Atlantic States Marine Fisheries Commission

American Lobster Management Board

January 31, 2017
1:30 – 4:30 p.m.
Alexandria, Virginia

Draft Agenda

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

1. Welcome/Call to Order *(D. Borden)* 1:30 p.m.

2. Board Consent 1:30 p.m.
   - Approval of Agenda
   - Approval of Proceedings from October 2016

3. Public Comment 1:35 p.m.

4. Consider American Lobster Draft Addendum XXV for Public Comment *(M. Ware)* **Action** 1:45 p.m.
   - Addendum XXV Subcommittee Report
   - Plan Development Team Report

5. Technical Committee Report **Possible Action** 2:30 p.m.
   - Report on the Gulf of Maine/Georges Bank (GOM/GBK) Stock *(K. Reardon)*
   - Discuss Next Steps in Management of GOM/GBK Stock *(D. Borden)*

6. Consider Action to Address Data Deficiencies in the American Lobster Fishery *(M. Ware)* **Possible Action** 3:15 p.m.

7. Jonah Crab Draft Addendum II for Final Approval **Final Action** 3:35 p.m.
   - Review Issues and Management Option *(M. Ware)*
   - Review Public Comment *(M. Ware)*
   - Law Enforcement Committee Report *(M. Robson)*
   - Consider Final Approval of Addendum II

8. Technical Committee Report 4:10 p.m.
   - Potential Impacts to Lobster Fishery from the New England Fishery Management Council's Deep-Sea Coral Amendment *(K. Reardon)*

9. Other Business/Adjourn 4:30 p.m.

The meeting will be held at the Westin Alexandria, 400 Courthouse Square, Alexandria, Virginia; 703.253.8600

MEETING OVERVIEW

American Lobster Management Board Meeting
Tuesday, January 31, 2017
1:30 – 4:30 p.m.
Alexandria, Virginia

Chair: David Borden (RI) Assumed Chairmanship: 02/16	Technical Committee Chair: Kathleen Reardon (ME)	Law Enforcement Committee Representative: John Cornish (ME)
Vice Chair: Stephen Train (ME)	Advisory Panel Chair: Grant Moore (MA)	Previous Board Meeting: October 27, 2016
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 October 2016

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. American Lobster Draft Addendum XXV (1:45-2:30 p.m.) Action

Background

- In response the 2015 Stock Assessment, the Board initiated Addendum XXV to increase egg production and decrease fishing pressure in the SNE stock.
- At the October 2016 meeting, the Board delayed approving draft Addendum XXV for public comment to allow state agencies and industry members an opportunity to provide comments on the management measures considered.
- Comments were submitted by MA, RI, CT, NY, and NOAA Fisheries and a subcommittee met via conference call on December 8th to provide recommendations to the Board and PDT.

Presentations

- Addendum XXV Subcommittee Report by M. Ware **(Briefing Materials)**
- Plan Development Team Report by M. Ware **(Briefing Materials)**

Board actions for consideration at this meeting

- Approve draft Addendum XXV for public comment **(Briefing Materials)**

5. Technical Committee Report (2:30-3:15 p.m.) Possible Action

Background

- In May 2016, the Board charged the TC with several tasks to better understand changing stock conditions in the GOM/GBK stock. This was prompted by the low settlement values recently seen in YOY surveys.
- The TC met in-person in September 2016 and held several conference calls throughout the fall and winter to compile a report on the GOM/GBK stock.

Presentations

- Technical Committee Report by K. Reardon **(Briefing Materials)**

Board actions for consideration at this meeting

- Discuss future management of the GOM/GBK stock.

6. Discussion on Reporting in the Lobster Fishery (3:15-3:35 p.m.) Possible Action

Background

- There is concern that the current reporting requirements do not provide enough information to accurately characterize the lobster fishery.
- In September 2016, the Lobster Reporting Work Group met and provided recommendations to the Board on ways to improve reporting in the lobster fishery.
- The TC has begun work to analyze a statistically valid sample of harvester reporting. The TC is working to expand the analysis to consider both harvest levels and trap hauls.

Board actions for consideration at this meeting

- Initiate addendum to improve reporting in the lobster fishery.

7. Jonah Crab Draft Addendum II (3:35-4:10 p.m.) Final Action

Background

- Draft Addendum II was initiated to consider a coastwide standard for claw harvest and a potential definition of bycatch in the Jonah crab fishery. The Board approved draft Addendum II for public comment in October 2016. **(Briefing Materials)**
- Public comments were gathered through January 6th.
- The Advisory Panel met to review draft Addendum II on January 6th.

Presentations

- Overview of options and public comment summary by M. Ware **(Briefing Materials)**
- Law Enforcement Report by M. Robson **(Briefing Materials)**

Board actions for consideration at this meeting

- Select management options and implementation dates.
- Approve final document.

8. Technical Committee Report (4:10-4:30 p.m.)

Background

- The NEFMC is currently drafting an Omnibus Deep-Sea Coral Amendment that may consider restrictions to lobster gear.
- The TC has completed analysis on potential impacts to the lobster fishery in the Gulf of Maine and offshore canyons.

Presentations

- Technical Committee Report by K. Reardon **(Supplemental Materials)**

9. Other Business/Adjourn

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

AMERICAN LOBSTER MANAGEMENT BOARD

The Harborside Hotel
Bar Harbor, Maine
October 27, 2016

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

ATTENDANCE

Board Members

Pat Keliher, ME (AA)
Terry Stockwell, ME Administrative proxy
Stephen Train, ME (GA)
Douglas Grout, NH (AA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
G. Ritchie White, NH (GA)
William Adler, MA (GA)
Dan McKiernan, MA, proxy for D. Pierce (AA)
Mark Gibson, RI, proxy for J. Coit (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Rep. Melissa Ziobron, CT, proxy for Rep. Miner (LA)
David Simpson, CT (AA)
Jim Gilmore, NY (AA)
Lance Stewart, CT (GA)
Emerson Hasbrouck, NY (GA)
Adam Nowalsky, NJ, proxy for Asm. Andrzejczak (LA)
Brandon Muffley, NJ, proxy for D. Chanda (AA)
Roy Miller, DE (GA)
John Clark, DE, proxy for D. Saveikis (AA)
Rachel Dean, MD (GA)
Mike Luisi, MD, proxy for D. Blazer (AA)
Joe Cimino, VA, proxy for J. Bull (AA)
Cathy Davenport, VA (GA)
Allison Murphy, NMFS
Peter Burns, NMFS

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

Ex-Officio Members

Kathleen Reardon, Technical Committee Chair
Rene Cloutier, Law Enforcement Committee Representative

Staff

Megan Ware
Toni Kerns
Robert Beal

Guests

Brian Benedict, USFWS
Glenn Chamberlain, NOAA
Patrice McCann, Maine Lobstermen's Assn.
Carl Wilson, ME DMR
Meredith Mendelson, ME DMR
Scott Olszewski, RI DEM
Jason McNamee, RI DEM
Stew Michels, DE DFW
Dick Allen, Little Bay Lobster Co.
Jocelyn Runnebaum, U Maine
Arnold Leo, E. Hampton, NY
Togue Brown, Downeast Dayboat

The American Lobster Management Board of the Atlantic States Marine Fisheries Commission convened in the Stotesbury Grand Ballroom of the Bar Harbor Club, Harborside Hotel, Bar Harbor, Maine, October 27, 2016, and was called to order at 12:43 o'clock p.m. by Chairman David V. Borden.

CALL TO ORDER

CHAIRMAN DAVID V. BORDEN: My name is David Borden and I am the Chairman of the Lobster Board. We've got a number of items here that we're going to have to work through on the agenda.

APPROVAL OF AGENDA

CHAIRMAN BORDEN: In terms of the agenda, we have distributed that and I guess I have a question. Does anyone have a preference for moving an item so that they can catch a plane?

If no then we'll take the items in which they appear. No hands up, so any objection to taking the items in the order that they were published. No objections. The agenda is approved.

APPROVAL OF PROCEEDINGS

CHAIRMAN BORDEN: Proceedings from the August meeting have been distributed. Are there any comments, additions, deletions to those? No hands up. Any objections to approving them, no objections; the proceedings are approved with unanimous consent.

PUBLIC COMMENT

CHAIRMAN BORDEN: We afford the public an opportunity to address the board for issues that are not on the agenda. Are there any members of the public? No one signed up on the signup sheet; but are there any members of the public that would like that opportunity? If so, raise your hand. There are no hands up, thank you.

CONSIDER AMERICAN LOBSTER DRAFT ADDENDUM XXV FOR PUBLIC COMMENT

CHAIRMAN BORDEN: I would like to just remind everyone that we've gone through a whole series of meetings here. We have adopted goals and objectives for this. At the last meeting we tasked the PDT with putting together a series of alternatives. That information became available on the website on Thursday night, October 20th, and I would imagine that most of you didn't read it until either Friday or over the weekend or in the last few days.

I am sorry that we couldn't get it out earlier, but that is just the way things were. What I would like to do is I would like to have Megan work through; give a presentation on the addendum. Then what I would like to do is to talk about the timing of any action, in terms of regulatory action, and get some feedback from the states on what they think is a realistic timeline in order to implement the measures; that range of measures, not specific measures.

Because I think that if we have that timing issue it will make some of the discussion on the addendum go smoother. In other words, if states can't implement this for this season, then in fact we have a little bit more time to refine the addendum. With that as a little bit of background, Megan, would you like to work through the draft addendum, please?

MS. MEGAN WARE: I'll be going through Draft Addendum XXV, which we are considering for public comment today. I will note that there are two issues in the document; the first is the targeted increase in egg production for southern New England, and then the second issue is where those management measures should apply. I'll go through each of those issues to hopefully set us up for a good discussion.

This is the timeline of the addendum. As David indicated, the board initiated this addendum in May to increase egg production and reduce fishing mortality in the southern New England

stock. In August the board defined the goals and the management options for this addendum. Since that time the PDT has been working on Addendum XXV.

If it is approved for public comment today, our public comment period would be from November, 2016 through January, 2017. Then in February we would review those public comments and consider final action. The reason the board is taking management action is because the 2015 stock assessment found the southern New England stock is depleted; with a reference abundance of 10 million lobsters, which is well below the threshold of 24 million lobsters.

Abundance, spawning stock biomass, and recruitment were all at historic lows, and modestly indicators corroborated these findings for spawning stock biomass. Six out of the eight surveys were below the 25th percentile. Furthermore, the survey encounter rate shows that the inshore population has contracted between 2008 and 2013.

One of the largest indicators of the poor stock condition in southern New England has been the marked decline in recruitment. I know we've shown this figure a couple of times, but I think it is really important to the document today. On the X access we have spawning stock biomass, and on the Y axis we have recruitment.

What this shows is that overall there is a positive trend between spawning stock biomass and recruitment. However, in the most recent years we can see that it is more of a vertical trend with recruitment dropping steadily and spawning stock biomass remaining steady. This suggests that spawning stock biomass and recruitment are decoupled.

There are several contributors to the poor condition in southern New England; the first is an increase in natural mortality. Climate change has had a significant impact on the stock as lobster physiology is intricately tied to water temperature; this includes when eggs hatch and larval survivorship.

What you see here on the bottom of the screen, it is a figure of bottom water temperatures from eastern Long Island Sound Connecticut, and it is the number of days above 20 degrees Celsius. This was included in the stock assessment, but I'm showing it here just to show that real change that we've seen in the bottom temperatures and the stress that is being put on these lobsters.

Another contributor to natural mortality is predation. Juvenile lobsters are an important source of food for many finfish species, and when those populations increase, pressure on the lobster stock also increases. In conjunction with an increase in natural mortality, continued fishing pressure has furthered the decline in southern New England. The graph you've seen here, it was also included in a TC memo; but what it shows is that we have natural mortality in the dark black line there, and then we have catch in the green line. This suggests that fishing mortality is still removing roughly twice as much spawning stock biomass from the population annually than natural mortality. If there is kind of a silver lining here, it is that this suggests management action can still have a real effect on the status of the stock. Given the poor condition of the stock, the board has initiated this addendum, and the goal for this addendum is recognizing the impact of climate change on the stock.

The goal of Addendum XXV is to respond to the decline of the southern New England stock, and its decline in recruitment; while preserving a functional portion of the lobster fishery in this area. Just as a reminder, the board is pursuing an increase in egg production; so that if environmental conditions become favorable we'll have enough eggs in the water to produce a successful and impactful recruitment event.

Also in setting the goal for this addendum, the board agreed that this is an initial management response to the stock assessment, and that the

board will continue to monitor the stock and the fishery to determine the next appropriate course of action. This year is a list of management tools that the board provided to the PDT at the August meeting.

What I'm going to do is go through each one of these. I'll give a bit of background on the discussion had by both the PDT and the TC, and then the final recommendation of whether to consider this in the document or not. I'm going to start with gauge size changes. Overall the PDT had the greatest confidence in gauge size changes to create impactful changes to the southern New England stock.

The PDT felt that changes to the minimum and maximum size are enforceable, and provide a direct benefit of keeping lobsters in the water longer. Gauge size changes are also intricately tied to the biology of lobsters, with clear benefits in terms of egg production and fitness; and as a result it is recommended for use in this management document.

Analysis by the TC suggests that gauge size changes can achieve up to a 60 percent increase in egg production, with increases in the minimum size resulting in larger increases in egg production. The PDT did note that decreases in the maximum size do provide permanent protection for those larger lobsters.

One of the things that the PDT discussed was the potential impact of gauge size changes or really any of the action taken in this addendum on interstate commerce. As a result of this addendum we might expect increased demand of lobsters from other LCMAs; especially those in the Gulf of Maine and Georges Bank.

Currently the minimum and the maximum size are possession limits, and while this is very helpful for enforcement, it can also complicate interstate commerce; as lobsters legally caught in LCMA 1 have a smaller gauge size than those in southern New England. Some states such as Connecticut and Rhode Island have language that allows dealers to possess these lobsters caught in LCMA 1, as long as they are not sold to consumers in their state.

The PDT does recommend that other states think about adopting similar language to try and get at this interstate commerce issue. Next I'll move on to trap reductions. The PDT definitely had a lot of discussion on trap reductions, and I think the biggest challenge here is that the relationship between traps fished and fishing mortality is unclear and a bit tenuous. Currently we are going through a series of allocation reductions in LCMAs 2 and 3. The intent of that is to scale the size of the fishery to the size of the resource. I think an important part of that reduction is that it is trap allocation reductions. That can reduce a fisherman's total trap allocation, including fish traps and latent effort.

The TC did attempt to try and model the relationship between actively fished traps and exploitation rate to kind of try and get at what trap reductions might result in. What they found is that a 25 percent reduction in the number of actively fished traps may result in at most a 13.1 percent increase in egg production.

There are a lot of important caveats to this analysis that I want to highlight; that suggest the actual increase in egg production might be a lot lower. The first is that the analysis assumes fishermen maintain a constant soak time. We don't believe that this is true. As fishermen reduce the number of traps they have, they tend to increase the number of hauls they take to maintain that constant harvest level.

Another important caveat here is that the analysis is based on active traps fished. Just as a reminder, those historic and current trap reductions we're taking include both actively fished traps and latent effort. Again, this is another way why this might not achieve that 13.1 percent increase.

Finally, we have trap transferability in LCMAs 2 and 3, and this provides a mechanism for those

fishermen to try and maintain their number of currently active fished traps. As a result of these many caveats, the PDT is recommending that trap reductions be used for management use in conjunction with gauge size changes. Trap reductions cannot be the sole management tool used in this addendum.

We also looked at accelerated trap reductions, and so that would be looking at the effect of speeding up the current trap reductions in LCMAs 2 and 3. Given the TCs concerns that fishermen can reduce soak time, that current trap reductions can remove latent effort, and that fishermen have the ability to maintain the number of actively fished traps through transferability.

The PDT is not recommending this tool for management use, as they don't believe it will create a meaningful increase in egg production. They also felt that this places a greater burden on LCMA 2 and 3 fishermen; and again we're trying to address the entire southern New England stock here, not just a portion of it. Next we'll discuss season closures.

The intent of this management tool is to reduce pressure on the stock at vulnerable times. The biological benefit here is that it removes stress on lobsters as they are caught, handled, and hauled to the surface. Analysis by the TC, which is new and it was done for this addendum, suggest that quarterly season closures can achieve up to a 21.6 percent increase in egg production, with the largest increases in egg production from summer closures; which is not surprising given that is when fishing mortality is highest.

An important assumption here is that fishermen don't increase their effort during the open seasons to recoup their losses. Given this important caveat, the PDT is again recommending that season closures be used in this document in conjunction with gauge size changes. Season closures cannot be the sole management measure used to achieve the targeted increase in egg production. One of the important things to consider here is the impact on the Jonah crab fishery. Especially in southern New England we're seeing the lobster fishery is more of a mixed crustacean fishery, where our fishermen can catch Jonah crab and lobsters using the same gear at different times of the year.

I think an important thing to consider here is the potential impact of a closure on the Jonah crab fishery. Next is trip limits. A trip limit is a management tool that is used in many other fisheries to maintain catch over a harvestable period of time, and to potentially reduce exploitation. Some of the positives here are that trip limits are enforceable, and they allow for the execution of both the lobster and the Jonah crab fishery.

The PDT asked the TC for their comments and potential analysis on trip limits, and the TC came back with several concerns. The first was that given the difference in the size of vessels and capacity between the inshore and offshore fleet, the TC was concerned that trip limits may disproportionately impact the offshore fleet.

There was also concern that fishermen might respond by increasing the number of trips they take to try and maintain their current harvest level. Kind of an unintended consequence of trip limits is that it may encourage those who currently harvest below that limit to increase their harvest. It is basically a goal that we've now set for them; and that they might try and attain.

Finally, trip limits may increase discards and stress. If you're limited to a certain number of lobsters, you may try and pick out the ones that you really want to bring in to sell. With that the TC recommended that trip limits be considered in conjunction with quotas. Quotas are a pretty large discussion here.

The PDT discussed quotas a bit, and overall it can be an effective management tool if properly enforced. However, it is a pretty complicated

discussion. It includes questions of how do you set the total allowable catch. How is that allocated, either to individuals, jurisdictions, or LCMAs? There are also particular problems in the lobster fishery, where we have some states that are landing lobsters from both southern New England and the Gulf of Maine stock, and so we would have to deal with that.

Given these complications the TC is not recommending trip limits and quotas for inclusion in this addendum; due to their complexity. The board has stated that this is an initial management response that is intended to be quick and decisive. I think if the Board is interested in pursuing quotas that should be a separate tasking for a separate document.

Next we'll move on to v-notching. V-notches are used to protect the reproductive females in the population, and currently some portions of the southern New England stock are doing mandatory v-notching. The value of the tool is predicated on high encounter and harvest rates. Given the significant reductions in landings in southern New England, v-notching is not expected to produce a large benefit to the stock.

V-notching in southern New England has also been hindered by some of the compliance issues. As a result it is not recommended for use in this document. Next we have culls. A cull lobster is one that only has one claw. Currently culls can be legally landed in the fishery. The PDT considered a prohibition on culls as a way to potentially reduce fishing mortality. One of the issues though is if we prohibit culls it may encourage better handling practices, which really reduces the effectiveness of this management tool. Furthermore, if prohibited there would have to be tolerances put in place in case a claw was lost during the steam back to port. We would also have to come up with a definition, since lobsters can regenerate their claws and we would need to deal with that issue.

As a result culls are not recommended for management use in this document. Our final management tool we considered was standardizing regulations. I think the TC has done a pretty good job of outlining the costs and benefits of this in a previous memo to the board. But just to sum that up, the benefits include improved enforcement and ease in the stock assessment process; where costs across the fishery could create real winners and losers.

During the PDTs discussion they discussed that LCMAs were established to reflect the fact that there are different conditions in different portions of the fishery; and that the industry has really supported the use of different management tools through LCMTs. As a result the PDT will support standard regulations in the inshore fishery; meaning LCMAs 2, 4, 5 and 6, but not between the inshore and offshore fishery; so not between those inshore LCMAs and LCMA 3.

I just want to clarify that standardized regulations are not required in this addendum; it is just that the PDT would support it if LCMAs and states were interested in that. Now we move on to our second issue in this addendum, and that is where should these management tools apply? One of the great challenges in the lobster fishery is that our biological stock units do not match up with our management areas.

This is particularly a problem for LCMA 3. As you can see there in the light blue, it spans both the southern New England and the Gulf of Maine/Georges Bank stock. That dividing line there is the 70 west longitude line. Historically actions we've taken in LCMA 3 or to address southern New England, have occurred throughout Area 3.

But given the potential severity of this addendum, the PDT thought it might be best to consider ways to just have that apply to the southern New England portion of Area 3; given that the Gulf of Maine and Georges Bank stock is at record high abundance, and is not considered overfished, and overfishing is not occurring.

I just want to kind of orient people to this figure here, because it is what I'll be discussing in a second issue. But again we have that 70 west longitude line. The western portion there would be the southern New England portion, and the eastern portion will be the Gulf of Maine/Georges Bank portion.

I am going to go into the management options now. First we'll start with the targeted increases in the egg production. Option 1 is status quo, so there would be no management changes in southern New England. Option 2 is a 20 percent increase in egg production, and this can be achieved through gauge size changes, trap reductions, and season closures.

Given the TC and the PDTs confidence in gauge size changes, those can be used on their own as a sole management tool in this addendum. However, given some of the caveats with trap reductions and season closures, those must be used in conjunction with gauge size changes. Furthermore, season closures and trap reductions cannot account for more than a 10 percent increase in egg production. The idea here is that we want to use the management tools we are most confident in, but we can be a little risky in that other percent of egg production we try and achieve. You'll see for these management options, they all follow the same pattern; so that 10 percent increase in egg production is 50 percent of the target.

That is going to increase with each of the management targets. I'll try and point that out as we move along here. Option 3 is a 40 percent increase in egg production; same story here. You can use gauge size changes, trap reductions and season closures. Gauge size changes can be used on their own.

However, trap reductions and season closures must be used in conjunction with gauge size changes; and together season closures and trap reductions cannot account for more than 20 percent increase in egg production. Again that would be 50 percent of the 40 target. Then Option 4 is a 60 percent increase in egg production.

I am not going to go through the specifics there. It is the same pattern, but hopefully everyone gets the general idea. This is Table 9. I don't expect people to be able to read this, but if you want to look at the specific increases in egg production from gauge size changes, this is where to look.

The intent here is that an LCMT or a state could look at these tables and say, all right how do we want to achieve that 40 percent increase in egg production, for example? You could go to these tables and pick out the various tools you might want to use. This is Table 10 for the closed seasons. This is some of the new analysis for this addendum. Again, if you want to look at the specific increases in egg production for each season closure, please look there.

All right this is our second issue here, and again we're trying to answer the question, where should these management tools apply? Option 1 is to maintain LCMA 3 as a single area. The current boundaries of LCMA 3 would stay the same, and management measures in this addendum would apply to all LCMA 3 permit holders.

Option 2 is to split LCMA 3 along the 70 west longitude line. This is the line that I pointed out before that divides the southern New England portion of LCMA 3 from the Gulf of Maine/Georges Bank portion. Annually LCMA fishermen can elect to fish exclusively in that eastern or Georges Bank portion of the stock.

Other LCMA 3 fishermen can fish throughout that area, but they are held to the stricter management measures of the two sections per the most restrictive rule. Trap tags would be amended to include 3E for 3 eastern, and they can only be fished in the eastern section or the Georges Bank Section. LCMA 3 permits can still be transferred, but the recipient at the beginning of the fishing year would be able to either specify

whether they want to fish throughout LCMA 3, or just exclusively in that eastern Gulf of Maine/Georges Bank portion.

Most importantly, the management measures in this addendum would only apply to the western portion of LCMA 3, which again is that southern New England portion. I'm going to pop this picture back up here just to clarify. We have that 70 west line. In this option the management measures would only apply in the area that says southern New England. The Gulf of Maine/Georges Bank area would have the same regulations. Fishermen could choose to exclusively fish in that Gulf of Maine/Georges Bank Section, and their regulations wouldn't change. However, if a fisherman wants to fish in southern New England or southern New England and Georges Bank, then they're going to be held to the stricter of the two management measures.

Finally here, we have some monitoring recommendations. Monitoring will be necessary to determine if the addendum meets its goals, as well as the need and extent of future management action. Our two recommendations are to monitor the exploitation rate and associated egg production of the southern New England stock, and a recommendation that model free abundance indicators are updated each year as a part of the FMP review. With that I will take questions.

CHAIRMAN BORDEN: Okay, as I indicated before we're going to take questions on what the PDT has fashioned. I would prefer members of the board to not be advocating additional alternatives. This is just questions on what has been presented. Then what I want to do is talk briefly about the timing issue and what the Board feels comfortable with.

Depending upon, I think there were a couple of alternatives there, depending upon the alternatives we pick, we'll either get into a very detailed discussion of the alternatives and any other potential alternatives, or there will be another process; so we'll follow, questions, Mark Gibson, Dan, Emerson.

MR. MARK GIBSON: Thanks for the presentation. Could you go back to the slide, I think on accelerated trap. If I remember, it was not recommended for a number of caveats, and I am not understanding the logic of that. If there is a recommendation that trap reductions can be combined with gauge increases.

Why wouldn't accelerated trap reductions be able to be combined with that? Seemingly you would get to your percent reduction, exploitation and increase in egg production faster. I am not understanding why this one is being ruled out and couldn't be used in combination.

MS. WARE: Just to clarify, the trap reductions in this addendum are separate and in addition to the trap reductions that are currently taking place. For example, if LCMA 2 wanted to use trap reductions here, they would be in addition to the trap reductions that are currently happening.

MR. DANIEL McKIERNAN: I just had a question, Megan; on a comment you made about the states have possession laws governing lobster. I don't believe the possession laws are actually a requirement of the Plan. In other words, in Massachusetts we have laws pertaining to possession by the harvesters, but our minimum size in commerce is the smallest of the three minimum sizes I have in the state.

We have very punitive laws governing the possession of short lobsters. It is $150.00 per lobster criminally, and so I'm not sure that we want to repeat what you said. In other words, I just want, I think want it on the record that states have the discretion to make it a possession law in their state or not.

MS. WARE: There is a sentence in the addendum that addresses Massachusetts regulations, so I can add that when I give the presentation.

MR. EMERSON C. HASBROUCK: Thank you, Megan, for your excellent presentation. I've got a question, Megan. It was your last slide or your next-to -last slide, it mentioned monitoring egg production. I'm just wondering, who was going to be monitoring egg production and how are they going to be doing that?

MS. WARE: That's a great question; it is really tricky to monitor egg production. The current model that we use to get the analysis that are in this addendum, it relies on reductions in fishing mortality and then translates that to egg production. That is why the recommendation is to monitor both the exploitation rate and then through that model or simulation, we can try and get at egg production.

CHAIRMAN BORDEN: Emerson, follow up.

MR. HASBROUCK: Okay so that is just a number generated out of the model then. It is a calculated number based on some assumptions that are in the model, but based on reduction in fishing mortality; is that right?

MS. WARE: Yes. I don't run the model, but that is my understanding as well.

MR. DAVID G. SIMPSON: Megan, very helpful. My question relates to Table 10 and the season closures. It seems to be where in Addendum, was it XVII, each LMA had a season closure table. This one is for use throughout southern New England, so I'm wondering how this might incorporate the three-month-closed season that we have in LMA 6 now.

We're closed from September 6th to the end of November. Do we get 13.6 percent credit for closing December? How do we handle that? The other curiosity is if we closed all four seasons we wouldn't get 100 percent reduction in exploitation; so maybe you could help me with that?

MS. WARE: Yes so I'll try and tackle both of those. The way that they got to this egg production number is through fishing mortality by quarter, and that comes out of I believe the stock assessment model. That is why it is to all of southern New England, because that is as specific as that value gets in the stock assessment. It is from the 2015 stock assessment, so I would have to check and see how your season closures influence that.

But if that data or that change was incorporated into the 2015 assessment, I would think it might be reflected in this. But I would want to check with the TC. As to the other question, I also had that similar question. I think it has more to do with compounding effects, and the longer you get the greater the increase will be. But I can try and provide a more robust answer for you if I talk with the TC.

CHAIRMAN BORDEN: David, follow up.

MR. SIMPSON: Yes I think that would be really helpful, because I look at it now and think, we're already closed for basically the entire fall; and if we were to close July and August, my sense is for Long Island Sound that would represent a lot more than a 26 percent reduction in exploitation. I want to make sure when we go out to public hearing on this we've got numbers that are realistic for our LMA.

MR. DOUGLAS E. GROUT: My question is actually for our federal partners. I just wanted to confirm with them that this 70 degree line that would impact federal permit holders fishing in Area 3, they don't see any conflict with any of the National Standards in Magnuson in implementing this; you don't see any problem with that?

CHAIRMAN BORDEN: Peter, do you want to respond or Chip?

MR. PETER BURNS: With respect to the National Standards, I'm not really quite sure but we've certainly been able to administratively determine who is fishing where by them declaring that on their permit. I see this as

something similar to that where somebody who is already qualified to fish their trap allocation in Area 3, to be able to voluntarily decide whether or not they want to be in either the eastern or the western part of it. But that is certainly something we'll have to look at in the context of this draft addendum.

CHAIRMAN BORDEN: Peter, can I follow up on that? Assuming that the board wants to consider that how long will it take NOAA to put that into a rule? What's a timeframe for that?

MR. BURNS: I'm assuming you mean all the measures that would be proposed in this addendum? Right, well our preference really would be to have something come out sooner rather than later; and if we could have a draft addendum that came forward today, I think that would help us.

The more time we have to do our analysis and do our rulemaking process, the better. I would say that if we could get something out today that would be good, get the process started earlier. We would be able to engage with the industry during this winter when they're more available to be able to focus their attention to it.

It might be difficult to get something in place, certainly for the 2017 fishing year, but potentially for the 2018 fishing year; if we could look at these measures and depending on the timing try to get that through. We also have a new administration that is coming in this fall as well, so have to take that into consideration.

CHAIRMAN BORDEN: If I could just respond, so 2018 then you think is realistic.

MR. BURNS: We could try.

CHAIRMAN BORDEN: Michael.

MR. MICHAEL LUISI: I think I've answered my own question by reading more thoroughly a couple paragraphs in the document, but maybe Megan, you can just confirm for me. Under standardized regulations the PDT is supporting standardizing the inshore regulations. But I'm assuming that we would still be able to maintain differences between the LCMAs, and it is not just one complete standardized rule for all the inshore LCMAs.

MS. WARE: Yes that is correct. Right now those LCMAs have the same gauge size, but they have different season closures. If that is something that as a region, I'll say, you wanted to maintain that is allowed under this document. It's just a recommendation not a requirement.

CHAIRMAN BORDEN: Other questions on the part of the board? If not, I'll take a few questions from the audience. Anyone in the audience have questions on any of the provisions? If not, I'm going to ask a couple questions. Megan, in terms of the closed season, did the PDT describe exactly what will take place during a closed season? I mean this issue has come up before. Is it gear out of the water? What exactly takes place during a closed season?

MS. WARE: I believe we discussed that a closed season is lobster traps out of the water.

CHAIRMAN BORDEN: I would just point out to you, and you know this but I'm just saying so it's on the record; 50 percent of the income, almost $20 million worth of income is generated by the crab fishery which takes place at the same time the lobster fishery takes place. I think we have to be, it is almost equal if not a greater portion of the income for the fishery.

We have to be pretty clear in any public hearing exactly what is going to take place and what the impacts are. I think where we are at this stage; we've gone through the issue of questions. Let's focus just for a short period of time on the issue of timing. Peter already responded to the question of timing and basically told us what the federal agency could do.

Given this array of management measures, none of us know exactly what would be implemented,

but given the array of management measures are all the states able to implement this under rulemaking, or do any of the states require legislative action? Any states require legislative action to implement any of these?

No, okay so my question to the board is what is a realistic timeframe for implementing this? Do you think it's realistic to try to implement this January 1st, 2017 or sometime before that or sometime after that? I would like to get some comments. What did I say?

MR. G. RITCHIE WHITE: Megan thought she might be able to do it a little quicker.

CHAIRMAN BORDEN: Well, the way Megan described it I think she was planning on adopting the final rule next week. Bill Adler.

MR. WILLIAM A. ADLER: I've got two things. First of all, I wanted to get this in earlier. On Page 32 where it says under the first scenario an 80/90 reduction in harvest is projected to stabilize the stock at current levels. Then it says assuming natural mortality also stabilizes at current levels.

That particular statement there I don't see as realistic, because I don't think natural mortality is going to stabilize. That was my point on that one on Page 32. As far as timelines go, you have a system here where you've got fishermen fishing in Area 2, which includes state and federal waters, I believe.

Now if the state were to close state waters for a closed season, how do you keep, unless the feds come right along and do the same thing instantly, how do you keep those fishermen from moving and using their federal waters part for the traps that were in state waters of that area? You closed the season there so they all run out with the traps into another area, where the feds would have to be control. I don't know how you would do that. This is part of the confusion and complications that this plan has.

MS. WARE: I'll try my best on this one. My understanding is that during the last addendum with the 10 percent, most restrictive rule wins. The states rule, the area closure was implemented in state waters ergo it was implemented in federal waters for those fishermen. I don't know if Pete wants to add to that or anyone else.

MR. BURNS: My understanding is that someone who has a dual permit, a state or federal permit would be subject to the more restrictive of the state or federal regulations in the meantime.

CHAIRMAN BORDEN: Any other comments, questions? Excuse me, Mark.

MR. GIBSON: On regards to the timeline. I think 2018 is fine from my standpoint. I don't know whether it's January 1st '18, or the start of the trap tag year. Perhaps that needs some discussion. The only concern I have about that timeline would be we have requests as you know from industry in different lobster management areas, for LCMT input into this document before it goes out for public hearing. I just wanted to make the Board aware of that that we will be looking to do that and that might change the schedule that has been presented.

CHAIRMAN BORDEN: Thanks for bringing that up, Mark. To me, I think that there is kind of a fundamental decision that the Board has to make today. There are kind of two paths I think for the Board to move forward. One of the paths would be to sit here, talk through all these different alternatives, and basically pass a motion to take alternatives out to public hearing as soon as possible.

That would mean that there would probably be some revisions to the document, and then Megan, we would basically follow the schedule that Megan outlined. The second path, I think, because I've had a number of requests from industry similar to what Mark just pointed out, is to have a variation of that that slows down the process very slightly.

Under that scenario what I would envision doing is taking comments, for let's say the month of November, and then forming a small subcommittee to review those comments with the staff, and then basically develop a memo which we would circulate to the entire Board on the suggestions that have been brought forth; and then do a conference call on it subsequent to that.

Then if the Board agrees with the suggestions that are outlined in the memo, then we would refer that to the PDT; and let them flesh out the rest of the management actions. If we did that the timeline we would be on is to approve a public hearing document in February. I think you've got a basic decision. Which one of those two paths does the Board prefer to be on?

I've spoken to a number of individuals around the table, not all, but quite a few of you have said to me that you have not had adequate time to not only review the document, but to talk to members of your industry on it. Can I get some comments on which one of those two procedures you would like to follow?

MR. BRANDON MUFFLEY: I mean I appreciate that we want to get industry's input on how we move forward, and I think we have the opportunity to do that. But the Board started discussing moving forward with an addendum in May. In August the Board talked about all the different options that the PDT should consider, and I think the PDT has considered all of the options that are available for us to evaluate.

I don't know what additional options industry is going to give us that are different. Gauge sizes, seasons, trap reductions, those are the options available to us; and we've considered all of those. I don't know what we're trying to get out of industry. I understand we want them to evaluate what we're proposing here and how that fits into what they want to do.

But these are the options that are there. I don't see what going back at this point gains us in terms of additional things that we can consider. The TC has considered everything that we have available. The PDT has considered everything that we have available, so I think we have what we need to be able to move forward. Not that there aren't nuances that we need to figure out, but I think we have the tools here to make some decisions.

CHAIRMAN BORDEN: Other comments on it? Mike.

MR. LUISI: It is not as much about, for me, for Maryland, it is not as much about the industry; because I could pick up my cell phone right now and call the industry in about five minutes. I could call him. That is where we stand. For me, for us, it is more about when we implement the measures.

Do we implement them in the middle of the summer, which is probably the timeline that we would be on? We have to wait for our legislative session to carry itself through to April. We wouldn't be able to put forth new rules until probably the middle of the summer, July or August; and if that were to be the case we can certainly do it.

I would prefer beginning new management measures at the beginning of a year, if at all possible. But I don't know how other states would feel about having an implementation date somewhere in the middle of the year. For me it would be better to start at the beginning of a year rather than the middle of a year.

CHAIRMAN BORDEN: Other comments on this, Mark Gibson.

MR. GIBSON: To Brandon's points, I appreciate those points. I guess what I would say in return is that I don't think industry, as you point out, is going to come up with some new unforeseen strategy. But they are challenging some of the assumptions that the Technical Committee and PDT have made relative to industry behavior in

response to the different management measures.

I think we should afford them the opportunity to advance those arguments, as to why they can't adjust their soak time to the extent that perhaps others have surmised they can, or switched their gears to other locations or times of season. That is what we're hearing. I would advocate the later timeline that you laid out.

MR. GROUT: Mr. Chairman, with the second scenario you laid out, you were talking about getting input that would be provided to a work group. Are you talking about soliciting input from industry, or is it something that commissioners would solicit and then bring back and provide that input?

CHAIRMAN BORDEN: My response to that is I don't see a big difference between just allowing anyone to comment and just allowing the commissioners to comment.

MR. GROUT: Would you send this unapproved document out to the industry for consideration, is that what you're proposing?

CHAIRMAN BORDEN: The document is already out. It is on the website, they have access to it. I think the point that Mark is making is the industry wants to comment on some aspects of the document before we authorize public hearings on it.

MR. GROUT: Okay.

CHAIRMAN BORDEN: I hit the wrong button, Doug.

MR. GROUT: I do that all the time. The final comment I'll make is to Mike's comment. No matter when we approve this document, whatever meeting, we still have to set an implementation date. You can approve it in May and have an implementation date of January 1. We could conceivably move forward expeditiously; but then decide to wait until January 1, 2018 to implement.

MR. ADAM NOWALSKY: The only question for me really in building on Doug's comment about the implementation date. The only question for me is whether this board believes the range of options in this document are within the realm of range of options that we're realistically going to consider; whenever we do.

If there are other options or something outside of this range, quite frankly that's the only reason I see to delay getting this out into the hands of the public; and officially getting their comment. If this is the range of all we're realistically going to consider, then I see no reason not to send this out. Again, when we actually implement it is at our discretion.

I would argue the sooner we come up with regulations gives individual states more time to actually get those into final rules within the states themselves. But I think that is the question here today. Is this everything we're going to consider? If it is we do it today. If it is not then that would be reason for delaying the process.

CHAIRMEN BORDEN: I have David Simpson and Dan McKiernan.

MR. SIMPSON: I think what some of us are feeling is a need to get more comfortable with this, and the time that's required to do that. Whether we take a two-step process, which might be informational meetings as opposed to formal public hearings or whether we go to formal public comment on this. I still have questions to resolve myself, and not the smallest of which is using that one table for season reductions; that just doesn't make sense to me yet. I would need to be more comfortable with that before going to public hearing. I am also wondering if we end up going down the road of considering trap reductions as a means of reducing exploitation, I would like to know more about these tables and how much of an equal

comparison, how comparable each state's individual trap numbers are to one another, especially traps reported fished. Everyone has different collection statistics, and I don't want to be held at a disadvantage by that.

Looking at Table 5, it appears to me our number is off by 100,000 in terms of the number of traps that we have, based on prior commission action. I'm a little bit concerned there. Then I guess what we have is a Technical Committee recommendation that would require certain management actions to be paired with other ones.

In other words, the Technical Committee is recommending that a closed season be paired with gauge changes that trap reductions be paired with gauge adjustments. While I feel like we've had some pretty good success in Long Island Sound with our achieving 10 percent reduction in exploitation with the fall closure.

I think that it is pretty clear that all the work the Technical Committee has done on trap reductions and its relationship to exploitation. They are taking pains to politely say it won't work. They are taking pains to say every analysis we've done says this won't work, and everything we know about fishing behavior says this won't work.

But reading between the lines you can see they're saying, but we know you want to do this anyway; so at least pair it with a gauge so we get something out of it. I continue to be concerned about that. I mean it's just crystal clear to me that if you consolidate traps into the hands of the most efficient operators, which is what would happen, who fish the most.

The remaining concentrations of lobsters, you're not going to achieve a reduction in exploitation. You're going to make a few people comparatively wealthy at the expense of everyone else, and you won't achieve a reduction in exploitation. But I think that needs to get vetted out and talked about. I'm hearing things from Mark saying just the opposite, and from you that oh no, they won't change their soak time, they won't change where the remaining traps are fished.

Well of course they will. I remain to have that concern, and as I said I'm concerned about the numbers of traps and I need more help with that table, given that Long Island Sound already has a three month closed season. It simply can't be that if we close the rest of the year we'd only get another 50 percent reduction.

MR. McKIERNAN: Yes I would be in favor of spending some time with the industry over the next month or two, and then come back and approve this for hearing in February. One of the concerns that I have is we just got the document so recently. But it doesn't really describe the impact on the Jonah fishery. We created a Jonah crab management plan over the last two years, under the argument that the fishery has become a mixed crustacean fishery using traps; and yet this document doesn't really describe the impacts of a seasonal closure on Jonah landings.

