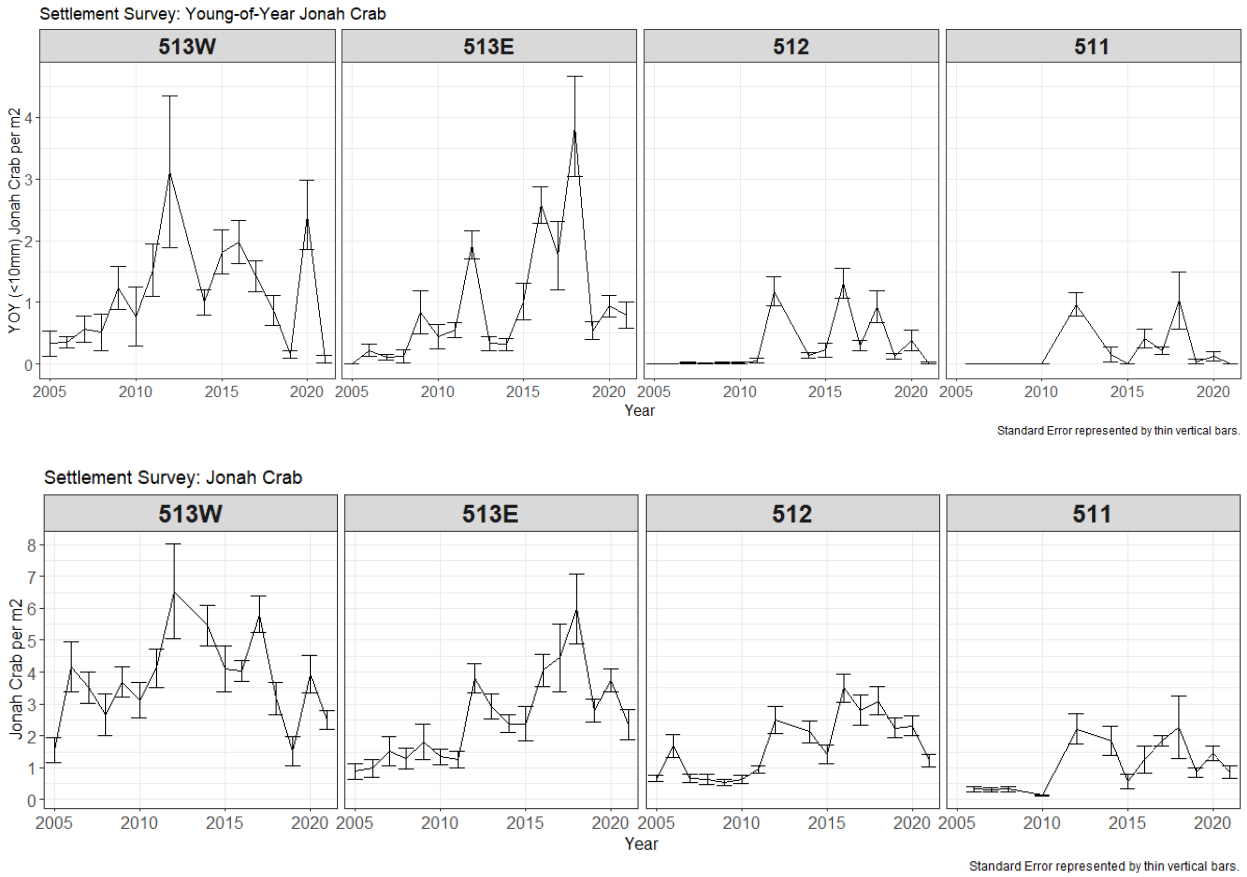

Figure 1. Density of Jonah crab over time in the Maine Settlement Survey by statistical area. The top graph shows the density of YOY Jonah crab (<10mm carapace width) and the bottom graph shows the density of all Jonah crab.