I think that has value, because we're going to have to figure that out. A closure versus a possession limit of zero is two different things. We might want to figure out a way to allow Jonah crab fishing. But it is really not captured in this document. I would be in favor of your latter proposal.

CHAIRMAN BORDEN: I've got Jim Gilmore and then Peter.

MR. JAMES J. GILMORE: Being on the other side of Area 6, I'll echo some of Dave's concerns, and in addition to that for lobster, it is one of the rare fisheries I manage where I do not have regulatory authority for everything. Things like gauge changes or some of the things of listings of our tools, I have to go through legislation to do this. If I don't submit it today then forget about next year. I just wanted to let everyone know that.

When we get to the end of this I have to hit the legislative process, which is typically September/October of each year, and have to go through that before I can even implement any of these. That's going to be another complication in getting this thing done. Bottom line is, so the timing, the whole thing isn't as important to me right now, because right now if we concluded this today it would be probably a year before I could even implement it.

CHAIRMAN BORDEN: Thank you very much for that point. That was exactly the reason I asked that question. I mean what I'm sensing here is that there are interests that want to proceed as soon as possible, and I think it's important to do that. But I also share Mark Gibson's perspective that providing an opportunity for the board members in particular to write their questions like David Simpson.

Write questions down, put those into some kind of format, have the PDT look at some of those types of questions and answer those questions; and then vote on the actions, I think is a probably a more sensible way to proceed. Let me go down through the rest of my list. I've got Peter, Ritchie and then Bill.

Anyone else, Emerson, anyone else wants to speak, John. Then what I think I'll do is just ask to see a show of hands on the part of the delegations as to which path we want to proceed on. If we have a majority of individuals then we'll proceed with the discussions accordingly. Is that agreeable to everyone? Okay so next I've got Peter and then Ritchie.

MR. BURNS: I certainly appreciate the comments from the various board members. NOAA Fisheries would certainly like to see this document go out today for public comment. To Adam's point, what other management measures could there possibly be? We had really an exhaustive list back in our August meeting, trying to ask the board what types of measures we thought should be evaluated in this. I think we gave a real comprehensive list of that. I think the PDT took the information that they got from the Technical Committee and was able to really show which measures really were going to get to the goals of this addendum, which are really to increase egg production by decreasing fishing mortality.

Keep in mind that I think the intent of the board was really to take a definitive quick strike here to really get something out there that is going to have some teeth. Everything here is going to be tied in with a gauge increase, which is something that we can be able to monitor over time; which I think is very important for this fishery, since we're almost two years out now from the stock assessment; which showed that things aren't getting any better. I would like to see it go out for public comment.

I know that later on in the meeting we're also going to be talking about developing another addendum for improved reporting requirements and things like that. That is another action potentially that is going to require the staff time here for the commission, and also for the states and for NOAA Fisheries to analyze these options. I would like to be able to put this out for public comment. Let the industry look at it in that context and any of these other issues that come up can certainly be vetted during that period.

MR. WHITE: I have to agree with Peter and Adam. We've been fooling with this for ten years. It's time we've got to take some substantial action here. I don't believe we'll ever answer all the questions prior to starting the process. Always going to be that we go back to the industry, they'll raise more things, we'll come back. You've got to start it, and I think we'll get a lot of the input from industry and a lot of those questions answered during the process. That's why we have that process, so let's get on with it.

MR. ADLER: I know we will hear this basic statement that we've got a trap reduction going on now. I don't believe it's over, so there is still

more reductions coming on traps. I didn't know when the technical group had looked at all these alternatives for trap reductions et cetera. Whether they already took into consideration what the current trap reduction program will achieve when it's over.

I don't know if they did that or whether they just said, right now this is where we are and you have to go down this much in traps alone in order to achieve X amount. I didn't know if they already anticipated that the trap reductions, which are still ongoing, are doing something. Because what you'll hear at public hearing is let what we've already done work. That is what you'll hear. There needs to be some response to that whenever we go out to public hearing. I'll stop there for now.

CHAIRMAN BORDEN: Bill, to answer your question. When the Center analyzed the impacts of the trap reduction they only analyzed the first 25 percent cut, which we implemented last May 1st. They have not analyzed the second 25 percent cut.

MR. ADLER: Okay so in other words there is another trap reduction coming already, and they haven't analyzed whether that cut into perhaps what they wanted to do with the trap reduction. They haven't analyzed that apparently; that part. In other words they may already have achieved something I guess. When they're finished with the existing trap reductions they may have already achieved some of what we're looking for. I know it's not all.

CHAIRMAN BORDEN: Yes I would just note I've got an e-mail someplace from Burton that basically says that. Let's see, I've got Emerson, John, and then David Simpson.

MR. HASBROUCK: Two things. One is I'm unclear what the role is of the LCMTs in this process, or what their role is anymore. It seems to me like they haven't interacted in the development at all. They haven't provided any input to the development of this addendum. Are the LCMTs still in existence? Have they been dissolved? Do they need to be reconstituted? I'm wondering what the role is again of the LCMTs, and how they are going to interact with this process.

I think that if they are still in existence there should be a more formal process with them, rather than just saying to them come to the public hearing when it comes to your state. For that reason I think that we might want to delay this so that we could codify their input; and the other is, and it may be a little bit late for this.

I guess I could put this together in a response to whatever committee might be formed if this delayed. What is the benefit, in terms of egg production, at removing ghost gear? We've already removed 16,000, a band of lobster pots out of Long Island Sound. There are three or four times that amount still, just in Long Island Sound; and there is gear elsewhere.

Dan, I think you mentioned the other day about a ghost lobster pot program or an analysis or something. I don't know if we can get at some level of increased egg production by removing ghost gear, and how that might factor into this. Those are my two issues.

CHAIRMAN BORDEN: I've got John and then David Simpson then Pat Keliher and Rene.

MR. JOHN CLARK: First Roy pointed out to me that we are another state that would have to go through legislation to change to meet most of the possible options in the plan here. In terms of whether to delay or go right out to public comment, I think there is not much of a problem for Delaware either way.

If the TC projections are correct, this addendum will likely just delay the date of commercial extinction of the stock; so I don't see that spending a few more months to get a little more input is really going to harm things here. I think if we would like to get some input from, like Mike we have very few lobstermen, so very simple to

get their input on some of these before we bring this back up in the winter. We wouldn't have a problem with that.

MR. SIMPSON: I guess this should have been a question for Megan earlier. The gauge size tables that memo refers to just inshore and offshore. Historically we've done it by LMA, but I also recognize that unless New York's been doing a lot of sea sampling, we don't have LMA 6 size composition any more. The fishery reached a point and lack of funding. It basically caused us to end our sea sampling program. What is inshore and what is offshore for these tables, because we know there would be differential impact; but I'm not clear what inshore means here.

MS. WARE: The heading for Table 9, it says that inshore is LCMAs 2, 4, 5 and 6 and offshore is LCMA 3. If it is clear I can add that to the actual boxer; but that's what the heading says. I just thought I might address some of the points that have come up, because I think there is a bit of confusion on LCMTs and trap reduction analysis, so I just kind of wanted to address that.

For the LCMTs, Emerson, so how traditionally they've been engaged is from my understanding the 10 percent reduction, they were involved in creating proposals on how they wanted to achieve that; and also kind of during that public comment period, I will say. The LCMTs are separate from the Commission.

We don't run those, those are industry run and they are run by the states. The Commission is not involved in their running, but we do receive their comments and their proposals. For the trap reduction analysis, Bill, just to answer your question on like what percentage of current trap reductions are being included in this. I think the really tricky part of that question, and it's a great question, is that to understand the tipping point between reductions and latent effort, and that tipping into reductions in actively fished traps is different for each fisherman; and it's really hard to predict. The big difference between the historical trap reductions and the analysis by the TC is that those historical trap reductions are based on total trap allocations; which includes latent effort. The analysis by the TC just looks at active trap reductions; and so I think that is the big difference there.

MR. SIMPSON: Related, we're talking about reasons for delaying, and I'm not trying to delay. But one of the things we don't have was actually Peter's suggestion, which I think was the last one added to the list, which were trip limits and quotas. I'm looking down the road fully believing that we're going to have to end up there if we're going to make substantial progress in reducing F.

I don't want to in this addendum create irreversible harm to the industry without accomplishing much on the way to trap limits. That is the one piece that I would like to know more about, and certainly if there is not agreement that we should wait for that information then I just want to make sure we're flexible enough in this addendum; in terms of must pair this with that that we do no harm in this addendum.

In other words, I think having already started on a season closure track, and seeing fishermen adjust to finding other things to do during those times. I'm thinking that's what we would pursue, but a gauge increase will be counterproductive. It will make them more inefficient, it will be disproportionately burdensome on Long Island Sound; which has smaller lobsters than Area 2, 4, and 5. Just keeping those things in mind, and there was something you said at the end that prompted me. I'll think of it and I'll have to come back to it.

CHIARMAN BOARDEN: Okay, Pat Keliher and then Rene.

MR. PATRICK C. KELIHER: Whether there is a delay or not, I mean I personally think input from industry on a lot of this is always beneficial. The one thing that continues to nag at me, in looking at the report, is the fact that we still have this

potential commerce issue if gauge size is going to be utilized. I'm wondering while we're gathering additional input from industry that we shouldn't also get some input from legal to ensure that we're not going to go down the road of a problem with commerce and interstate commerce.

MR. RENE CLOUTIER: I can only speak to Maine's ability to enforce a trap limit in Area 3. Right now with the equipment that we have, we wouldn't be effective in enforcing a trap limit in Area 3. We just don't have the equipment to do that. If it is not enforceable, if you have any trap reduction at this point would just be a suggestion, because it is not an enforceable thing, realistically.

MR. SIMPSON: I'm trying very hard not to be a pest. It was actively fished traps. You mentioned actively fished traps. Could you explain how that was defined for each state? Again, I think that's a key, an extremely important point, and I think it varies by state. I would like to understand it.

MS. WARE: The number of actively fished traps was from the 2015 stock assessment. I don't have that table number in front of me, but I could look it up and e-mail it to you really quick. But what the heading reads is that it is the number of traps reported fished by state in the southern New England stock unit.

MR. SIMPSON: Could I follow up? What does that mean? Who reported them and how? Is it the number of tags that were purchased? What is that?

MS. WARE: I would have to ask the TC.

MR. SIMPSON: I think it is an important detail, because I suspect it varies widely by state; based on the type of information they collect. I know that we have a mechanism for calculating how many traps a fisherman must have been fishing to explain his number of traps hauled and has set over days.

It is a complicated thing that requires us to follow a fisherman day after day after day. I suspect not everyone did that and if we're comparing that against how many tags were sold, there are fishermen who for years have bought their tags and not used them for this day; for this very purpose right here.

CHAIRMAN BORDEN: Just a couple of comments. One of the things that is a big tricky about talking about active and latent traps is we've had qualifying timelines and qualifying criteria that have differed in the different LMAs. In Area 2 they use the qualifying timeline of 2001 to 2003. Then basically the traps that the individuals were allocated were based on their landings during that period of time.

In terms of Area 4 and 5 and 3, NOAA, and Peter, you can correct this if I misstate it, but NOAA used very different criteria. In Area 3 they used the criteria was you had to prove that you had 25,000 pounds of landings in one year and fished 200 traps. Then I think in Area 4 and 5 it was the same criteria minus the 25,000 pound landing limit. There has been a variety of criteria used to actually qualify the trap allocations, but it was all based on performance in those areas. Okay so any other comments, statements, questions? Mike, and then Peter, and then Dan.

MR. LUISI: I'll just make a quick comment. It sounds to me like you're still looking for some input on whether or not we put this forth to the public today or perhaps delay it until the winter meeting to finalize it. Like John, I really could go either way. I don't have much of a stake in it, given the nature of the fishery in Maryland.

It sounds to me like implementation, given some of the legislative and other issues that we're going to be facing as states, will likely not have implementation until 2018 for these actions. It's just the way, from what I've heard. If I had a bigger stake and I had concerns in the draft as it stands right now; as some of my colleagues from the north do, and I were asking for a delay so that

I could fold in more comment from my stakeholders.

I would hope the board would go forward with that request. I'm willing to support a delay of a few months. I'm also thinking about Megan too, because we just finished up the PID from hell yesterday with menhaden, and so she's going to have quite a winter. This may give her a little time so Christmas isn't ruined. Just my thoughts, so I can go either way, but likely leaning towards whatever colleagues from the northern states are asking for.

CHAIRMAN BORDEN: All right I'm going to recognize Peter, and then I just want to make a brief comment. Then I'm going to take like a one minute break so you can talk among your delegation. Then I would like to see a show of hands so we get a sense of what the preference of the committee is. What I'm trying to do is avoid a motion, and then the whole range of motions to amend and so forth; Peter and then Brandon.

MR. BURNS: Just to put a final point on what you said, David. I think that in the document the Technical Committee did provide an analysis on active traps the best way that they could characterize that; given the disparity in how that information is collected. We talked about that at the PDT meeting and we said we've already gone through this.

The Commission has already qualified and allocated in the various areas and we don't want to get into a situation where we have to do that again; based on what we think now is active, as opposed to what the historical allocations are. We really worked hard, along with the states, to try to pair up dual permit holders who had state and federal allocations.

We already crossed that point, and I don't think we want to go back there again. I think the Board can look at this draft addendum and realize that some level of active and latent effort is going to be taken out with any kind of trap reductions. What that amount is it is going to be difficult to say. In the meantime we also have the trap transfer program that can allow people to buy more traps and activate those traps.

As we move forward it is kind of a dynamic process and difficult to pinpoint that. But I think what we came away with from that at the PDT meetings was that the TCs analysis was really just kind of a guideline of what's in there, and not necessarily the real time number, but just something to give the Board some kind of a baseline as a reference.

The other thing I want to point out is that this document does a good job of giving – it does constrain the choices to specific management measures – but it also gives the flexibility to each LCMT to decide how they want to break that up and use that; depending on how their fishery works. I think that's to David Simpson's point that there will be some flexibility there. It's not going to be a one-size-fits-all once the board decides what percentage reduction would come from this.

CHAIRMAN BORDEN: Brandon, you get the last comment.

MR. MUFFLEY: Yes, just I certainly appreciate that board members want to get additional input from their industry. I wholly get that. But I think the purpose is to try to gain some clarity in terms of how active trap numbers are calculated how these seasonal changes are going to impact things. But I don't think we're going to get any additional clarity on any of those things.

The TC has spent years doing a lot of analysis, and they've provided the best information. The data isn't clear, and we're not going to get it any clearer by trying to evaluate it anymore, because there is no consistency among states in terms of how they determine what an active trap is, or determining what latent effort is. The seasonal changes here, there isn't enough data to break it down spatially to evaluate what the true reductions are going to be at a smaller scale than

across the entire southern New England stock. I understand the need and the one to get additional information from industry on it, but again I think it is to see clarity; but I think it is going to be clarity that we're not going to get.

MR. TERRY STOCKWELL: Just a point of order for the record. I'm sitting at the table on behalf of the New England Fishery Management Councils, so I will be abstaining on issues that are not council business.

CHAIRMAN BORDEN: Okay, what I would like to do is get some clarity on the timing of this. You get two options. One option is we basically proceed today to agree today to make a motion, and basically put forth a motion to take this document or a variation of the document out to public hearing.

Under the second option, we would take some comments, and then at the February meeting the Board would authorize public hearings. We'd have public hearings in early spring and then adopt a final document, plan addendum excuse me, at the May meeting for implementation as soon as possible.

A personal comment is I don't see a tremendous amount of difference between these two timelines. From the discussion and comments that different board members have made, the document is not going to get implemented in 2017 or at least 2016. It might get implemented early in 2017, it may even be delayed on the part of some states if they require legislative action to a date past that.

I'm not trying to sway votes one way or another, but I think the second option still gets the job done with sufficient time to implement it. I am going to let you have a one minute caucus, and then I'm going to ask for hands on which jurisdictions favor Option 1, and which favor Option 2; one minute.

MR. WHITE: I just have a question as to the process. There is nothing in our procedure that would not allow us to have two public hearings on an addendum. We could start the process now, and have a public hearing and then have input come back from that. If we felt that that was substantial enough to change the document up and go back out to public hearing a second time.

CHAIRMAN BORDEN: Yes that's true.

MR. WHITE: We could basically do what you're asking to do, but do it in the formal process of the Commission, and having the public participate fully, and it would also send a message that we're starting something; we're starting something today. That would just be a suggestion of something we could do.

MR. MUFFLEY: I don't want to hold up the vote or however we're proceeding here, but in talking with Adam I think we may be missing a step that we need to consider in the timeline, because say we agree for this to go out. We take input on the document, and at February the Board will agree to a 0 to 60 percent increase in egg production.

But then you're going to have to go back to the LCMTs to craft measures that are going to achieve that reduction. That is going to have to come back to the Board at another meeting to evaluate whether or not those different – that is my assumption – you're going to create seasons and gauge changes and all those things combined for the different LCMTs. That will have to come back to the Board for their evaluation, to see if it meets the required whatever increase in egg production the Board decides to do. Then the states will then have to go back and implement those measures to ensure that once they're approved that they meet those required reductions.

I think there is another meeting where those final actions are going to have to take place for states to get those things in place; unless I'm wrong about that. But I think that's something else we need to consider.

CHAIRMAN BORDEN: All right I think we've had enough discussion on this. Let me see a show of hands. All those that favor proceeding under the timeline in Option 1 raise your hand. I had three votes. All those that favor operating under Timeline 2, raise your hand; eight, we're going to proceed under Option 2.

Let me just ask, we've had a good long discussion. I think we originally set aside about an hour for this agenda item. Is there any other point that individuals want to make at this time? If so I will allow a few comments. If not, I will outline again the process so everyone is clear on what the process is; any other comments? Anyone in the audience want to make a comment? Peter.

MR. BURNS: I certainly respect the vote, but I think Brandon brought up a very important point that this is not just choosing the measures and then moving forward, and everyone goes back to their office and implements these regulations. It's going to have to require some engagement with the industry and maybe some complicated meetings about how we're going to implement this. I hope that we can stay on our timeline.

CHAIRMAN BORDEN: Bill Adler, and please let's not reargue the points. I don't mean that in a prejudicial manner, Bill.

MR. ADLER: I think that since we basically thought Option 2 was good. I think it is imperative that the states take this time to say to their industry and any of the come up with the questions or clearing some of the question marks they have; not to just sit there. But you could almost have a meeting with industry and say, this isn't an approved for public hearing yet, but this is what we're looking at. Any suggestions, because we're going to approve it probably for official public hearing; let's say in February.

This way, don't wait until February to start something. Start it now, I know that the Massachusetts Lobstermen's Association will be having their winter meeting in January in Falmouth, and it would be a perfect opportunity for instance to have an open session there and get some ideas; at least from the Massachusetts and probably Rhode Island area on this stuff, so it's not that you sit quietly until February.

CHAIRMAN BORDEN: We can issue flak vests to the individuals that go to the meeting. Adam.

MR. NOWALSKY: Well building on that comment, I'll go one step further and ask that staff provide a date today when they need feedback on. If the intent here is that this document is not sufficient, staff needs feedback to take to the PDT to craft a revised document, let's get a date when they need that feedback by.

CHAIRMAN BORDEN: What I suggested when I outlined what I thought the steps would be under that venue. What I would say is any comments would have to be in prior to the end of the month of November. That would give the individuals around the table basically 30 days to consult with anyone you want to consult with, talk to your staff, talk to members of the industry or whatever.

But the letters have to be into Megan prior to the end of November. Is there anybody disagree with that? Okay so Adam's point is spot on. You have a deadline. Then once we get those, what I intend to do is to have a very small subcommittee, like one representative from the Mid-Atlantic and one from New England; work with myself and Megan. We'll craft a memo that kind of summarizes any of the suggestions and try to group them.

Then we'll send all of the suggestions and a memo from the small subcommittee out to everyone as soon as we can do that. Then following that we'll probably have a conference call; to see whether or not there is a consensus to move some of those items to the PDT, is that agreeable that timeline? Okay if it is then I think that concludes the discussion on this.

We've got a plan of attack, we've got deadlines. We've got tasks. Let's move on to the next agenda item. I've got to find my agenda. We're on discussion of trap cap, and just as a reminder NOAA previously notified us that they had suspended their rulemaking on Addendum XXI and XXII until there was greater clarity on the issue. Megan is going to provide a report on the meeting that took place on this, and then I'm going to make a couple of suggestions.

DISCUSSION ON TRAP CAPS INCLUDED IN ADDENDA XXI AND XXII

MS. WARE: I'm going to be reviewing a conference call that we had to discuss the trap caps included in Addenda XXI and XXII. Just for a little bit of reminder and background on what was proposed and established in Addenda XXI and XXII. It proposed and established a series of trap caps. We have active trap caps, which is the number of traps you can fish, and individual ownership caps; which is the number of traps you can own.

What you'll see from the table up here is that the number of traps you can own is always greater than the number of traps you can fish. This results in something that we typically call trap banking. Something else that was established in Addenda XXI and XXII is the series of reductions for both the active trap cap and the individual ownership cap in LCMA 3.

As David mentioned, NOAA sent a letter to the Board saying that it has suspended their rule making process for federal trap caps and banking. This is due to the poor condition of the southern New England stock, and our current work on Addendum XXV. It appears that significant management action in the area may take place.

With so much uncertainty NOAA felt it was imprudent to continue the rule making process for these addenda, given that they may encourage fishermen to invest significant funds in a fishery that could be severely restricted in the future. On September 7th we had a call to discuss trap caps and banking in the lobster fishery. Participants on this call included commissioners, NOAA representatives, PDT members and fishermen. I'll go over some of the highlights of that call. Industry members supported federal implementation of trap caps and banking. Some members stated that the conservation benefit of having traps which can't be fished tied to a permit. Others noted that the implementation delay has affected industries ability to make future business decisions. NOAA reiterated its concern that trap banking encourages fishermen to invest in a fishery in poor condition, and they did express greater concern with implementing the individual ownership caps rather than the annual reductions in the LCMA 3 active trap cap.

Overall I think one of the themes of this call was the growing disconnect between state and federal regulations. In the Commissions addenda we're proposing a series of reductions for the active and individual ownership cap in Area 3, and that is currently not in the federal regulations. As time goes on that difference gets larger and larger. I think moving forward there are a couple of options for the board. One option is that the Board could recommend NOAA implement the active trap cap for LCMA 3.

This would help to align state and federal regulations for the active trap cap in LCMA 3, and this action reduces fishing effort commensurate with the annual trap reductions currently in place. On the other hand the Board could revisit the issue in spring of 2017, after we have a better idea of what might happen with Addends XXV; and take a more holistic view to this issue. With that I'll turn it back over to you.

CHAIRMAN BORDEN: I'll try to cut through this. From an industry perspective there is a lot of concern about this disconnect between the federal plan and the ASMFC plan, basically because of the suspension of the rules in Area 3, we end up leaving somewhere between 5 and 7,000 traps more per year get fished out there because of this disconnect.

I think it is important to straighten it out. Having said that I also think it's important, the point that the NOAA staff has made is important. They want some certainty that these programs match up and complement each other. My suggestion is that we not take any action on this today. Basically put it on the agenda for the spring meeting, when we will be finalizing the southern New England plan.

At that point NOAA will know exactly what the restrictions are going to be in southern New England, and after we adopt the southern New England plan, then we would revisit this issue at that same meeting and decide whether or not we want to continue to ask them to implement these measures. I mean to me that's a logical way to proceed; comments on that suggestion, if I don't see hands up I'm going to ask whether there are any objections, comments; Peter.

MR. BURNS: Just so I'm understanding it correctly. Would that be that in the spring you would look at whether you would be requesting NOAA Fisheries to implement the active trap cap, or all of the banking and other aggregate trap cap elements of those two addenda?

CHAIRMAN BORDEN: There are a number of different provisions as you know that the Commission has already adopted and implemented, and I think all of those would be on the table for that discussion. Then if we want all of them to be implemented, we would recommend that. If we only want a few of them implemented, to my way of thinking.

That way NOAA will know exactly what the restrictions are, and what we're recommending at that time. Those two link up. Any objections to doing that; if not that item will be schedule for the spring meeting, okay so we're going to move on. Next item on the agenda is the work group report, Megan.

REPORT FROM THE
LOBSTER REPORTING WORK GROUP

MS. WARE: I will be going over a report from the Lobster Reporting Work Group. Just a reminder as to how we started this discussion on reporting. In February of 2016, as a part of a TC memo, the TC highlighted data deficiencies in the lobster fishery; and particularly they were referencing some data deficiencies in federal waters.

As a result the board requested NOAA implement 100 percent trip level reporting for all federally licensed fishermen, and in response NOAA recommended that the Board follow the addendum process to address these data concerns, and allow for public participation in that process.

Since then there have been several issues which have really highlighted the data deficiencies in the lobster fishery; not just only in federal waters, but really throughout the entire coast. These include the designation of the Marine Monument, ongoing coral protection, offshore winds; all of these management issues are asking for information on where the fishery is occurring and its value.

It is highlighting that we need improved harvester data with greater spatial resolution to respond to these management issues. At the August meeting the Board convenes a Lobster Reporting Work Group, and we had our meeting September 26 in Gloucester, Massachusetts. It was attended by commissioners, TC members, GARFO representatives, state data specialists, industry members and ACCSP.

We discussed a couple of things. We discussed temporal and spatial deficiencies in the lobster fishery, the prevalence or lack thereof of electronic reporting, the percentage of harvester reporting, and the collection of biological data as it pertains to the stock assessment. From that discussion the group came up with a series of five goals.

The first is to improve spatial resolution of harvester reporting, the second is utilize the latest technology to improve and increase reporting, the third is collect greater effort data in harvester reports. The fourth is, define an inshore versus offshore area, and the fifth was proactively address the data concerns of the Atlantic large whale take reduction team.

To achieve these goals the workgroup came up with a series of recommendations, and they are split up into short term, intermediate, and long term recommendations. We have two short term recommendations. The first is that Maine's 10 percent harvester reporting only includes commercial license holders who have actively fished in the past two years.

Currently recreational license holders are included in that 10 percent of fishermen who are selected to report. Removing noncommercial fishermen from the sampling pool will insure the greatest amount of harvester data is collected through that current program. Another short term recommendation is to define inshore as 0 to 3 miles offshore, nearshore as 3 to 12 miles and offshore is greater than 12 miles.

Currently there is no definition of inshore versus offshore in this fishery, and it poses some problems; especially when the board tasks the TC to analyze differences in the inshore versus offshore areas. Currently what the TC does is they assign a statistical area to either inshore or offshore. It is an imperfect system, as some statistical areas are quite large and they include both inshore and offshore areas.

For intermediate recommendations, we're recommending that there be 100 percent active harvester reporting for all state and federally permitted fishermen. Resource limited states should at a minimum require reporting from a statistically valid sample of fishermen. In 2007 the TC did some analysis on this, and they concluded that is 30 percent of active harvesters. We have asked the TC to revisit this to make sure that percentage still holds. But that was the recommendation in 2007. There is also a recommendation to add data components to harvester reporting, including number of trap hauls, soak time, catch disposition, gear configuration, number of vertical lines, LCMA and depth. States are collecting a variety of this information, but it is not uniform across all states.

A lot of this information would be really useful to collect. A number of trap hauls and soak time is important effort data, gear configuration and number of vertical lines is important for large whale take reduction teams and LCMA and depth is important to tell us where the fishery is occurring.

Our final intermediate recommendation is to further delineate NMFS stat areas over harvester reports. Statistical areas are a really important basis of the stock assessment, but they are too broad to provide the spatial resolution needed to answer a lot of the management questions we have. A recommendation from this work group is to; at a minimum delineate inshore, nearshore and offshore areas in a statistical area.

However, it could be taken a step further by breaking down a statistical area into smaller boxes, and having a harvester check off which boxes he is fishing in. Finally we have our long term recommendations. The first one is to establish electronic swipe card system for harvester and dealer reports.

Currently swipe cards are used in the Maine elver and urchin fisheries, and the Massachusetts shellfish fishery. Dealer's swipe harvester cards during a transaction, and they are unable to complete that transaction if reporting or permits are not current. Some of the benefits of this swipe card system are ease of dealer reporting, quick linking of harvester and dealer reports, preprogrammed fishermen information to reduce data entry mistakes, and insuring compliance during reporting.

Another recommendation is to incorporate VMS or other locater beacon to all lobster vessels. Again, this is trying to allow for greater spatial resolution in the fishery. This includes not only where traps are being set, but also important transit routes to the fishery. Finally, there is a recommendation to establish an electronic fixed-gear VTR for all federal permit holders.

One of the challenges right now with the VTR is that is for all gear types, so it is really hard to ask specific questions in regards to fixed gear or trap fisheries. There is a recommendation to create a VTR form that would just be for fixed gears. This would be electronic in nature, so it could only be filled out online. But the idea here is that this would allow for more data collection that is pertinent to the lobster fishery. The LEC also discussed some of this, so I'll pass it over to Rene to discuss this.

MR. CLOUTIER: As far as the VMS requirement, the LE is recommending that this happens sooner rather than later for all Area 3 vessels. Like I talked earlier, we really don't have the equipment or the technology right now to enforce a trap limit offshore, which is where everything is going, is to trap limits to increase egg production or wherever else you want to go with it. That is where the LE Committee was with VMS.

CHAIRMAN BORDEN: Thanks, Rene. Megan, questions?

MS. WARE: That's it, we can take questions.

CHAIRMAN BORDEN: All right so questions for Megan, any questions on this? Anyone in the audience, questions? Pat.

MR. KELIHER: This is actually for Rene, just for clarification. You mentioned Area 3, but wasn't the VMS for offshore areas within Area 1 as well?

MR. CLOUTIER: Yes. I guess I misspoke. Most of our issues right now, the enforcement issues that we've had in Maine anyway, have been in Area 1. A VMS component for Area 1 federal lobster permits would be a good thing for us.

CHAIRMAN BORDEN: Pat, as a follow up, as I indicated early on it would be my intent, and I think we should do this as a routine matter, to have the Enforcement Committee look at the proposals that are going to be incorporated into the public hearing document; and give us advice specifically on that issue.

Again, I mean this has come up at two LEC meetings, at least three LEC meetings that I've attended. But it has changed a little bit since the first time they discussed it. But I think the point is, they're going to get another bite at it and they can flush out exactly what they think should be incorporated into the public hearing document.

MR. KELIHER: That sounds really good, Mr. Chairman. I think what is critical here is that we're meshing both the LE Committee and the Reporting Committee's advice, because I think we've got an opportunity to have technology that will help us both on the reporting side for regulatory compliance; as well as the enforcement side. I think these two things potentially can have the ability to talk to each other.

CHAIRMAN BORDEN: Yes, and just a follow up. On these suggestions, I don't think that the board needs to take any action on them today. But just factor these recommendations in as you look at the plan. If you think, for instance, I think the first suggestion there was a Maine suggestion. If the state of Maine wants that option included in the public hearing document, it is a very simple thing to add that in and take it out to public hearing. Then at least we'll start the process of solving some of these problems. Doug, did you have your hand up?

MR. GROUT: Yes I did, Mr. Chairman. One thing that I want the Board to consider, or at least to take into consideration with this with the VMS, is one when we were talking about Area 3 boats I would fully support that. I think that is a great

idea. As we bring it into the inshore fishery in Area 1, there are a number of people that fish in very, very small boats that a VMS may not be something that is feasible right now; given the power requirements for it. I think we're going to have to think about this from a functionality to feasibility of being able to apply this to every boat in the inshore area; before we start moving down this road.

MR. KELIHER: Yes I agree with Doug's concerns. I think from my perspective I think we would be looking at any boat or any vessel that is fishing in Area 3, not any small vessels fishing in near coastal, nearshore environments.

CHAIRMAN BORDEN: Anyone else on this point? Okay everyone be clear that this is something we want you to consider, and if New Hampshire and Maine want to trade e-mails on how it would be placed in effect in nearshore Maine, I think that would be helpful. Yes.

REPRESENTATIVE MELISSA ZIOBRON: I'm just trying catch up and do a little homework on VMS, and according to the NOAA website it is saying that typically a vessel gets reported once an hour for their location. For me, I'm always wary of "Big Brother" and my constituents being tracked. I'm just curious, is it going to be in real time, this proposal or is it using the NOAA standard, which is once an hour?

CHAIRMAN BORDEN: Rene, do you want to comment? Has the Enforcement Committee discussed that?

MR. CLOUTIER: We did discuss that. VMS is not the answer for the enforcement problems. It's a step in the right direction. It is once an hour that they report. A scallop boat, any boat that has a federal scallop permit, they are once every half hour. In an hour you can haul a lot of trawls. What the fishery is becoming, just to give you a little example.

What we're running into now is trawls that are set offshore with no buoys. That eliminates any need for lobster trap tags or anything like that. These are impossible for enforcement to find without some sort of tracking capabilities. Once an hour isn't going to do it for us, but it is a step in the right direction.

How they retrieve this, I'm sure a lot of people in the room are saying why would anybody set them without the buoys; that must be a nightmare? But you can haul gear quicker with no buoys on it than you can with the buoys on it, because you don't have end lines. How they set these is they set a head trap, and then 100 fathom of float line with a toggle in the middle of the float line.

They can cross that hump in the water going 10 knots, throw the grapple over with 20 fathom on it and get that every time. They can haul that up really quick. We have one in the process right now we're prosecuting a person right now that is doing that. The information that we get from a lot of people is that this is becoming more and more prevalent out there; just to circumvent trap limits.

CHAIRMAN BORDEN: I would offer the thought that the next time the LEC discusses this issue, it would be very useful to have the appropriate personnel from NOAA there; not only their enforcement people, but the VMS staff to attend and provide guidance. Any other business on this issue, okay so factor this into your recommendations that you're going to bring forth. We're going to move along to Jonah crab. I'm going to let Megan do the introduction. We have a couple of motions that were postponed from the prior meeting. We'll put those up. I'm going to give you a suggestion on how to handle them in a fairly expedient manner, and then we'll proceed.

CONSIDER JONAH CRAB DRAFT ADDENDUM II FOR PUBLIC COMMENT

MS. WARE: We're going over Jonah Crab Draft Addendum II for consideration for public comment today. Just a reminder, the Board did see this document in August, but we delayed

public comment for a couple of reasons. There was a request for additional management options in the document, particularly in regards to claw harvest.

There was also an issue raised over the lack of definition of bycatch in the fishery. As a result the Board established a Jonah Crab Working Group to try and get at some of these issues. This is our timeline for this addendum. Today we're reviewing the addendum for public comment, and if it is approved our public comment period will be from November, 2016 through January, 2017. Then we would consider final action in February.

Just a reminder as to the current claw provision, the Jonah crab FMP establishes a whole crab fishery, with the exception of individuals from New Jersey through Virginia; who can prove a history of claw landings before June 2, 2015. This was to account for the historic DelMarVa claw fishery, which is typically executed by small boat fishermen who either have small capacity boats or don't have refrigeration onboard.

After final action on the Jonah crab FMP there were two problems that came up. The first was that claw fishermen from New York and Maine were identified, and currently these fishermen are limited to whole crabs; so there are concerns about equity in this fishery. Another potential problem is that NOAA has stated there are potential challenges implementing the regulation in federal waters.

Specifically National Standard 4 requires management measures not discriminate between residents of different states. I am going to jump right into the data that the workgroup discussed, because I think that this is really the key for the changes that were made. This was a graph that was included in the original version of the addendum.

It looks at male morphometric data with carapace width on the X axis and claw length on the Y axis. This is from claws that were measured by Mass DMF both in southern New England and Georges Bank. What we can see here is that a male crab whose carapace width meets the minimum size of 4.75 inches, we would expect to have a claw length of 2.47 inches.

We can look at the same data for female crabs. Again, we have carapace width on the X axis, and claw length on the Y axis. What we can see here is with that same relationship, if we look at the minimum size of 4.75 inches, we would expect a female crab to have a claw length of 2.06 inches. Clearly a little bit smaller than the male crabs.

But I think more importantly what this shows is that of the hundreds of female crabs that has been sampled, 100 percent have had a claw length less than 2.75 inches. There hasn't been a single female crab sampled that have claw length greater than 2.75 inches, and that is going to be an important fact for the changes made. Going back to the Jonah Crab Workgroup discussion, on that call there were several concerns with a claw fishery in general. These included that it might undermine the current minimum size, and also it allows for the potential harvest from egg bearing females. Currently we have a prohibition on the harvest of egg bearing females, but there could be a way in the claw fishery to try and undermine that.

But kind of the solution we came to here is that by increasing the minimum claw size to 2.75 inches, this protects the female population, so the berried crabs; and provides a bit more cushion to that minimum size. Really this is a higher standard for claws that are harvested or detached at sea. I'm going to jump right into the management options.

Option A is status quo, this has not changed. Again, this would be a whole crab fishery with the exception of individuals who can prove a history before the control date in the states of New Jersey through Virginia. Option B also has not changed, this is for a coastwide whole crab fishery. Only whole crabs may be retained and

sold coastwide, and once landed claws may be detached from the whole crab and sold.

This is Option C, and this has been the modified option in this document. This allows for claw harvest coastwide. Claws may be detached and harvested at sea if they meet the minimum claw length of 2.75 inches. Again, this is a larger claw length size than originally proposed, and this is to protect those egg bearing females; and also to provide a bit more cushion to the minimum size.

Two claws may be harvested from the same crab, and the bycatch limits would still remain in Addendum 1. If an individual is limited to their thousand crab bycatch limit, they would be limited to a 2,000 claw limit. Fishermen can also harvest whole crabs; which meet the minimum size of 4.75 inches, and once landed claws can be detached from these whole crabs and sold.

I am going to roll right into the second issue here and then we can just discuss this all at the end. There was also an issue brought up about bycatch in the fishery. Originally the FMP established a 200 crab per day, 500 crabs per trip bycatch limit for non-trap gear, but this was increased in Addendum I to 1,000 crabs, and it was also expanded to include non-lobster trap gear.

These limits were intended to account for incidental catch, but no definition of bycatch was provided. What this means is it allows for a small scale fishery to develop, where a fisherman could go out, harvest 1,000 crabs, and nothing else for the day. This really does not reflect the intention of the bycatch limit, which is to account for Jonah crab caught while targeting other species.

The Jonah Crab Workgroup is proposing that a second issue be added to this addendum. It would be to consider a definition of bycatch in the fishery. Option A would be status quo, so there would be no definition of bycatch in the Jonah crab fishery. Fishermen, who use non trap gear or non-lobster trap gear, could land Jonah crab up to the bycatch limit without having any other species onboard.

Option B is to have bycatch defined as a percent composition. Under this option Jonah crab caught under the incidental bycatch limit must comprise at all times during a fishing trip, an amount lower in pounds than the species the deployed gear is targeting. The LEC also discussed this Jonah Crab Addendum in their meeting, so I'll pass it over to Rene to sum up their report.

MR. CLOUTIER: When the LEC met they realized we agreed that there was a fishery that was occurring that it was just a claw fishery. We thought that a five gallon pail of crab claws would be allowed, and I guess everybody on the Committee agreed to that.

MS. WARE: That is the end of my report, I'll take questions.

CHAIRMAN BORDEN: Okay questions for Megan or Rene on either one of those issues, anyone, any questions? In terms of the motions, could you put up the postponed motion, please? This was Motion 5, is that what it was, Megan?

MS. WARE: I don't remember the specific number, to be honest. But it was postponed to this meeting so it is on the table for today's meeting.

CHAIRMAN BORDEN: Okay so comments on the table, anyone would care to comment on this? Mike.

MR. LUISI: I think there was something in the water in Alexandria in August. This is like the second or third motion I've had to consider just pulling off this week. I think we've addressed this motion through the working group, which I think was a great thing for this Board to suggest. We've dealt with the claw fishery; we've dealt with some of this volumetric concern that we had. I'll look to you for some advice on what to do here, whether we can withdraw the motion

and just move forward with the addendum as it's currently written. I would be happy to do that.

CHAIRMAN BORDEN: My preference, Mike, would be for someone to make a motion to postpone indefinitely; that will kill it. Mark Gibson, Dan.

MR. GIBSON: **So moved, move to postpone indefinitely**.

CHAIRMAN BORDEN: Jim, do you want to second that? Seconded by Jim Gilmore, any discussion on it? No hands up, anyone in the audience care to comment. No hands up. Are there any objections to approving this by unanimous consent**? It stands approved**.

MR. GROUT: Before we get to potentially approving this for public comment, there was one issue that I saw in this that I thought maybe we should try and consider adding a sentence in. This is just to make sure we're on the same page is to have a definition of how states would measure a claw length in the document, so that we're all on that same page.

CHAIRMAN BORDEN: Pat Keliher to that point. Okay Doug has made a suggestion. Does anyone disagree with that? Remember this is just a public hearing document, so the staff would craft a definition and basically include it in the document. No objections? There are no objections so we'll do it with unanimous consent. Pat Keliher.

MR. KELIHER: The motion to postpone. I couldn't even quickly figure out what that meant, but I had drafted a motion under 3.0 to get to a volumetric measure for retaining claws. We don't want to be in the business of measuring crab claws. I have a motion if Amy could put it up on the board. **I move to add Option D under 3.0 management measures. Claw harvest permitted coastwide under this option, claws may be detached and harvested, but may not exceed a volumetric limit of five gallons.** If I get a second I'll give some additional information.