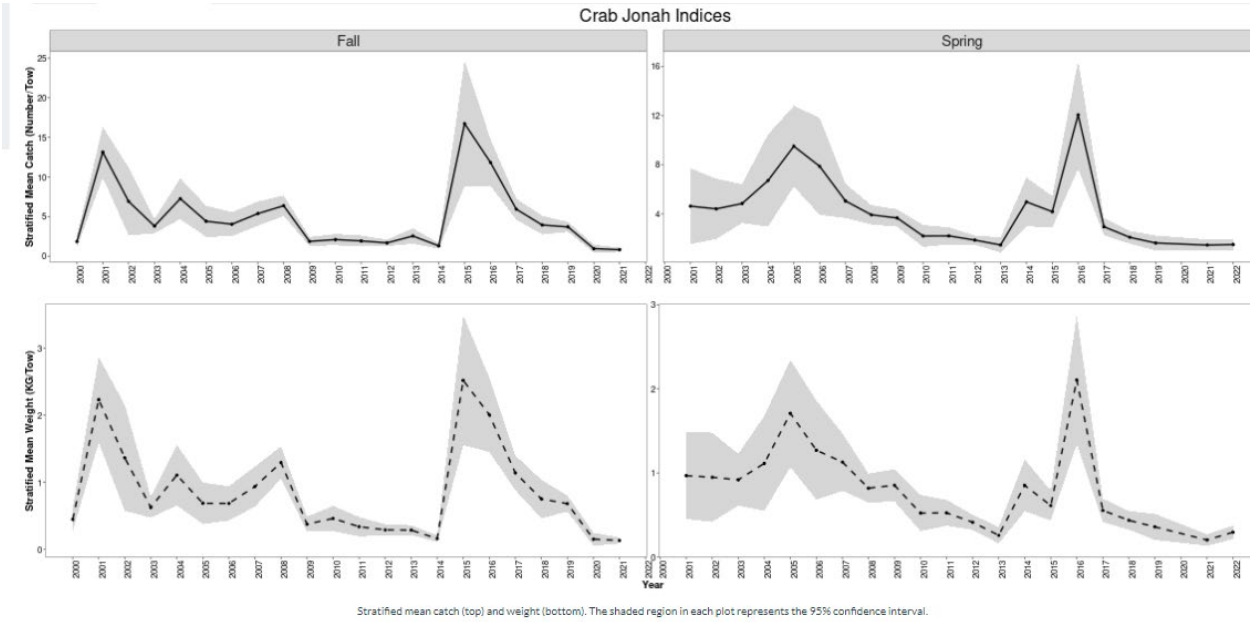

Figure 2. Maine-New Hampshire trawl survey abundance indices for Jonah crab, 2001-2021. Stratified mean catch (top) and results from the stratified mean weight (bottom).

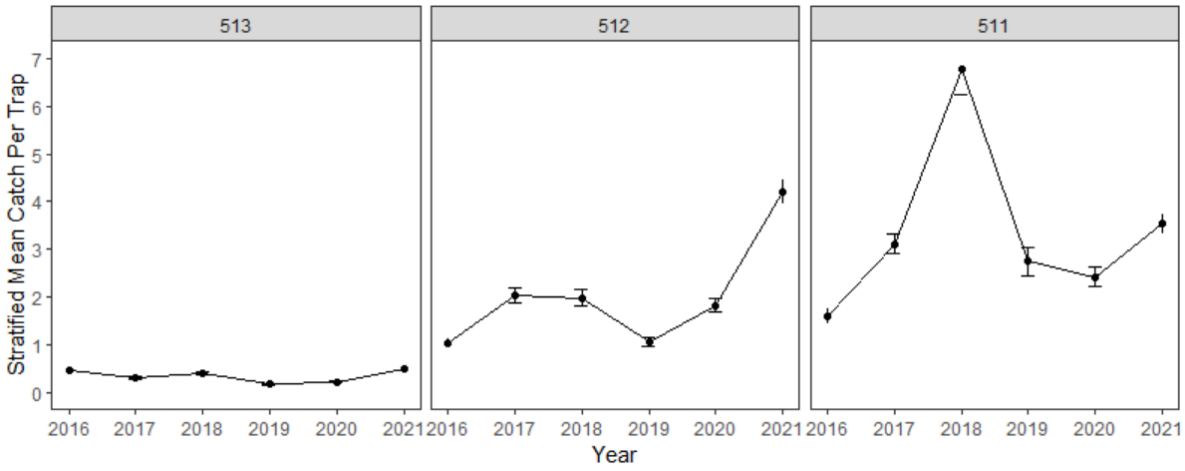

Figure 3. Stratified mean of Jonah crab from Maine Ventless Trap Survey 2016-2021. Standard error shown.