CHAIRMAN BORDEN: We have a motion, is there a second; anyone? Jim Gilmore, second. Discussion, Pat.

MR. KELIHER: Rene Cloutier, the Major and I took a very scientific approach to this. Rene went down, picked up a tote of crabs, it's 120 in a level packed tote. That tote equated to a five gallon bucket of crabs. We're talking about a five gallon bucket of claws. Harvesters are not retaining small crabs, because that equates to a small claw.

We're looking for what I believe is a very simple fix to allowing a very small amount of claws to be retained. If somebody wants to, the way I would envision this rolling out, at least in Maine, would be that we would have a rule that says if you're going to retain claws, you would not be able to retain a whole crab. You would have to detach and just keep the claws. Again, we're talking 120 crabs a day when you could harvest unlimited.

CHAIRMAN BORDEN: All right so we have a motion second for the discussion on this.

MS. WARE: Just a clarifying question, Pat. Is there a minimum size with this claw limit or it is claws of all lengths?

CHAIRMAN KELIHER: There would be no minimum size. We don't want to be measuring claws. But again, people aren't taking off small claws, because there is no meat, no sense.

MR. McKIERNAN: With all due respect, I'm not sure that this language captures just what I heard Pat say. I think it needs to say, may be detached, and if there are detached claws on the vessel whole crabs may not be retained. You just said something that is not captured in that motion. I think you need to rework the motion.

CHAIRMAN BORDEN: Pat, do you want to perfect your motion?

CHAIRMAN KELIHER: Yes.

CHAIRMAN BORDEN: How about this. We'll take a five minute break, how's that? Anyone that needs to use a restroom please do so now, because we're going to go right through the rest of the agenda as soon as we come back; five minute break.

(Whereupon a recess was taken.)

CHAIRMAN BORDEN: Can everyone have a seat, please. Pat, have you perfected the motion the way you want?

MR. KELIHER: Yes, Mr. Chairman, but Toni has now pointed out to me we may have an issue. My thinking was that a jurisdiction would be able to choose one or the other for their state. Toni has indicated that that now may be an issue of having two different sets of rules; and maybe she should comment on that before we go any further.

CHAIRMAN BORDEN: Let me ask Jim Gilmore. Jim, do you agree with the perfection of the language?

MR. GILMORE: Yes, but.

CHAIRMAN BORDEN: But you want to hear the discussion, okay.

MS. TONI KERNS: As Pat has explained to me on the break that he was thinking that each state could choose of different options that were within this claw only section of the document. My one concern and I guess it would be a question to Ali or Peter, is that if Maine federal water fishermen were fishing on one rule and Maryland federal water fishermen were fishing on another rule, both Area 3 fishermen. NOAA would have to choose one of those two rules. Having inconsistent set of regulations could be problematic for those federal water fishermen.

CHAIRMAN BORDEN: Ali, do you want to comment or Peter?

MS. ALISON MURPHY: I think Toni is right. Having states all pick their own measures for this certainly creates a lot of complications for us. My understanding of the addendum was to pick one option to be used coastwide or at least that's what all of the options in the document were for previously.

MR. WHITE: Well, if the 2,000 was adopted, a five gallon bucket is a lot less than 2,000; so that boat would just be more conservative. If the 2,000 was enforced offshore the vessel would have to make sure that he had good sized crabs if he wasn't measuring them.

MR. GROUT: The way I looked at this is this would be similar to a conservation equivalency within a plan. You have one state that wants to have 2,000 crab claws and the minimum size that is implemented in the plan. What the state of Maine was looking for was relief from having to have a minimum size, but they were going to drastically reduce by I think about an eighth, the amount of claws.

I could see a scenario, because I believe there are some plans that the Feds recognize conservation equivalency between the states. But I could see this working out where the federal agencies would implement the 2,000 pound and minimum size; but within the state of Maine or say in the state of New Hampshire.

We would implement something, a much smaller trip limit on it, but would not be enforcing the minimum size. The only problem we would run into is if there was a coast guard vessel out there that would start measuring claws on federally permitted vessels at sea.

EXECUTIVE DIRECTOR ROBERT E. BEAL: I wonder if we could be very creative in how we worded this, which is that if you have more than five gallons of claws, you can't retain any claws less than 2.5 inches. There is a threshold of five gallons, and once you exceed that threshold then the size limit kicks in. If you want to retain more than five gallons you can't have any below 2.5

inches, or whatever the size limit is. Then you cap it at a maximum, but you set a threshold for when the size limit kicks in.

CHAIRMAN BORDEN: I'm just thinking of creative ways to handle this. Rather than try to do this with motions let me suggest that we pass this motion. If everyone agrees with Bob's suggestion; let me ask that first. Does anybody disagree with what Bob just suggested? It seemed like it was kind of a creative way of handling this. I see everyone kind of nodding, but let's not do this just based on verbal commitments. My suggestion would be to pass this motion, and then the staff will write that up and circulate it to everyone within a few days, and see whether or not everybody still is in agreement after they look at it in writing; any problem with that? It's basically an option that's going to be folded in; but we give the discretion to the staff to draft it.

MR. LUISI: I don't have a problem with the suggestion. What I do have a problem with just approving the motion. We discussed it in the call. Maybe somebody else that was on the call can help me remember the last sentence there about fishing. If you're participating in the claw fishery you can have no possession, whole crabs are prohibited.

That was something we discussed, I just can't remember who brought that up and what situation there was that we, I believe we decided that as long as the claws were still attached to the crab, they didn't need to meet the minimum size that we would be requiring for a claw only fishery; but a fisherman could bring both home. I think that is what we concluded on our call.

MS. WARE: Yes, I'm trying to remember as well, Mike. I think what we said was that if you harvest at sea you are basically held to a higher standard, so that you would have to meet that 2.75 inch minimum size. However, if you bring in whole crabs and then broke the claws off, you would be held to the whole crab minimum size. It is really a higher standard for that at-sea harvest.

MR. KELIHER: I think Bob's suggestion is good, and I'm just wondering if under Option C we just get rid of this motion altogether. Then under Option C I think we could add one sentence that says, any amount of claws retained over a volumetric measure of five gallons would have to meet the minimum requirement. You would make that change within the existing Option C.

CHAIRMAN BORDEN: All right so we've got another suggestion here.

MR. KELIHER: Then we can just put it to bed.

CHAIRMAN BORDEN: Does anyone object to what Pat said? Are there any objections to that? If not, my suggestion is someone makes a motion to postpone this motion indefinitely and we'll go back and revise the language the way you just said.

MR. GROUT: I'll make a motion to postpone this indefinitely.

CHAIRMAN BORDEN: All right, is there a second? Seconded by Mark Gibson, any discussion, no discussion, any disagreement with this? **Any comments from anyone in the audience; no hands up any place, the motion to postpone indefinitely is passed by unanimous consent.** Let's go back to the language, Pat and make sure it's modified accordingly.

MR. KELIHER: I think if we can get that language up**. Option C currently reads, under this option claws may be detached and harvested at sea if they meet a minimum claw length of 2.75. I think it would say, under this option if a volumetric measure of greater than five gallons is to be retained, the claws may be detached and harvested at sea, as long as they meet a minimum claw length of 2.75.**

CHAIRMAN BORDEN: Okay so this is a motion to add this language to Option C, correct? Is there

a second, seconded by Doug Grout; discussion on it, any discussion? Any hands up? No hands up; anyone in the audience, no hands up. Are you ready for the question? All those; well I'm not going to vote, any objection to adopting this by consent? **Motion stands adopted by unanimous consent.** What other issues, Megan, do we need to discuss on this?

MS. WARE: The bycatch definition. There is a proposal to add a second issue to this addendum to consider adding a definition for bycatch in the fishery.

CHAIRMAN BORDEN: All right can we put that language up? It's going to take one minute. We'll put the language up and then my suggestion is I'll ask for whether or not we have any comments or questions on it. I'm not sure we need to go into a detailed debate on it, but we do need to pass a motion to include it in the document if that is what our intent is.

This is what happens when you move at light speed. Okay so there is the language. Bob indicated that we do not need a motion. Do we have consent on this? Does anyone object? Mike, no objection, do you want to comment on it? Turn your microphone on, please.

MR. LUISI: Just a question under Option D. Is there going to be anything written under this for the document to talk about claws versus weight of the whole crab versus? If you have 20 pounds of claws, does that mean you need just 20 pounds of your targeted species or more or are we going to have some debate down the road where we have a comparison of the whole crab weight that you harvested the claws from? I just want to make sure that sometime in the future we've got that clarified; because I'm sure someone is going to ask.

CHAIRMAN BORDEN: Does anyone want to comment on this? Dan.

MR. McKIERNAN: If we don't clarify it then it is a very liberal treatment, and that is something you can ratchet down later.

MR. GROUT: Just one thing that I agree that something like this needs to be put in, but I also think it might be important to include in the document a definition of how we determine what the target species is. As long as that's clear in the document, I think it is something that the states can implement.

MR. McKIERNAN: Yes, I would request that the states who supported the thousand Jonah crab bycatch option in non-lobster trap fisheries, maybe they could give Megan a list of those trap types and those target species that is being caught; because I think it's whelk. I think that was the one example that seemed plausible, however unlikely. In Massachusetts we don't have that issue, so I think we're looking to the states in the Mid.

CHAIRMAN BORDEN: Dan made a suggestion. Are the states that have been advocating this willing to work together and try to come up with that definition and provide it to Megan next week. Is that okay? We don't need a motion on this. **Are there any other changes, and if not then we need a motion to approve this addendum as modified by the discussion today for public hearing.**

MR. ADLER: I'll so move what you just said.

CHAIRMAN BORDEN: Seconded by Mike; any discussion on this? Ali.

MS. MURPHY: I've gone on the record a number of times at these meetings that NMFS is supportive of the Law Enforcement Committee's recommendation for a whole crab fishery, but at the same time we've also been supportive of this document having a wide range of alternatives for public consideration. Just one point of clarification to make sure my understanding is correct. The option is it under Option C, for the targeted fleet having a lobster permit. Those

vessels would be able to harvest an unlimited amount of claws, is that correct?

MS. WARE: That's a good question, Ali. In the original way that Option C was written the answer would be yes, because it was only individuals under the bycatch limit that would be limited to the 2,000 claws. I think that would still remain true, because you can still land greater than a five gallon bucket. Yes, those lobster permit holders are able to land an unlimited amount of claws.

MS. MURPHY: If I could just follow up. I think one of the goals of the original FMP was to preserve the Jonah crab fishery kind of as it stands today, and allow for this small, historic harvest of claws to continue. I guess that's just a little concerning to me that this option could potentially allow a vast expansion of the claw fishery.

CHAIRMAN BORDEN: Any further follow up on this? Megan just reminded me, we actually had a motion to approve this addendum; so we have to go back and clear the record on this. Thank you, Megan. Let me just, in the interest of time, does anyone have an objection to modifying this, perfecting this motion?

I'm not sure we have an original motion maker and seconder in the room**. It would basically say, move to approve Draft Addendum II to the Jonah Crab FMP for public comment as modified by the comments and conclusions today; any objection to doing that. No hands up so it is adopted by consensus.** Do we need to vote on this? I think not since we have pretty much unanimous agreement. Anyone object to approving this motion? **No objections, it is approved by unanimous consent.** The next issue on the agenda is the FMP Review, Megan.

CONSIDER APPROVAL OF 2016 AMERICAN LOBSTER FMP REVIEW AND STATE COMPLIANCE

MS. WARE: While we pull up that presentation here, I'm doing the FMP review for the 2015 fishery. The lobster fishery has seen incredible expansion in effort and landings over the last four years. Coastwide landings in 2015 were 147 million pounds, which is equivalent to the landings in 2014 and just below the landings in 2013.

The largest contributors to the fishery are Maine, seen here in blue, and Massachusetts seen here in red, with 83 percent and 11 percent of landings respectively. Landings in descending order also occur in New Hampshire, Rhode Island, New Jersey, Connecticut, New York, Maryland, Delaware and Virginia

The ex-vessel value for all lobster landings in 2015 was $617.7 million, which I believe is the largest on record; at least for the records that I have. In terms of status of the stock, the 2015 stock assessment indicated a mixed picture of the American lobster resource, with record high abundance through the Gulf of Maine and Georges Bank, and record low abundance throughout southern New England. The assessment found that the Gulf of Maine/Georges Bank stock is not overfished and overfishing is not occurring. However, some of the population indicators for the young-of-year estimates were low, and this could be a sign of some low recruitment in the future. We've talked extensively today about southern New England, so I won't go too much into that. But the stock is depleted.

For a status of management we are currently under Amendment 3, which created the seven lobster conservation management areas you see here; as well as Addenda I through XXIV. The most recent addenda sought to align federal and state regulations regarding trap conservation taxes, trap transfer increments, and trap allocation for dual permit holders.

We're currently working on Addendum XXV to respond to the poor condition of the southern New England stock. Addendum XVIII established a series of trap reductions for LCMA 2 and 3, and the intent of this addendum was to scale the size

of the southern New England fishery to the size of the resource.

Per this addendum, states with fishermen in Areas 2 and 3 are required to report on the degree of consolidation that has taken place. In total 33,880 traps were retired in Area 2, and 8,663 traps were retired in Area 3. Addendum X requires 100 percent dealer reporting and 10 percent active harvester reporting, as well as sea sampling.

Non de minimis states are required to conduct fishery independent sampling through one of the following methods, which could be annual trawl survey, a ventless trap survey, or a young of year survey. I've put Maine's information up, since I thought it might be appropriate for our meeting location.

Just to orient everyone here. We have on the left their young-of-year survey with 513 being in southern Maine, and 511 being in northern Maine. What you can see here is that all of these indices are below the average for that statistical area. On the right hand side here is the Maine ventless trap survey.

The different colored bars are different years with the right most bar being 2015. Again, as we move from 513 to 511 we get further north in Maine. What we're seeing here is we haven't really seen the drastic reductions yet in the ventless trap survey; and I think this is something to keep an eye on, because if we do start to see reductions in this ventless trap survey, then that would corroborate what we're seeing in the young-of-year survey.

In terms of compliance all states are found to be in compliance with Amendment 3 and Addenda I through XXIV. For de minimis status commercial landings in the two most recent years of data cannot exceed an average of 40,000 pounds. We received requests from Delaware, Maryland, and Virginia. Virginia and Delaware qualify. Maryland's two-year average is slightly above the 40,000 pounds; so that can be open for discussion today.

In terms of PRT recommendations, the PRT recommends full implementation of data collection programs, including increased harvester reporting and creation of a fixed-gear VTR form. They recommend continued investigation in stock connectivity, and larval transport between the inshore and offshore areas. The PRT noted several inconsistent regulations, notably that in outer Cape Cod with the v-notch definition; and also noted that now that Gulf of Maine/Georges Bank is a single biological unit, the Board might want to consider the repercussions or potential options for consistent regulations in this area. Also, they're recommending improved enforcement of management measures, especially at-sea enforcement of trap limits. With that I will take questions.

CHAIRMAN BORDEN: Questions for Megan, any questions? No hands up. I think what we need here is **a motion to approve the FMP review including de minimis status. My suggestion is to include, I guess it is Maryland in the de minimis category, because it is only very slightly over the limit and normally below the limit.** I think it is a reasonable action. Does somebody want to make that as a motion? Dan.

MR. McKIERNAN: **Want me to read that or just make the motion? All right, I make the motion, so moved.**

CHAIRMAN BORDEN: Okay seconded by Brandon. Brandon, do you want to second this motion?

MR. MUFFLEY: Yes since this is my last meeting I will get my name up on the board, thank you Mr. Chairman.

CHAIRMAN BORDEN: I actually thought you wanted to propose a 12 inch minimum size for New Jersey. We have a motion, any discussion on it? Jim.

MR. GILMORE: Mike, how much did the one guy actually harvest over the 40,000 pounds?

MR. LUISI: It's a bit of an embellishment. We have a couple guys that bring a few lobsters in. I will say since I have the microphone and I'll be quick. You know while we have been harvesting, well we have been in de minimis status and have been hovering around that 40,000. I have dedicated some staff time for collection purposes to help better our understanding of the fishery down there. We're doing what we can to collect information, we just can't do as much as what is required under the FMP.

MR. BURNS: Mike, not to put you on the spot. I just was wondering is this something that is going to continue. Is it one particular vessel? I thought there was a vessel that came into Maryland and then it was no longer in Maryland anymore. Is that what happened? You think that after this, because it's a three-year average that's why it's been over?

MR. LUISI: That's exactly it. We had a vessel that was fishing in Area 3, and he was bringing a lot of lobsters in. He's no longer part of the fishery, so that three-year average is continuing to drop in my understanding, and we expect it to be below 40,000 in the future.

CHAIRMAN BORDEN: Any further discussion on this? **Any objection, no objections; motion stands approved by unanimous consensus.**

UPDATE ON THE ATLANTIC MARINE MONUMENT DESIGNATION

CHAIRMAN BORDEN: All right so we're going to move on to the next issue, which is the Marine Monument. I think everyone knows the background here. But what we have not discussed is the letter from NOAA, so Megan.

MS. WARE: I'm just going to go over the facts that we know of so far. It was designated on September 15th, it is over 100 miles southeast of Cape Cod, and it encompasses just under 5,000 square miles; some of which is shallower than 100 meters. It includes Oceanographer, Gilbert and Lydonia Canyons, as well as some of the offshore seamounts. The red crab and lobster fisheries are allowed to continue fishing in the monument for seven more years. However, other commercial fishing operations have 60 days to move their practices from within the monument, and recreational fishing is allowed within the boundaries.

CHAIRMAN BORDEN: Questions, are there any questions? I think it would be useful also to discuss the letter from NOAA. Peter, do you or somebody on the staff want to comment on this? Mike, then my suggestion is that if we can formalize a recommendation on this I think it would be useful.

MR. MICHAEL PENTONY: Just for the Boards understanding. Last Friday we sent out three letters, one each to the two councils; Mid-Atlantic and New England Council, and then one to the Commission, basically informing all three bodies of the current status of rulemaking.

CHAIRMAN BORDEN: Mike, can I stop you just for one second. Brandon, if you're going to sneak out of the room I would just point out to everybody, this is his last meeting. I think we owe him a debt of gratitude for all the work and dedication that he's put into serving the fisheries and fisheries in New Jersey.

He's done a terrific job; he's been a fabulous guy to work with. I'm sorry to see him go, but I look forward to working with him on the Mid-Atlantic Council. I suggest we give him a round of applause. (Applause) Are you sure you don't want to propose a 12 inch minimum size for New Jersey, just as a going away present?

MR. MUFFLEY: I have been talking to Steve Heins quite a bit. He had asked me to transfer all of the New Jersey's quota to New York.

CHAIRMAN BORDEN: We'll see you at the Mid-Atlantic meetings. Okay, Mike I apologize; please continue.

MR. PENTONY: No problem, Mr. Chairman. The letters basically were to inform the three bodies as to where we are in terms of implementing regulations to enforce or implement the proclamation; the president's proclamation for the monument. On the council side, under the Magnuson Act we're obligated to work through the councils.

The letters to the two councils are essentially asking the two councils to take up amendments to their existing FMPs through which we would modify the regulations to implement the restrictions in the monument; but also to let the councils know that if they decline to do so then we would be obligated under the Magnuson Act to develop Secretarial amendments to the plans to implement those regulations.

Then the letter to the Commission was along the same lines, but informing the Commission that because we don't have, for lobster regulations we implement those under 697 through Atlantic Coastal Act Provisions. Then when we work either with the councils or through a secretarial plan, we will at the same time be planning to develop regulations for the lobster fishery.

That would obviously go into effect seven years from the date of the proclamation for the trap fishery. During that process we plan to consult with the Commission on several occasions as we go through the development of that process. That is a quick summary of the letter.

CHAIRMAN BORDEN: Any questions for Mike? Does anyone have a preference here? Doug.

MR. GROUT: I have a preference if I can get an answer from Mike about one issue, and that is if the councils and the commissions preferred to have the NOAA Fisheries develop the plan, I know you would consult with the councils, but would you consult with the Commission?

MR. PENTONY: Yes, we would consult with the Commission in all circumstances, because the process under the Atlantic Coastal Act for us to develop regulations for the lobster fishery if not required is certainly good practice to consult with the Commission on those actions.

MR. GROUT: Then my recommendation, Mr. Chair would be for the Council to defer to NOAA Fisheries to develop the measures that are needed to implement the Antiquities Act as they apply to fisheries.

CHAIRMAN BORDEN: Any objections to that suggestion? No objections. That will be the course of action that is reflected in the minutes. I don't think we need a motion on it. Any further action on this issue, if not we'll move on to the Deep Sea Corals. Terry, are you going to give the report or is Megan?

UPDATE ON
NEW ENGLAND FISHERY MANAGEMENT
COUNCIL DEEP-SEA CORAL AMENDMENT

MS. WARE: The New England Council is continuing to work on the Omnibus Deep Sea Coral Amendment, which could limit lobster traps. The document currently includes discreet zones, such as offshore canyons and in Gulf of Maine we have Jordan Basin, Mount Desert Rock, Lindenkohl Knoll and Outer Schoodic Ridge.

At the September council meeting a 600 meter depth-based broad coral zone was added for consideration. There was also a motion to consider an exemption for the lobster and crab fisheries, and this passed. But what this means is that the option for limiting the trap fishery still exists; and so analysis on the lobster fishery will continue.

ASMFC has been working with the council to provide data on potential impacts to the lobster fishery, and the TC has been consulting among themselves and also with staff from Maine DMR, to apply catch and effort in the potentially affected areas. In talking with Michelle, it sounds like the tentative timeline for that is to have a document ready for public comment in their spring or summer of 2017. I'm not sure

how concrete that timeline is, but we'll keep you guys posted and let you know of any developments.

CHAIRMAN BORDEN: Any comments, questions, Toni you've got your hand up, go ahead.

MS. KERNS: The discussion of the corals and the need for information reminds me that when we were talking about reporting, you made the suggestion that states give recommendations back in the one month time period. It made it sound like to me you're only talking about reporting that pertained to the southern New England addendum. But I believe what the working group was making a recommendation for was changes to reporting for coastwide reporting. With things like corals and ocean use, there is a lot of information that is being needed for us to give to the councils and to NOAA to be able to describe our lobster fishery, and the impacts to that fishery. I wanted to know if we were going to look at reporting just for the southern New England area or for all.

CHAIRMAN BORDEN: That's a good point and actually I talked to Pat during the brief break. He needs a little bit of time to talk to his staff about various aspects of the data collection suggestions. What I would suggest we do is not include data suggestions as part of this addendum that we're proceeding with.

At the February meeting we'll have a discussion of whether or not we want to initiate Addendum XXVI and do a comprehensive one. Is that agreeable? That will give you a little bit of time, Pat, and then we'll compile all of the data collection changes in one document.

MS. KERNS: Just one question. In the working group report I think they had made the suggestion of letting the TC take a look at what's a good percentage. I think there possibly could have been some tears for down the line. Is that something that we would want the TC to look at between now and February or would you want them to wait until after February; and I would look to Pat.

MR. KELIHER: I think having that input from the TC, if it is 30 percent that's fine, possibly fine. But I think getting that TC input as soon as we can. Then I can try to put some numbers around it to see if it's doable. One of the recommendations in the short term was the 10 percent focused on active harvesters within a two-year period. We could implement that for the next fishing year, and could do that voluntarily outside of this if that would be beneficial.

CHAIRMAN BORDEN: Let's do this. If you want to make that suggestion during the next one-month period, we'll consider it for this addendum. But all the rest of the suggestions we'll take up at the February meeting and see whether or not we want to initiate a draft addendum; any objections to doing that? Okay so no objections. Toni, are you getting heartburn?

MS. KERNS: No, no objections, just one more task for the TC to look at. Does the Board want to have the TC also evaluate what we're actually collecting, and what additional information might be informative, as we move into this new expansion of ocean use and folks asking for information from us? At least to give us a list to consider and what it would mean to actually have to try to collect that information.

MS. WARE: I think the Reporting Workgroup kind of had that list and there were TC members on that group, but we could run it by the TC and see if there are any others.

CHAIRMAN BORDEN: Any objection to doing that; no objections. Okay so it seems like we have a course of action. Pat, you can make your suggestion in terms of doing the quick fix to the Maine suggestion if that is what you want to do, and we'll consider that and then we'll deal comprehensively with the data deficiencies at the February meeting. That will take the form of initiating an addendum at that point.

MR. KELIHER: Mr. Chairman, I think I could simply for the 2017 fishing year just tweak our 10

percent reporting without any action, as long as it – why can't we? Yes, we can.

MS. KATHLEEN REARDON: I'm Kathleen Reardon; I'm the new TC Chair, but I also work for Pat in Maine. We do have some issues with our 10 percent, because we lose the randomness, we also lose being able to track latency within the fishery. We need to discuss it a little bit more before we commit to dropping anything other than the active harvesters.

CHAIRMAN BORDEN: I think that is consistent with what I offered. Maine has the ability to recommend that if they would like, after they do their internal consultations. If they don't recommend it, it will all get folded into the Comprehensive Data Deficiency Addendum. Okay, everyone clear?

MR. KELIHER: It's clear as mud, because if that's the case then the TC needs to comment on that. I would like that from the TC; no offense to my staff. The TC is going to have to look at the 10 percent change that was listed for the short term as well as the 30 percent.

CHAIRMAN BORDEN: Megan, you've got a charge for the TC. Bill Adler.

MR. ADLER: This is back on the closed area things, and I've already talked to you about a petition that's been put in to make Hudson Canyon a sanctuary. I'm not sure where that is in the middle of all the little dots and stuff. If that is an additional area to the monument area and the coral area and now an environmental group had put in for a sanctuary on Hudson Canyon. I just wanted that noted.

CHAIRMAN BORDEN: Thanks Bill, for noting that. Actually it is three canyons. There are three canyons all in the Mid-Atlantic area that I think have been proposed. My suggestion is let the staff get the information on that and then present whatever information they can get on that at the next meeting.

Are there any objections to handling that? Okay so anything further on corals? If not, any other business before the Board? If not, I would just like to personally thank, oh Doug; I was going to thank our host. But I would also like while I've got the microphone, before Doug flicks it off. I would like to thank the members of the PDT for all the work they put into the document.

Although it didn't go out the door today, I think that the first part of the document I thought was one of the better documents that have been written by the PDT. It is clear, it's concise, and it lays out all the facts. I think it's very well written. We can just tweak those sections that go behind it and I'm sure at the February meeting we'll get it out the door. But thank you very much for all your labors.

MR. GROUT: Thank you, Mr. Chair. I also wanted to thank all the commissioners for hard work this week. It was a long and very, I think productive week in what we did. If any of you happen to be staying over tonight, and that includes any staff. I'm going to open up my room at about 4:30 today for a little hospitality suite, its Room 2077, and it's going to be BYOB and BYO snacks.

CHAIRMAN BORDEN: Any other business? Peter.

MR. BURNS: Real quickly, I just wanted to commend Megan for her hard work. Since the last meeting she did an excellent job sharing and facilitating the Technical Committee, the PDT and all the working groups that had to meet, and she did that really effectively and that helped us get through our business today; so thank you for that.

ADJOURNMENT

CHAIRMAN BORDEN: Any other business? No hands up, meeting is adjourned.

(Whereupon the meeting adjourned at 3:48 p.m. on October 27, 2016.)

Atlantic States Marine Fisheries Commission

DRAFT ADDENDUM XXV TO AMENDMENT 3 TO THE AMERICAN LOBSTER FISHERY MANAGEMENT PLAN

RESPONSE TO SOUTHERN NEW ENGLAND STOCK DECLINE

This draft document was developed for Management Board review and discussion during the January 31, 2017 Lobster Board meeting. This document is not intended to solicit public comment as part of the Commission/State formal public input process. However, comments on this draft document may be given at the appropriate time on the agenda during the scheduled meeting. Also, if approved, a public comment period will be established to solicit input on the issues contained in the document.

ASMFC Vision Statement: Sustainably Managing Atlantic Coastal Fisheries

January 2017

Public Comment Process and Proposed Timeline

In May 2016, the American Lobster Management Board initiated Draft Addendum XXV to address continued stock declines in Southern New England. In August 2016, the Board identified a management goal for the Southern New England stock as well as management targets for development in this addendum. This draft addendum 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 201X 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: Megan Ware
Atlantic States Marine Fisheries Commission
1050 N. Highland St. Suite 200A-N
Arlington, VA 22201
Fax: (703) 842-0741

Email: mware@asmfc.org
(Subject line: Lobster Draft Addendum XXV)

August– October 2016	Draft Addendum for Public Comment Developed
October 2016 – February 2017	Preliminary Industry Comment and Subcommittee Review
February 2017	Board Reviews Draft and Makes Any Necessary Changes
February – April 2017	Public Comment Period, LCMTs prepare preliminary proposals
May 2017	Management Board Review, Selection of Management Measures
May 2017	LCMTs Submits Proposals to Meet Target Increase in Egg Production
August 2017	Board Reviews and Approves LCMT Proposals, Final Approval of Addendum XXV
2018	Implementation of Addendum XXV

Executive Summary

The Southern New England (SNE) lobster stock is at record low abundance and is experiencing recruitment failure (ASMFC, 2015). This poor stock condition is the result of environmental factors and continued fishing mortality (ASMFC, 2015). As an initial management response, the American Lobster Management Board initiated this draft addendum to consider increasing egg production in SNE by 20% to 60%. This addendum focuses on increases in egg production so that, if environmental conditions become favorable, the SNE stock can benefit from a strong recruitment year.

To respond to the Board's objective to increase egg production, the Plan Development Team (PDT) evaluated multiple management tools, including: gauge size changes, trap reductions, season closures, trip limits, v-notching, and culls. In their evaluation of these various management tools, the PDT analyzed not only the ability to achieve the specified management targets but also the ability to effectively monitor, administer, and enforce selected management tools.

This draft Addendum includes six issues. The first proposes five targets by which to increase egg production, ranging from 0% to 60%. The second issue asks whether the management tools considered for use in the document can be used independently or in conjunction with one another. The third issue addresses the effects of this addendum on the recreational fishery. The fourth issue explores the implementation of season closures and potential impacts to the Jonah crab fishery. The fifth issue examines whether management measures in SNE should be uniform across LCMAs. The sixth issue asks where in LCMA 3 the management measures in this document should apply.

Table of Contents

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-XXIV 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 Southern New England (SNE) stock (subject of this draft addendum) includes all or part of five of the seven Lobster Conservation Management Areas (LCMAs) (Appendix 1). There are eight states (Massachusetts to Virginia) which regulate American lobster in state waters of the SNE stock, as well as regulate the landings of lobster in state ports.

The Board initiated Draft Addendum XXV to respond to continued stock declines in SNE. The 2015 Benchmark Stock Assessment found abundance, spawning stock biomass (SSB), and recruitment are all at historic low levels in SNE. The stock was deemed depleted as the current reference abundance of 10 million lobsters is well below the management threshold of 24 million lobsters. As a result, the Board directed the Plan Development Team (PDT) to draft an addendum to address the poor condition of the SNE stock by increasing egg production and decreasing fishing mortality.

The principle challenge facing the SNE stock is the increase in natural mortality, primarily due to climate change and predation. Specifically, the 2015 stock assessment showed a pronounced warming trend in coastal waters, particularly in New England and Long Island Sound. These warming waters have negatively impacted the stock as they have resulted in reduced spawning and recruitment. Predation from species such as black sea-bass has further depleted the stock. Together, these challenges highlight the vital role the environment plays in the health of the American lobster population. Importantly, fishing pressure, while at an all-time low level, continues to be a significant source of mortality and a measurable factor contributing to the overall decline of the SNE stock.

Given these challenges, the Board identified the following goal for this addendum.

> "*Recognizing the impact of climate change on the stock, the goal of Addendum XXV is to respond to the decline of the SNE stock and its decline in recruitment while preserving a functional portion of the lobster fishery in this area."*

To achieve this goal, the Board tasked the TC and the PDT to analyze management tools that would result in increased egg production in the SNE stock. The Board identified four alternative egg production targets for analysis: increasing egg production by 20%; 30%; 40%; and 60%. A 0% increase was also analyzed to provide a baseline, no-action context

to assist in decision-making. The Board is pursuing increases in egg production so that, if environmental conditions become favorable in SNE, there will be enough eggs in the water to produce a successful and impactful recruitment event. Given uncertainties surrounding future climate conditions and their impact on the stock, most notably on recruitment, it is unclear whether the SNE stock can be rebuilt to the current reference levels if unfavorable environmental conditions continue.

This addendum is intended to be an initial response to the most recent stock assessment. The 2015 Stock Assessment clearly stated climate change is impacting the SNE fishery in a profoundly negative way. While the Board recognizes serious and impactful management actions are needed to preserve the SNE stock, they also recognize questions regarding the full impacts of climate change still remain. As a result, the Board agreed to take quick and decisive action while preserving a functional portion of the fishery. It is important to note, that a functional fishery may not mean the continuation of the current state and size of the fishery. The Board will continue to monitor the stock and fishery in order to determine the next appropriate course of action. All management tools remain available for future consideration.

2.0. Overview

2.1 Statement of the Problem

The 2015 Benchmark Stock Assessment found the SNE stock to be depleted, with record low abundance and recruitment failure. This poor stock condition can be attributed to many factors including changing environmental conditions and continued fishing mortality. In response, the Board initiated Draft Addendum XXV with the goal of preserving a functional portion of the SNE lobster fishery while addressing the poor stock condition. The measures in this addendum are intended to increase egg production so that, if environmental factors improve, the stock can benefit from a successful recruitment event. This addendum is an initial response to the most recent stock assessment and may be followed by other management measures.

2.2 Resource Issues

Results of the 2015 Benchmark Stock Assessment concluded the SNE stock is depleted and experiencing continued declines (Table 1). The assessment highlighted that abundance, SSB, and recruitment are all at historic low levels for the model time-series (1982-2013). Model-free indicators corroborate these findings as spawning stock abundance, a measure of the reproductively mature portion of the population, is below the 25th percentile in six of the eight surveys from 2008-2013 (Appendix 2). Furthermore, the distribution of lobsters inshore has contracted as the survey encounter rate is negative in all six inshore indices over the 2008-2013 time period. In contrast to the poor condition of the SNE stock, the assessment concluded that the GOM/GBK stock is at record high abundance, with a dramatic increase in abundance since the late 1980's. This dichotomy suggests environmental conditions are changing along the coast and these changes are impacting the condition of the stock.

Table 1. Current (2011-2013) reference estimates for each stock as well as the target and threshold levels for abundance and effective exploitation. The reference abundance is used to determine a depleted status while effective exploitation is used to determine an overfishing status.

		GOM/GBK	SNE
Abundance (millions)	**2011-2013 Reference**	**248**	**10**
	Threshold	**66**	**24**
	Target	**107**	**32**
Effective Exploitation	**2011-2013 Reference**	**0.48**	**0.27**
	Threshold	**0.50**	**0.41**
	Target	**0.46**	**0.37**

One of the largest indicators of poor stock condition in SNE has been the marked decline in recruitment, or the number of lobsters surviving to enter the fishery. Indices suggest the stock is in recruitment failure as, since 2011, all larval indices have been below the 25th percentile. Figure 1 depicts larval indices from Long Island Sound from 1983 to 2015 which show a significant decline in the density of larvae since the 1990's. Model-free indicators show similar trends as all four young-of-year indices, which measure the abundance of age 0 lobsters, are below the median (Appendix 2). In 2015, the young-of-year index in Massachusetts hit zero (Appendix 2). This is concerning as it means the number of young lobsters which have yet to recruit into the fishery is low and the stock may experience further declines.

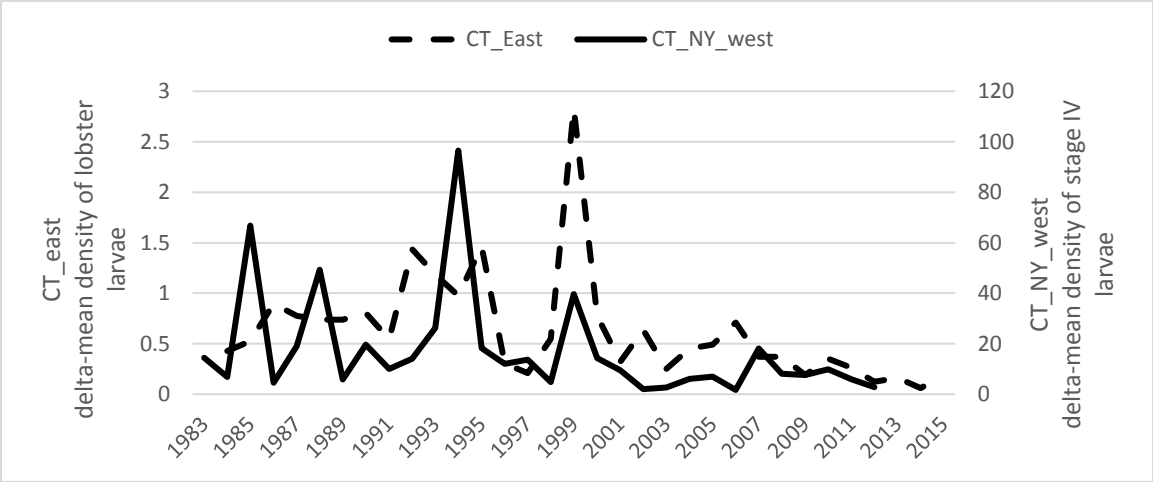


Figure 1: Annual density (delta mean per 1000 m^3) of lobster larvae (all stages) in MPS entrainment samples during their season of occurrence (CT-East) and stage IV larvae captured in surface plankton nets at 8 stations in western Long Island Sound. Source: CT DEEP and Dominion Nuclear Power Station.

Furthermore, analysis by the TC shows spawning-stock biomass (SSB) and recruitment may be decoupled. Figure 2 shows the relationship between SSB and recruitment from 1979 to 2011. Overall, the plot indicates a positive relationship such that there are more lobsters entering the fishery when the reproductive portion of the population is larger;

however, over the last decade, this relationship has decoupled, with recruitment declining and SSB remaining steady. This suggests depensatory mechanisms may be at play in SNE, such that recruitment drops to very low levels well before SSB reaches zero. Low recruitment levels may be the result of reduced mating success, environmentally-mediated changes in survivorship, and/or increased predation. Figure 2 also shows the wide range of recruitment which can be produced from a single level of SSB, even when stock abundance was high in the early 1990's. This is important to note as management action seeking to increase SSB and egg production can result in a wide range of recruitment.

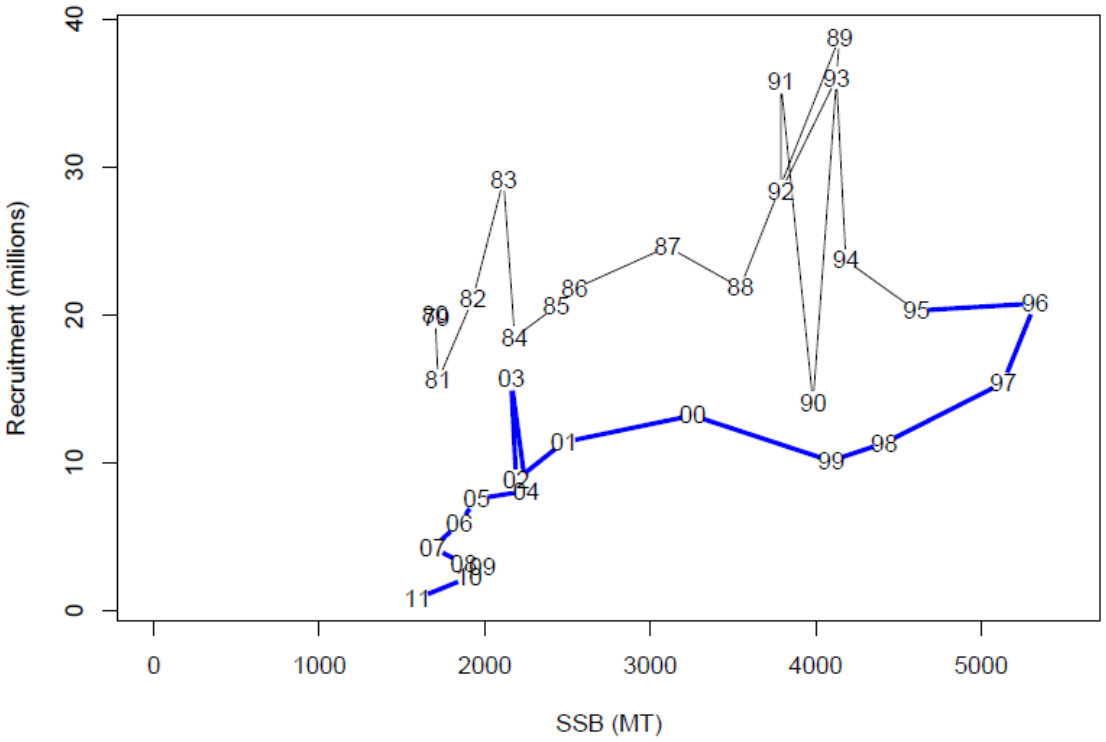


Figure 2: The relationship between model-based spawning stock biomass and recruits from 1979 to 2011. The blue line denotes the trajectory from 1995 – 2011 (recruiting to the model from 1998 to 2014).

There are several contributors to the poor stock condition in SNE, including an increase in natural mortality and continued fishing pressure. Climate change has had a significant impact on the stock as lobster physiology is intricately tied to water temperatures. Not only does water temperature impact when lobster eggs hatch but it also has a direct effect on larval survivorship as waters which are too cold (<10°C) or too warm (>22°C) increase mortality.[1] Adult lobsters also are impacted by warming waters as recent laboratory studies suggest lobsters have a threshold of ~20.5°C, above which lobsters experience significant stress.[2] Unfortunately, ocean temperatures, particularly inshore, have been rising. Data from Buzzards Bay, MA and Long Island Sound show the number

[1] MacKenzie, 1988.
[2] Powers et al., 2004.

of days above 20°C has markedly increased since 1997 (Appendix 3). These warming waters have increased the natural mortality of the stock. Predation also has a significant impact on the species. Lobsters, especially juveniles, are an important source of food for many finfish species including Atlantic cod, spiny dogfish, black seabass and skate. When populations of these species increase, pressure on the lobster stock increases.

In conjunction with the increase in natural mortality, continued fishing pressure has furthered the decline of the SNE stock. As the stock has decreased to record low abundance, effort and landings in the SNE fishery have likewise declined. This is in response to not only the low abundance but also recently implemented regulations and the higher costs of fuel and bait. Importantly, while the 2015 Stock Assessment did not conclude overfishing is occurring, fishing mortality is still the primary contributor to the stock's mortality. Work by the TC shows that, even when accounting for the recent increases in natural mortality, fishing mortality is removing roughly twice as much SSB from the population annually than natural mortality (Figure 3). This suggests that, in the face of climate change and increases in predation, management action can still have real effects on spawning stock abundance and egg production. Importantly, favorable environmental conditions will be needed to translate this increase in egg production into a successful recruitment event. This is highlighted in Figures 2 and 3 as, while the proportion of SSB surviving in SNE has generally increased since 2000, recruitment has significantly declined.

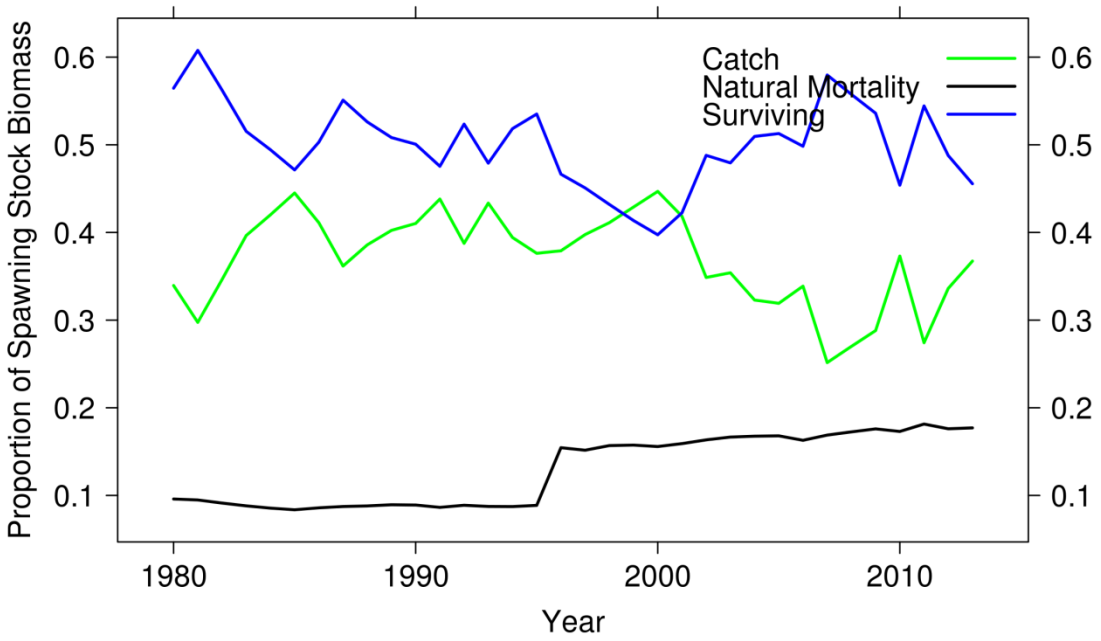


Figure 3: Proportion of SSB surviving or removed by fishing and natural mortality annually (1980-2013).

In an attempt to understand the extent of management action needed to improve stock conditions, the Board directed the TC to model future lobster abundance under various levels of fishing mortality and natural mortality. Results of these stock projections

concluded a 75% to 90% reduction in fishing mortality would be needed to stabilize the stock under current natural mortality conditions (Appendix 4); should natural mortality increase, greater reductions in fishing mortality would be needed. The projections also showed that without management action, stock conditions would be expected to deteriorate and reference abundance could decline by 50%. These results highlight the poor condition of the stock and the need for impactful management action.

2.3 Fishery Status

2.3.1 Commercial Fishery

The SNE fishery is carried out by fishermen from Massachusetts, Rhode Island, Connecticut, New York and New Jersey, with smaller contributions from Delaware, Maryland, and Virginia. This fleet is comprised of small vessels (22' to 42') which make day trips in nearshore waters (less than 12 miles) as well as larger boats (55' to 75') which make multi-day trips to the canyons along the continental shelf. The SNE fishery is executed in LCMAs 2, 4, 5, and 6 as well as the western portion of LCMA 3 (Appendix 1).

The SNE fishery has experienced a noticeable contraction in effort and landings over the last decade (Table 2). Landings in the 1980's steadily rose from 4.06 million pounds in 1981 to over 13 million pounds in 1989. Landings continued to rise in the 1990's, peaking at 21.9 million pounds in 1997. 43% of these landings were from New York, followed by Rhode Island (28%), Connecticut (16%), and Massachusetts (12%). Starting in the early 2000's, landings began to precipitously decline. In 2004, landings (5.48 million pounds) were less than half of what they were four years earlier in 2000 (13.39 million pounds). This trajectory continued such that landings in 2015 were 3.5 million pounds. Rhode Island was the largest contributor of landings (55%) followed by Massachusetts (22%). This large decline in harvest is likely the result of a declining stock size, attrition in the fishery, regulatory changes, and substantial increases in the operating costs of the fishery associated with fuel and bait. Interestingly, despite the decrease in overall fishing effort, those who remain in the fishery have experienced increasing catch rates. The TC discussed this trend in their February 2016 presentation to the Board and highlighted that this is due to high attrition in the lobster fleet which has resulted in fewer fishermen concentrating their effort on the remaining aggregations of lobster in SNE.

In conjunction with the decrease in landings, the number of active permit holders has also decreased (Table 3). In 1990, there were 202 active lobster permits in Massachusetts. Only 24 years later, this number decreased by ~50%. Similar trends can be seen in the other states as from 2007-2014, the number of active permits decreased by 50% in Rhode Island and by 60% in Connecticut.

Data on the number of traps fished in Massachusetts, Rhode Island, Connecticut, and New York also matches the trends seen in landings (Table 4). In 1990, the number of active traps fished in Massachusetts, Connecticut and New York was 291,632 and this quickly rose to 443,833 by 1995. The number of traps fished peaked in 1998, just one

year after landings peaked, at 588,422 traps. At this time, 59% of traps were from New York. Since then, the number of active traps has dramatically declined. In 2013, only 151,970 traps were fished in SNE, with New York seeing the largest decline and comprising only 14% of active traps fished. Rhode Island fishermen contributed the largest number of traps fished in 2013 at 42%.

Table 5 shows 2016 trap allocations in LCMAs 2, 3, 4, 5, and 6. The greatest number of traps are allocated in LCMAs 2, 3 and 6; however; a large portion of traps in LCMA 6 are not actively fished. This is corroborated by data showing the harvest of lobster from LCMA 6 has the second lowest landings in the SNE fishery (Table 6). Roughly two-thirds of landings in 2012 came from LCMA 3, followed by LCMA 4 and LCMA 2. The lowest landings are from LCMA 5, which also the fewest traps allocated to its waters.

Table 2. SNE landings, in pounds, by state from 1981 to 2015.

Year	MA	RI	CT	NY	NJ & South	Total
1981	952,396	749,571	806,891	835,551	714,297	4,058,705
1982	1,161,835	1,737,241	879,643	1,119,947	1,007,511	5,906,177
1983	1,340,409	3,236,382	1,653,465	1,208,132	912,713	8,351,101
1984	1,494,732	3,611,168	1,796,765	1,307,340	1,168,449	9,378,453
1985	1,276,475	3,509,755	1,380,092	1,241,201	1,322,772	8,730,295
1986	1,300,726	4,310,032	1,254,429	1,417,571	1,382,297	9,665,054
1987	1,274,270	4,241,689	1,571,894	1,146,402	1,591,736	9,825,991
1988	1,384,501	3,897,768	1,922,429	1,571,894	1,699,762	10,476,354
1989	1,485,914	4,989,055	2,076,752	2,345,716	2,198,006	13,095,443
1990	2,004,000	6,382,375	2,645,544	3,414,956	2,350,125	16,797,000
1991	2,059,115	5,998,771	2,674,204	3,128,356	1,761,491	15,621,937
1992	1,792,356	5,502,732	2,533,108	2,652,158	1,263,247	13,743,601
1993	1,913,610	5,509,345	2,175,960	2,667,590	981,056	13,247,562
1994	2,158,323	6,078,137	2,147,300	3,955,088	597,452	14,936,301
1995	2,160,528	5,628,395	2,541,927	6,653,543	663,591	17,647,983
1996	2,151,709	5,557,847	2,888,052	9,409,318	690,046	20,696,973
1997	2,574,996	6,086,956	3,467,867	8,878,005	895,076	21,902,900
1998	2,420,673	5,897,359	3,712,580	7,896,949	745,162	20,672,722
1999	2,180,369	7,656,645	2,594,838	6,452,923	985,465	19,870,240
2000	1,629,214	6,483,787	1,386,706	2,883,643	1,005,307	13,388,657
2001	1,649,056	4,179,960	1,322,772	2,052,501	641,544	9,845,833
2002	1,653,465	3,600,144	1,062,627	1,439,617	293,214	8,049,068
2003	1,025,148	2,742,547	668,000	945,782	249,122	5,630,599
2004	989,874	2,250,917	639,340	1,170,653	425,492	5,476,276
2005	1,117,742	3,068,831	712,092	1,225,769	436,515	6,560,949
2006	1,199,313	2,769,003	789,254	1,300,726	529,109	6,587,405
2007	850,983	2,321,465	544,541	888,462	760,594	5,366,045
2008	751,775	2,707,273	416,673	705,478	800,277	5,381,477
2009	888,462	2,334,693	410,059	729,729	855,393	5,218,336
2010	762,799	2,231,075	432,106	811,300	806,891	5,044,171
2011	548,950	1,604,963	196,211	343,921	751,775	3,445,821
2012	637,135	1,845,267	240,304	275,578	992,079	3,990,362
2013	696,660	1,618,191	127,868	246,917	791,459	3,481,095
2014	727,525	1,807,788	141,096	216,053	619,542	3,512,004
2015	771,617	1,966,521	156,528	145,505	505,982	3,546,153

Table 3. The number of active permits (MA, RI, CT, NJ, DE, MD) or total permits (NY) in the SNE stock. An active permit means any commercial vessel that reported landings. MA data includes both active trap and non-trap lobster permits.

	MA (Active)	RI (Active)	CT (Active)	NY (Total)	NJ (Active)	DE (Active)	MD (Active)	Total
1990	202			994				1196
1991	190			1067				1257
1992	184			1171				1355
1993	205			1211				1416
1994	236			1265				1501
1995	222		365	995				1582
1996	207		322	932	42		12	1515
1997	217		305	888	42		15	1467
1998	225		311	761	40		12	1349
1999	223		299	746	41		11	1320
2000	199		245	657	53		10	1164
2001	191		234	600	54		10	1089
2002	196		210	554	46		10	1016
2003	171		167	507	34	7	8	894
2004	152		177	477	35	7	9	857
2005	134		179	458	27	3	7	808
2006	144		220	428	27	5	7	831
2007	133	304	195	412	31	5	8	1088
2008	112	288	162	384	30	5	7	988
2009	110	267	139	375	33	3	7	934
2010	121	269	129	360	30	3	7	919
2011	116	216	98	344	30	2	5	811
2012	112	195	80	334	29	1	6	757
2013	95	163	59	326	29	1	5	678
2014	96	156	57	309	29	3	6	656

Table 4. Traps fished by state in the SNE stock unit. Traps fished are those traps reported fished by industry members on their state catch reports or on VTRs. (Source: 2015 Stock Assessment)

Year	Massachusetts	Rhode Island	Connecticut	New York	Total
1981	41,395	*NA*		48,295	89,690
1982	44,123	*NA*		43,977	88,100
1983	46,303	*NA*		59,808	106,111
1984	49,072	*NA*	66,709	77,599	193,380
1985	55,954	*NA*	65,262	88,332	209,548
1986	59,156	*NA*	65,826	77,429	202,411
1987	63,518	*NA*	70,646	76,729	210,893
1988	63,610	*NA*	79,154	101,790	244,554
1989	62,700	*NA*	83,915	143,320	289,935
1990	53,768	*NA*	100,360	137,504	291,632
1991	59,922	*NA*	101,290	155,276	316,488
1992	58,406	*NA*	107,668	187,661	353,735
1993	62,615	*NA*	115,224	237,117	414,956
1994	71,472	*NA*	110,805	269,419	451,696
1995	71,269	*NA*	119,983	252,581	443,833
1996	71,830	*NA*	130,360	314,297	516,487
1997	76,717	*NA*	133,770	335,860	546,347
1998	83,166	*NA*	158,527	346,729	588,422
1999	83,394	*NA*	162,149	332,323	577,865
2000	68,162	*NA*	122,386	212,767	403,314
2001	65,225	173,133	121,501	191,853	551,712
2002	78,965	152,021	117,731	157,747	506,464
2003	63,444	133,687	85,048	101,207	383,386
2004	55,191	128,081	84,071	102,351	369,694
2005	47,779	117,610	83,946	85,817	335,152
2006	52,990	120,242	90,421	89,301	352,954
2007	49,722	130,556	81,792	92,368	354,438
2008	42,934	104,440	56,355	90,909	294,638
2009	40,237	105,414	63,824	51,173	260,648
2010	48,558	111,509	53,516	70,350	283,933
2011	58,783	78,849	39,518	49,779	226,929
2012	54,102	76,826	29,353	29,678	189,959
2013	49,319	63,089	18,435	21,127	151,970

Table 5: 2016 trap allocations by LCMA in the SNE stock. LCMA 3 includes traps fished in both the SNE stock and the Gulf of Maine/Georges Bank stock.

	LCMA 2	LCMA 3	LCMA 4	LCMA 5	LCMA 6
MA	33,377	49,040	1,100		
RI	59,789	41,288	2,424		
CT	4,163	652	2,725		139,186
NY	1,141	2285	11,075	600	111,108
NJ	940	12,155	6,530	3,154	
DE				4,530	
MD				4,000	
VA				1,200	
TOTAL	99,410	105,420	23,854	13,484	250,294

Table 6. Estimated SNE lobster landings (in pounds) by LCMA.

Year	LCMA 2	LCMA 3	LCMA 4	LCMA 5	LCMA 6
1982	1,656,479	2,135,954	622,674	99,093	1,359,058
1983	2,958,366	2,258,492	633,254	71,804	2,428,633
1984	2,978,985	2,765,512	795,180	135,652	2,704,070
1985	2,992,330	2,330,628	964,043	170,998	2,273,337
1986	3,081,903	3,009,509	1,084,282	125,969	2,362,128
1987	3,219,900	2,655,725	1,473,841	98,486	2,378,765
1988	3,259,336	2,269,480	1,666,439	85,142	3,195,208
1989	4,175,114	2,845,444	2,232,935	106,126	3,735,250
1990	4,374,062	5,253,653	2,431,198	237,410	4,250,654
1991	4,140,145	4,811,267	2,096,138	115,020	4,393,986
1992	3,795,367	4,023,295	1,448,866	77,854	4,362,551
1993	3,772,494	3,776,113	1,597,447	89,495	3,968,663
1994	5,602,507	3,030,046	554,367	26,013	5,738,398
1995	4,960,453	2,661,176	962,077	45,054	8,564,325
1996	4,880,328	2,610,223	978,376	52,758	11,705,439
1997	5,324,775	3,183,034	1,162,862	36,623	11,650,701
1998	5,273,463	2,724,429	1,534,067	41,963	10,575,143
1999	6,938,658	3,195,423	1,346,509	77,621	8,331,142
2000	5,651,160	2,673,111	1,123,486	53,364	3,802,880
2001	3,862,054	2,053,831	762,408	55,537	3,013,551
2002	3,445,004	1,899,923	442,425	14,838	2,230,869
2003	1,110,534	2,519,713	423,583	17,394	1,448,011
2004	1,184,942	2,014,702	480,203	93,270	1,534,130
2005	1,464,433	1,800,406	457,275	54,181	1,673,396
2006	1,853,505	1,983,721	516,130	59,928	1,840,308
2007	1,430,836	1,494,830	617,978	56,866	1,263,648
2008	1,168,921	1,918,429	440,108	322,916	920,951
2009	1,051,241	2,227,432	488,792	308,212	896,594
2010	1,022,528	2,135,008	522,037	184,409	966,505
2011	730,889	1,954,052	488,977	148,587	306,079
2012	627,051	2,003,412	782,684	154,455	286,215

*To separate landings by LCMA, NMFS statistical areas are placed into a single LCMA.

One of the largest changes over the last decade has been the transition from a primarily inshore to a primarily offshore lobster fishery. In 1982, 64% of landings in SNE were from the inshore portion of the stock. This increased to 87% in 1998 as landings quickly grew in the fishery. However, declines in the stock, particularly inshore, have led the fishery to be primarily executed offshore. Figure 4 shows the landings of lobster inshore and offshore. While the pounds of lobster landed inshore has declined since 1997, offshore landings have experienced less severe declines and have even stabilized over the last decade. In fact, 2011 was the first year in which a greater portion (55%) of lobster were landed offshore than inshore. This shift in the fishery can likely be explained by warming coastal waters which have caused declines in recruitment and prompted migrations of lobsters to cooler waters offshore.

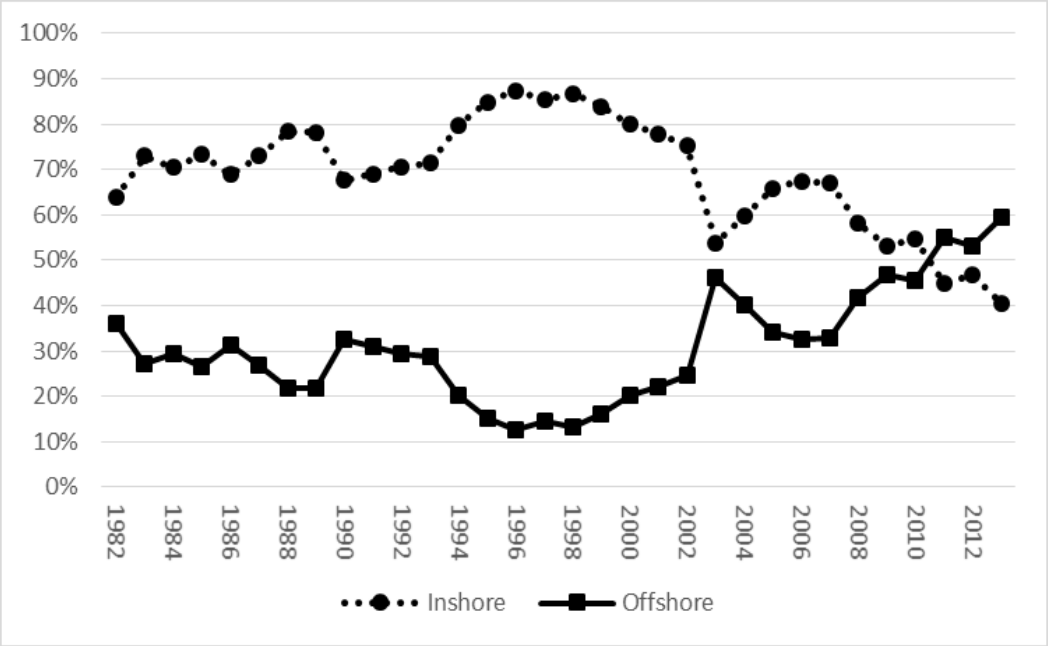


Figure 4: Percentage of landings in SNE occurring in the inshore and offshore fishery. The inshore fishery is defined as landings from statistical areas 538, 539, 611, 612, 613, 614, 621, 625, 631, and 635. The offshore fishery is defined as landings from statistical areas 533, 534, 537, 615, 616, 622, 623, 624, 626, 627, and 632.

The non-trap fishery for lobster is a relatively small percentage of the overall SNE landings. In 2015, a total of 858,736 pounds were landed with non-trap gear. This value is an overestimate as it includes non-trap landings from Massachusetts which spans both the GOM/GBK and SNE stock. 93.6% of non-trap landings come from Massachusetts, followed by Rhode Island (5.8%) and Connecticut (0.4%).

2.3.2. Recreational Fishery

While the lobster fishery is predominately commercial, there is a small recreational fishery which harvests lobsters. This recreational fishery primarily occurs in the summer months and lobster are typically harvested with traps, and in some states, by hand while diving. The states of Massachusetts, Connecticut, and New York currently collect recreational information on lobster landings. In general, recreational landings are only a small percentage of the states' total landings. In Connecticut, recreational landings have declined in conjunction with commercial landings, with the number of personal-use licenses sold in Connecticut dropping from 875 in 2009 to 163 in 2015. Recreational landings in Connecticut have varied between 1% and 4% of annual total harvest between 2001 and 2011. In New York, 2015 recreational harvest was 2,130 pounds, or roughly 1.4% of total state harvest. Recreational harvest in Massachusetts is significantly higher, in pounds, with a five year average from 2010-2014 at 224,932 pounds; however, it is important to note that this includes landings from both the GOM/GBK and SNE stocks. Similar to New York, Massachusetts' recreational fishery represents roughly 1% of total state landings.

2.4 Status of Management

Lobster are currently managed under Amendment 3, and its twenty-four addenda. One of the hallmarks of Amendment 3 was the creation of seven LCMAs along the coast. These areas are intended to reflect the regional differences in the fishery and, as a result, are permitted to have disparate management measures. The Lobster Board, the Commission's managing body for the species, is comprised of 10 states (Maine through Virginia) and the Federal Government. While ASMFC is not under the purview of the Magnuson-Stevens Act (MSA), the Federal Government, via NOAA Fisheries, supports the Commission's management of interjurisdictional fisheries. When federal support involves the implementation of management measures offshore (3-200 miles), those regulations must both be compatible with the Commission Plan and consistent with the National Standards outlined in MSA.

To date, the American lobster fishery has primarily been managed through input controls, such as biological measures and trap caps, which limit the amount of effort fishermen put into the fishery. Table 7 describes current management measures for all LCMAs which fall within SNE. All areas have a minimum size of 3 ⅜", with the exception of LCMA 3, which is at 3 $^{17}/_{32}$". All areas also have the same maximum size of 5 ¼", with the exception of LCMA 3, which is at 6 ¾". LCMAs 2, 5, and federal waters of Area 4 require v-notching of egg-bearing females; this is not required in LCMA 6, state waters of LCMA 4, or the SNE portion of LCMA 3. All areas in SNE, however, do have the same v-notch definition which prohibits retention if the notch is at least an 1/8 inch deep. All areas have history-based effort control programs with LCMA 2 having the lowest trap cap set at 800 traps.

In response to the findings of the 2009 stock assessment, the Board passed several addenda aimed at reducing exploitation and scaling the size of the fishery (Table 8). Addendum XVII reduced exploitation by 10% with LCMAs 2, 5, and federal waters of 4 instituting mandatory v-notching, LCMA 3 increasing the minimum gauge size by 1/32", and LCMAs 4, 5, and 6 instituting closed seasons. The Board also approved Addendum XVIII, which implemented a series of trap allocation reductions in LCMAs 2 and 3. The goal of this management action was to scale the size of the SNE fishery to the diminished size of the resource. Previous to Addendum XVIII, LCMA 3 also implemented a 10% (Addendum IV) and 5% (Addendum XI) reduction in trap allocations. In a subsequent phase of management action, the Board approved Addenda XXI and XXII, which modified the trap transferability rules for LCMAs 2 and 3. The intent of these addenda was to increase the flexibility for fishermen to adjust to management measures aimed at reducing latent effort through fishery consolidation. Management measures in these addenda include modifications to the single or individual ownership caps (otherwise known as trap banking) and aggregate ownership caps. These measures have not yet been implemented in Federal waters.

Table 7. 2016 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. None 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	1/8" 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	February 1-March 31	Sept 8-Nov 28	February 1-April 30

Table 8: Management action taken by the Board since the 2009 Benchmark Stock Assessment.

Year	Addendum	LCMA Affected	Action Taken	Implementation Date
2012	Addendum XVII	2	Mandatory v-notching	June 1, 2012
		3	Minimum gauge size increased from 3 ½" to 3 17/32"	January 1, 2013
		4	Mandatory v-notching Season closure from April 30 – May 31	July 1, 2012*
		5	Mandatory v-notching Season closure from Feb. 1 – Mar. 31	January 1, 2013
		6	Season closure from Sep 8-Nov 28	January 1, 2013
	Addendum XVIII	2	Trap allocation reduced by 25% on first year, reduced by 5% every year for following five years	2016
		3	Trap allocation reduction annually by 5% for five years	2016
2013	Addendum XIX	3	10% conservation tax assessed on any transfer or full business sale**	2013
	Addendum XX	3	Prohibitive to set lobster traps in Close Area II from Nov 1 – June 15	2013
	Addendum XXI	2	Recipient of a multi-LCMA trap allocation retains multi-LCMA history and declares which area(s) will be fished in a year; Single Ownership Cap/Aggregate Ownership Cap is 1,600 traps for any individual or corporation at a given time; Sunset Provision of two years on Single Ownership Cap	November 1, 2013***
		3	5% reduction for 5 years on active trap cap from 2,000 to 1,548; recipient of a multi-area trap allocation retains the multi-area history and declares which area(s) will be fished each fishing year	November 1, 2013***
	Addendum XXII	3	5% reduction for 5 years on single-ownership and aggregate ownership caps	***
2015	Addendum XXIV	2	Removed 10% conservation tax on full business transfers; traps shall be transferred in increments of 10; dual permit holders are allowed to transfer allocation with dual permit holders from other states	2015

*ASMFC's Lobster Management Board voted to revise this closure from February 1 – March 31 to April 30- May 31 to maximize the conservation benefit of the closure. NOAA Fisheries implemented this change in Federal waters in November 2015.

**Conservation tax on partial transfers was reduced from 20% and replaced Section 4.1.1 of Addendum XIV

***NOAA Fisheries postponed rule making on Addenda XXI and XXII pending the outcome of SNE management in Addendum XXV.

2.5 Economic Status of Fishery

Total ex-vessel value in 2015 from the SNE lobster stock was just under $18.5 million (Table 9). The largest contributor was Rhode Island with 57% of the total value in SNE. This was followed by Massachusetts (20.9%) and New Jersey (12.2%). While there are a number of participants in the SNE lobster fishery, a large portion of landings are harvested by a small portion of fishermen. In 2015, 57% of fishermen landed less than 10,000 pounds of lobster per year; however, these fishermen were responsible for just 9% of total SNE landings, in pounds. In contrast, just 2% of fishermen landed greater than 100,000 pounds each year but they were responsible for 20% of landings in the fishery. This suggests a significant portion of landings in the lobster fishery are made by a small number of participants. While the lobster fishery in New England is a distinct fishery with lobster being the primary catch, in the Mid-Atlantic, lobster is often a secondary component of catch in traps. Lobster fishermen in the southern extent of the lobster's range participate in a multi-species fishery in which harvesters catch various species, including lobster, Jonah crab, and black seabass.

Table 9: 2015 ex-vessel values in the SNE lobster fishery.

	MA	RI	CT	NY	NJ	DE	MD	VA	Total
Ex-Vessel ($)	3,871,993	10,535,726	748,797	820,456	2,248,638	61,400	186,039	24,092	18,497,141
%	20.9%	57.0%	4.0%	4.4%	12.2%	0.3%	1.0%	0.1%	100.0%

*MA and RI values were calculated by multiplying landings from harvester reports by an average price based on dealer information.

In considering the economic status of the lobster fishery, it is also important to consider the Jonah crab fishery, as the two species are managed together and are primarily caught with the same gear. The Jonah crab fishery has experienced immense growth over the last 15 years. In the early 2000's, landings were roughly 2.6 million pounds and the fishery was valued at $1.5 million. By 2014, landings increased to over 17 million pounds with a value exceeding $13 million. It is believed that this rapid increase in landings is the result of an increase in demand as well as the poor condition of the SNE lobster sock, which has prompted fishermen to supplement their income with Jonah crab.

Table 10 shows 2015 Jonah crab landings and ex-vessel value by state and quarter. Landings primarily came from Massachusetts (~70%) and Rhode Island (~29%) with landings occurring throughout the year. It is important to note that Massachusetts and Rhode Island landings include those from SNE and the GOM/GBK stock, and as a result, may represent an overestimate of Jonah crab landings in SNE.

Table 10: 2015 pounds landed and ex-vessel value for the Jonah crab fishery by state and quarter. Massachusetts and Rhode Island landings include those from SNE and GOM/GBK.

		Quarter 1	Quarter 2	Quarter 3	Quarter 4
Massachusetts	Pounds	2,079,872	2,236,879	1,868,270	2,911,353
	Ex-Vessel	$ 1,582,678	$ 1,690,807	$ 1,406,117	$ 2,214,914
Rhode Island	Pounds	1,022,100	716,318	655,522	1,467,320
	Ex-Vessel	$ 777,179	$ 566,794	$ 508,208	$ 803,182
Connecticut, New York, New Jersey	Pounds	17,298	18,831	13,774	24,156
	Ex-Vessel	$ 5,773	$ 13,237	$ 11,848	$ 15,513
Delaware, Maryland, Virginia	Pounds	16,264	15,511	7,915	3,886
	Ex-Vessel	$ 12,600	$ 25,709	$ 30,856	$ 9,746

2.6 Management Tools Considered

At the August 2016 meeting, the Lobster Board provided the Plan Development Team (PDT) with a list of potential management tools to consider in this addendum. They included: gauge size changes, trap reductions, closed seasons, trip limits, v-notching, and culls. The PDT evaluated the effectiveness of these various tools, considering the ability to successfully achieve the management targets for egg production as well as the ability to monitor, administer, and enforce the management tools in the fishery. For this evaluation, the PDT made extensive use of the TC's expertise, including their three memos to the Board in January 2016, April 2016, and July 2016.

2.6.1 Gauge Size Changes

Analysis conducted by the TC suggests that, both inshore and offshore, gauge size changes are an effective management tool to increase egg production and decrease fishing mortality. Changes to the minimum and maximum gauge size are enforceable and provide a direct benefit of keeping lobsters in the water longer. Furthermore, gauge size changes are intricately tied to the biology of lobsters, with clear benefits in terms of egg production and fitness. These impacts can be accurately predicted, adding confidence to the results of management decisions. As a result, gauge size changes are considered for use in this document.

Work presented in the TC's July memo to the Board (see Appendix 5) suggests gauge size changes can be used to achieve up to a 60% increase in egg production. Increases in the minimum size result in larger increases in egg production; however, it is important to note that decreases to the maximum gauge size provide permanent protection to larger lobsters which have likely already survived stressful conditions. Changes to the gauge size may necessitate changes to the vent size as the harvestable window of lobster sizes narrows. This would allow a greater portion of undersized lobsters to exit the trap and reduce stress from handling.

Economic impacts of gauge size changes depend on how the change is implemented, as gradual changes to the gauge size over several years may dampen the reductions in

harvest. Short-term impacts of gauge size changes include an immediate decrease in landings as there is a narrower slot from which to harvest lobsters; however, as the population stabilizes, landings settle into a common trajectory.

It is likely that the implementation of gauge size changes, or any of the proposed measures in the addendum, will create increased demand and shipments of lobsters from different LCMAs, including those LCMAs in the Gulf of Maine and Georges Bank (GOM/GBK), which have different gauge sizes. For many states, the minimum and maximum sizes in place are possession limits, meaning harvesters and dealers must abide by their state's regulations. While these strict regulations improve enforcement of gauge sizes, it can complicate interstate commerce as lobsters legally caught in LCMA 1 have a smaller minimum gauge size of 3 ¼". Some states have developed dealer provisions to address this concern. Rhode Island and Connecticut allow dealers to possess smaller lobsters legally harvested in other LCMAs as long as those lobsters are not sold to consumers in their state. Dealers are required to have thorough documentation regarding the origin of lobsters below the state's minimum size and these smaller lobsters must be kept separate from those lobsters legally landed in the state. Massachusetts, because it has lobster landed from four LCMAs, is only able to enforce LCMA-specific gauge sizes at the harvester level but has implemented significant penalties for violations.

2.6.2 Trap Reductions

The relationship between the biology of lobsters and trap reductions is not well understood. One of the major sources of uncertainty is the effect of trap reductions on the exploitation rate. This is because current trap reductions reduce a fishermen's total trap allocation, which includes both actively fished traps and latent effort. As trap allocations are reduced, it is impossible to predict the tipping points between reductions in latent effort and reductions in the number of actively fished traps.

Currently, LCMAs 2 and 3 are going through a series of trap reductions aimed at reducing trap allocations (ASMFC, 2012). Specifically, Addendum XVIII established a 25% reduction in year 1 followed by a series of 5% reductions for 5 years in LCMA 2. In LCMA 3, Addendum XVIII established a series of 5% reductions for 5 years. The intent of these reductions is to scale the size of the SNE fishery to the reduced size of the SNE stock. These trap reductions were initiated in 2016 and, as a result, potential biological impacts of the trap reductions were not included in the 2015 stock assessment. It is important to note that these actions reduce a fishermen's total allocation (latent and active effort) and that through the Commission's Trap Transferability Program, fishermen can replace cut traps and immediately build back up their number of actively fished traps. Some fishermen may choose to reduce effort or depart the fishery.

In an attempt to understand the impact of trap reductions on the SNE stock, the TC attempted to model the relationship between the number of traps actively fished (as opposed to total trap allocations which include latent effort), the exploitation rate, and

associated egg production. Information on the number of actively fished traps was from the 2015 stock assessment, which includes data from Massachusetts, Connecticut, Rhode Island and New York (Table 4). Data on the number of traps actively fished in states south of New York is not consistently collected and were not available for use by the TC. Furthermore, since the analysis uses data through 2014 (the last year of data in the 2015 Stock Assessment), it does not consider potential increases in egg production as the result of current trap allocation reductions (latent and active effort) in LCMAs 2 and 3. The analysis suggests, based on data from 1999-2013, a 25% reduction in the number of actively fished traps may result in a 14.3% (95% CI: 3.5%-21.2%) reduction in exploitation. This equates to a 13.1% (95% CI: 2.6%-19.7%) increase in egg production.

There are several concerns with the ability of trap reductions to achieve the projected increase in egg production. The first is that the above analysis assumes fishermen maintain a constant soak time when their trap allocation is reduced. Some studies show this assumption is not true, as fishermen reduce their soak time to compensate for fewer traps[3]; fishermen haul fewer traps more frequently to maintain current exploitation rates. This results in decreased impacts to catch and much smaller increases in egg production. It is important to note that many of these studies were conducted on the inshore fishery and the ability of offshore fishermen to increase their number of trips and trap hauls is unknown. Secondly, the analysis assumes that historic changes in exploitation are only the result of active trap reductions. This assumption is not true as previous management measures (gauge size changes, season closures, etc.) and general attrition in the fishery all contribute to the exploitation rate. Again, this results in an overestimate of egg production produced by trap reductions. Thirdly, the analysis is based on reductions in the number of traps actively fished; however, trap allocation reductions decrease a combination of latent and active traps. This further inflates the expected increase in egg production as trap reductions remove effort that is not currently in the water. Finally, fishermen in LCMAs 2 and 3 can maintain their number of actively fished traps through the Trap Transferability Program, which was created to allow active fishermen to replace cuts in their number of active traps with purchased traps. This again results in an overestimate of egg production benefits. Given these caveats, the TC's analysis, while based on the best available data, primarily serves as a tool for guidance by providing an upper limit of expected increases in egg production from trap reductions. It is likely that expected increase in egg production resulting from trap reductions is lower than 13.1%.

While there are several caveats to this management tool, trap reductions are considered for use in this document. Given the tenuous relationship between traps fished and fishing mortality, the economic impacts of trap reductions are not clear. Analysis suggests fishermen may be able to reduce their soak time in order to maintain current harvest levels, thereby minimizing reductions in profit. However, some

[3] Miller, 1990; Fogarty and Addison, 1997.

fishermen may also be encouraged to obtain trap allocations up to the trap cap in order to maintain their current business despite the reductions.

2.6.3 Closed Seasons

Closed seasons are a management tool which can be used to reduce pressure on the lobster stock at vulnerable times. A biological benefit of this tool is it removes stress on lobsters as they are caught in a trap, hauled to the surface, and handled by fishermen. Analysis by the TC shows seasonal closures can achieve up to a 21.6% increase in egg production, provided fishermen do not drastically alter fishing behavior to compensate for the closure. The largest increases in egg production result from summer closures (July-September) when fishing mortality is highest. Furthermore, a summer closure protects female lobsters which have mated but have yet to extrude their eggs. Importantly, this analysis is predicated on the assumption that fishermen do not adapt to the implementation of a season closure by intensifying their effort during the rest of the year. It also assumes that season closures, on an area-by-area basis, are implemented in a complementary manner as both lobsters and fishermen (i.e. dual permit holders) can move between LCMAs. Otherwise, the realized increases in egg production may be lower than is predicted in the analysis.

An important consideration with closed seasons is the potential impact on the Jonah crab fishery. Particularly in SNE, the lobster fishery is evolving into a mixed crustacean fishery in which lobsters and Jonah crab can be caught with the same gear at different times of the year. Season closures would directly impact the Jonah crab fishery if traps must be taken out of the water. Allowing lobster traps to remain in the water during a closed season would reduce the biological benefit of the management tool as lobsters would still be hauled, handled, and thrown overboard. As a result, the timing of season closures, if used, should be considered to minimize impacts on the Jonah crab fishery.

Given the potential for season closures to result in biological benefits to the stock, season closures are considered for use in this document. Economic impacts of season closures include reduced profits at certain times of the year; however, studies suggest gross revenues over the year may increase as the result of season closures. Analysis of the Maine lobster fishery by Chen and Townsend (1993) suggests closures of at least 3-4 months causes the redistribution of landings across seasons, which evens out prices and strengthens market values. SNE markets are more tenuous than in Maine but may be strengthened by consolidation.

2.6.4 Trip Limits

While trip limits are frequently used as a management tool in other fisheries, to-date they have not been used in the directed lobster fishery. Overall, trip limits are an enforceable management tool which can be used to maintain catch over the harvestable year and potentially reduce exploitation. Trip limits allow for the execution of both the lobster and Jonah crab fishery as lobster traps would still be allowed in the water.

There are several concerns about the effectiveness and equity of this management tool. Given the difference in vessel size and capacity between the inshore and offshore fleet, trip limits may disproportionately impact the offshore fleet which frequently takes multiday trips. As a result, impacted fishermen may respond by increasing the number of trips taken each year to maintain current harvest levels. Trip limits may also encourage fishermen who typically harvest below the limit to increase their catch and maximize their potential harvest. This unintended consequence could result in increased landings, a result contradictory to the stated purpose of this Addendum. Furthermore, trip limits often result in increased discards and stress as lobsters are hauled, handled, and returned to the water. A challenge for trip limits is how states with fishermen harvesting from both the SNE stock and GOM/GBK stock should monitor compliance when only one area may have a trip limit.

Given these concerns, the TC recommended trip limits be considered in conjunction with a quota for the SNE stock. A quota, if properly enforced, can cap landings in a fishery and allow managers to increase or decrease the total catch for the year depending on the current stock status. Implementing a quota in the lobster fishery presents many challenges and questions. The establishment of quotas requires tough discussions on how the total allowable catch will be set and if this will be allocated among jurisdictions, LCMAs, and/or seasons. An effective quota also requires good monitoring and enforcement, both of which need to be carefully considered prior to implementation. A particular challenge in the lobster fishery is how states with fishermen harvesting from both the SNE stock and GOM/GBK stock should monitor landings.

Given the challenges associated with implementing a trip limit and quota in the SNE lobster fishery and the stated intent of the Addendum to take quick and decisive action, trip limits and quotas are not considered for use in this document. The Board has not specified quotas as a management tool to consider in this addendum.