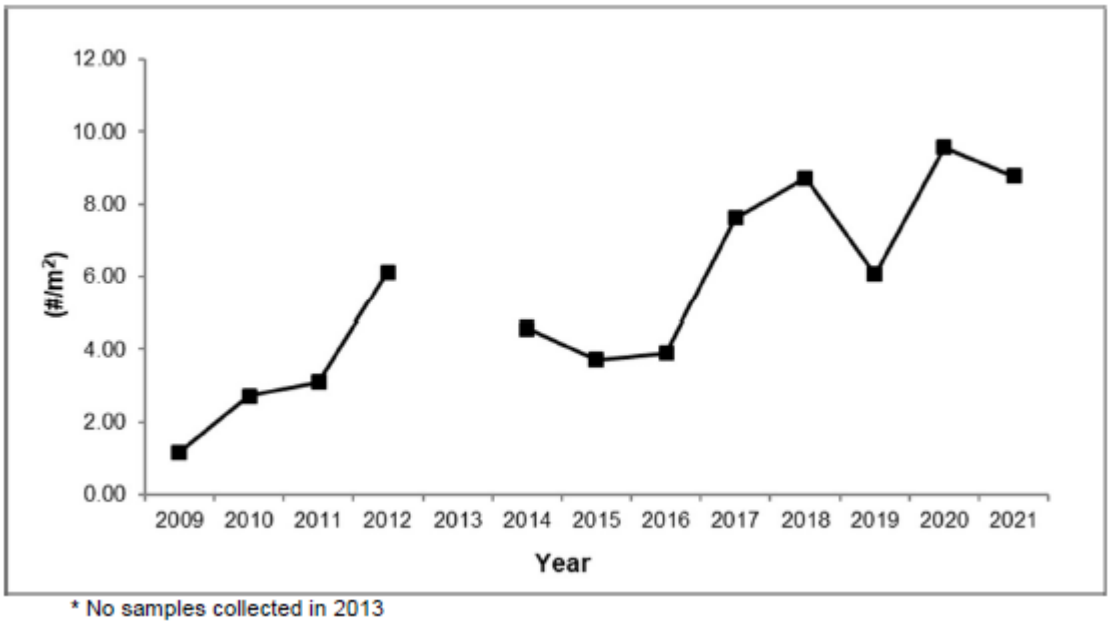

Figure 4. Catch per unit effort (#/m^2) of Jonah crab during the American Lobster Settlement Index Survey, in New Hampshire, from 2009 through 2020.

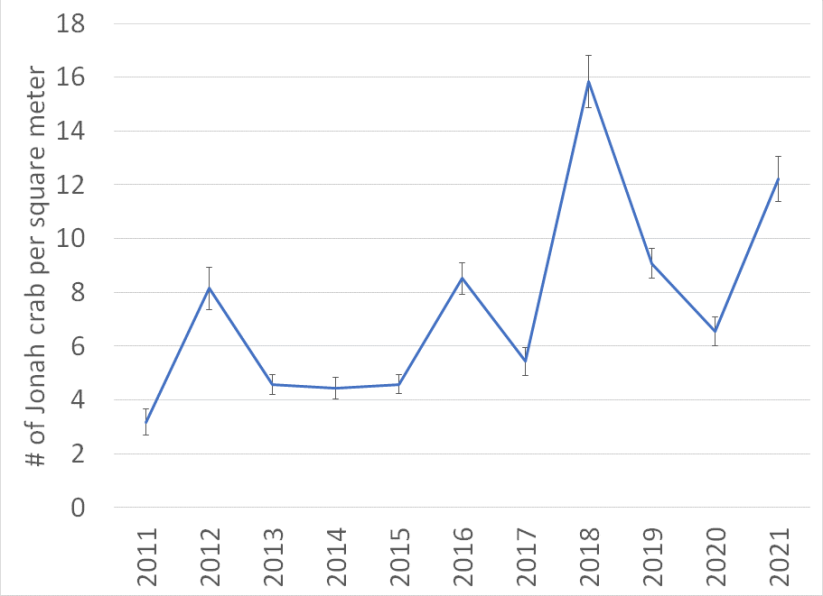

Figure 5. Mean number of Jonah crab per square meter from the MA DMF Settlement Survey from the Gulf of Maine (GOM) region. Error bars are two times the standard error.