2.6.5 V-Notching

V-notching is a tool which has been used in the lobster fishery to protect reproductive females in the population. Currently, LCMAs 2, 5, and federal waters of LCMA 4 require mandatory v-notching; LCMA 6, state waters of LCMA 4, and the SNE portion of LCMA 3 do not. All areas use the same 1/8" definition for possessing a v-notch lobster, a less strict definition than the zero tolerance rule in LCMA 1. As a result, there is some concern that reproductive females who are protected in the Gulf of Maine, receive less protection if they migrate south. While v-notching can be a valuable management tool when actively conducted, the value of this tool is predicated on high encounter and harvest rates. Given significant reductions in landings in SNE, v-notching is not expected to produce a large benefit to the stock. Furthermore, the effectiveness of v-notching in SNE has been hindered by issues with non-compliance and incorrect marking, which lessen the value of this management tool. As a result, v-notching is not considered for use in this addendum.

2.6.6 Culls

Lobsters which only have one claw are referred to as culls. Claws can be lost naturally, such as in an interaction with another lobster, or during handling by fishermen. Currently, culls can be legally landed in the lobster fishery. A prohibition on the harvest of culls may reduce fishing mortality; however, it may also encourage better handling practices, reducing the number of culls and the benefit of this management tool on the stock. Furthermore, should culls be prohibited, tolerances would have to be established in case a lobster loses a claw during the steam to port and a clear definition would be needed to address regeneration. Given these limitations, a prohibition on culls is not considered for use in this document.

2.7 Additional Issues Considered in Addendum

2.7.1 Uniform Regulations

The Commission's Lobster Plan attempts to balance the sometimes competing interests of the need for regulatory consistency with the desire for area flexibility. Amendment 3 established seven LCMAs by which to manage the fishery. The intent of these areas was to identify the different stock conditions in various parts of the fishery and recognize the different measures needed to successfully manage the species. Amendment 3 also created Lobster Conservation Management Teams intended to inform the Board of conditions in various areas and to advise the Board on LCMA management measures. LCMTs have provided an avenue for industry participation in the management of lobster.

Nevertheless, the Board has recognized the need for a certain amount of standardization in the fishery. For example, all LCMAs have minimum gauge sizes of at least 3 ¼ inches, a maximum gauge size, and a prohibition on the harvest of berried lobsters. Most recently, the Board expressed the importance of all permitted fishermen having a single uniform trap allocation, and implemented the Trap Tag Data Base Program to ensure congruence amongst the states and federal government.

Currently, LCMAs use different suites of management measures; however, the Board has expressed some interest in further standardizing regulations across LCMAs in SNE. Possible combinations of standardization include creating uniform management measures for the inshore areas (LCMAs 2, 4, 5, and 6) or grouping LCMAs by region. In their April 25th memo to the Board, the TC outlined the costs and benefits of standardizing regulations in SNE. Overall, the report stated that standardizing biological measures would improve enforcement and the stock assessment process but may negatively impact industry by creating clear winners and losers in the fishery. This is especially true in regards to changes to the gauge size, as uniform increases in the minimum size will primarily impact inshore fishermen while uniform decreases in the maximum size will primarily impact offshore fishermen. Uniform regulations, in the context of this addendum, may also create implementation challenges as various LCMAs would have to come together to identify a common suite of tools which enable multiple areas to achieve the specified increase in egg production. By contrast, differing

Addendum XXV measures, particularly across states and adjacent LCMAs, may complicate needed management and undermine any potential benefits of the proposed measures as lobsters move from area to area.

2.7.2 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 (SNE vs. GOM/GBK). This is particularly problematic in LCMA 3 which spans both SNE and GOM/GBK. Historically, management measures implemented in LCMA 3 to address the poor condition of the SNE stock also impacted the GOM/GBK stock, which is not depleted. The complexity of the stock boundaries is further complicated by the fact that many vessels fishing out of Rhode Island and Massachusetts and are harvesting lobsters on Georges Bank, must travel through the SNE stock area to reach their port of landing. In addition, these vessels may be permitted to fish in multiple management areas, including areas that span both lobster stocks.

To date there has been no permit requirements to delineate within which stock an Area 3 fisherman is eligible to fish. Management action taken in response to the 2009 stock assessment was applied throughout LCMA 3, including portions in the GOM/GBK. Given the conservation burden of this addendum applies only to SNE, new conservation rules must either apply to all Area 3 fishermen regardless of location and stock fished (with economic implications on the GOM/GBK fisheries) or new measures will have to be stock specific.

3.0 Management Options

The following management issues are intended to increase egg production and decrease fishing mortality in SNE. Management tools which are considered for use in this document include gauge size changes, trap allocation reductions, and season closures. The management options are presented with the intent that each LCMT can choose how they would like to achieve the targeted increase in egg production. During the public comment period, LCMTs are encouraged to submit preliminary proposals on how they would prefer to achieve the various increases in egg production. One month after the Board chooses an egg production target and preliminarily approves the addendum, proposals on preferred management measures to achieve the required increase in egg production are due from the LCMTs. These proposals will be reviewed by the PDT, TC, and Board. If a proposal is not received from a LCMT, states with permitted individuals in that LCMA will work together to choose the management measures that will be implemented in that LCMA to achieve the target increase in egg production. The PDT encourages that states do not implement divergent management measures for a single LCMA; each state should agree on the management measures in a LCMA.

The starting point from which this document measures changes in egg production is 2014. This represents the last year for which data were incorporated into the 2015 Stock Assessment as well as the last year for which data were used in the TC's analyses on the

management tools included in this document. Table 8 shows the management action implemented by each LCMA before and after 2014. Management action implemented after 2014 is not accounted for in the analysis for this addendum and, as a result, counts towards the egg production target chosen by the Board. The value of egg production credit will depend on the management tool used and the extent of the management action taken, and will be reviewed by the Board. Other measures which were not implemented as a result of an addendum but which a LCMA believes contributed to a measurable increase in egg production since 2014 may be brought before the Board through the through the LCMT proposal process.

This document considers potential changes to the minimum and maximum carapace length at which lobsters can be harvested. Carapace length is defined as the straight-line measurement from the rear of the eye socket parallel to the centerline of the carapace to the posterior edge of the carapace. LCMTs would use Table 11 or Appendix 5 to determine the minimum and maximum size limit which would achieve the targeted increase in egg production.

This document also considers trap allocation reductions. LCMTs would use Table 12 to determine the impacts of a 25% trap reduction. Should an LCMA which is currently going through a series of trap reductions as a part of Addendum XVIII decide to complete additional trap reductions to achieve the egg production target, these would occur following the final year of trap reductions specified in Addendum XVIII. LCMAs that have previously agreed to reduce traps can accelerate these on-going trap cuts in order to begin implementation of any additional trap reductions which may result from this addendum and meet the timeline selected by the Board. The acceleration of on-going trap reductions does not result in a significantly higher level of egg production than trap reductions implemented on the current schedule.

This document also considers season closures. LCMTs would use Table 13 to determine the dates of the season closure and the expected increase in egg production.

Issue 1: Target Increase in Egg Production

This issue asks what the targeted increase in egg production should be in SNE. The Board has stated that the goal of Addendum XXV is to respond to the decline of the SNE stock and its decline in recruitment while preserving a functional portion of the lobster fishery in this area. The Board also identified increases in egg production ranging from 20% to 60%. Option A: 0% Increase in Egg Production is included primarily to add context to the Board's deliberations. Larger increases in egg production have the potential to provide greater benefits to the stock but are also likely to result in greater detriments to the industry.

Option A: 0% Increase in Egg Production (Status Quo)
Under this option there would be no targeted increase in egg production and no changes to management would be made through this addendum. All measures would remain the same as listed in Table 7.

Option B: 20% Increase in Egg Production
Under this option, LCMAs must take management action to increase egg production by 20% from current levels. Current stock status is that which is characterized by the end of the 2015 Stock Assessment.

Option C: 30% Increase in Egg Production
Under this option, LCMAs must take management action to increase egg production by 30% from current levels. Current stock status is that which is characterized by the end of the 2015 Stock Assessment.

Option D: 40% Increase in Egg Production
Under this option, LCMAs must take management action to increase egg production by 40% from current levels. Current stock status is that which is characterized by the end of the 2015 Stock Assessment.

Option E: 60% Increase in Egg Production
Under this option, LCMAs must take management action to increase egg production by 60% from current levels. Current stock status is that which is characterized by the end of the 2015 Stock Assessment.

Issue 2: Management Tools
This issue asks whether management tools can be used independently or must be used in combination with one another. Gauge size changes, trap reductions, and season closures are management tools which can be used to achieve the targeted increase in egg production. The Board has the greatest confidence in gauge size changes to achieve meaningful biological impacts. There is less confidence in trap reductions and season closures as the effectiveness of both tools is dependent on fishermen maintaining their current fishing behavior.

Option A: Management Tools Can Be Used Independently
Under this option, gauge size changes, trap reductions, and season closures can be used independently to achieve the targeted increase in egg production. For example, a season closure can be the sole management tool used to achieve the targeted increase in egg production. Management tools can still be paired together to achieve the required increase in egg production in this Addendum. For reference, analysis suggests that on their own, gauge size changes can account for up to a 60% increase in egg production, quarterly season closures can account for up to a 21.6% increase in egg production, and a 25% trap reduction in active traps can account for up to a 13.1% increase in egg production.

Option B: Trap Reductions and Season Closures Must Be Used In Conjunction with Gauge Size Changes

Under this option, gauge size changes can be used as a sole management measure to achieve the targeted increase in egg production; however, trap allocations and season closures must be used in conjunction with gauge size changes. Furthermore, season closures and trap reductions cannot account for more than half of the targeted increase in egg production. For example, if the targeted increase in egg production is 40%, trap reductions or season closures cannot account for more than a 20% increase in egg production.

Issue 3: Recreational Fishery

This issue asks whether the recreational fishery must abide by the management measures taken in this addendum. Recreational fishermen are those individuals who do not offer for sale their harvest of lobsters and are identified by their jurisdiction's recreational fishing permit. Historically, the recreational fishery has been subject to gauge size changes and season closures while trap reductions have only impacted the commercial fleet.

Option A: Recreational Fishery Must Abide by Management Action Taken in Addendum

Under this option, recreational fishermen in the lobster fishery must abide by all of the management measures implemented in their LCMA as a result this addendum. This could include gauge size changes, season closures, and trap reductions.

Option B: Recreational Fishery Must Abide by Gauge Size Changes and Season Closures

Under this option, recreational fishermen in the lobster fishery must abide by any gauge size changes or season closures that are implemented in their LCMA as a result of this addendum. Recreational fishermen would be exempt from any trap reductions taken in the LCMA in which they fish.

Option C: Recreational Fishery Must Abide by Gauge Size Changes

Under this option, recreational fishermen in the lobster fishery must abide by any gauge size changes that are implemented in their LCMA as a result of this addendum. Recreational fishermen would be exempt from any trap reductions or season closures taken in the LCMA in which they fish. Recreational fishermen with a trap allocation would be allowed to keep their pots in the water and land lobster during a season closure implemented as a result this addendum.

Issue 4: Season Closures

This issue asks how season closures, which are established as a result of this Addendum, should be implemented. Season closures implemented in LCMAs 4, 5, and 6 as a result of Addendum XVII currently require lobster traps to be removed from the water and prohibit harvesters from taking, landing, or selling lobster from that LCMA during the closure. Connecticut and New Jersey allows lobster traps to remain in the water only if

the license holder has a permit for another species. Since Addendum XVII, a fishery management plan was established for Jonah crab, and the Jonah crab and lobster fisheries are now jointly managed as a mixed-crustacean fishery. As such, the removal of traps during a season closure may negatively impact the Jonah crab fishery; however, the greatest biological impacts of a season closure are achieved when traps are removed from the water as the hauling and discarding of lobsters can increase stress and predation.

Option A: Lobster Traps Removed from Water

Under this option, lobster traps must be removed from the water during a season closure. No lobsters can be landed by any gear type including non-trap gear (trawls, gill nets, etc.) and trap gears (lobster traps, fish pots, whelk pots, etc.). During a season closure, lobster potters will have a two week period to remove lobster traps from the water and may set baited lobster traps one week prior to the end of the closed season.

Sub-Option A: Most Restrictive Rule Applies: Under this sub-option the most restrictive rule would apply to season closures. For example, if a fisherman is authorized to fish in LCMAs 2 and 3, and LCMA 2 implements a season closure, that fisherman cannot fish in either LCMA 2 or 3 during the closure.

Sub-Option B: Most Restrictive Rule Does Not Apply: Under this sub-option, the most restrictive rule would not apply to season closures. For example, if a fisherman is authorized to fish in LCMAs 2 and 3, and LCMA 2 implements a season closure while LCMA 3 does not, that fisherman could still fish in LCMA 3 while LCMA 2 is closed. The most restrictive rule would apply in the Area 2-3 overlap and the Area 3-5 overlap zones.

Option B: No Possession of Lobsters While Fishing

Under this option, no commercial harvester may possess on board or land lobsters during a season closure. Lobster traps, as well as other gears which harvest lobster, may remain in the water during a season closure and Jonah crab and whelk may be harvested during a season closure.

Sub-Option A: Most Restrictive Rule Applies: Under this sub-option the most restrictive rule would apply to season closures. For example, if a fisherman is authorized to fish in LCMAs 2 and 3, and LCMA 2 implements a season closure, that fisherman cannot fish in either LCMA 2 or 3 during the closure.

Sub-Option B: Most Restrictive Rule Does Not Apply: Under this sub-option, the most restrictive rule would not apply to season closures. For example, if a fisherman is authorized to fish in LCMAs 2 and 3, and LCMA 2 implements a season closure while LCMA 3 does not, that fisherman could still fish in LCMA 3 while LCMA 2 is closed. The most restrictive rule would apply in the Area 2-3 overlap and the Area 3-5 overlap zones.

Option C: Limit for Non-Trap Bycatch Fisheries

Under this option, a fisherman with a lobster trap allocation may not possess on board or land lobsters during a season closure but lobster traps may remain in the water and

Jonah crab and whelk may be harvested. Individuals who are permitted to land lobsters incidentally caught in non-trap gears may continue to land the bycatch allowance established in Amendment 3 of 100 lobsters per day (based on a 24 hour period) up to a maximum of 500 lobster per trip, for trips 5 days or longer. Addendum I categorized the black seabass pot fishery as a non-trap fishery. As a result, vessels issued an Area 5 trap waiver to fish for black sea bass are allowed to land lobster equivalent to the bycatch allowance established for non-trap gears.

Sub-Option A: Most Restrictive Rule Applies: Under this sub-option the most restrictive rule would apply to season closures. For example, if a fisherman is authorized to fish in LCMAs 2 and 3, and LCMA 2 implements a season closure, that fisherman cannot fish in either LCMA 2 or 3 during the closure.

Sub-Option B: Most Restrictive Rule Does Not Apply: Under this sub-option, the most restrictive rule would not apply to season closures. For example, if a fisherman is authorized to fish in LCMAs 2 and 3, and LCMA 2 implements a season closure while LCMA 3 does not, that fisherman could still fish in LCMA 3 while LCMA 2 is closed. The most restrictive rule would apply in the Area 2-3 overlap and the Area 3-5 overlap zones.

Issue 5: Uniform Regulations

This issue asks whether management measures should be uniform across LCMAs. See Section 2.7.1 Uniform Regulations for additional information.

Option A: Regulations Are Not Uniform Across LCMAs (Status Quo)

Under this option, regulations would not need to be standardized across management areas. LCMAs would be allowed to develop their own plans for how to achieve the targeted increase in egg production.

Option B: Regulations Are Uniform Across LCMAs 4 and 5

Under this option, gauge size changes and season closures would be standardized in LCMAs 4 and 5. Existing season closures implemented as a result of Addendum XVII must be reconciled such that they achieve the decrease in fishing mortality specified in Addendum XVII and the increase in egg production specified in Addendum XXV.

Option C: Regulations Are Uniform Across LCMAs 2, 4, 5, and 6

Under this option, gauge size changes and season closures would be standardized in LCMAs 2, 4, 5 and 6. Existing season closures implemented as a result of Addendum XVII must be reconciled such that they achieve the decrease in fishing mortality specified in Addendum XVII and the increase in egg production specified in Addendum XXV.

Issue 6: Implementation of Management Measures in LCMA 3

The following management options are intended to determine where in LCMA 3 the management measures selected in this addendum will apply. See Section 2.7.2 Stock Boundaries for additional information. Due to implications to the Trap Tag Data Base Program, trap reductions must be applied throughout LCMA 3.

Option A: Maintain LCMA 3 as a Single Area
Under this option, the current boundaries of LCMA 3 would be maintained. Management measures in this document would apply to all LCMA 3 permit holders, including those that fish in the GOM/GBK stock.

Option B: Split LCMA 3 along the 70°W Longitude Line
Under this option, LCMA 3 would be split along the 70°W longitude line to create an eastern section and a western section in LCMA 3 (see Appendix 1). The eastern portion of LCMA 3 would be comprised of areas east of the 70°W longitude line which are currently a part of the GOM/GBK stock. The western portion of LCMA 3 would be comprised of areas west of the 70°W longitude line which are currently a part of the SNE stock.

LCMA 3 permit holders would made a one-time declaration into either the eastern or western portion of LCMA 3 and would only be allowed to fish in their declared portion of LCMA 3. Trap tags would be amended to include "3E" for fishermen exclusively fishing in the eastern portion of the LCMA and "3W" for fishermen exclusively fishing in the western portion of the LCMA. Traps with "3E" trap tags can only be fished in the eastern portion of LCMA 3 while traps with "3W" can only be fished in the western portion of LCMA 3.

LCMA 3 permits and trap allocations may still be transferred as specified in Addendum XXI and the transfer recipient will designate in which section he/she would like to fish. Season closures and gauge size changes that are implemented as a result of this addendum would not apply for fishermen who elect to fish exclusively in the eastern portion of LCMA 3.

Option C: Split LCMA 3 along the 70°W Longitude Line with an Annual Declaration
Under this option, LCMA 3 would be split along the 70°W longitude line to create an eastern section and a western section in LCMA 3 (see Appendix 1). The eastern portion of LCMA 3 would be comprised of areas east of the 70°W longitude line which are currently a part of the GOM/GBK stock. The western portion of LCMA 3 would be comprised of areas west of the 70°W longitude line which are currently a part of the SNE stock.

On an annual basis, current LCMA 3 fishermen could elect to fish exclusively in the eastern portion of LCMA 3. Fishermen who do not choose this option could fish throughout the entire LMCA 3; however, they will be held to the stricter management measures of the two sections, as per the most restrictive rule (ASMFC, 2009). Fishermen can elect to fish exclusively in the eastern portion of LCMA 3 at the start of the fishing year but not during a fishing season. Trap tags would be amended to include "3E" for fishermen exclusively fishing in the eastern portion of the LCMA and traps with "3E"

trap tags can only be fished in the eastern portion of LCMA 3. All other LCMA 3 trap tags can be fished in the eastern or western portions of LCMA 3.

LCMA 3 permits and trap allocations may still be transferred as specified in Addendum XXI and the transfer recipient will designate at the start of the fishing year in which section he/she would like to fish. Season closures and gauge size changes adopted in this addendum would not apply for fishermen who elect to fish exclusively in the eastern portion of LCMA 3.

Table 11: Changes in the gauge size inshore (LCMAs 2, 4, 5, and 6) and offshore (LCMA 3) and the corresponding effects in egg production, exploitation, SSB, reference abundance, and catch. Each LCMT may use this table to propose how they will achieve the targeted increase in egg production.

		Min	Max	Harvest Window (mm)	Egg Production	Exploitation	Spawning Stock Biomass	Reference Abundance	Catch
20%	**Inshore**	88mm (3-15/32")	105mm (4-1/8")	17 (0.7")	20%	-18%	20%	9%	-11%
		91mm (3-9/16")	115mm (4 ½")	24 (0.9")	18%	-22%	22%	11%	-14%
		92mm (3-5/8")	165mm (6 ½")	73 (2.9")	20%	-27%	25%	13%	-17%
	Offshore	91mm (3-9/16")	105mm (4-1/8")	14 (0.6")	22%	-21%	22%	9%	-13%
		94mm (3-11/16")	115mm (4 ½")	21 (0.8")	20%	-26%	24%	12%	-17%
		95mm (3 ¾")	165mm (6 ½")	70 (2.8")	21%	-28%	26%	13%	-19%
30%	**Inshore**	94mm (3-11/16")	115mm (4 ½")	21 (0.8")	31%	-36%	38%	19%	-24%
		94mm (3-11/16")	125mm (4-9/10")	31 (1.2")	29%	-35%	36%	18%	-23%
	Offshore	96mm (3-25/32")	115mm (4 ½")	19 (0.7")	29%	-34%	34%	16%	-24%
		97mm (3-4/5")	165mm (6 ½")	68 (2.7")	31%	-38%	38%	18%	-27%
40%	**Inshore**	96mm (3-25/32")	115mm (4 ½")	19 (0.7")	40%	-43%	49%	23%	-30%
		96mm (3-25/32")	165mm (6 ½")	69 (2.7")	37%	-42%	46%	22%	-29%
		97mm (3-4/5")	165mm (6 ½")	68 (2.7")	43%	-46%	53%	25%	-33%
	Offshore	98mm (3-27/32")	165mm (6 ½")	67 (2.6")	39%	-45%	46%	22%	-33%
		99mm (3-7/8")	165mm (6 ½")	66 (2.6")	41%	-47%	49%	23%	-35%
60%	**Inshore**	99 mm (3-7/8")	115mm (4 ½")	16 (0.6")	60%	-56%	71%	32%	-42%
		101mm (3-29/32")	165mm (6 ½")	64 (2.5")	59%	-59%	76%	35%	-45%
	Offshore	102mm (4")	115mm (4 ½")	13 (0.5")	62%	-60%	71%	31%	-47%
		103mm (4-1/16")	165mm (6 ½")	62 (2.4")	63%	-63%	75%	34%	-50%

Table 12: Trap reductions in active SNE traps and the corresponding effects in egg production and exploitation. "All years" include data from 1981-2013 and "recent years" include data from 1999-2013. This split is done to reflect two apparent regimes in the relationship between fishing exploitation and actively fished traps. This table presumes that every trap reduced is active and that latent traps purchased through the Trap Transferability Program do not replace reduced active traps.

Years	Trap Reduction	Egg Production	Exploitation	Spawning Stock Biomass	Catch
All Years (1981-2013)	25%	9.6% (95% CI: 4.5%-13.0%)	-11.6% (95% CI: 6.5% - 16.3%)	14.4%	-6.9%
Recent Years (1999-2013)	25%	13.1% (95% CI: 2.6% - 19.7%)	-14.3% (95% CI: 3.5% - 21.2%)	15.6%	-10.2%

Table 13: Season closures in SNE and the corresponding effects in egg production, exploitation, SSB, and catch. Each LCMT may use this table to propose how they will achieve the targeted increase in egg production. This table assumes that fishermen do not intensify fishing effort during open seasons.

Season Closure	Egg Production	Exploitation	Spawning Stock Biomass	Catch
Winter (Jan-March)	3.0%	-2.1%	2.3%	-0.7%
Spring (April-June)	15.0%	-10.8%	16.0%	-1.7%
Summer (July-Sept)	21.6%	-26.0%	15.5%	-12.3%
Fall (Oct-Dec)	8.1%	-13.6%	8.4%	-4.2%

4.0 Monitoring

Given Addendum XXV represents an initial response to the results of the 2015 stock assessment, monitoring is necessary to determine the need and extent of future management action. The stated goal of this addendum is to increase egg production and reduce fishing mortality. As a result, the exploitation rate of the SNE stock will be monitored. If a reduction in fishing mortality, and a corresponding increase in egg production, is not observed following implementation of this addendum, the management tools implemented in this document will be re-evaluated. Furthermore, in order to determine the extent of future management action, model-free abundance indicators for SNE will be updated each year as a part of the annual Fishery Management Plan Review. This includes information on spawning stock abundance, full recruit abundance, recruit abundance, young-of-year indices, and survey encounter rates.

5.0 Compliance

If the existing lobster management plan 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 addendum. A final implementation schedule will be identified based on the target egg production and management tools chosen. In August 2016, the Board initially specified a two year implementation timeline; however, the length of the phase-in period may change with the degree of egg production increase chosen; a 60% increase in egg production may necessitate a longer implementation period than a 20% increase in egg production. The compliance schedule will take the following format:

XXXXX:	States must submit programs to implement Addendum XXV for approval by the American Lobster Management Board. These programs must reflect the management changes that will occur in each LCMA for which they have a permitted individual.
XXXXX:	The American Lobster Board Approves State Proposals
XXXXX:	All states must implement Addendum XXV through their approved management programs. States may begin implementing management programs prior to this deadline if approved by the Management Board.

6.0 Recommendation for Federal Waters

The SNE lobster resource has been reduced to very low levels. ASMFC believes additional fishery restrictions are necessary to prevent further depletion of the resource.

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

7.0 References

Atlantic States Marine Fisheries Commission (ASMFC). 2015. American Lobster Benchmark Stock Assessment and Peer Review Report.

ASMFC. 2009. Addendum XII to Amendment 3 to the Interstate Fishery Management Plan for American Lobster.

ASMFC. 2012. Addendum XVIII to Amendment 3 to the American Lobster Fishery Management Plan.

Cheng, H. and R. Townsend. 1993. Potential impact of seasonal closures in the US lobster fishery. Marine Resource Economics, 8:101-117.

Dominion Nuclear Connecticut, Inc. (DNC). 2013. Lobster studies. In: Monitoring the Marine Environment of Long Island Sound at Millstone Power Station, Waterford, CT. Annual Report 2012. 91 – 124pp. Appendix 1

Fogarty, M. and J. Addison. 1997. Modelling capture processes in individual traps: entry, escapement, and soak time. ICES J. Mar. Sci., 54: 193-20.

MacKenzie, B.R. 1988. Assessment of temperature effects on interrelationships between stage durations, mortality, and growth in laboratory-reared Homarus americanus Milne Edwards. J. Exp. Mar. Biol. Ecol. 116: 87-98.

Miller, R. 1990. Effectiveness of Crab and Lobster Traps. Can. J. Fish. Aquat. Sci., 47: 1228-1251

Powers, J., G.Lopez , R.Cerrato, and A. Dove. 2004. Effects of thermal stress on Long Island Sound lobster, H. americanus. Proceedings of the LIS Lobster Research Initiative working Meeting. 3-4 May, 2004, University of CT Avery Point, Groton, CT.

Appendix 1: LCMAs, stock boundaries, and NMFS statistical areas.

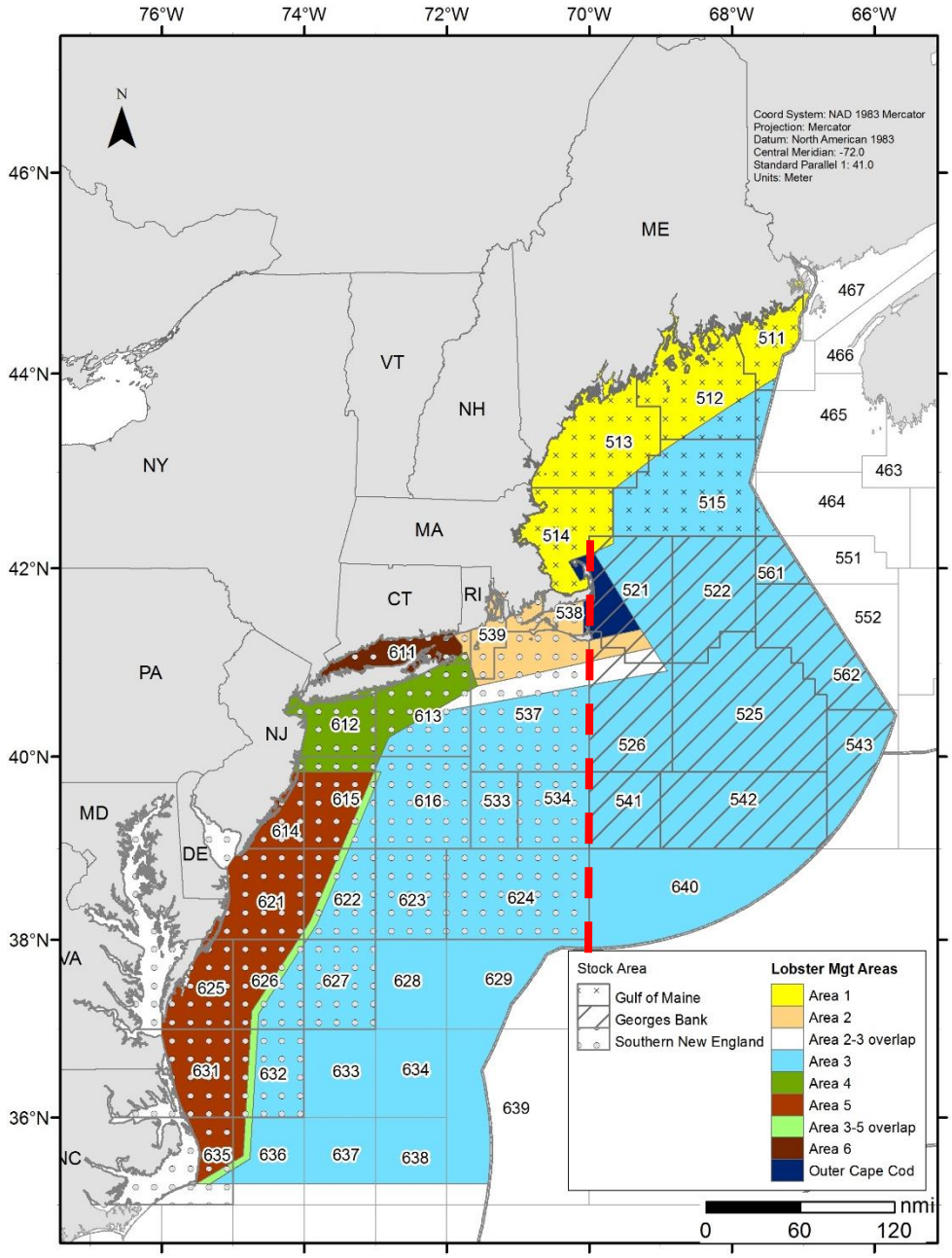


Figure 32.1. Statistical areas used to define the American lobster, *Homarus americanus*, stock.

Figure 1. Chart of Lobster stock units (GOM, GMB, and SNE), management conservation areas (1-6 and OCC), and NMFS statistical areas. The red dashed line represents the 70°W longitude line

Appendix 2: Southern New England Model Free Abundance Indicators

SPAWNING STOCK ABUNDANCE Mean weight (g) per tow of mature females								
Survey	NESFC		MA		RI		CT	
	Fall	spring	fall	spring	Fall	spring	Fall	spring
1981	198.93	15.71	9.21	99.78	161.55	111.57		
1982	156.07	118.29	50.04	26.42	53.52	43.52		
1983	120.20	35.51	0.72	59.62	87.86	141.69		
1984	192.38	44.50	4.04	51.67	203.58	259.91	2331.33	
1985	132.96	138.13	1.88	36.90	125.09	60.22	1040.42	1155.01
1986	59.83	61.35	87.60	19.06	128.49	136.78	1548.94	751.75
1987	143.76	67.33	44.51	35.12	475.51	86.13	1869.91	932.49
1988	122.36	121.34	13.16	46.33	662.07	100.75	1081.60	639.82
1989	124.57	44.65	233.88	70.68	363.92	151.06	853.74	1193.87
1990	175.83	75.87	59.02	150.21	230.17	258.72	1818.59	2369.93
1991	160.99	53.14	125.79	236.11	367.25	698.35	2185.29	2692.42
1992	178.88	61.38	179.80	47.84	321.95	117.18	1905.99	3598.02
1993	139.25	71.48	99.33	25.59	1286.74	1595.77	3335.55	2320.25
1994	54.70	36.40	126.00	82.42	359.96	164.37	3402.43	1170.49
1995	145.39	10.18	10.89	92.76	410.53	153.14	2253.58	3302.56
1996	227.08	32.01	59.61	54.16	861.32	353.55	3018.00	3882.27
1997	121.74	137.20	29.11	225.15	654.91	439.93	7173.56	5994.27
1998	161.20	44.97	52.73	138.81	251.53	286.59	2573.44	7738.30
1999	69.56	122.59	24.53	81.12	171.54	324.62	2546.24	8261.90
2000	95.66	60.02	20.08	142.78	268.99	303.32	1744.69	4430.68
2001	95.78	36.43	21.28	16.61	267.62	535.45	1513.56	3363.78
2002	85.56	146.86	0.00	44.75	35.68	572.35	365.12	2044.42
2003	52.83	31.71	0.00	5.97	205.85	110.43	1187.14	698.04
2004	47.10	47.01	37.18	3.58	288.49	591.60	626.96	522.99
2005	110.36	42.31	101.87	23.02	353.53	243.36	473.26	479.71
2006	65.03	90.62	0.00	60.77	465.26	788.63	219.99	465.37
2007	44.60	34.20	41.79	10.32	350.43	206.96	188.98	595.89
2008	25.90	58.14	0.00	19.67	401.73	194.57	248.63	760.88
2009	36.92	24.49	3.95	31.29	184.35	250.00	305.31	371.95
2010	101.74	46.39	130.73	32.09	166.07	177.64	na	361.72
2011	89.95	22.79	36.96	8.55	148.47	152.43	30.24	64.00
2012	205.12	39.64	14.13	9.93	31.16	118.13	6.28	88.85
2013	52.95	42.05	23.96	35.49	2.02	67.76	24.56	39.81
2014	50.93	198.30	0.10	20.95	190.12	24.98	23.00	34.02
2015	na	44.83	54.57	1.72	62.34	15.60	na	23.02
2011 - 2015 ave.	99.74	69.52	25.95	15.33	86.82	75.78	21.02	49.94
25th	93.14	42.48	12.59	36.45	205.28	131.88	1431.95	1162.75
median	128.76	60.69	36.81	52.92	295.47	259.32	1887.95	2369.93
75th	161.04	87.24	90.53	104.27	426.78	375.15	2553.04	3740.14

FULL RECRUIT ABUNDANCE (SURVEY) Abundance of lobsters > 85 mm CL (sexes combined)								
Survey	NEFSC		MA		RI		CT	
	Fall	spring	fall	spring	Fall	spring	Fall	spring
1981	0.24	0.03	0.00	0.02	0.01	0.03		
1982	0.17	0.13	0.07	0.02	0.04	0.03		
1983	0.13	0.03	0.00	0.07	0.13	0.08		
1984	0.24	0.04	0.07	0.03	0.16	0.31	2.67	
1985	0.12	0.07	0.00	0.00	0.10	0.07	0.81	1.06
1986	0.06	0.12	0.05	0.00	0.08	0.11	2.73	0.63
1987	0.19	0.05	0.05	0.05	0.31	0.04	1.62	0.99
1988	0.15	0.04	0.00	0.03	0.83	0.09	1.26	0.82
1989	0.20	0.07	0.20	0.07	0.24	0.05	1.00	1.41
1990	0.19	0.05	0.05	0.05	0.38	0.10	2.39	1.35
1991	0.20	0.04	0.23	0.19	0.44	0.37	1.34	3.26
1992	0.20	0.07	0.22	0.05	0.34	0.10	2.37	1.44
1993	0.14	0.10	0.12	0.02	1.12	1.42	1.55	0.68
1994	0.08	0.03	0.00	0.00	0.55	0.10	3.75	0.50
1995	0.15	0.01	0.01	0.05	0.33	0.07	2.20	1.85
1996	0.22	0.02	0.06	0.08	0.82	0.19	1.97	1.96
1997	0.11	0.19	0.02	0.10	0.98	0.08	4.00	4.44
1998	0.25	0.00	0.04	0.00	0.17	0.17	1.48	4.10
1999	0.08	0.07	0.00	0.16	0.27	0.26	1.70	3.27
2000	0.08	0.08	0.08	0.08	0.30	0.32	0.95	2.44
2001	0.10	0.07	0.02	0.03	0.10	0.32	0.35	2.47
2002	0.08	0.08	0.00	0.08	0.00	0.20	0.03	1.35
2003	0.08	0.05	0.00	0.06	0.29	0.07	0.62	0.35
2004	0.07	0.04	0.04	0.00	0.26	0.41	0.27	0.30
2005	0.12	0.07	0.06	0.00	0.30	0.33	0.21	0.25
2006	0.11	0.06	0.00	0.14	0.24	0.65	0.03	0.20
2007	0.07	0.03	0.05	0.01	0.32	0.15	0.03	0.24
2008	0.07	0.06	0.00	0.02	0.74	0.12	0.19	0.66
2009	0.07	0.03	0.00	0.01	0.17	0.19	0.24	0.32
2010	0.11	0.05	0.15	0.07	0.07	0.12	na	0.26
2011	0.10	0.04	0.07	0.00	0.14	0.16	0.01	0.07
2012	0.19	0.05	0.03	0.02	0.02	0.09	0.03	0.06
2013	0.08	0.09	0.03	0.07	0.00	0.02	0.03	0.07
2014	0.07	0.18	0.00	0.02	0.00	0.00	0.01	0.04
2015	na	0.06	0.05	0.02	na	0.00	na	0.02
2011 - 2015 ave.	0.11	0.08	0.03	0.03	0.04	0.06	0.02	0.05
25th	0.08	0.04	0.00	0.03	0.17	0.07	0.99	0.91
median	0.14	0.06	0.04	0.05	0.31	0.10	1.59	1.41
75th	0.20	0.08	0.07	0.08	0.46	0.28	2.38	2.46

RECRUIT ABUNDANCE (SURVEY)								
Abundance of lobsters 71 - 80 mm CL (sexes combined)								
Survey	*NEFSC*		*MA*		*RI*		*CT*	
	Fall	*spring*	*fall*	*spring*	*Fall*	*spring*	*Fall*	*spring*
1981	0.40	0.05	0.07	0.65	1.31	0.89		
1982	0.29	0.24	0.04	0.10	0.62	0.26		
1983	0.28	0.14	0.04	0.09	0.43	0.94		
1984	0.19	0.04	0.01	0.42	1.21	1.03	8.62	
1985	0.34	0.78	0.09	0.34	0.97	0.26	5.03	4.73
1986	0.14	0.09	0.20	0.17	1.30	0.75	8.22	3.45
1987	0.20	0.33	0.17	0.27	2.53	0.79	9.46	3.90
1988	0.26	0.09	0.16	0.24	4.14	0.42	4.82	2.16
1989	0.52	0.04	0.43	0.14	3.26	0.93	6.32	5.51
1990	0.36	0.29	0.31	2.29	1.38	2.17	10.31	9.53
1991	0.24	0.18	0.87	1.18	3.05	4.77	14.23	15.39
1992	0.38	0.06	0.57	0.10	1.97	0.67	12.25	16.55
1993	0.17	0.29	0.52	0.25	8.29	7.81	21.46	10.69
1994	0.12	0.10	0.42	0.95	3.64	1.00	18.87	5.90
1995	0.28	0.00	0.03	1.14	4.48	1.36	15.30	16.31
1996	0.77	0.14	0.32	0.40	6.42	1.60	14.91	16.30
1997	0.56	0.62	0.12	1.45	6.10	2.58	40.43	25.49
1998	0.46	0.37	0.11	1.09	3.38	1.63	18.61	37.56
1999	0.20	0.92	0.19	0.75	2.10	1.64	20.22	40.84
2000	0.40	0.30	0.13	0.54	1.83	1.54	12.71	20.72
2001	0.17	0.14	0.03	0.18	2.21	3.03	11.94	19.12
2002	0.17	0.62	0.00	0.34	0.75	2.73	3.52	11.44
2003	0.12	0.21	0.00	0.07	1.00	0.29	5.56	4.58
2004	0.12	0.11	0.00	0.05	1.48	1.86	4.52	2.92
2005	0.08	0.06	0.00	0.08	2.48	1.02	2.14	2.67
2006	0.12	0.14	0.03	0.08	2.26	3.63	1.38	2.12
2007	0.11	0.12	0.00	0.08	2.76	0.73	1.35	2.86
2008	0.12	0.14	0.01	0.16	2.98	0.64	1.43	3.10
2009	0.05	0.05	0.05	0.16	1.36	1.14	1.72	1.55
2010	0.14	0.05	0.18	0.06	1.21	0.44	na	1.41
2011	0.12	0.03	0.00	0.18	1.02	0.42	0.19	0.42
2012	0.16	0.04	0.21	0.07	0.27	0.61	0.14	0.50
2013	0.10	0.02	0.04	0.11	0.02	0.18	0.06	0.23
2014	0.14	0.52	0.00	0.04	0.14	0.02	0.05	0.15
2015	NA	0.01	0.30	0.07	na	0.05	na	0.15
2011 - 2015 ave.	**0.13**	**0.12**	**0.11**	**0.09**	**0.36**	**0.26**	**0.11**	**0.29**
25th	0.17	0.09	0.08	0.23	1.36	0.78	7.74	5.12
median	0.25	0.20	0.17	0.37	2.37	1.45	12.09	11.44
75th	0.38	0.34	0.35	0.99	3.77	2.27	16.13	17.84