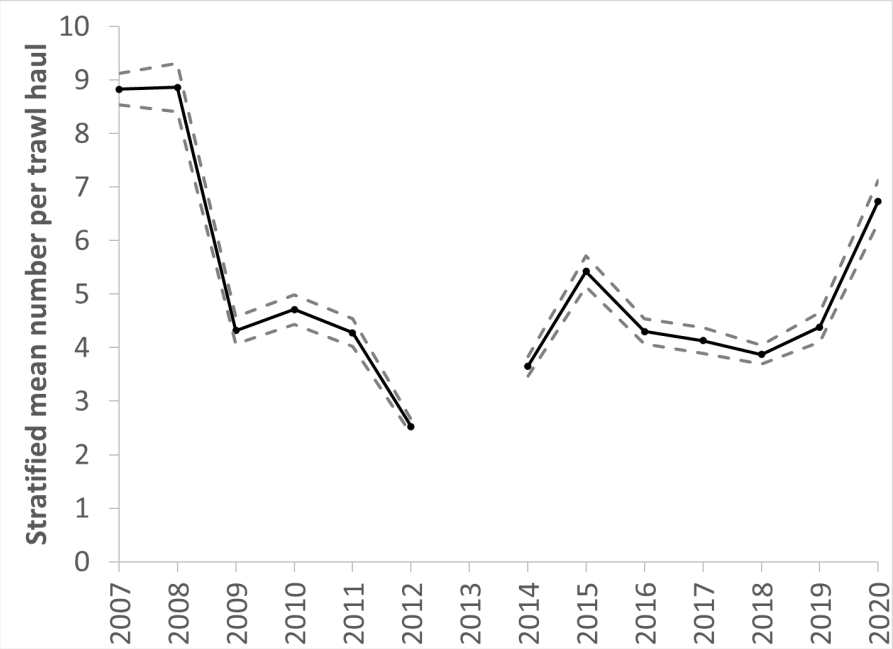

Figure 6. Mean number of Jonah crabs per trawl haul from ventless traps from GOM region of the MA DMF Ventless Trap Survey (standardized to a 6-pot trawl with three vented and three ventless traps). 2021 data are not available yet due to a staffing shortage. Error bars are two times the standard error.

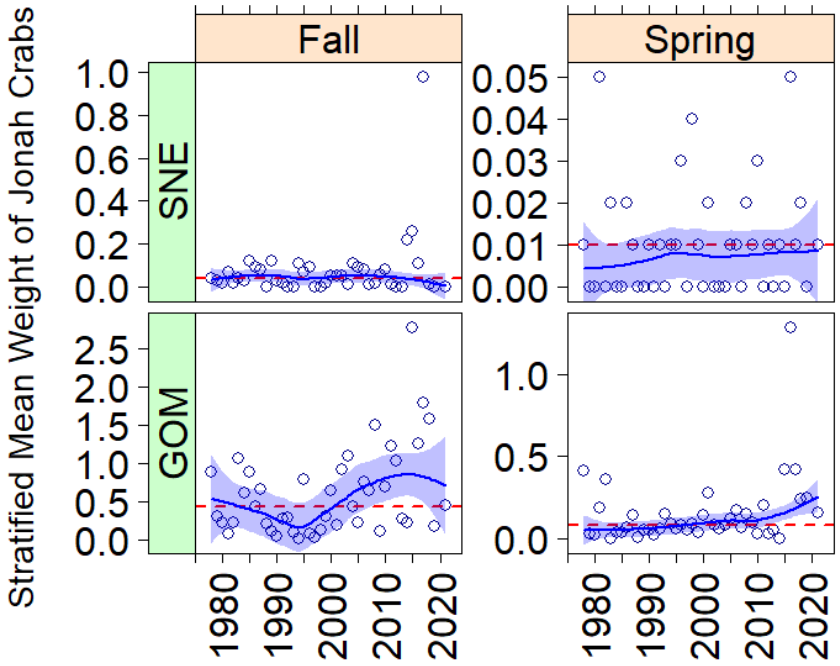

Figure 7. Stratified mean weight (kg) of Jonah crab from the MA DMF Trawl Survey. The left column shows the fall surveys, the right columns show the spring surveys. Southern New England (SNE) is on the top row, Gulf of Maine (GOM) is on the bottom. Red dashed line is the time series median. Blue line is a trend line (Loess smoother), and the blue shaded area is the confidence interval around the trend line. The survey was not conducted in 2020 due to the Covid-19 pandemic.

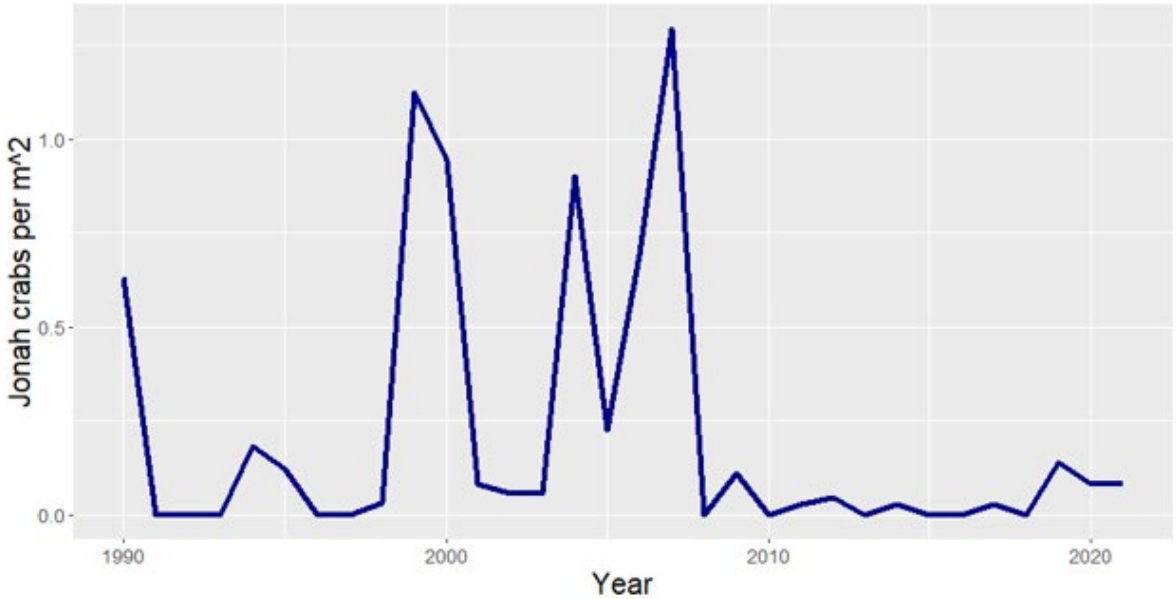

Figure 8. Rhode Island YOY Settlement Survey trend for all Jonah crabs caught per m^2, 1990-2021.