YOUNG-OF-YEAR INDICES				
	YOY	YOY	Larvae	Postlarvae
Survey	*MA*	*RI*	*CT / ELIS* Summer	*CT_NY / WLIS* Summer
1981				
1982				
1983				14.48
1984			0.43	6.89
1985			0.53	66.75
1986			0.90	4.58
1987			0.78	18.98
1988			0.74	49.27
1989			0.74	5.88
1990		1.31	0.81	19.66
1991		1.49	0.55	9.97
1992		0.63	1.44	14.12
1993		0.51	1.19	26.23
1994		1.23	0.98	96.52
1995	0.17	0.33	1.46	18.20
1996	0.00	0.15	0.31	12.07
1997	0.08	0.99	0.21	13.69
1998	0.20	0.57	0.55	4.85
1999	0.03	0.92	2.83	39.70
2000	0.33	0.34	0.78	14.28
2001	0.10	0.75	0.32	9.46
2002	0.10	0.25	0.64	1.99
2003	0.03	0.79	0.25	2.60
2004	0.03	0.42	0.45	6.10
2005	0.13	0.53	0.49	6.90
2006	0.17	0.44	0.71	1.70
2007	0.10	0.36	0.37	18.10
2008	0.00	0.14	0.37	8.10
2009	0.03	0.08	0.19	7.62
2010	0.00	0.11	0.35	9.91
2011	0.03	0.00	0.26	5.90
2012	0.00	0.09	0.12	2.77
2013	0.13	0.22	0.16	no data
2014	0.07	0.22	0.06	no data
2015	0.00	0.14	na	no data
2011 - 2015 ave.	**0.05**	**0.13**	**0.15**	**4.34**
25th	0.03	0.39	0.50	6.64
median	0.10	0.69	0.74	13.91
75th	0.17	0.97	0.92	21.30

SURVEY LOBSTER ENCOUNTER RATE Proportion of postive tows								
Survey	*NEFSC*		*MA*		*RI*		*CT*	
	Fall	*spring*	*fall*	*spring*	*Fall*	*spring*	*Fall*	*spring*
1981			0.15	0.38	0.54	0.49		
1982	0.34	0.24	0.21	0.28	0.59	0.30		
1983	0.22	0.14	0.16	0.21	0.36	0.45		
1984	0.27	0.09	0.18	0.40	0.45	0.59	0.76	0.72
1985	0.30	0.20	0.22	0.51	0.50	0.31	0.69	0.57
1986	0.25	0.19	0.38	0.39	0.43	0.64	0.61	0.67
1987	0.23	0.13	0.18	0.28	0.47	0.33	0.76	0.63
1988	0.27	0.08	0.21	0.39	0.59	0.49	0.66	0.65
1989	0.37	0.11	0.33	0.50	0.55	0.52	0.63	0.75
1990	0.43	0.14	0.44	0.66	0.54	0.66	0.76	0.73
1991	0.29	0.13	0.39	0.41	0.69	0.77	0.78	0.81
1992	0.31	0.23	0.23	0.51	0.57	0.41	0.69	0.78
1993	0.26	0.09	0.26	0.54	0.73	0.50	0.77	0.74
1994	0.23	0.09	0.20	0.51	0.57	0.56	0.74	0.73
1995	0.33	0.06	0.13	0.44	0.67	0.55	0.68	0.77
1996	0.41	0.08	0.16	0.30	0.76	0.79	0.78	0.68
1997	0.28	0.24	0.21	0.45	0.71	0.75	0.81	0.71
1998	0.30	0.11	0.13	0.54	0.55	0.59	0.71	0.83
1999	0.29	0.18	0.21	0.41	0.59	0.76	0.79	0.78
2000	0.30	0.13	0.15	0.45	0.63	0.68	0.73	0.82
2001	0.24	0.18	0.18	0.28	0.61	0.64	0.58	0.77
2002	0.21	0.19	0.03	0.28	0.45	0.63	0.59	0.73
2003	0.25	0.11	0.03	0.14	0.40	0.53	0.63	0.71
2004	0.20	0.10	0.03	0.28	0.50	0.54	0.66	0.61
2005	0.20	0.08	0.15	0.34	0.45	0.50	0.55	0.63
2006	0.23	0.13	0.03	0.43	0.61	0.81	0.53	0.61
2007	0.19	0.15	0.10	0.34	0.54	0.43	0.53	0.70
2008	0.24	0.11	0.10	0.33	0.52	0.55	0.65	0.63
2009	0.28	0.16	0.05	0.50	0.40	0.57	0.55	0.49
2010	0.30	0.09	0.24	0.23	0.45	0.47	na	0.54
2011	0.32	0.11	0.05	0.18	0.23	0.29	0.28	0.46
2012	0.32	0.12	0.15	0.18	0.16	0.29	0.20	0.44
2013	0.24	0.09	0.08	0.18	0.09	0.20	0.15	0.28
2014	0.24	0.23	0.08	0.13	0.23	0.07	0.10	0.26
2015	na	0.054	0.05	0.10	na	0.12	0.10	0.27
2011 - 2015 ave.	**0.28**	**0.12**	**0.08**	**0.15**	**0.18**	**0.19**	**0.17**	**0.34**
25th	0.25	0.09	0.16	0.37	0.49	0.52	0.65	0.70
median	0.29	0.13	0.20	0.42	0.57	0.59	0.72	0.73
75th	0.31	0.18	0.24	0.51	0.64	0.66	0.76	0.77

Appendix 3. Bottom Water Temperatures

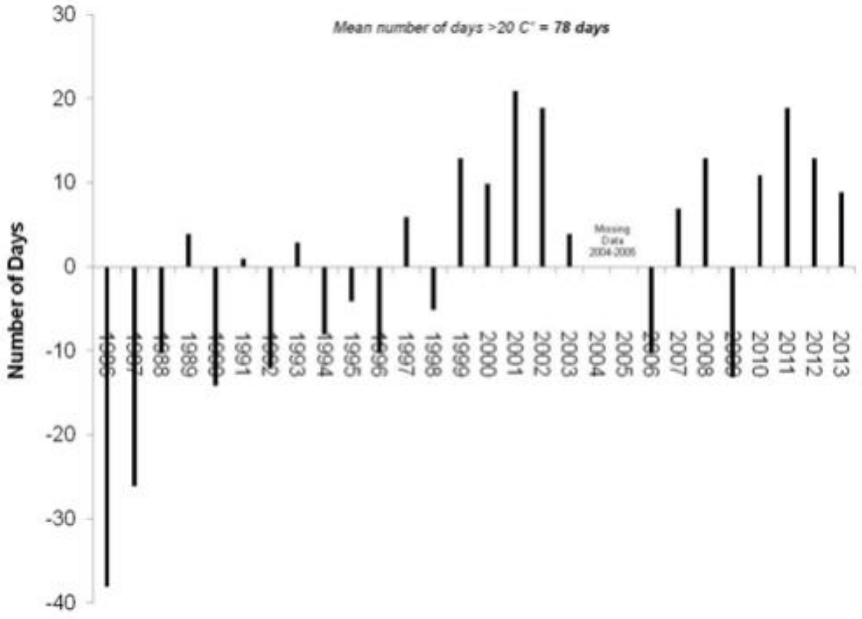


Figure 1: Bottom water (11m) temperature anomalies from the mean number of days >20^{o}C at Cleveland Ledge, Buzzards Bay, MA, 1986-2013. Source: 2015 Benchmark Stock Assessment.

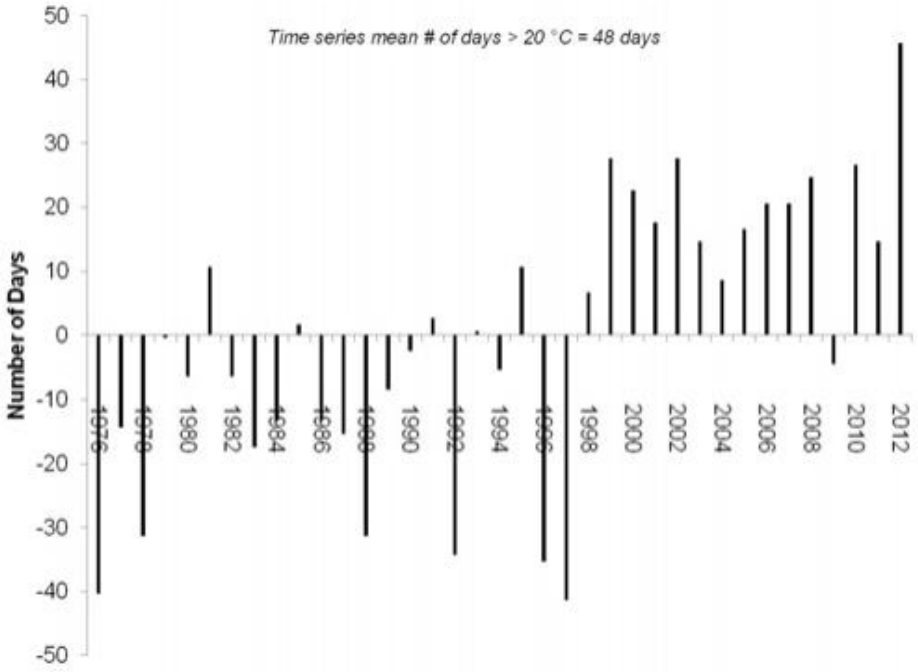


Figure 2: Bottom water (11m) temperature anomalies from the mean number of days >20^{o}C at Dominion Nuclear Power Station, eastern Long Island Sound, CT, 1976-2012.

Appendix 4: Southern New England Stock Projections

The American Lobster Technical Committee (TC) met on December 8th to review projections for the Southern New England (SNE) lobster stock. Below are the series of projections that the TC unanimously recommends for Board consideration. These projections represent two potential scenarios. In the first scenario, recruitment is assumed to be independent of stock biomass and stable at current estimated levels. While this can limit the potential for rebuilding, it is perhaps the more realistic of the two scenarios given that recruitment has been declining for the past couple decades.

In the second scenario, future recruitment is linked to the spawning stock via a Beverton-Holt stock-recruitment relationship. This is perhaps less realistic than the first scenario with regards to stock rebuilding but more realistic for the continued decline of the population because recruitment decreases with further depletion of the spawning stock.

Under the first scenario with fixed recruitment, an 80% to 90% reduction in harvest rate is projected to stabilize the stock at current levels, assuming natural mortality also stabilizes at current levels; even lower harvest rates show some potential for recovery. Under the second scenario with recruitment linked to spawning stock, a 75% reduction in harvest rate would be needed to stabilize the stock under current natural mortality conditions.

The TC ran stock projections to examine population responses under various levels of natural mortality (M) and fishing mortality (F). It is important to note that here F is used to represent the proportion of current catch levels by weight, not a fishery removal rate as is typical. In plots where F was fixed at zero, M varied from 0.15 to 0.5. The effect of varying M on population projections is presented and highlights the sensitivity to the assumed value of M.

The projections are shown in two different units: reference abundance (N) and spawning stock biomass (SSB). Reference abundance is the number of lobsters 78+ mm carapace length on January 1st plus the number that will molt and recruit to the 78+ group during the year. Current reference points are also expressed in N. SSB is the total weight of mature lobsters (both sexes) in the stock. In the projections, SSB shows greater recovery potential than reference abundance because SSB is the product of abundance at-size, the probability of maturity at-size, and weight at-size. As a result, SSB increases more rapidly than N because larger individuals weigh more than smaller lobsters.

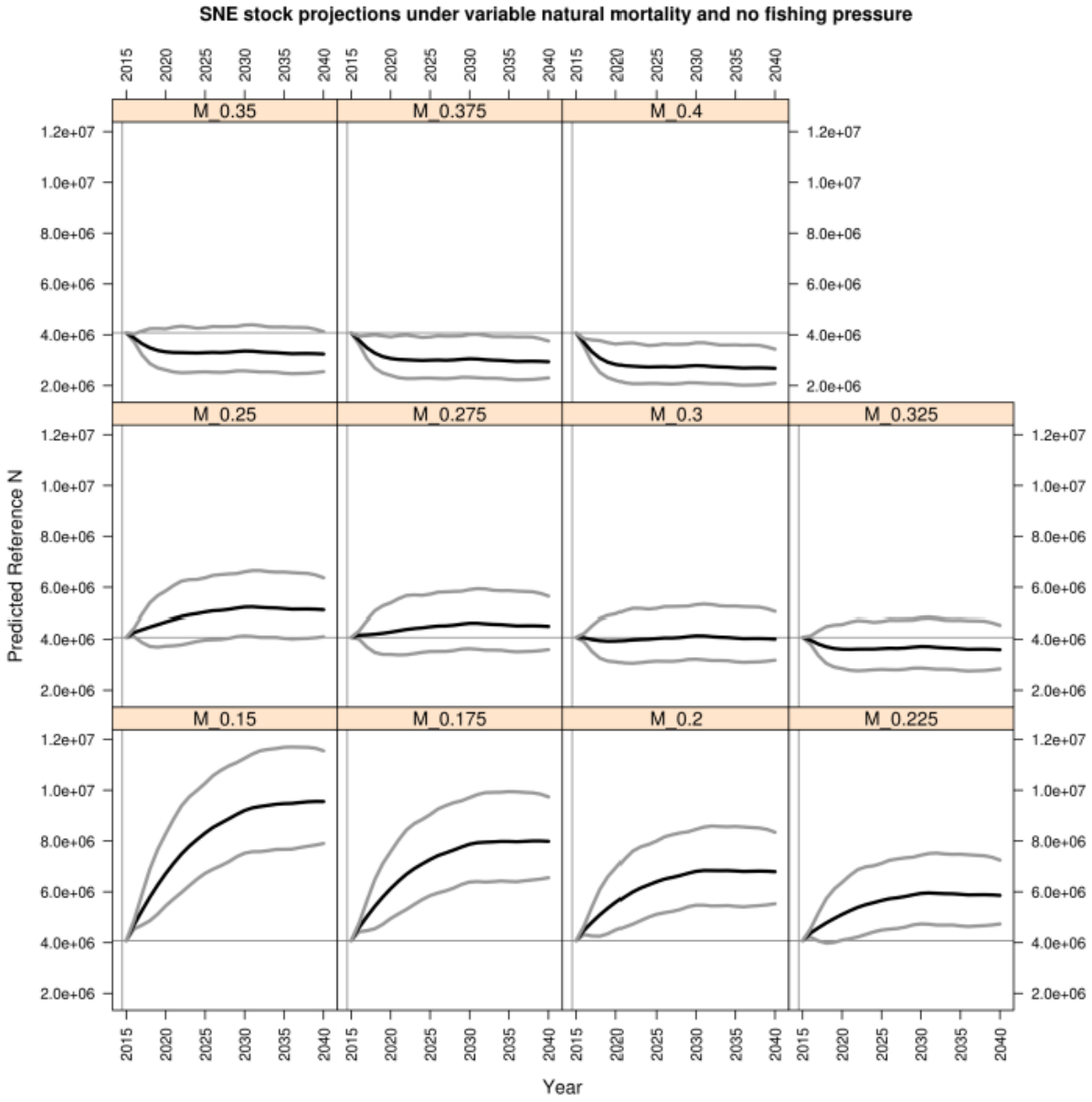


Figure 1: SNE stock projections assuming constant recruitment (similar to levels seen from 2011 to 2014) under various levels of M. F is fixed at zero. The units are reference abundance. Black line is the mean trend +/- 2SD (gray lines).

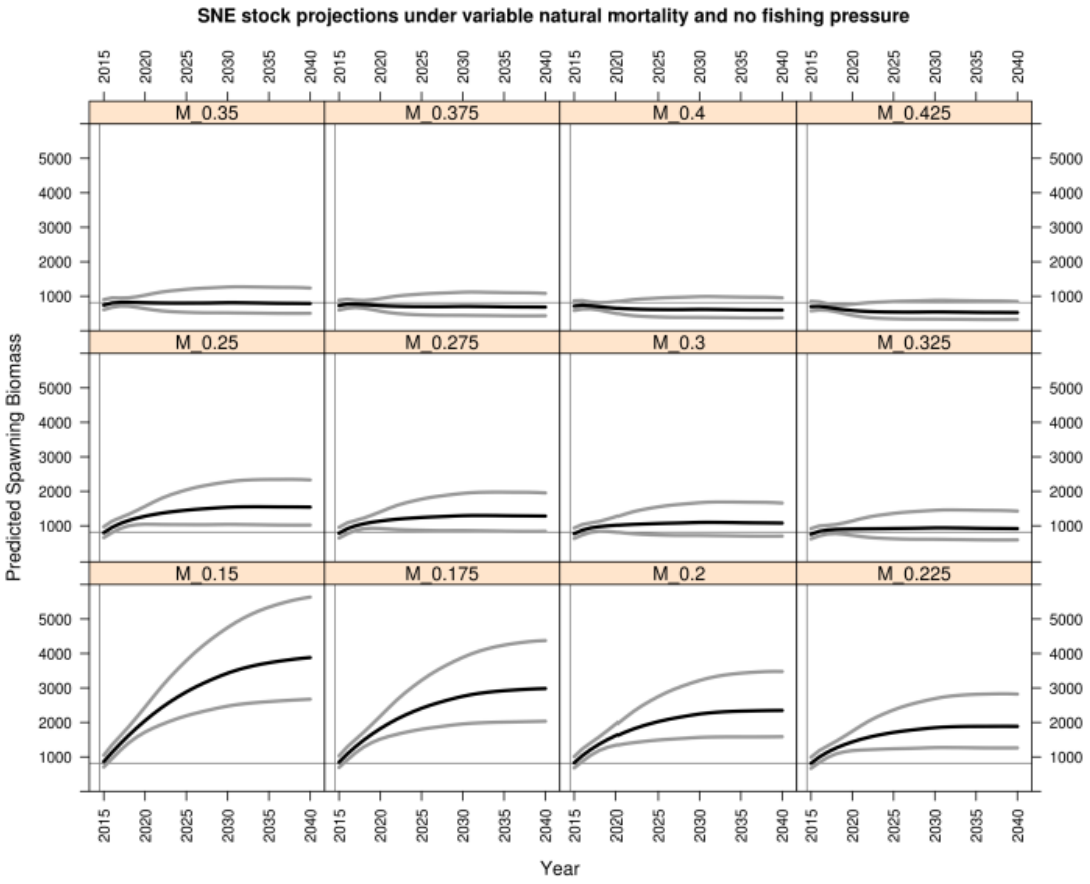


Figure 2: SNE stock projections assuming constant recruitment (similar to levels seen from 2011 to 2014) under various levels of M. F is fixed at zero. The units are SSB. Black line is the mean trend +/- 2SD (gray lines).

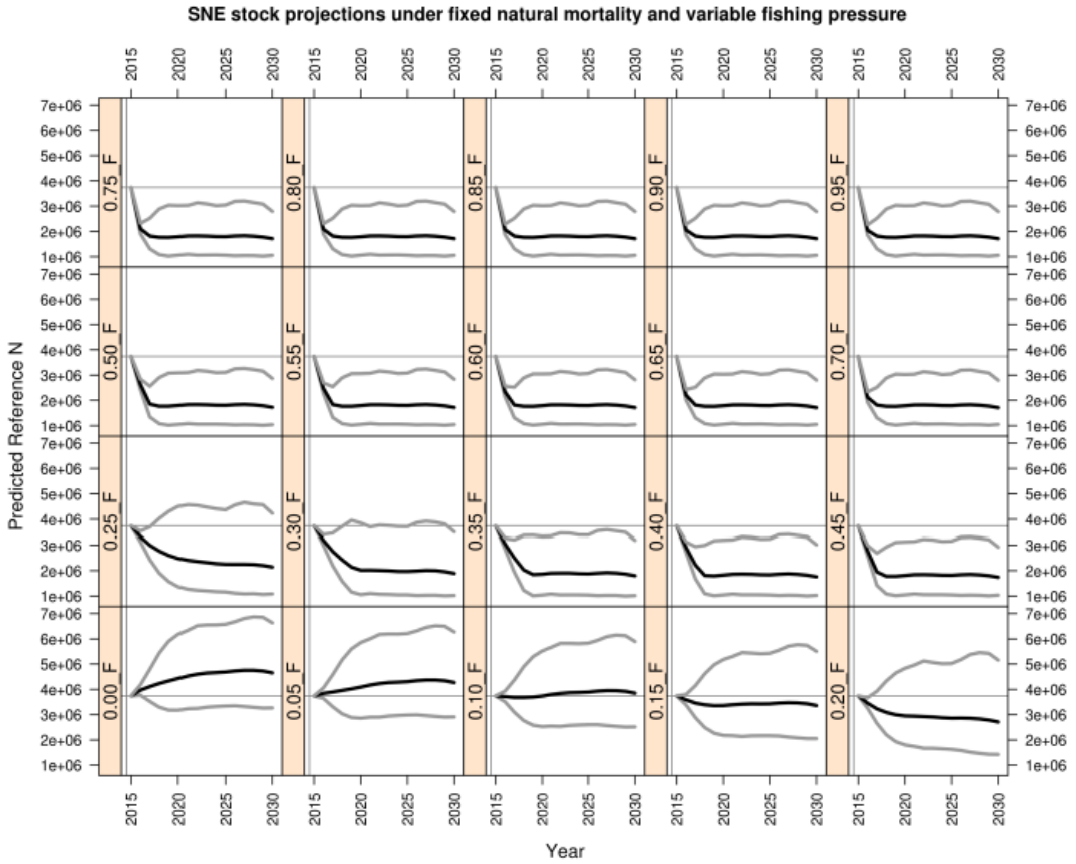


Figure 3: SNE stock projections assuming constant recruitment (similar to levels seen from 2011 to 2014) under various levels of F. M is fixed at 0.285. The units are reference abundance. Black lines is the mean trend 2 +/-2SD (gray lines).

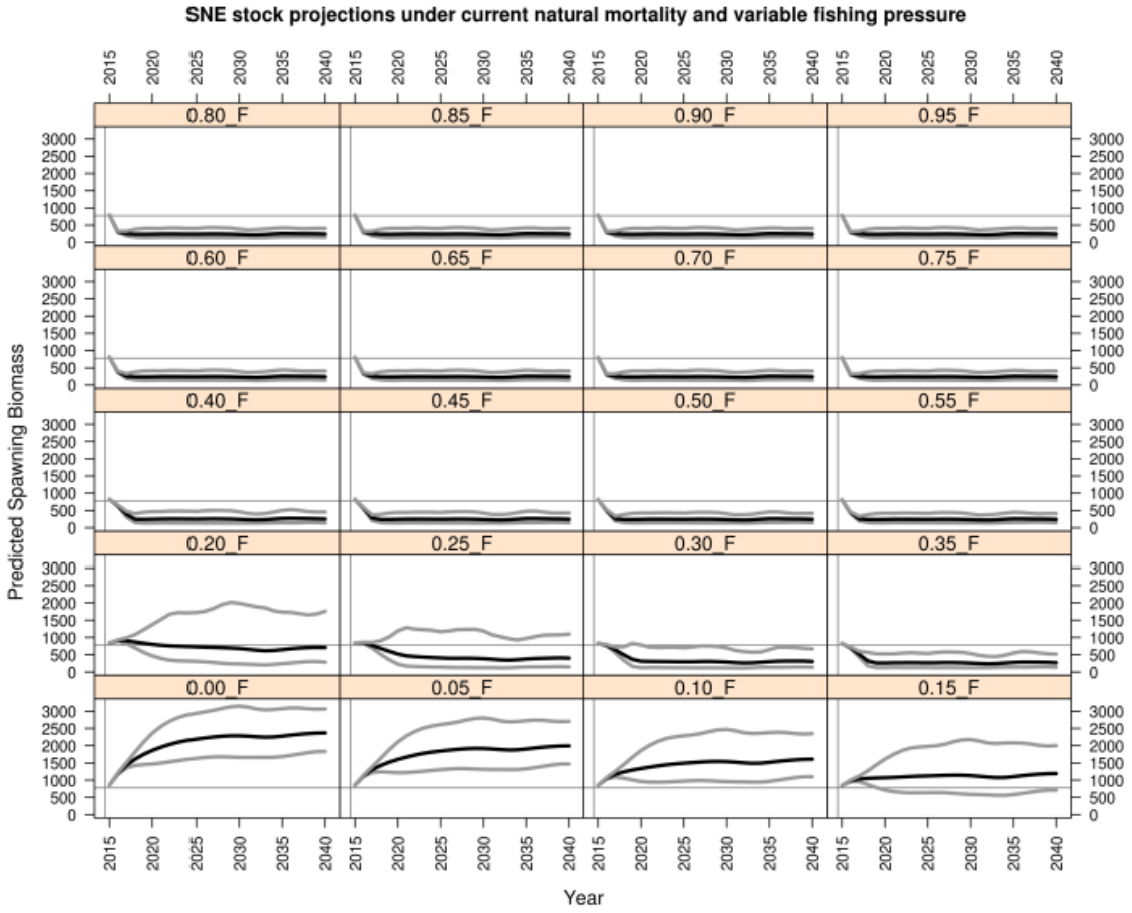


Figure 4: SNE stock projections assuming constant recruitment (similar to levels seen from 2011 to 2014) under various levels of F. M is fixed at 0.285. The units are SSB. Black line is the mean trend +/1 2SD (gray lines).

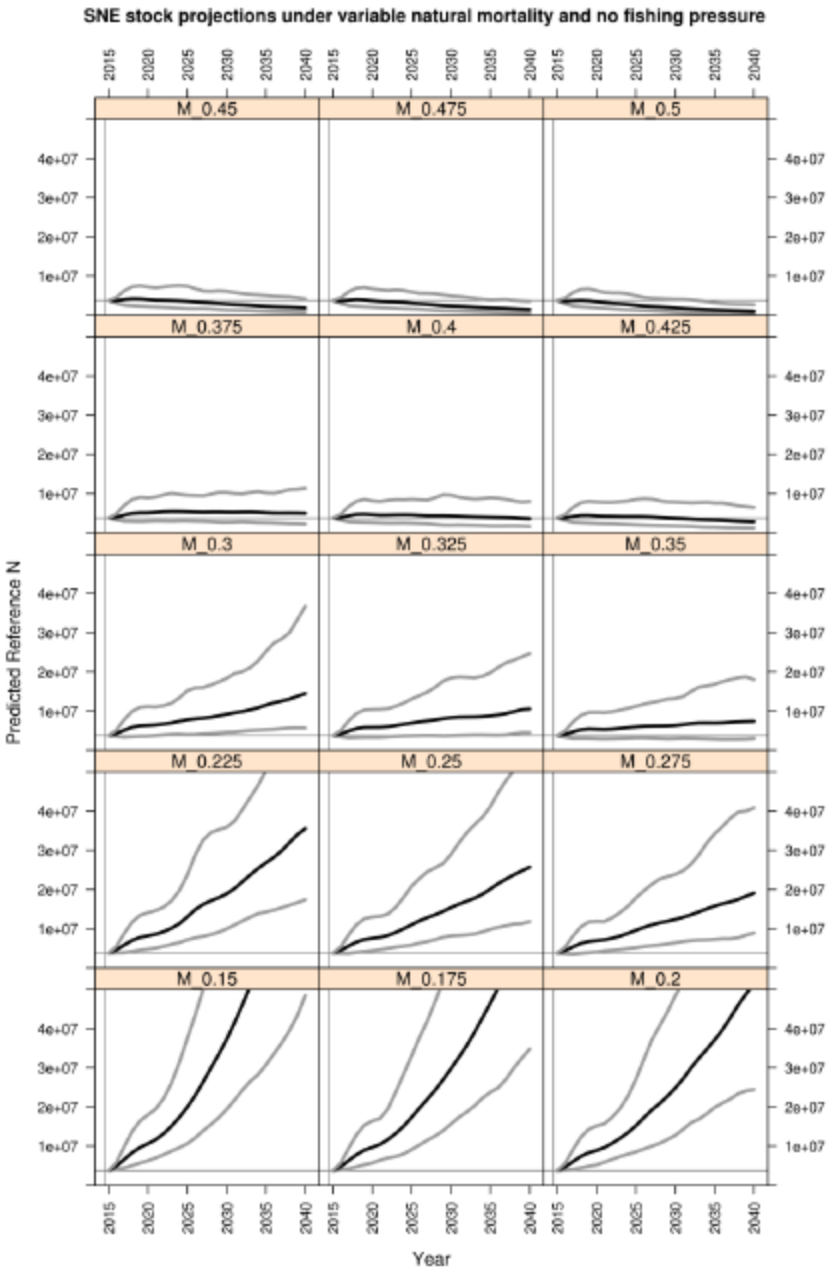


Figure 5. SNE stock projections assuming a Beverton-Holt stock recruit relationship under various levels of M. F is fixed at zero. The units are reference abundance.

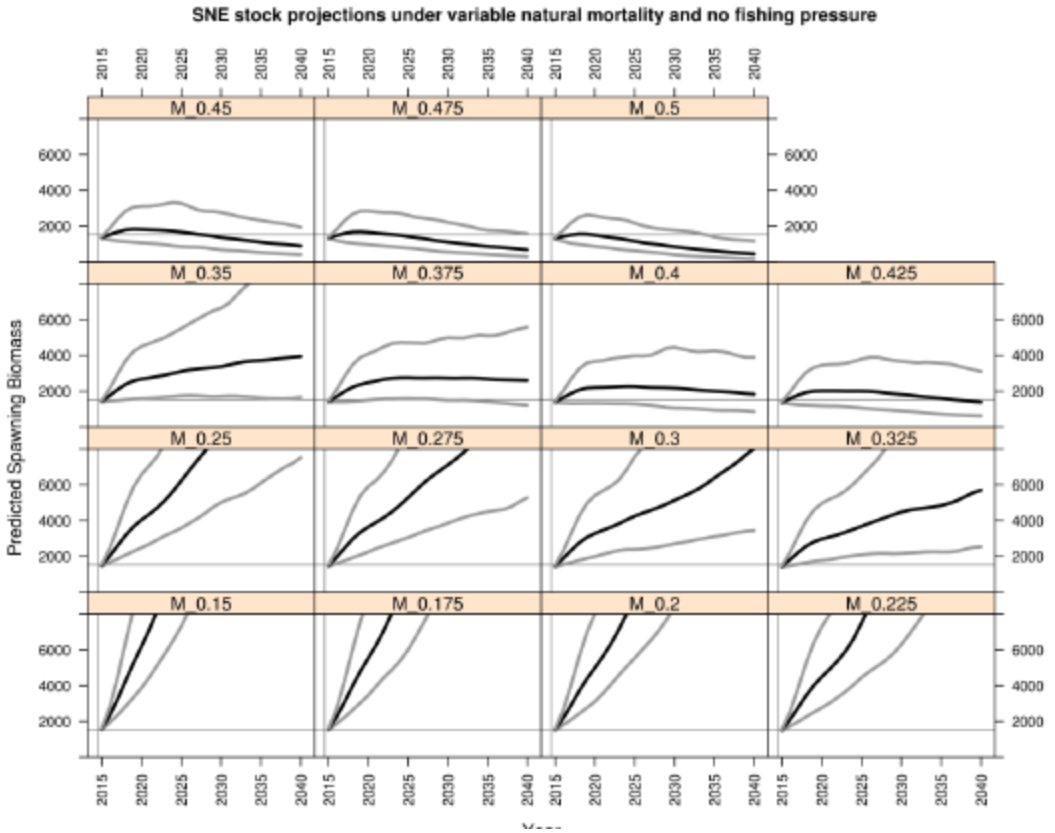


Figure 6: SNE stock projections assuming Beverton-Holt recruitment under various levels of M. F is fixed at zero. The units are SSB.

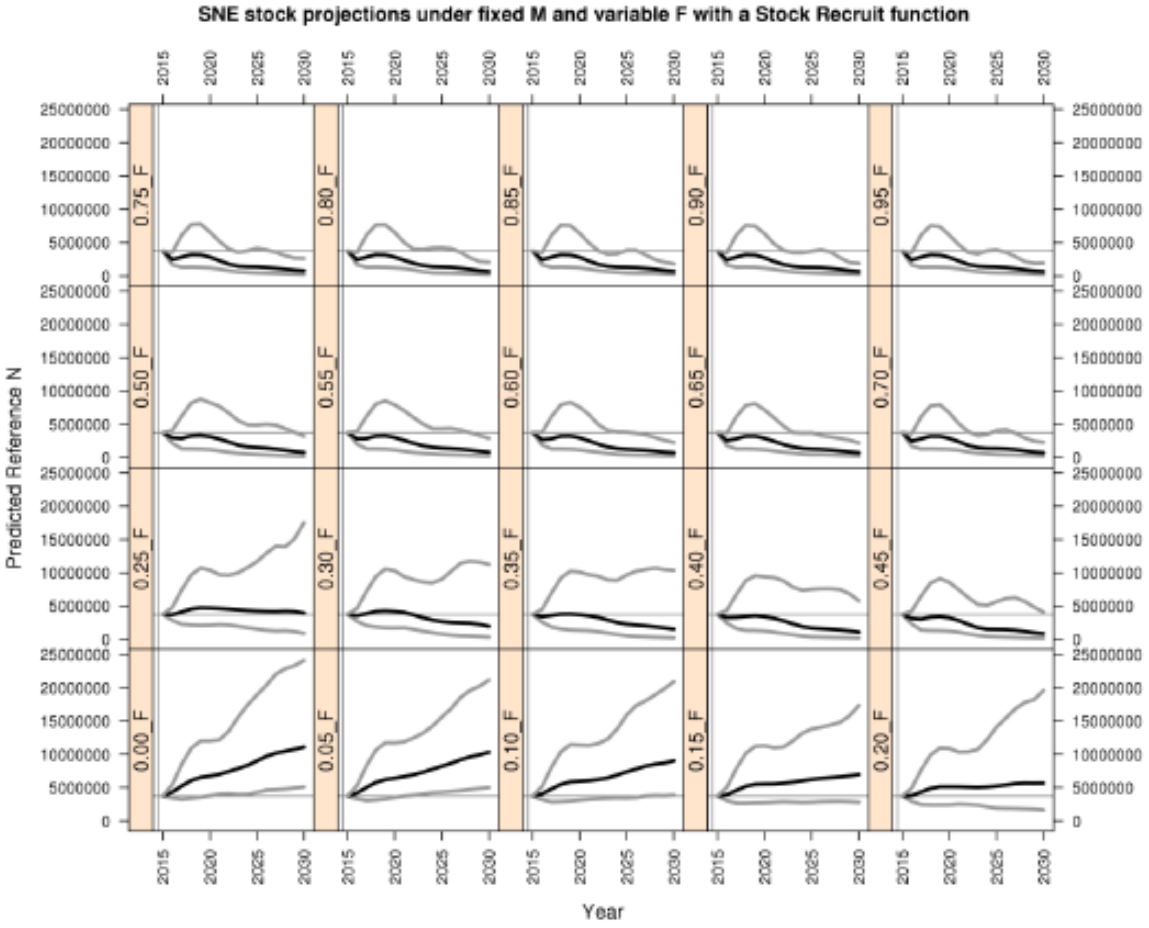


Figure 7: SNE stock projections assuming Beverton-Holt recruitment under various levels of F.M is fixed at 0.285. The units are reference abundance.

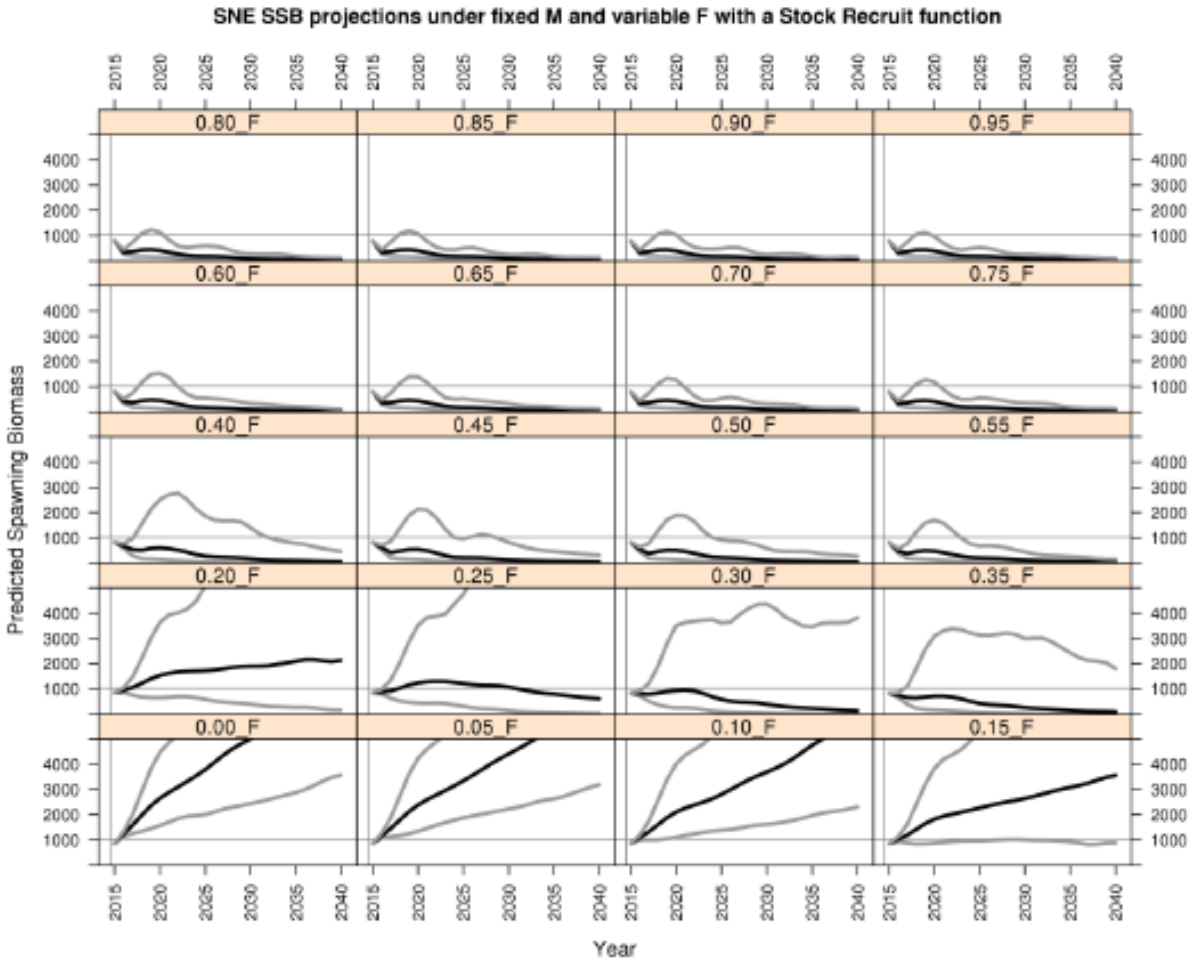


Figure 8: SNE stock projections assuming Beverton-Holt recruitment under various levels of F. M is fixed at 0.285. The units are SSB.

Appendix 5: TC Memo to Board on Gauge Size Changes

MEMORANDUM

TO: American Lobster Management Board

FROM: American Lobster Technical Committee

DATE: July 25, 2016

SUBJECT: Effect of Gauge Changes on Exploitation, SSB, Reference Abundance, and Catch

The following analysis looks at the effect of gauge size changes on egg production, exploitation, spawning stock biomass (SSB), reference abundance, and catch. This work is intended to provide a holistic view of stock and fishery changes that may result from alterations to the minimum and maximum gauge size. Table 1 summarizes scenarios in which a 20% or 60% increase in egg production is achieved, per the motion of the Board at the May 2016 meeting. Tables 2-6 look at all combinations of gauge changes in regards to egg production, exploitation, SSB, reference abundance, and catch.

Table 1. Minimum and maximum size window necessary to achieve a 20% and 60% increase in egg production respectively. Includes % change in exploitation, spawning stock biomass, reference abundance, and catch associated with the size windows presented. *Assumes changes in gauge size from the current 86 mm minimum and 133 mm maximum size inshore, and an 89 mm minimum size and a 171 mm maximum size offshore. English unit conversions are approximate.

	Min	Max	Egg Production	Exploitation	Spawning Stock Biomass	Reference Abundance	Catch
Inshore	88 mm (3 15/32")	105 mm (4 1/8")	20%	-18%	20%	9%	-11%
	91 mm (3 9/16")	115 mm (4 1/2")	18%	-22%	22%	11%	-14%
	92 mm (3 5/8")	165 mm (6 1/2")	20%	-27%	25%	13%	-17%
Offshore	91 mm (3 9/16")	105 mm (4 1/8")	22%	-21%	22%	9%	-13%
	94 mm (3 11/16")	115 mm (4 1/2")	20%	-26%	24%	12%	-17%
	95 mm (3 3/4")	165 mm (6 1/2")	21%	-28%	26%	13%	-19%
Inshore	99 mm (3 7/8")	115 mm (4 1/2")	60%	-56%	71%	32%	-42%
	101 mm (3 29/32")	165 mm (6 1/2")	59%	-59%	76%	35%	-45%
Offshore	102 mm (4")	115 mm (4 1/2")	62%	-60%	71%	31%	-47%
	103 mm (4 1/16")	165 mm (6 1/2")	63%	-63%	75%	34%	-50%

Table 2. Inshore and offshore minimum/maximum gauge change scenarios and corresponding egg production changes from the current gauge sizes. Egg production is expressed as percent increases from the current conditions.

Inshore; Min=86, Max=133

Min Size \ Max size	105	115	125	135	145	155	165
82	2%	-7%	-8%	-8%	-8%	-8%	-8%
83	3%	-6%	-7%	-7%	-7%	-7%	-7%
84	5%	-4%	-5%	-5%	-5%	-5%	-5%
85	8%	-1%	-3%	-3%	-3%	-3%	-3%
86	12%	1%	0%	0%	0%	0%	0%
87	15%	5%	3%	3%	3%	3%	3%
88	20%	8%	6%	6%	6%	6%	6%
89	23%	11%	9%	9%	9%	9%	9%
90	27%	14%	12%	12%	12%	12%	12%
91	33%	18%	16%	16%	16%	16%	16%
92	39%	22%	20%	20%	20%	20%	20%
93	46%	28%	26%	25%	25%	25%	25%
94	51%	31%	29%	28%	28%	28%	28%
95	NA	35%	32%	32%	32%	32%	32%
96	NA	40%	37%	37%	37%	37%	37%
97	NA	47%	43%	43%	43%	43%	43%
98	NA	56%	51%	51%	51%	51%	51%
99	NA	59%	54%	54%	54%	54%	54%
100	NA	63%	58%	57%	57%	57%	57%
101	NA	69%	63%	62%	62%	62%	62%
102	NA	76%	70%	69%	69%	69%	69%
103	NA	87%	79%	78%	78%	78%	78%
104	NA	91%	82%	81%	81%	81%	81%
105	NA	NA	85%	84%	84%	84%	84%
106	NA	NA	90%	89%	89%	89%	89%
107	NA	NA	97%	96%	95%	95%	95%
108	NA	NA	107%	105%	105%	105%	105%
109	NA	NA	110%	108%	107%	107%	107%
110	NA	NA	113%	111%	110%	110%	110%

Offshore; Min=89, Max=171

Min Size \ Max size	105	115	125	135	145	155	165
82	-7%	-14%	-15%	-16%	-16%	-16%	-16%
83	-6%	-14%	-15%	-15%	-15%	-15%	-15%
84	-3%	-12%	-13%	-13%	-13%	-13%	-13%
85	0%	-9%	-10%	-11%	-11%	-11%	-11%
86	3%	-7%	-8%	-8%	-8%	-8%	-8%
87	6%	-4%	-5%	-5%	-5%	-5%	-5%
88	10%	-1%	-2%	-2%	-2%	-2%	-2%
89	13%	2%	0%	0%	0%	0%	0%
90	17%	5%	3%	3%	3%	3%	3%
91	22%	8%	6%	6%	6%	6%	6%
92	27%	12%	11%	10%	10%	10%	10%
93	34%	18%	15%	15%	15%	15%	15%
94	39%	20%	18%	18%	18%	18%	18%
95	NA	24%	22%	21%	21%	21%	21%
96	NA	29%	26%	26%	25%	25%	25%
97	NA	35%	32%	31%	31%	31%	31%
98	NA	43%	39%	39%	39%	39%	39%
99	NA	46%	42%	41%	41%	41%	41%
100	NA	50%	45%	45%	45%	45%	45%
101	NA	55%	50%	49%	49%	49%	49%
102	NA	62%	56%	55%	55%	55%	55%
103	NA	72%	64%	64%	63%	63%	63%
104	NA	75%	67%	66%	66%	66%	66%
105	NA	NA	70%	69%	69%	69%	69%
106	NA	NA	75%	74%	73%	73%	73%
107	NA	NA	81%	80%	79%	79%	79%
108	NA	NA	90%	89%	88%	88%	88%
109	NA	NA	92%	91%	90%	90%	90%
110	NA	NA	95%	93%	93%	93%	93%

Table 3. Inshore and offshore minimum/maximum gauge change scenarios and corresponding exploitation changes from the current gauge sizes. Exploitation is expressed as percent increases from the current conditions.

Inshore; Min=86, Max=133

Min Size \ Max size	105	115	125	135	145	155	165
82	7%	14%	14%	14%	14%	14%	14%
83	5%	12%	13%	13%	13%	13%	13%
84	1%	8%	9%	9%	9%	9%	9%
85	-4%	4%	4%	4%	5%	5%	5%
86	-8%	-1%	0%	0%	0%	0%	0%
87	-13%	-6%	-5%	-5%	-5%	-5%	-5%
88	-18%	-11%	-10%	-10%	-10%	-10%	-10%
89	-22%	-14%	-13%	-13%	-13%	-13%	-13%
90	-26%	-18%	-17%	-17%	-17%	-17%	-17%
91	-31%	-22%	-22%	-21%	-21%	-21%	-21%
92	-37%	-28%	-27%	-27%	-27%	-27%	-27%
93	-43%	-33%	-32%	-32%	-32%	-32%	-32%
94	-46%	-36%	-35%	-35%	-35%	-35%	-35%
95	NA	-39%	-38%	-38%	-38%	-38%	-38%
96	NA	-43%	-42%	-42%	-42%	-42%	-42%
97	NA	-48%	-46%	-46%	-46%	-46%	-46%
98	NA	-54%	-53%	-53%	-52%	-52%	-52%
99	NA	-56%	-54%	-54%	-54%	-54%	-54%
100	NA	-58%	-56%	-56%	-56%	-56%	-56%
101	NA	-61%	-59%	-59%	-59%	-59%	-59%
102	NA	-65%	-63%	-63%	-63%	-63%	-63%
103	NA	-71%	-68%	-68%	-68%	-68%	-68%
104	NA	-72%	-69%	-69%	-69%	-69%	-69%
105	NA	NA	-71%	-70%	-70%	-70%	-70%
106	NA	NA	-73%	-72%	-72%	-72%	-72%
107	NA	NA	-75%	-75%	-75%	-75%	-75%
108	NA	NA	-80%	-79%	-79%	-79%	-79%
109	NA	NA	-81%	-80%	-80%	-80%	-80%
110	NA	NA	-81%	-81%	-81%	-81%	-81%

Offshore; Min=89, Max=171

Min Size \ Max size	105	115	125	135	145	155	165
82	23%	31%	32%	32%	32%	32%	32%
83	21%	29%	30%	30%	30%	30%	30%
84	16%	24%	25%	25%	25%	25%	25%
85	11%	20%	20%	21%	21%	21%	21%
86	6%	14%	15%	15%	15%	15%	15%
87	0%	9%	10%	10%	10%	10%	10%
88	-6%	3%	4%	4%	4%	4%	4%
89	-10%	-1%	0%	0%	0%	0%	0%
90	-15%	-5%	-4%	-4%	-4%	-4%	-4%
91	-21%	-11%	-10%	-9%	-9%	-9%	-9%
92	-27%	-16%	-15%	-15%	-15%	-15%	-15%
93	-34%	-23%	-22%	-22%	-22%	-22%	-22%
94	-38%	-26%	-25%	-25%	-25%	-25%	-25%
95	NA	-30%	-28%	-28%	-28%	-28%	-28%
96	NA	-34%	-33%	-33%	-33%	-33%	-33%
97	NA	-40%	-38%	-38%	-38%	-38%	-38%
98	NA	-47%	-45%	-45%	-45%	-45%	-45%
99	NA	-49%	-47%	-47%	-47%	-47%	-47%
100	NA	-52%	-50%	-50%	-49%	-49%	-49%
101	NA	-55%	-53%	-53%	-53%	-53%	-53%
102	NA	-60%	-57%	-57%	-57%	-57%	-57%
103	NA	-66%	-63%	-63%	-63%	-63%	-63%
104	NA	-68%	-64%	-64%	-64%	-64%	-64%
105	NA	NA	-66%	-66%	-66%	-66%	-66%
106	NA	NA	-68%	-68%	-68%	-68%	-68%
107	NA	NA	-72%	-71%	-71%	-71%	-71%
108	NA	NA	-77%	-76%	-76%	-76%	-76%
109	NA	NA	-78%	-77%	-77%	-77%	-77%
110	NA	NA	-79%	-78%	-78%	-78%	-78%

Table 4. Inshore and offshore minimum/maximum gauge change scenarios and corresponding spawning stock biomass (SSB) changes from the current gauge sizes. SSB is expressed as percent increases from the current conditions.

Inshore; Min=86, Max=133

Min Size \ Max size	105	115	125	135	145	155	165
82	-1%	-9%	-10%	-10%	-10%	-10%	-10%
83	0%	-8%	-9%	-9%	-9%	-9%	-9%
84	4%	-5%	-6%	-6%	-6%	-6%	-6%
85	7%	-2%	-3%	-3%	-3%	-3%	-3%
86	11%	1%	0%	0%	0%	0%	0%
87	16%	5%	4%	4%	4%	4%	4%
88	20%	9%	8%	8%	8%	8%	8%
89	25%	13%	11%	11%	11%	11%	11%
90	30%	17%	15%	15%	15%	15%	15%
91	36%	22%	20%	20%	20%	20%	20%
92	43%	27%	26%	25%	25%	25%	25%
93	51%	34%	32%	32%	32%	32%	32%
94	57%	38%	36%	36%	36%	35%	35%
95	NA	43%	40%	40%	40%	40%	40%
96	NA	49%	46%	46%	46%	46%	46%
97	NA	57%	54%	53%	53%	53%	53%
98	NA	67%	63%	63%	63%	63%	63%
99	NA	71%	67%	66%	66%	66%	66%
100	NA	76%	71%	71%	71%	71%	71%
101	NA	82%	77%	76%	76%	76%	76%
102	NA	90%	84%	84%	84%	84%	84%
103	NA	102%	95%	94%	94%	94%	94%
104	NA	106%	98%	97%	97%	97%	97%
105	NA	NA	102%	101%	101%	101%	101%
106	NA	NA	107%	106%	106%	106%	106%
107	NA	NA	115%	113%	113%	113%	113%
108	NA	NA	125%	124%	124%	124%	124%
109	NA	NA	128%	126%	126%	126%	126%
110	NA	NA	131%	129%	129%	129%	129%

Offshore; Min=89, Max=171

Min Size \ Max size	105	115	125	135	145	155	165
82	-11%	-18%	-19%	-19%	-19%	-19%	-19%
83	-10%	-17%	-18%	-18%	-18%	-18%	-18%
84	-7%	-15%	-16%	-16%	-16%	-16%	-16%
85	-4%	-12%	-13%	-13%	-13%	-13%	-13%
86	0%	-9%	-10%	-10%	-10%	-10%	-10%
87	4%	-6%	-7%	-7%	-7%	-7%	-7%
88	8%	-2%	-3%	-3%	-3%	-3%	-3%
89	12%	1%	0%	0%	0%	0%	0%
90	17%	5%	4%	4%	4%	4%	4%
91	22%	9%	8%	8%	8%	8%	8%
92	29%	15%	13%	13%	13%	13%	13%
93	36%	21%	19%	19%	19%	19%	19%
94	41%	24%	22%	22%	22%	22%	22%
95	NA	28%	26%	26%	26%	26%	26%
96	NA	34%	31%	31%	31%	31%	31%
97	NA	41%	38%	38%	38%	38%	38%
98	NA	50%	47%	46%	46%	46%	46%
99	NA	54%	50%	50%	49%	49%	49%
100	NA	58%	54%	53%	53%	53%	53%
101	NA	64%	59%	59%	59%	59%	59%
102	NA	71%	66%	65%	65%	65%	65%
103	NA	82%	75%	75%	75%	75%	75%
104	NA	85%	78%	77%	77%	77%	77%
105	NA	NA	82%	81%	81%	81%	81%
106	NA	NA	87%	86%	85%	85%	85%
107	NA	NA	93%	92%	92%	92%	92%
108	NA	NA	103%	101%	101%	101%	101%
109	NA	NA	105%	103%	103%	103%	103%
110	NA	NA	108%	106%	106%	106%	106%

Table 5. Inshore and offshore minimum/maximum gauge change scenarios and corresponding reference abundance changes from the current gauge sizes. Reference abundance is expressed as percent increases from the current conditions.

Inshore; Min=86, Max=133

Min Size \ Max size	105	115	125	135	145	155	165
82	-3%	-6%	-6%	-6%	-6%	-6%	-6%
83	-2%	-5%	-5%	-5%	-5%	-5%	-5%
84	0%	-3%	-4%	-4%	-4%	-4%	-4%
85	2%	-2%	-2%	-2%	-2%	-2%	-2%
86	4%	0%	0%	0%	0%	0%	0%
87	6%	3%	2%	2%	2%	2%	2%
88	9%	5%	5%	5%	5%	5%	5%
89	11%	7%	6%	6%	6%	6%	6%
90	13%	9%	8%	8%	8%	8%	8%
91	16%	11%	10%	10%	10%	10%	10%
92	19%	14%	13%	13%	13%	13%	13%
93	23%	17%	16%	16%	16%	16%	16%
94	25%	19%	18%	18%	18%	18%	18%
95	NA	21%	20%	20%	20%	20%	20%
96	NA	23%	22%	22%	22%	22%	22%
97	NA	26%	25%	25%	25%	25%	25%
98	NA	31%	30%	30%	30%	30%	30%
99	NA	32%	31%	31%	31%	31%	31%
100	NA	34%	33%	33%	33%	33%	33%
101	NA	36%	35%	35%	35%	35%	35%
102	NA	40%	38%	38%	38%	38%	38%
103	NA	45%	42%	42%	42%	42%	42%
104	NA	46%	43%	43%	43%	43%	43%
105	NA	NA	45%	44%	44%	44%	44%
106	NA	NA	46%	46%	46%	46%	46%
107	NA	NA	49%	49%	49%	49%	49%
108	NA	NA	53%	53%	53%	53%	53%
109	NA	NA	54%	54%	54%	54%	54%
110	NA	NA	55%	55%	55%	55%	55%

Offshore; Min=89, Max=171

Min Size \ Max size	105	115	125	135	145	155	165
82	-8%	-11%	-11%	-11%	-11%	-11%	-11%
83	-8%	-10%	-11%	-11%	-11%	-11%	-11%
84	-6%	-9%	-9%	-9%	-9%	-9%	-9%
85	-4%	-7%	-8%	-8%	-8%	-8%	-8%
86	-2%	-5%	-6%	-6%	-6%	-6%	-6%
87	0%	-3%	-4%	-4%	-4%	-4%	-4%
88	2%	-1%	-1%	-2%	-2%	-2%	-2%
89	4%	0%	0%	0%	0%	0%	0%
90	6%	2%	2%	2%	2%	2%	2%
91	9%	4%	4%	4%	4%	4%	4%
92	12%	7%	7%	7%	6%	6%	6%
93	16%	10%	10%	10%	10%	10%	10%
94	18%	12%	11%	11%	11%	11%	11%
95	NA	14%	13%	13%	13%	13%	13%
96	NA	16%	15%	15%	15%	15%	15%
97	NA	19%	18%	18%	18%	18%	18%
98	NA	23%	22%	22%	22%	22%	22%
99	NA	25%	23%	23%	23%	23%	23%
100	NA	26%	25%	25%	25%	25%	25%
101	NA	28%	27%	27%	27%	27%	27%
102	NA	31%	30%	30%	30%	30%	30%
103	NA	36%	34%	34%	34%	34%	34%
104	NA	37%	35%	35%	35%	35%	35%
105	NA	NA	36%	36%	36%	36%	36%
106	NA	NA	38%	38%	38%	38%	38%
107	NA	NA	40%	40%	40%	40%	40%
108	NA	NA	44%	44%	44%	44%	44%
109	NA	NA	45%	45%	45%	45%	45%
110	NA	NA	46%	46%	46%	46%	46%

Table 6. Inshore and offshore minimum/maximum gauge change scenarios and corresponding catch changes from the current gauge sizes. Catch is expressed as percent increases from the current conditions.

Inshore; Min=86, Max=133

Min Size \ Max size	105	115	125	135	145	155	165
82	4%	7%	8%	8%	8%	8%	8%
83	3%	6%	7%	7%	7%	7%	7%
84	0%	4%	5%	5%	5%	5%	5%
85	-2%	2%	2%	2%	2%	2%	2%
86	-5%	0%	0%	0%	0%	0%	0%
87	-8%	-3%	-3%	-3%	-3%	-3%	-3%
88	-11%	-6%	-6%	-6%	-6%	-6%	-6%
89	-14%	-9%	-8%	-8%	-8%	-8%	-8%
90	-17%	-11%	-10%	-10%	-10%	-10%	-10%
91	-20%	-14%	-13%	-13%	-13%	-13%	-13%
92	-25%	-18%	-17%	-17%	-17%	-17%	-17%
93	-30%	-22%	-21%	-21%	-21%	-21%	-21%
94	-33%	-24%	-23%	-23%	-23%	-23%	-23%
95	NA	-27%	-26%	-26%	-26%	-26%	-26%
96	NA	-30%	-29%	-29%	-29%	-29%	-29%
97	NA	-34%	-33%	-33%	-33%	-33%	-33%
98	NA	-40%	-39%	-38%	-38%	-38%	-38%
99	NA	-42%	-40%	-40%	-40%	-40%	-40%
100	NA	-44%	-42%	-42%	-42%	-42%	-42%
101	NA	-47%	-45%	-45%	-45%	-45%	-45%
102	NA	-51%	-49%	-49%	-49%	-49%	-49%
103	NA	-58%	-55%	-54%	-54%	-54%	-54%
104	NA	-59%	-56%	-56%	-56%	-56%	-56%
105	NA	NA	-58%	-57%	-57%	-57%	-57%
106	NA	NA	-60%	-60%	-60%	-59%	-59%
107	NA	NA	-63%	-63%	-63%	-63%	-63%
108	NA	NA	-69%	-68%	-68%	-68%	-68%
109	NA	NA	-70%	-69%	-69%	-69%	-69%
110	NA	NA	-71%	-71%	-71%	-71%	-71%

Offshore; Min=89, Max=171

Min Size \ Max size	105	115	125	135	145	155	165
82	13%	17%	17%	17%	17%	17%	17%
83	12%	16%	16%	16%	16%	16%	16%
84	9%	13%	14%	14%	14%	14%	14%
85	6%	11%	11%	11%	11%	11%	11%
86	3%	8%	9%	9%	9%	9%	9%
87	0%	5%	6%	6%	6%	6%	6%
88	-4%	2%	2%	2%	2%	2%	2%
89	-6%	-1%	0%	0%	0%	0%	0%
90	-10%	-3%	-3%	-3%	-3%	-3%	-3%
91	-13%	-7%	-6%	-6%	-6%	-6%	-6%
92	-18%	-11%	-10%	-10%	-10%	-10%	-10%
93	-24%	-15%	-14%	-14%	-14%	-14%	-14%
94	-27%	-17%	-17%	-16%	-16%	-16%	-16%
95	NA	-20%	-19%	-19%	-19%	-19%	-19%
96	NA	-24%	-23%	-22%	-22%	-22%	-22%
97	NA	-28%	-27%	-27%	-27%	-27%	-27%
98	NA	-35%	-33%	-33%	-33%	-33%	-33%
99	NA	-37%	-35%	-35%	-35%	-35%	-35%
100	NA	-39%	-37%	-37%	-37%	-37%	-37%
101	NA	-42%	-40%	-40%	-40%	-40%	-40%
102	NA	-47%	-44%	-44%	-44%	-44%	-44%
103	NA	-54%	-51%	-50%	-50%	-50%	-50%
104	NA	-56%	-52%	-52%	-52%	-52%	-52%
105	NA	NA	-54%	-54%	-53%	-53%	-53%
106	NA	NA	-56%	-56%	-56%	-56%	-56%
107	NA	NA	-60%	-60%	-60%	-60%	-60%
108	NA	NA	-66%	-66%	-66%	-66%	-66%
109	NA	NA	-67%	-67%	-67%	-67%	-67%
110	NA	NA	-69%	-68%	-68%	-68%	-68%

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: Megan Ware, American Lobster FMP Coordinator

DATE: December 20, 2016

SUBJECT: Recommended Changes to Draft Addendum XXV

The Addendum XXV Subcommittee met via conference call on December 8, 2016 to review comments submitted by state agencies on draft Addendum XXV. The Subcommittee was comprised of David Borden (Board Chair), Dan McKiernan (MA Commissioner), John Clark (DE Commissioner), Story Reed (PDT), and Megan Ware (ASMFC Staff).

Comments on draft Addendum XXV were received from Massachusetts, Rhode Island, Connecticut, New York, and NOAA Fisheries. Copies of the letters are attached to this memo. Based on the comments received, the Subcommittee makes the following recommendations to the American Lobster Management Board (Board) and Plan Development Team. The Subcommittee notes that no management options have been removed from draft Addendum XXV but additional options are recommended for inclusion in the document to address the comments received and to offer a broad range of alternatives on each subject for public comment.

If the Board agrees to these changes, they will be directed to the PDT for their inclusion in draft Addendum XXV, which the Board hopes to approve for public comment at the winter meeting. The recommendations below fall into two general categories based on the magnitude of the change: 1) editorial clarifications; and 2) the addition of a broader range of options for public comment. For the new options recommended by the Subcommittee, no new analysis are required by the Technical Committee.

Editorial Changes

- Per the suggestion of Rhode Island and Connecticut, *Section 1.0: Introduction* should be expanded to clearly outline the expectations of this addendum, including a statement that it may not be possible to rebuild this stock to the reference levels unless favorable environmental conditions develop.
- Ventless trap survey data should be added to *Section 2.2: Resource Issues* in order to provide more recent evidence of low settlement, per the recommendation of Massachusetts. Both Rhode Island and Massachusetts have agreed to provide the updated material.
- *Section 2.2: Resource Issues* should describe the shifting abundance of American lobster as there is record high abundance in GOM/GBK but record low abundance in SNE, per the recommendation of Rhode Island.
- The terminal year of Figure 2 in *Section 2.2: Resource Issues* should be noted in the caption.
- The number of active permits in Table 3 (*Section 2.3.1*) should be verified by the PDT based on concerns from Massachusetts that these numbers may not be accurate.
- Non-trap landings from Massachusetts should be added to *Section 2.3.1 Commercial Fishery* to fully describe catch in that state and the impact on the non-trap fleet.
- New Hampshire recreational landings should be removed from *Section 2.3.2 Recreational Fishery* in order to focus the document on SNE, per the recommendation of Massachusetts and Rhode Island.

- A table of management action taken in each LCMA since the 2009 stock assessment should be added to *Section 2.4: Status of Management*, per the recommendation of Rhode Island. This information is already reported in the FMP Review and can be reformatted for the addendum.
- Potential economic impacts to the Jonah crab fishery should be further explained in *Section 2.5 Economic Status of Fishery* per the recommendation of Massachusetts and Rhode Island. This should include a table of landings and ex-vessel value by state and quarter. The multi-species nature of the fishery (crab/lobster) should also be highlighted and described.
- References to positions taken in *Section 2.6: Management Tools Considered* by the PDT or TC should be reworded to indicate that these are Board positions, per the recommendation of Massachusetts. This will ensure the Board is responsible for the content of the document.
- Per the recommendation of Rhode Island, *Section 2.6.2: Trap Reductions* should note that many of the studies which cite the ability of fishermen to increase trap hauls to offset the impacts of trap reductions were conducted inshore. It should also be added that it is more difficult for offshore fishermen to alter their behavior due to long travel times and longer soak times.
- *Section 5.0: Compliance* should note that the Board may select a final implementation schedule based on the target egg production identified and management tools chosen. The PDT noted that a phase-in period might be useful to lessen negative impact of gauge changes. This change was recommended by Rhode Island given that some tools, such as large gauge size changes, may be best implemented over several years. The current Board positon is to implement Addendum XXV over two years, but we may need flexibility depending on the final strategy selected by the Commission.

Additional Alternatives for Inclusion in Draft Addendum XXV

- Based on a recommendation from Rhode Island, add a 30% egg production target to draft Addendum XXV so that the implications of this alternative can evaluated by the public. According to ASMFC staff this does not pose major technical problems as analysis exists for this target level.
- To address concerns raised by both Massachusetts and Rhode Island on the potential impacts of gauge size changes to inter-state commerce, it is recommended that a brief description and management alternatives be added to the document asking whether minimum gauge size changes greater than 3 ¼" should apply to all persons or just to harvesters. If higher minimum gauge sizes do not apply to dealers, they would be allowed to possess lobster legally landed in another LCMA which has a smaller gauge size. A table of current state regulations on this issue should also be added to the addendum.
- Given concerns raised by Massachusetts and Rhode Island that Addendum XXV needs to clarify which gear types are affected by seasonal closures, it is recommended that a description and associated management alternatives be added to the document to further explain the impacts on various gear types, such as recreational gears and trawlers. The management alternatives should ask whether a season closure restricts the landing of lobsters, implements a possession limit for bycatch fisheries, or requires lobster traps to be hauled out of the water.
- As pointed out by Massachusetts and Rhode Island, draft Addendum XXV does not discuss the application of regulatory changes to the recreational fishery. It is recommended that management alternatives be added to the addendum to seek comment on how the recreational fishery should be impacted. The issue should specifically ask if the recreational fishery must abide by new season closures, size and bag limits or be exempt from the regulation applied to the commercial fishery.
- To respond to comments that draft Addendum XXV is not clear on the need for standardized management measures among LCMAs, it is recommended that additional language and alternatives be added to Addendum XXV to explore standardization. Alternatives should be added for different combinations of LCMAs, as well as an option that does not require standardization.

- The Rhode Island comment letter stated that Rhode Island fishermen feel singularly penalized for trap cuts taken in Addendum XVIII, as those cuts were implemented after the 2015 stock assessment, which was based on data through 2012. The trap cuts were also only implemented in two LCMAs (2&3) and the other LCMAs in SNE stock area were exempt. They have requested that an option be added to provide credit for trap reductions which have been completed prior to implementation of this addendum. This change would result in there being two alternatives in the document, one which does not give credit towards the egg production target and one which does give credit.
- To address requests from Massachusetts and Rhode Island that the acceleration of current trap reductions prescribed in Addendum XVIII be included as a management option, an issue should be added to draft Addendum XXV asking whether current trap reductions should be accelerated to end in 2018. Massachusetts believes the acceleration of current trap reductions may negate the need for trap banking in federal waters which would simplify the federal rule making process.
- Two states, Rhode Island and Connecticut, questioned the necessity to link management tools together. Both suggested that the various management tools should be independent. As a result, it is recommended that two option be included in Addendum XXV, one requiring that season closures and trap reductions be used in conjunction with gauge size changes, and a second option to allow them to be considered independently.
- Per Rhode Island's request, additional options should be added to *Issue 2: Stock Boundaries*, to determine how the 70^{o}W latitude split should be implemented in the lobster fishery. Additional options include a 70^{o}W split with no annual declaration and a 70^{o}W split with states issuing permits and new tags. Other options can be developed by the PDT as they see fit.
- New York's comments were received after the Subcommittee call; however, the letter included a recommendation that alternatives for restrictive trap cuts in Area 4 and Long Island Sound be added to the draft addendum. Should the Board want to include this issue in draft Addendum XXV, analysis would need to be conducted on expected egg production from restrictive trap cuts. Any such analysis will be conducted following the Winter meeting and be available prior to the Spring meeting.

Massachusetts Suggestions for Amendments in Addendum 25

Section 2.2 Resource Issues. It would be revealing and useful if the ventless trap results in MA & RI could be updated to include the most up to date time as possible (2016?) to corroborate the decline in the stock and to confirm the poor year classes that Figure 1 portrays in the model-based spawning stock biomass and recruits. The fact that the stock assessment was last done based on data up to 2012 makes us vulnerable to criticism that our results are out of date, but if the ventless trap surveys can corroborate the decline since 2012, then that makes the case for more conservation.

Section 2.3: Fishery Status. The number of active permits needs to be checked. It seems unlikely NY would have 50% more active permits than MA. Moreover the number of active permits seems too high to me, esp. in MA.

Since we embarked on a plan to scale the fishery to the size of the resource, it seems important to me to get the most recent numbers of traps fished and active permits into the document. Else the industry will be highly critical of the info.

Number of traps allocated in Table 5 has no year mentioned.

Not sure why MA non-trap landings are excluded (p. 11, 1st paragraph) . We can provide those.

NH's rec landings should not be mentioned at all (p. 11, 2nd paragraph).

Section 2.5 Economic Status of the fishery.

This section ignores the growing dependence on jonah crabs. Part of my rationale in approving the Jonah Crab plan was to recognize the SNE fishery as a mixed crustacean fishery (Jonah & lobster). This should be investigated and revealed because if an addendum is enacted that constrains the Jonah catch due to closed seasons or closed areas, then the economic impacts of the loss of Jonah crabs needs to be revealed. This is especially true for the Area 3 vessels (I think). NMFS will surely need this information in their EIS so we might as well get this out asap. Table 8 should include poundage and value of jonahs as well as lobster

2.6.1 Gauge Size changes.

On pg. 15 2nd paragraph it's not clear if the document is endorsing SNE/MA states to sell GOM sized lobsters (3 ¼") or just allowing them to be shipped through to other markets in states not subject to the plan. I recommend the former be allowed and the states address potential noncompliance by harvesters with elevated penalties. For example there is a $150 criminal fine per short lobster in MA. This is an effective deterrent.

2.6.2 Trap Reductions

It would be useful to broaden this section to include the reductions in active permits fished.

On page 16 paragraph 4, the document recommends against accelerated trap cuts. This should be reconsidered because if adopted it would negate much of the need for the feds to develop a rule to allow trap allocation banking. This should be welcomed by NMFS.

2.6.3 Closed Seasons

As noted above, referring to the Jonah crab fishery as a distinct fishery is really a mistake.

2.6.4 Trip Limits

Reference to positions taken by the PDT or the TC should be downplayed in the document. The Board should be responsible for proposing and embracing whatever is in the document.

Rhode Island Letter on Draft Addendum XXV

At the October 27, 2016 meeting of the ASMFC Lobster Management Board, the Board deferred action on sending Addendum XXV out for public comment and remanded the draft document back to the States and or the appropriate Lobster Conservation Management Teams (LCMTs). The following comments were provided to the State of Rhode Island Department of Environmental Management, Marine Fisheries Section from the Lobster Industry leaders, which represented comments from the State of Rhode Island Southern New England Lobster Fishing Industry. Comments are arranged by section corresponding to those in the draft Addendum. Actual sections from the Addendum are in bold and sections comments refer to are italicized.

SNE Industry representatives of the LCMT's of 2 and 3 met on November 7, 2016 at the RI Marine Fisheries Lab in Jamestown, RI and offered the following industry comments on Draft Addendum XXV.

2.2 Resource Issues

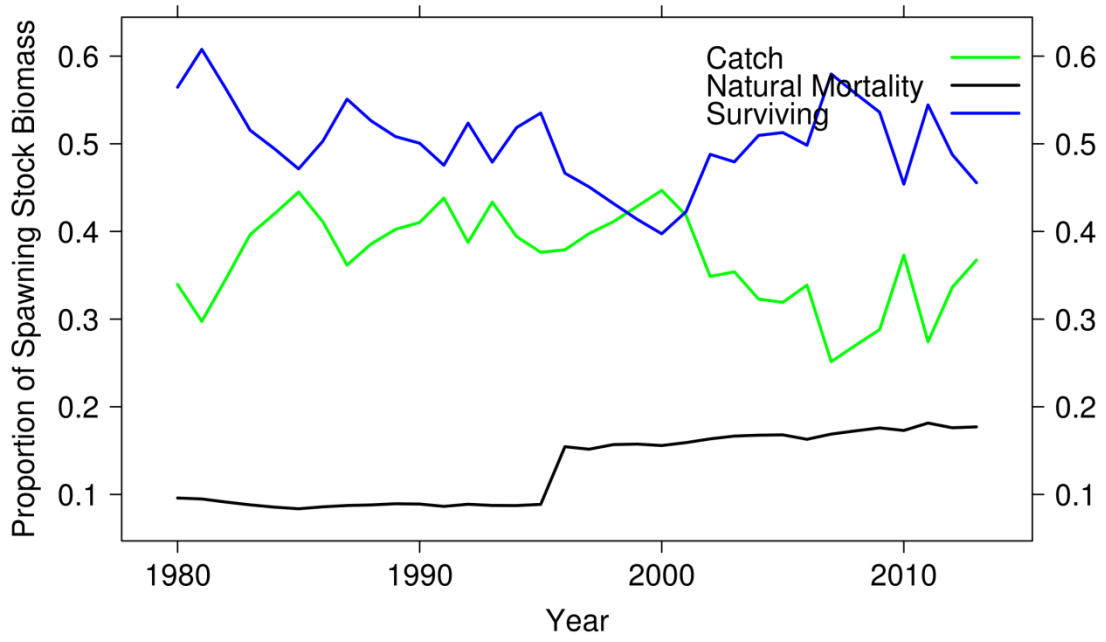
There was a question of whether the abundance value in Table 1 for SNE is still relevant given prolonged low abundance levels in Long Island Sound in recent years. Upwards of 60 % of landings came from LI Sound (Table 2) as reported in section 2.3.1 below. There is the belief that there may be little hope of achieving the reference numbers presented, given the decline in the Long Island portion of the SNE stock.

Given the environmental changes in LI Sound, which historically contributed 60 % of the landings to SNE, it may not be realistic to expect the stock to rebuild to former levels unless environmental conditions become more favorable .It may be unlikely that the reference levels for the SNE stock are achievable without the contributions of LIS .

Table 1. Current (2011-2013) reference estimates for each stock as well as the target and threshold levels for abundance and effective exploitation. The reference abundance is used to determine a depleted status while effective exploitation is used to determine an overfishing status.

		GOM/GBK	SNE
Abundance (millions)	2011-2013 Reference	248	10
	Threshold	66	24
	Target	107	32
Effective Exploitation	2011-2013 Reference	0.48	0.27
	Threshold	0.50	0.41
	Target	0.46	0.37

The group also noted in this section that the proportion of SSB surviving is relatively stable over the time period. Therefore, one might argue then that under a period of believed high natural mortality (warming waters, shell disease, predators increasing) intense fishing pressure and LIS stock declines, SSB has not changed dramatically.



2.3 Fishery Status

2.3.1 Commercial Fishery

From the draft Addendum: *"Table 5 shows the current trap allocations in the LCMAs 2, 3, 4, 5, and 6. The greatest number of traps are allocated in LCMA 2, 3 and 6; however; a large portion of traps in LCMA 6 are not actively fished. This is corroborated by data showing the harvest of lobster from each LCMA (Table 6) as LCMA 6 has the second lowest landings in the SNE fishery. Roughly two-thirds of landings in 2012 came from the LCMA 3."*

This is important given the lack of bio sampling from that area and its eventual implications with regards to changes in egg production due to minimum and maximum size changes. It is assumed that little bio sampling takes place in area 4 and 5 and this would make it difficult to predict min/max size impacts in those areas that are not sampled because their population demographics may be different than those areas that are sampled.

In table 6 below, landings from A-4 are suspect. A 60 % increase in landing in one year (see 2011 to 2012 in area 4 below) does not seem possible, therefore the data in this table should be investigated further to make sure it is accurate.

Table 6. Estimated lobster landings (in pounds) by LCMA.

Year	LCMA 2	LCMA 3	LCMA 4	LCMA 5	LCMA 6
1982	1,656,479	2,135,954	622,674	99,093	1,359,058
1983	2,958,366	2,258,492	633,254	71,804	2,428,633
1984	2,978,985	2,765,512	795,180	135,652	2,704,070
1985	2,992,330	2,330,628	964,043	170,998	2,273,337
1986	3,081,903	3,009,509	1,084,282	125,969	2,362,128
1987	3,219,900	2,655,725	1,473,841	98,486	2,378,765
1988	3,259,336	2,269,480	1,666,439	85,142	3,195,208
1989	4,175,114	2,845,444	2,232,935	106,126	3,735,250
1990	4,374,062	5,253,653	2,431,198	237,410	4,250,654
1991	4,140,145	4,811,267	2,096,138	115,020	4,393,986
1992	3,795,367	4,023,295	1,448,866	77,854	4,362,551
1993	3,772,494	3,776,113	1,597,447	89,495	3,968,663
1994	5,602,507	3,030,046	554,367	26,013	5,738,398
1995	4,960,453	2,661,176	962,077	45,054	8,564,325
1996	4,880,328	2,610,223	978,376	52,758	11,705,439
1997	5,324,775	3,183,034	1,162,862	36,623	11,650,701
1998	5,273,463	2,724,429	1,534,067	41,963	10,575,143
1999	6,938,658	3,195,423	1,346,509	77,621	8,331,142
2000	5,651,160	2,673,111	1,123,486	53,364	3,802,880
2001	3,862,054	2,053,831	762,408	55,537	3,013,551
2002	3,445,004	1,899,923	442,425	14,838	2,230,869
2003	1,110,534	2,519,713	423,583	17,394	1,448,011
2004	1,184,942	2,014,702	480,203	93,270	1,534,130
2005	1,464,433	1,800,406	457,275	54,181	1,673,396
2006	1,853,505	1,983,721	516,130	59,928	1,840,308
2007	1,430,836	1,494,830	617,978	56,866	1,263,648
2008	1,168,921	1,918,429	440,108	322,916	920,951
2009	1,051,241	2,227,432	488,792	308,212	896,594
2010	1,022,528	2,135,008	522,037	184,409	966,505
2011	730,889	1,954,052	488,977	148,587	306,079
2012	627,051	2,003,412	782,684	154,455	286,215

Table 6 should to be updated through 2015. Reasoning being that by the time this goes to hearing in 2017, the information will be five years out of date, so should be updated to the extent possible.

From the draft Addendum: *"The non-trap fishery for lobster is a small percentage of the overall SNE landings. In 2015, a total of 55,191 pounds were landed with non-trap gear. It is important*

to note that this value is an underestimate as it does not include non-trap landings from Massachusetts."

Massachusetts non-trap landing should be included if possible.

2.3.2. Recreational Fishery

This section needs to be updated as the inclusion of MA data from north of the cape and NH is not relevant to this Addendum which is focused on SNE.

2.4 Status of Management

From the draft Addendum: *"The Board also approved Addendum XVIII, which implemented a 50% trap reduction in LCMA 2 over a 6-year period and a 25% trap reduction in LCMA 3 over the span of 5 years. The goal of this management action was to scale the size of the SNE fishery to the diminished size of the resource."*

The Board initiated addendum XVIII to scale the SNE fishery to the diminished size of the SNE resource, however the management measures in the addendum only apply to Areas 2/3. These areas shouldn't be penalized for being proactive, and their existing management efforts should be recognized and credited in this new action for both past and future trap reductions.

A summary table showing the management changes by LCMA in response to the 2009 stock assessment should be included in this document.

2.5 Economic Status of Fishery

Table 8: 2015 ex-vessel values in the SNE lobster fishery.

	MA	RI	CT	NY	NJ	DE	MD	VA	Total
Ex-Vessel ($)	3,871,993	10,535,726	748,797	820,456	2,248,638	61,400	186,039	24,092	18,497,141
%	20.9%	57.0%	4.0%	4.4%	12.2%	0.3%	1.0%	0.1%	100.0%

A similar table of Jonah crab landings by state and quarter with value is needed which will become very pertinent in any discussion of a closed season.

2.6 Management Tools Considered

2.6.1 Gauge Size Changes

Minimum and maximum gauges interact with lobster pot escape vent size, therefore it needs to be clarified as to whether this interaction will be acknowledged in the document.

From the draft Addendum: *"Economic impacts of gauge size changes depend on how the change is implemented, as gradual changes to the gauge size over several years may dampen the reductions in catch. Short-term impacts of gauge size changes include an immediate decrease in landings as there is a narrower slot from which to harvest lobsters; however, as the population stabilizes, landings settle into a common trajectory."*

The board should reconsider the 2 year implementation strategy if the targets are set at 40% or higher.

When considering changes to the gauge size, potential impacts to interstate commerce should be considered.

If this is deemed to present a significant problem, a strategy to counteract this problem should be offered in the document or the gauge size strategy should not be part of the document until this can be further vetted.

2.6.2 Trap Reductions

From the draft Addendum: *"The relationship between the biology of lobsters and trap reductions is not well understood. Recent analysis by the TC suggests a 25% reduction in the number of actively fished traps in SNE may result in, at most, a 13.1% increase in egg production. Importantly, the TC heavily caveated this result by highlighting the analysis assumes fishermen maintain a constant soak time when their trap allocation is reduced. Studies show this is not true, as fishermen reduce their soak time to compensate for fewer traps."*

These fishery behavioral assumptions are pertinent to inshore and areas of high trap density. The study cited also takes place under these characteristics which are no longer the case. Since the majority of SNE landings now come from offshore, it makes it much more difficult to change behavior as offshore fisheries operate very differently than inshore fisheries from an economic standpoint. Therefore these caveats offered do not account for the dynamics currently occurring in SNE and the trap reduction analysis should not be so readily dismissed.

From the draft Addendum: *"Trap reductions are recommended for use in conjunction with gauge size changes; trap reductions are not recommended as the sole management measure used to increase egg production."*

How the methods are used, either by themselves or in conjunction with other measures is a policy decision and not a PDT decision. Another option could be the allowance to use trap reduction without size changes, or make the measures independent. This is policy/management uncertainty and risk question and the purview of the board not the PDT.

From the draft Addendum: *"Accelerated trap reductions are not recommended as a management tool in this addendum."*

We believe other lobster management areas should implement trap reductions. Reducing traps 10 % a year in these areas would remove some of the latent effort at minimum and possibly reduce exploitation. TC has pointed out in prior memos that the trap reduction strategy should be universal, otherwise the trap reductions in A-2 and 3 may be circumvented by more fishing in A4 and 5. Furthermore, accelerated trap cuts should be an option as well as calculating the benefit from the additional scheduled trap cuts for Areas 2 and 3.