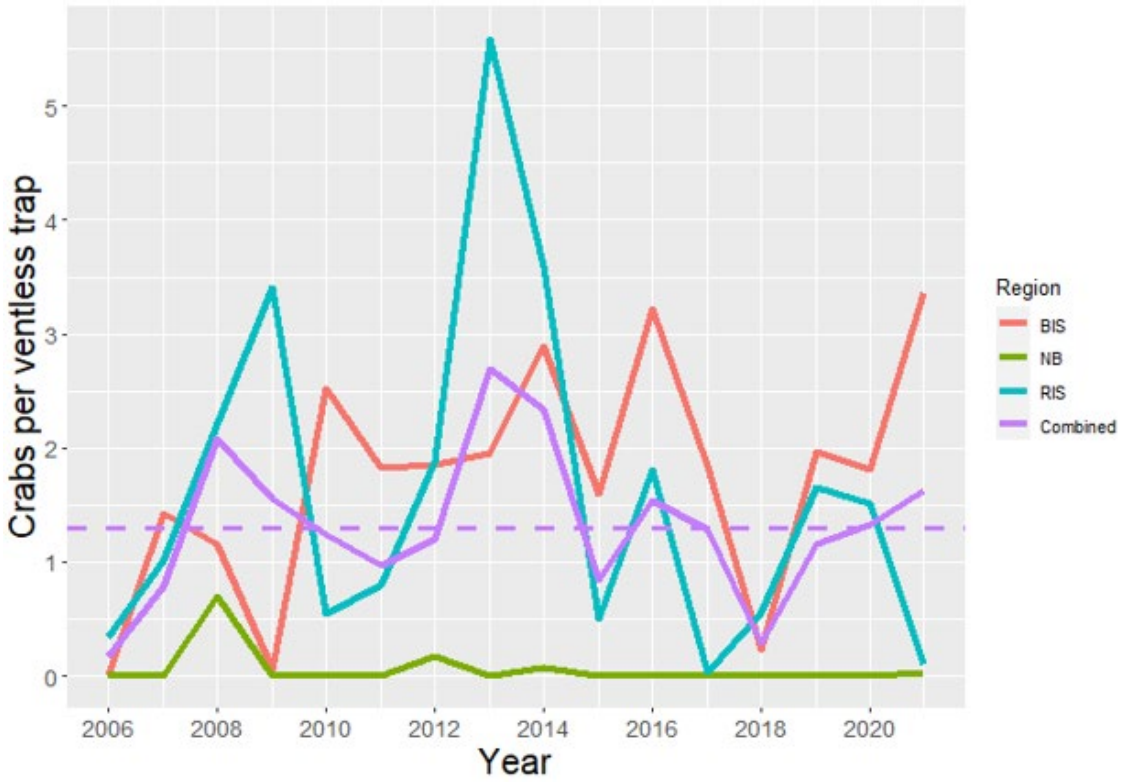

Figure 9. Rhode Island ventless trap survey index of Jonah crab abundance by region: Narragansett Bay (NB), Rhode Island Sound (RIS), and Block Island Sound (BIS). Time series mean for the combined region is presented as a dashed purple line.

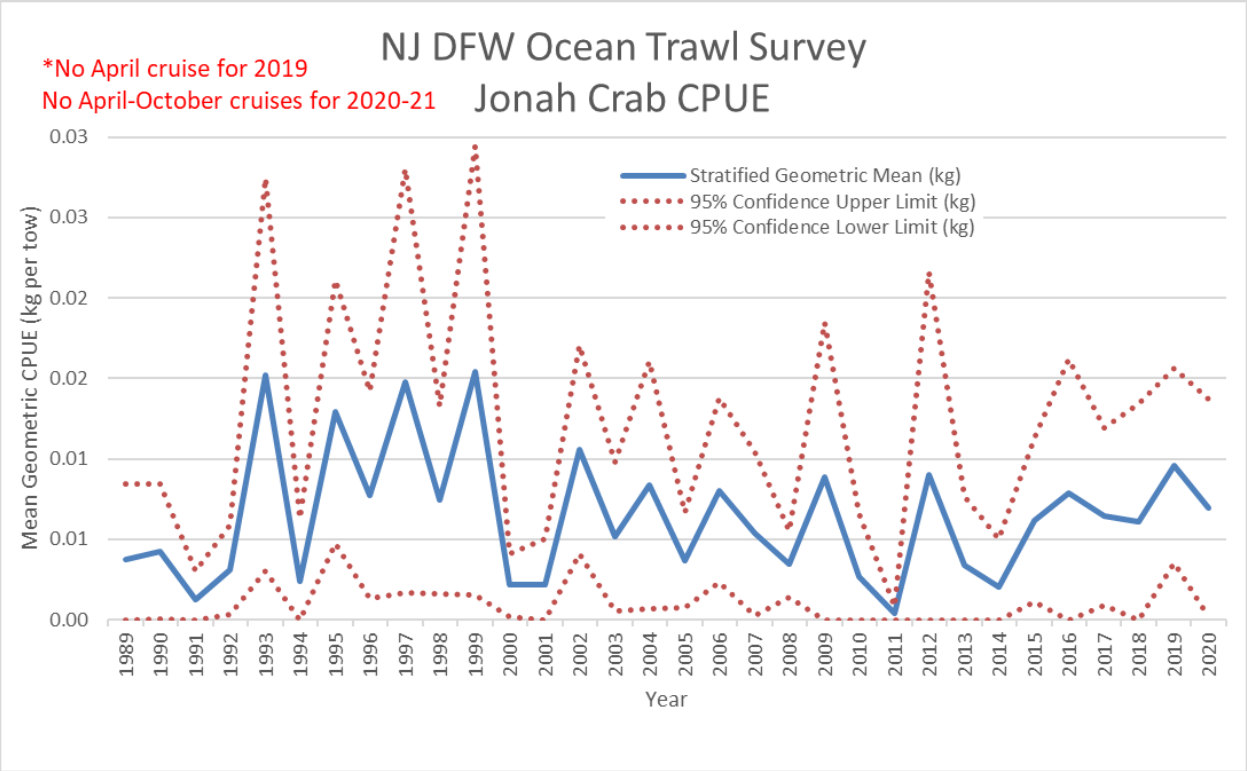

Figure 10. Stratified mean CPUE of all Jonah crab collected aboard the NJDFW Ocean Trawl Survey. The survey stratifies sampling in three depth gradients, inshore (18'-30'), mid-shore (30'-60'), offshore (60'-90'). The mean CPUE was calculated as the sum of the mean weight (in kg) of Jonah crab per size class collected in each sampling area weighted by the stratum area. ***NOTE: No April 2019 Survey was conducted due to Research vessel mechanical issues. Due to the COVID-19 pandemic, 2020 and 2021 CPUE and indices were not obtained.**

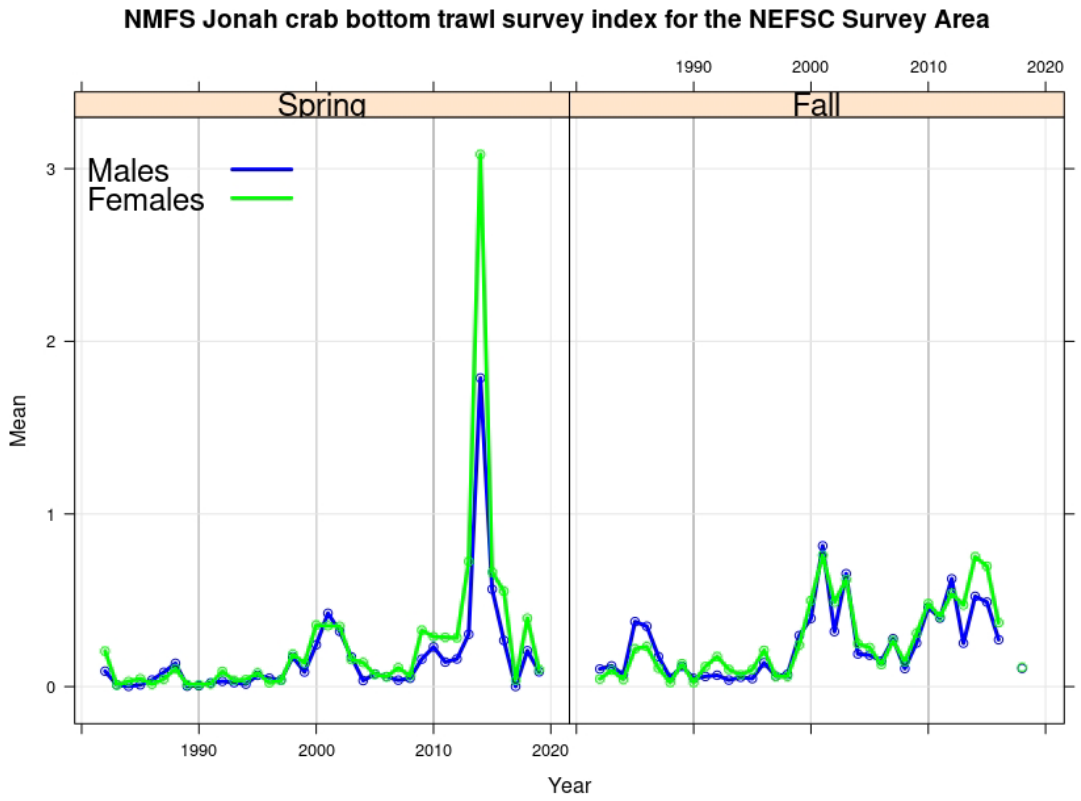

Figure 11. NMFS Jonah Crab index (mean number per tow) from the bottom trawl survey for the NEFSC Survey Area, through spring 2019. There was no survey conducted in 2020 due to the COVID-19 pandemic.