2.6.3 Closed Seasons

Fishing effort or the fleet's capacity to fish lobsters is currently changing with far more large vessels capable of fishing offshore and as the Jonah crab fishery becomes more important it will ultimately make seasonal closures more problematic.

Closed seasons will likely not be effective because fishermen will adapt to the implementation of seasonal closures by intensifying effort during the rest of the year.

Spatial distribution of lobsters does change seasonally which may allow more lobsters to migrate offshore so they would no longer be available to inshore fishermen.

Offshore enforcement of a seasonal closure would be a challenge.

An indirect consequence of closed seasons is the loss of trap grounds to other fisheries when forced to remove gear from the water. After the closed season, lobstermen wouldn't be able to place their gear back due to other fisheries claiming it in their absence.

Potential impacts to the Jonah Crab and Black Sea Bass fisheries.

Massachusetts has fishermen landing from 4 LMA's - Closure enforcement would seem problematic.

Impacts of summer closure on recreation fishery should be discussed.

It is not reflected in the document on how seasonal closures would affect the mobile gear and non-trap gear fleet.

There is the need to evaluate the impacts of seasonal closures with regard to the fact that the lobster fishery is now a mixed crustacean fishery in SNE. It is important to maintain a viable crab fishery in SNE and closed seasons would impact this.

From the draft Addendum: *"Given the assumptions in the analysis on season closures and the potential impact on the Jonah crab fishery, closed seasons are recommended for use in conjunction with gauge size changes; closed seasons are not recommended as the sole management measure used to increase egg production."*

As noted previously, how to use these various options is a policy decision, so the document should not be prescriptive as to how to use the various options. This is policy/management uncertainty and risk question and the purview of the board not the PDT.

2.6.4 Trip Limits

From the draft Addendum: *"Given these concerns, the TC recommended trip limits be considered in conjunction with a quota for the SNE stock."*

As noted previously, how to use these various options is a policy decision, so the document should not be prescriptive as to how to use the various options. This is policy/management uncertainty and risk question and the purview of the board not the PDT.

This issue of trip limits was suggested in addendum XVIII, which noted all of the problems associated with trip limits. None of the identified issues have been resolved.

It would also imply that there would be a change in the management currency from traps to resource, which would complicate many of the existing management programs already in place.

From the draft Addendum: *"The PDT recommends trip limits and quotas be considered in a subsequent management document. This will allow for the proper consideration."*

It is important to note that there are numerous implementation issues that need to be resolved before it can be considered, therefore these measures are not recommended as a management tool for use in this addendum.

2.6.7 Standardize Regulations

From draft Addendum Document: *"Given the different dynamics of the fishery, the PDT does not recommend standardized regulations between the inshore and offshore fishery but does support standardized regulations within the inshore fishery (LCMAs 2, 4, 5, and 6). This would be achieved by maintaining uniform gauge sizes and standardizing closed seasons."*

If each LMA chooses a separate set of management measures this would move farther away from the concept of standardized regulations but also realizing inshore lobster fisheries are not a one size fits all. Consideration should be given to the unforeseen results of this action such as redistribution of effort.

2.7 Stock Boundaries

From draft Addendum Document: *"The complexity of the stock boundaries is further complicated by the fact that many vessels fishing out of Rhode Island and Massachusetts who are harvesting lobsters in Georges Bank, must travel through the SNE stock to reach their port of landing. This means SNE-specific rules designed to be enforced only at the port of landing provide compliance challenges."*

The Document should include a list of options

1. No line, which means the SNE restrictions apply everywhere
2. A line at 70 degrees
3. A line at 70 degrees plus an annual declaration
4. A line at 70 degrees plus an annual declaration on a shorter timeline
5. A line at 70 degrees and let the States issue permits and new tags

It is likely NOAA won't implement until 2018 or 2019 and the states have no appreciable offshore enforcement.

3.0 Management Options

Issue 1: Increases in Egg Production

From draft Addendum Document: *"This document also considers trap allocation reductions. These potential reductions are separate and in addition to the trap allocation reductions established in Addendum XVIII. Should trap allocation reductions be chosen in this addendum for LCMA 2 and 3 fishermen, they will occur following the final year of trap reductions specified in Addendum XVIII."*

The existing trap reductions should count towards some of the reduction needed and future reductions should be analyzed for potential future increases in egg production.

The TC tables relating to the egg production options from gauge changes found in appendix 5 should be added to the document.

Hi Megan,

Connecticut DEEP hosted an informal public meeting last night to discuss the options presented in draft addendum XXV.
20 fishermen attended. Although many comments were shared, the two that are most important at this stage were in regard to the option to require uniform measures throughout the SNE stock area and the Technical Committee suggestion that would require many options to be bundled with a gauge adjustment. Uniform measures could have very different impacts across LMA's given the differences in seasonality of the fisheries, size composition of the resource as examples. The requirement to bundle a season closure with a gauge adjustment was of particular concern. Fishermen generally felt no options should be taken off the table at this stage, suggesting hatchery stocking, water quality improvements and subsidy for fishermen who stop or curtail fishing or who v-notch lobsters.

I do not suggest any modifications to the document based on these comments given that their main desire was to keep all options on the table and that the suggested additions would be costly with no apparent source of funding or in some cases likelihood of success in increasing egg production.

However, I do have some real concerns with some of the options given our legal mandate to base Commission FMP's on the best available science under ACFCMA and for any element of the plan adopted for federal waters to comply with all aspects of the MSA. The Board needs to come to terms with the fact that the Technical Committee has said as clearly and politely as possible that trap reductions will not achieve meaningful conservation – they will not reduce exploitation or increase egg production meaningfully or nearly as much as they calculate (13.1% for 25% reduction in traps) because the assumptions of that estimate are invalid. We have tortured writing in the Addendum now that tries to rationalize how despite the TC's advice to the contrary we may consider taking credit for "at most, a 13.1% increase in egg production" by reducing active traps by 25%. Option 2c goes on to say "trap allocations must be used in conjunction with gauge size changes to achieve the 20% increase in egg production" and goes on to stipulate that trap reductions and closed seasons cannot account for more than 10% of the expected increase in egg production.

The absence of a table that equates percent reduction in active traps with a percent increase in egg production is the clearest evidence that there is no scientific basis for the trap reduction option. Further, how would we implement a trap reduction under Option 2c? As written that option requires we take no more than 10% of the 20% increase from the trap reduction side. So does that mean we can cut traps less than 25% (77% of 25% or 19.2%)?
It gets worse when we move to Option 3c when the implication is an LMA could take all of the 13.1% credit for the same 25% trap reduction that can at most account for 10% in Option 2c. It seems NOAA was pretty well discounted the mid-stream switch from managing total trap allocations to active trap currency in federal waters which seems enough to sink this option from moving forward.

How do we preserve credibility as a Commission when we consider moving forward with and Addendum that devotes almost 1 ½ pages of Technical Committee rebuke of trap reductions as an effective means of conserving lobsters then forge head and offer it as an option anyway? Example text: "The relationship between the biology of lobsters and trap reductions is not well understood." "Current trap reductions may impact the number of traps actively fished; however it is impossible to predict the tipping point between reductions in latent effort and reductions in the number (of) actively fished traps." (The analysis of traps is only possible in about half the states in the SNE stock region.) "The expected increase

in egg production is likely much lower as trap reductions remove latent effort too". "Given the tenuous relationship between traps fished and fishing mortality…"

The final paragraph in Section 2.6.2 Trap Reductions would seem to put a nail in the trap reduction coffin – "given the TC's concerns.. the acceleration of trap reductions (in ADDXVIII) .. is not recommended as a management tool in this addendum." It's some area 2 interests that have pushed this option, yet the Addendum says it shouldn't be applied there.

Closed seasons needs to be offered as a stand-alone option in this addendum. The technical comment on the merits of closed seasons are mainly positive especially with respect to a summer closure that would prevent lobsters from repeated hauling and handling during a thermal stress period and would protect "pregnant" females prior to egg out although they offer a word of caution over potential recoupment during the open season, the TC has been consistent for several years that there would be real benefits to protecting lobsters during the summer. We believe Area 6 has derived similar benefits from its fall closure when most females have still not egged out and water temperatures remain high (Sept-Oct at least). The PDT also apparently felt confident enough in the scientific merit of a season closure that a table of closures and percent egg production / exploitation response was provided.

We need to take the same tact with trap reduction in this addendum as it takes for v-notching and culls– it gets mentioned to document it was considered but a statement is included that it is not recommended for use as a management tool and it is not included in any of the options.

I appreciate all of your work on this addendum and that of the PDT and TC. The TC has provided a tremendous amount of very useful and important analysis for our consideration. My final comment is that the draft Addendum needs a clear concise discussion of what the Board, Lobstermen and the public can expect from any actions taken under this Addendum.

We have created a bit of fuzz by migrating from fishing mortality and SSB to egg production but the addendum contains enough information that the connection remains. The goal now is to "respond to the decline of the SNE stock… while preserving a functional .. fishery". I believe that requires some additional text in the Introduction that references the % reduction in exploitation required to stabilize the stock (something like 80%) to put into context the range of actions we are considering. 80% cuts are not being considered because we don't believe that would preserve enough of the fishery. I think the rest of the Introduction does a very good job of laying out the situation we are in. The last sentence of Intro paragraph at the top of page 2 I think does a good job of handling the lack of certainty in any action we take. It is a fingers crossed situation.

Thanks again for all of your work on this addendum. Please give me a ring if you have any questions / want to discuss.
Dave

David Simpson
Director
Marine Fisheries Division
Bureau of Natural Resources
Connecticut Department of Energy and Environmental Protection
333 Ferry Rd / PO Box 719 Old Lyme, CT 06371
P: 860.447-4306 | F: 860.434-6150 | E: david.simpson@ct.gov

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Marine Resources
205 North Belle Mead Road, Suite 1, East Setauket, NY 11733
P: (631) 444-0430 | F: (631) 444-0434 | FW.Marine@dec.ny.gov
www.dec.ny.gov

M E M O R A N D U M

To: Megan Ware
From: Kim McKown
Subject: Lobster Addendum XXV additional management measures from LCMT
Date: December 8, 2016

The NYSDEC mailed letters on November 18, 2016 to Lobster Conservation Management Team (LCMT) 6 and LCMT 4 members and alternates asking them to contact us if they had ideas for additional management measures for Addendum XXV. Letters were mailed to eight LCMT 6 and four LCMT 4 fishermen (see attached letter).

Five LCMT members replied, four from LCMT 6 and one from LCMT4. A number of additional management measures were recommended, they are listed below:

- Very restrictive trap limit. Suggestions ranged from 250 to 500 traps per permit holder.
    - Could have LCMA 6 subarea in Long Island Sound with very restrictive trap limit.
        - Potential subarea would run from 72 degrees 20 minute longitude to 72 degree 50 minute longitude.
    - The trap limit could have a sunset date to reassess if the limit is still needed.

- Decrease effort by increasing the trap tag fee to a large amount (such as $15 per tag).

- Get rid of latent trap effort. Dates would need to be selected to determine active versus latent effort.

- Pay fishermen market price to v-notch legal females and return them to the water.

- Male only fishery in August – September to preserve the new shell females so they could egg out.

- Increase the quotas for lobster predators, especially black sea bass and scup.

In addition, I heard from a number of fishermen that there were a large number of lobsters caught this year and that they were in very good condition, no shell disease. Fishermen also said there were good numbers of small lobsters.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

NOV 29 2016

David Borden, Chair
American Lobster Management Board
Atlantic States Marine Fisheries Commission
1050 N. Highland Street, Suite 200A-N
Arlington, VA 22201

Dear David,

Thank you for the memorandum dated November 7, 2016, requesting public comments on potential management alternatives in draft Addendum XXV to Amendment 3 of the Interstate Fishery Management Plan for American Lobster. As participants on the Lobster Management Board and co-managers of the lobster fishery, we provide our comments to assist the Board in moving ahead as soon as possible for public comment with a comprehensive draft addendum to address the continued decline of the Southern New England (SNE) lobster stock.

Now that the Board has chosen to postpone approval of the draft addendum, we question the process that the Board is undertaking with Addendum XXV, as outlined in your memorandum. In October, the Board granted the states time to solicit further comments on the addendum, but it is unclear who they will solicit and how they will accept that commentary. While we certainly endorse public and industry commentary, the memorandum does not state whether this process will convene the Lobster Conservation Management Teams or seek comment from the public.

Further, it appears that this open-ended process could lead to changes to the draft addendum. The memorandum does not outline the opportunity for the Technical Committee (TC) or the Plan Development Team (PDT) to review and comment on any potential changes. Certainly, voting on new material without TC or PDT input would be inappropriate given the importance of the action. It would also seem contrary to Commission best practices and could potentially result in management alternatives that lack the appropriate technical and scientific basis to achieve the addendum's goals and objectives.

Additionally, we have concerns about the scope of the process outlined in the memorandum. As you know, given the poor condition of the SNE lobster stock, the Board voted in August to increase egg production for the stock by 20 to 60 percent, which remains the directive for the PDT, TC, and others who will be commenting on Addendum XXV. We were encouraged to see that the PDT offered, for Board consideration in October, a very effective, responsible, and science-based approach for achieving the various egg production alternatives based on changes to the minimum and maximum lobster carapace sizes, either alone or in combination with seasonal closures and/or trap reductions. The options in the draft addendum are clear and concise. The PDT and TC conducted a substantial number of analyses in advance of the Board's October meeting and concluded that many other potential Addendum XXV alternatives are infeasible based on the best available science. In fact, at the time of the document's development, scientists suggested that gauge restrictions, as the primary measure, are the

singular reasonable choice. As a result, we urge that the Board not seek unfettered commentary as part of the process outlined in the memorandum. The Board's tasking on measures to increase SNE egg production is clear and commentary outside the bounds of the Board's mandate at this stage will not be useful.

We note the Board's intent to develop Addendum XXV as an initial next step to address the recruitment failure in the SNE stock. We agree that the draft addendum provided by the PDT meets this mandate because it provides a quick and quantifiable means of improving stock conditions. Consequently, we ask that the Board continue its urgency in finalizing Addendum XXV and apply to a subsequent addendum any comments received during the revised process addressed in the memorandum. Alternatively, if the Board considers changes to the addendum based on comments it receives prior to the February Board meeting, then we recommend that the TC and PDT have the opportunity to review them and submit their own comments and recommendations to the Board.

Under the current timeline, the Board will not be able to finalize the management measures for this action until August 2017, at the earliest. This compresses the timeline for implementation by the states and us. It will be a challenge for us to implement Federal regulations by the start of the 2018 fishing year that begins May 1, 2018. Accordingly, we recommend that the Board take action to expedite the development of this addendum so we can see the benefits as soon as possible.

We look forward to continuing to collaborate with the states and the industry in the conservation of the American lobster stock and fishery.

Sincerely,

for John K. Bullard
Regional Administrator

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 Plan Development Team

DATE: January 12, 2017

SUBJECT: Revisions to Draft Addendum XXV

The American Lobster Plan Development Team (PDT) met via conference call on January 4, 2017 to review the recommendations made by the American Lobster Management Board (Board) and Subcommittee on draft Addendum XXV. The PDT then made changes to Draft Addendum XXV based these recommendations and a revised Addendum is included in briefing materials for Board consideration. The intention of this memo is to provide a synopsis of the discussion had by the PDT so the Board may better understand revisions made to draft Addendum XXV. This memo highlights areas where the PDT expanded upon, deviated from, or expressed concerns about the Board's recommendations. This memo also highlights a question for the Board regarding what year should be the baseline by which egg production increases will be measured. The PDT has drafted language for the Board to use a starting point for their discussion. All other changes from the Board and the Subcommittee were included, as recommended, in draft Addendum XXV.

Editorial Changes

- There was a recommendation to include ventless trap survey data in *Section 2.2 Resource Issues* in order to provide additional evidence of low settlement, especially in recent years. Given that the ventless trap data has a limited timeframe and would not show a full picture of declines in settlement, the PDT included larval survey data from Old Dominion Power Plant and Connecticut DEEP which has an extensive time-series (1983-2015). The PDT believes this provides a more complete picture of settlement declines in SNE.

Additional Alternatives for Inclusion in Draft Addendum XXV

- There was a recommendation that alternatives be added to the document to investigate how gauge size changes could be implemented to minimize impacts on interstate commerce. ASMFC has received advice that this document should not address issues related to interstate commerce and as a result, the PDT did not include this issue in draft Addendum XXV.
- There was a recommendation that an issue regarding the implementation of season closures be added to draft Addendum XXV, with management alternatives that ask whether a season closure restricts the landings of lobster, implements a possession limit for bycatch fisheries, or requires lobster traps to be hauled out of the water. The PDT has added these issue to the document (*Issue 4: Season Closure*); however, the PDT recommends Option C, which allows for lobsters to continue to be landed under the non-trap bycatch provision, be

removed from the document. The PDT finds this option defeats the purpose of a season closure because it allows for continued harvest and could create enforcement challenges if a harvester has permits for both lobster pots and mobile gear.

- There was a recommendation that impacts to the recreational fishery be addressed in an additional issue. The PDT has added this issue to the document (*Issue 3: Recreational Fishery*); however, the PDT did not add an option that exempts the recreational fishery from changes to the gauge size. The PDT expressed concern that exempting the recreational fishery from changes to the gauge size could create two sets of minimum and maximum sizes: one for the recreational fishery and one for the commercial fishery. This could create enforcement challenges in the fishery and undermine the gauge sizes set in the commercial fishery.
- There was a recommendation that an issue be added to draft Addendum XXV to further explore the standardization of management measures across LCMAs. The PDT has added this issue to the document (*Issue 5: Standardized Regulations*); however, some members of the PDT expressed concern that standardizing regulations across LCMAs could create implementation challenges. Notably, LCMAs would have to find a uniform set of management measures which continue to achieve the 10% decrease in fishing mortality prescribed in Addendum XVII and achieve the targeted increase in egg production in this addendum. On the other hand, the PDT encourages uniform measures be implemented within a LCMA; states should not have different regulations for the same LCMA. Some level of standardization may also be desired since lobsters and fishermen (i.e. dual-permit holders) can move between areas.
- There was a recommendation that an issue be added to the document which asks whether LCMAs 2 and 3 should receive credit for the on-going trap reductions implemented in 2016 as a part of Addendum XVIII. In their discussion of this issue, the PDT concluded the primary question this issue asks is: what time period does this addendum consider to be 'current conditions'? Said another way, this issue prompts the question: what is the baseline from which the Board will measure increases in egg production? In reviewing the TC reports on trap reductions, gauge size changes, and season closures, all of these analyses rely on data from the 2015 stock assessment and use data through 2014. This means that these analyses do not include biological benefits that may result from the on-going trap reductions. To address this issue, the PDT has added the following language to draft Addendum XXV:

  The starting point from which this document measures changes in egg production is 2014. This represents the last year for which data were incorporated into the 2015 Stock Assessment as well as the last year for which data were used in the TC's analyses on the management tools included in this document. Table 8 shows the management action implemented by each LCMA before and after 2014. Management action implemented after 2014 is not accounted for in the analysis for this addendum and, as a result, counts towards the egg production target chosen by the Board. The value of egg production credit will depend on the management tool used and the extent of the management action taken, and will be reviewed by the Board. Other measures which were not implemented as a result of an addendum but which a LCMA

believes contributed to a measurable increase in egg production since 2014 may be brought before the Board through the through the LCMT proposal process.

Should the Board disagree with the above language, the Board needs to direct the PDT on how they would like to resolve this issue and what baseline they would like to use to measure increases in egg production. Furthermore, if the Board would like to exempt certain management tools from receiving credit, that needs to be specified by the Board. An eventual question for the Board will be what level of credit will be given to LCMAs who have implemented management measures after 2014. The PDT does not feel it is in their purview to comment on the amount of credit received.

- There was a recommendation that an issue be added to draft Addendum XXV which allows for the acceleration of on-going trap reductions in LCMAs 2 and 3. While the implementation timelines prescribed in Addendum XVIII provide the final date by which trap reductions can be completed, there is nothing which stops a LCMA from implementing trap reductions ahead of schedule. Rather than adding an issue to address this topic, a sentence was added to *Section 3.0 Management Measures* which states that LCMAs can accelerate on-going trap cuts in order to meet the final objectives and timeline selected by the Board in draft Addendum XXV. The PDT does note that the acceleration of trap reductions, as opposed to the implementation of trap reductions on the current schedule, does not result in a significantly higher increase in egg production.
- There was a recommendation that an issue be added to draft Addendum XXV which considers whether management tools should be linked together or independent of one another. The PDT has added this issue to the document but notes trap reductions and season closures are limited in their ability to produce large increases in egg production. As a result, higher egg production targets may necessitate the use of gauge size changes.

A Proposal from Rhode Island to Add an Option to Issue 6: Implementation of Management Measures in LCMA 3

Currently there are an estimated twelve lobster vessels that fish east of 70 degrees for lobster in the spring and summer and then in the fall and winter fish for crabs west of the 70 degree line. The number that do so changes by year and fishing season. This provision would allow vessels to continue their current practices within the overlap area and allow the continuation of the historic crab fishery in SNE. This change would also reduce the probability of a redirection of effort into the eastern area and the Gulf of Maine.

Option D: Split LCMA 3 along the 70°W Longitude Line with an Overlap Area

Under this option, LCMA 3 fishing declarations would be split along the 70°W longitude line to create an eastern section and a western section in LCMA 3 with an overlap area of 30' on either side of the 70°W longitude line. The eastern boundary of the LCMA 3 overlap would be comprised of the area west of the 69° 30' W longitude line. The western boundary of the overlap would be comprised of the area east of 70° 30' W longitude line. Within this overlap area, permit holders who declare fishing activity in either LCMA "3W" (SNE) or LCMA "3E" (GOM) would be allowed to fish for American Lobster or Jonah Crab regardless of their LCMA 3 sub-area declaration. The western portion of LCMA 3 would be comprised of areas west of the 70° 30' W longitude line which are currently a part of the SNE stock. The eastern portion of LCMA 3 would be comprised of areas east of the 69° 30' W longitude line which are currently a part of the GOM/GBK stock.

On an annual basis, LCMA 3 fishermen could elect to fish exclusively in the western or eastern portions of LCMA 3 while being allowed to fish annually in the overlap zone without the need to change their area declaration. In the overlap zone, the fishermen would be held to the management measures of the sub-area declared. Fishermen can elect to fish exclusively in either portion of LCMA 3 at the start of the fishing year but not during a fishing season. Trap tags would be amended to include "3E" for fishermen exclusively fishing in the eastern portion of the LCMA and "3W" for fishermen exclusively fishing in the western portion of the LCMA. Traps with "3E" trap tags can only be fished in the eastern portion of LCMA 3 or the overlap area while traps with "3W" can only be fished in the western portion of LCMA 3 or the overlap area.

LCMA 3 permits and trap allocations may still be transferred as specified in Addendum XXI and the transfer recipient will designate at the start of the fishing year in which section he/she would like to fish. Season closures and gauge size changes adopted in this addendum would only apply to the western portion of LCMA 3. Trap reductions would apply to all LCMA 3 permit holders as fishermen are able to switch their annual designation.

A Proposal from Delaware, Maryland, and Virginia to Add an Issue to Draft Addendum XXV to Consider an Exemption for De Minimis States

The three states at the southern end of the commercial American lobster fishing range, Delaware, Maryland, and Virginia contribute little to American lobster landings, less than 0.1% coast wide and, at most, 2% of SNE. The lobster fishery in these states is, for the most part, a secondary fishery for the black sea bass fishery and participation in each state is limited to very few (<5) lobster permit holders. Recent American lobster biological information from the benchmark assessment suggested that lobsters inhabiting the southern end of its range were living under conditions not conducive to lobster reproduction and these lobsters were not likely to contribute much to the recovery of the SNE lobster population. The management measures proposed in Addendum XXV will impose a large administrative burden on the de minimis states relative to the size of their lobster fisheries and the importance of the lobsters targeted in the de minimis states to the SNE population. De minimis states want to allow their few lobster permit holders to continue some level of harvest, but the costs of compliance with all Addendum XXV management measures could force de minimis states to close their lobster fisheries. The potential benefit of reducing the already extremely low landings from de minimis states to the stated goals of Addendum XXV is small, since these minimal landings do little to drive fishing mortality or egg production. Allowing de minimis states an exemption from Addendum XXV requirements based on the criteria selected from options below could afford the few existing permit holders a chance to remain in the fishery.

Amendment 3 to American Lobster FMP (ASMFC 1997) allows the Board to exempt de minimis states from management actions, "If de minimis status is granted, the de minimis state is require to implement, at a minimum, the coastwide requirements contained in Section 3.1 of Amendment 3. Any additional components of the FMP, which the Board determines necessary for a de minimis state to implement, can be defined at the time de minimis status is granted. For all other required components of the plan, the Board will specify by motion which measures a de minimis state must adopt". The Board may opt to require de minimis states to implement all Addendum XXV management measures or to exempt de minimis states from these management measures provided these states meet certain conditions.

Issue X: De Minimis Management Options

Option 1: *Status Quo - De minimis states must implement all Addendum XXV management measures.*

Option 2: *De minimis states are exempted from Addendum XXV management measures if the said states meet the following conditions:*

a) *Close the lobster fisheries in the de minimis state to new entrants (state permit/license transfers allowed)*
b) *Allow only lobster permit/license holders of the de minimis state to land lobsters in that state*
c) *Limit landings in the de minimis state lobster fishery to the de minimis level of no more than 40,000 lbs. annually*

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: January 12, 2017

SUBJECT: Report on the GOM/GBK Stock

At their May 2016 meeting, the American Lobster Management Board (Board) charged the American Lobster Technical Committee (TC) with a series of tasks to investigate stock conditions in the Gulf of Maine and Georges Bank (GOM/GBK). This was prompted by the 2015 stock assessment which found that, while the GOM/GBK is at record high abundance, there has been a decline in settlement in recent years. This could be a sign of poor recruitment in the future.

To more fully understand potential changes occurring in the GOM/GBK stock, the Board tasked the TC with: describing ocean currents and larval supply patterns; investigating stock connectivity; identifying changes in the size distribution of egg-bearing females; plotting a stock recruit relationship; investigating the potential standardization of biological management measures; develop a traffic light analysis; and identifying research holes and data gaps. The TC also investigated habitat availability for recruitment.

The TC met via conference call on September 7th, November 29th, and January 6th as well as in-person on September 27th and 28th. Below is the TC's analysis on the tasks requested by the Board. An executive summary is presented on pages 2-3 followed by the full report.

The TC would like to start by noting that current reference abundance and SSB are at all-time highs according to the 2015 stock assessment. While YOY indices have declined, the trends in total abundance and SSB suggest that egg production is not the cause behind the observed declines in young-of-year (YOY) settlement.

Executive Summary

Ocean currents play a critical role in the life history of lobsters as studies suggest there is a strong connectivity between the life stages of lobster that rely on physical oceanography. Lobster larvae in the GOM are primarily transported by the Gulf of Maine Coastal Current (GMCC) which moves counter-clockwise and is comprised of two major branches including the Eastern Maine Coastal Current, which flows intensely along the shore from the Bay of Fundy to Penobscot Bay, and the Western Maine Coastal Current, which is weaker and flows southwest along the coast west of Penobscot Bay. Potential changes in the Gulf of Maine oceanography, including changes in temperature, stratification, phytoplankton species composition, and wind forcing advection patterns could all impact lobster settlement and recruitment.

Based on tagging data, lobster movement appears to be quite complex with long distance movements between some areas, but limited evidence of exchange in other areas. Although there is tag data suggesting some movement of lobsters between GOM and GBK, the impacts of this movement cannot be determined with the existing tagging data. Using historic tagging data alone to determine stock **connectivity** is inconclusive and requires some additional research. In an effort address this question, the TC intends to further analyze a historic tagging study that was recently brought to their attention and continue to collect/analyze data on a recent tagging effort on GBK. Larval connectivity, as well as the location of larval sinks, is dependent on the GMCC. Typically the GMCC operates in a "gate ajar" scenario, causing water to be deflected offshore at Penobscot Bay with some leaking into the WMCC; however, the GMCC can flow in a "gate open" scenario, which causes greater water flow along the coast strengthening WMCC, or a "gate closed" scenario when the current is completely deflected offshore at Penobscot Bay.

Commercial trap sampling data provides evidence of **decreased size-at-maturity**. Increases in the proportion of egg-bearing females in the 76-80 mm CL size range are evident in all statistical areas but most prominent in the southern portion of GOM. Importantly, while spawning stock biomass is at an all-time high and larval indices show increases in the abundance of Stage I larvae, there has been a noticeable decrease in the abundance of stage IV larvae. This could be the result of changes in wind patterns (advection), food availability, or timing of hatch. There is evidence that zooplankton populations have decreased in recent years and that eggs are hatching earlier in the season.

In an effort to look at the **habitat available for recruitment**, analysis was undertaken to examine the quantity of habitat by depth for the GOM. The results show that incremental increases in depths suitable as recruitment habitat would likely result in incremental increases in total recruitment habitat. This suggests that the decrease seen in settlement cannot be explained solely by increases in the habitat available for recruitment. More work is needed to assess the importance of, and potential changes in, temperature and increased bottom complexity with depth.

The **stock-recruit relationship** for the GOM/GBK shows increases in recruitment through the time series. The relationship between recruitment and SSB is generally linear from 1981-2002, suggesting that recruitment per unit of spawning biomass was stable. In contrast, recruitment between 2002 and 2007 increased while spawning biomass remained relatively stable, suggesting that recruits per unit of spawning biomass increased over these years. In contrast, spawning biomass in SNE has remained stable since 2003 while recruitment has decreased, suggesting a decline in recruitment per unit of spawning biomass.

Biological management measures, namely gauge size changes, were explored as a way to improve resiliency of the stock. Analysis shows that increasing the minimum size is predicted to increase total catch in the fishery by weight but decrease catch by number. Furthermore, increases in the minimum gauge size could result in dramatic increases in the number of mature lobsters and SSB, potentially adding resilience to the fishery. An important caveat regarding this analysis is that, given lobster abundance in the GOM is already at record levels, it is unclear whether the ecosystem can support large increases in the amount of lobster biomass.

The development of a **Traffic Light Analysis (TLA)** was explored as a method to maintain high catch rates in the GOM/GBK; however, several concerns were noted with this method. Primarily, concerns were expressed that a TLA is designed for data-poor species and that color coded model-free indicators are already created as a part of the stock assessment, and can be used for annual updates to monitor stock conditions. Recognizing the Board's desire to be proactive, the TC recommends the Board monitor the ventless trap surveys for decreases in recruitment as this would confirm changing stock conditions. Further, it is recommended that management action be triggered at the 50th percentile, rather than the 25th percentile. Finally, the TC could develop an environmental indicator based on water temperature, should the Board desire this analysis.

Given the effects of water temperature of lobster life history, **research** is critically needed to update the maturity and growth information used in the stock assessment. Studies are also needed to examine age- or length-varying natural mortality and post-larval settlement dynamics given changes in the distribution of spawning females.

1. Ocean Currents in GOM

Circulation changes in the Gulf of Maine may have implications for future recruitment and spawning stock of American lobster through population connectivity. Recent genetic work indicates lobsters north of Nova Scotia and in the Gulf of St. Lawrence may be genetically different than the GOM/GBK and SNE stocks; however, lobsters within the U.S. managed stocks appear to be genetically indistinguishable, suggesting possible stock mixing (Benestan et al., 2015). Synchrony between settlement densities and models that predict larval transport suggests there is strong connectivity between these life stages that rely on physical oceanography (Incze et al., 2010). Given the apparent significance of circulation on recruitment, Gulf of Maine current systems are summarized to evaluate prospective future challenges under a changing environment.

The Gulf of Maine is a semi-enclosed system with an overall counterclockwise circulation (Figure 1). The majority of deep water entering the Gulf of Maine is through the Northeast Channel, located between Georges Bank and Browns Bank (Figure 2). Water masses entering deep through the Northeast Channel are largely influenced by current systems north and south of the domain and are reflective of the slope water outside of the Gulf (Townsend et al. 2004). The slope water conditions vary based on the predominance of two types of slope water: the Labrador Sea Slope Water (LSSW) and the Warm Slope Water (WSW) (MERCINA, 2001; Townsend et al., 2010). The LSSW originates from the Labrador Current, moves south around the Grand Banks towards the Northeast Channel, and is characterized as cold, fresh, and low in nitrate. The WSW originates from the Gulf Stream, moving north/northeast, and is typically warmer, saltier, and higher in nitrate than the LSSW. Prevalence of either water mass on the slope and that enters the Gulf of Maine typically depends on the strength of the Labrador Current and/or Gulf Stream. The strength of these current systems are linked to the atmospheric pressure system over the North Atlantic, represented as the North Atlantic Oscillation (MERCINA, 2001, Pershing et al., 2005). NAO phase shifts and changes in slope water temperatures have implications for water column mixing, primary productivity, and zooplankton abundances in the Gulf of Maine (MERCINA et al. 2001, 2004). With strong tidal mixing and progressive counter-clockwise circulation in the northern Gulf of Maine, deep water entering via the Northeast Channel is vertically mixed with surface waters. At the surface, these waters move counterclockwise in the Gulf of Maine and eventually exit through the Great South Channel between Georges Bank and Nantucket Shoals, or the Northeast Channel.

Fresh, less dense surface water enters the Gulf of Maine from the Scotian Shelf (Brown and Beardsley, 1978; Pettigrew et al. 1998; Ji et al. 2010). It is this northern portion of the Gulf of Maine, near the mouth of the Bay of Fundy, where the Gulf of Maine's coastal current system begins, known as the Gulf of Maine Coastal Current (GMCC). The GMCC is a pressure gradient current driven by freshwater inflows to the Gulf of Maine (Pettigrew et al. 2005). GMCC surface waters flow south as part of two major branches. The Eastern Maine Coastal Current (EMCC) is characteristic of a cold band that extends southwestward from the Bay of Fundy towards Penobscot Bay. At this juncture, the EMCC bifurcates (Figure 2). One pathway includes water moving offshore to the center of the Gulf, contributing to the cyclonic circulation around Jordan Basin (Pettigrew et al. 1998). The other branch continues along the coast to what becomes the Western Maine Coastal Current (WMCC) (Brooks, 1985; Pettigrew et al., 2005). The WMCC is a buoyant, wind-driven current which accumulates plume water from several Maine rivers (e.g. Kennebec, Androscoggin, Penobscot, Merrimack and St. John Rivers) as it flows southwest (Geyer et al., 2004; Janzen et al., 2005). Plume thickness within the WMCC can be 20m in depth up to 100m, suggesting the WMCC can be stratified over the water column depending on the amount of freshwater (Geyer et al. 2004). Once around Cape Ann, the WMCC either enters northern Massachusetts Bay or moves offshore

along the eastern edge of Stellwagen Bank towards Georges Bank, depending on the wind conditions (Lynch et al., 1997; Jiang et al., 2007).

The physical structure of the GMCC and its two branches (EMCC, WMCC) can change from year to year. Pettigrew et al. (2005) described the three GMCC summer scenarios at the interface of the EMCC and the weaker WMCC. The typical condition of the GMCC is "gate ajar" where most of the EMCC deflects offshore at Penobscot Bay, though there is some spillover in the nearshore into the WMCC. The two other scenarios are when the EMCC is connected to the WMCC increasing the western flow and connectivity as a "gate open" condition or the "gate closed" condition where the EMCC does not flow west of Penobscot Bay and is deflected offshore. *Section 3B: Larval Connectivity* describes how these three scenarios can impact larval settlement.

The GMCC strength and water properties have implications for downstream nutrient and particulate loading (Balch et al., 2012), phytoplankton species composition (Jiang et al. 2014) harmful algal bloom prevalence (Franks and Anderson 1992), primary productivity (McManus et al., 2014), and larval fish transport and survival (Churchill et al. 2016). Particularly for the clockwise gyre circulating around Georges Bank, phytoplankton biomass produced in GMCC can support biological productivity on the Bank (Hannah et al., 1998).

As such, lobster settlement in coastal Maine may be influenced by the transport and the habitat structure of the GMCC. Physical transport, behavioral responses to changing environments, and reduced survival are all mechanisms that the GMCC may have on lobsters from hatch to settlement. Annis et al. (2013) found that while larval lobster abundances did not vary across different bottom temperature regions in coastal Gulf of Maine, settlement abundances were higher in the warmer (>12ºC), coastal areas. Barret et al. (2016) also identified temperature as critical in dictating larval survival, settlement behavior, and post larval energetics. The authors found that thermoclines in the water column reduce settlement (Barret et al. 2016), thus prospective stratification in the GMCC could impact recruitment for the GOM/GBK stock. Differences in the EMCC and WMCC systems may transcend to spatial differences in lobster recruitment patterns along the coastal Gulf of Maine. Chang et al. (2016) found that stock-recruitment relationships, both fitness, form, and parameter estimates, varied between eastern and western Gulf of Maine. Further, the authors note that data aggregation and analyses at a medium scale were best in identifying stock-recruitment relationships. Thus, while it is known that fine-scale oceanographic processes are important to larval settlement, there is not a good understanding of how to scale this fine-scale information up to the population level.

Future changes in Gulf of Maine oceanography and the GMCC may have implications for larval transport and settlement locations. Given lobster larval transport relies heavily on the GMCC and varies with strength of the GMCC and prevailing winds (Xue et al. 2008), long term changes in stratification, river runoff, and temperature may influence mortality rates through thermal tolerance, larval drift offshore and food supply. Sea surface temperatures and days above thermal thresholds in coastal Gulf of Maine have increased since the 1980s (Figure 3). The northwest Atlantic is projected to further increase in temperature in the coming decades (Saba et al., 2016), which could increase Gulf of Maine temperature and stratification, as well as alter the water masses circulating in the Gulf of Maine.

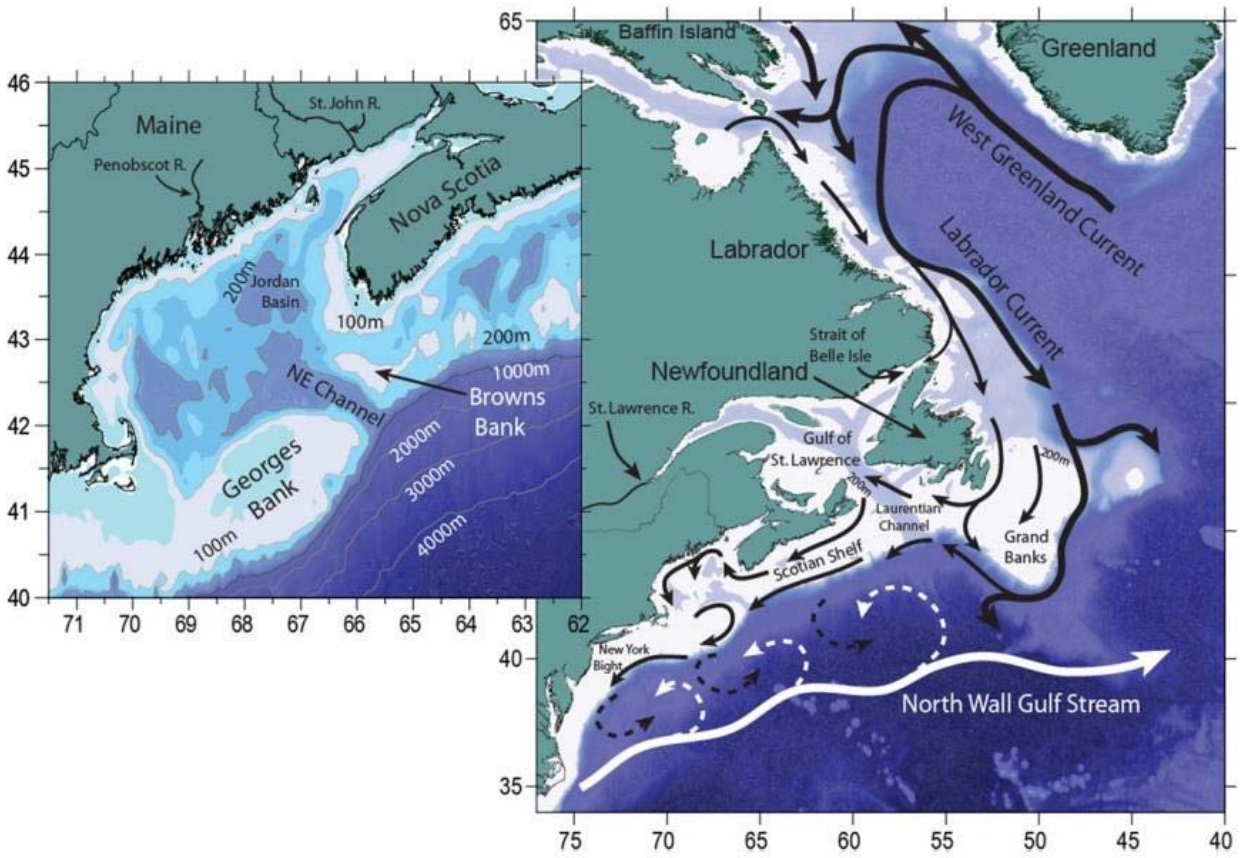


Figure 1. Maps of Gulf of Maine and Georges Banks (left) and larger northwest Atlantic current paths (Townsend et al., 2010).

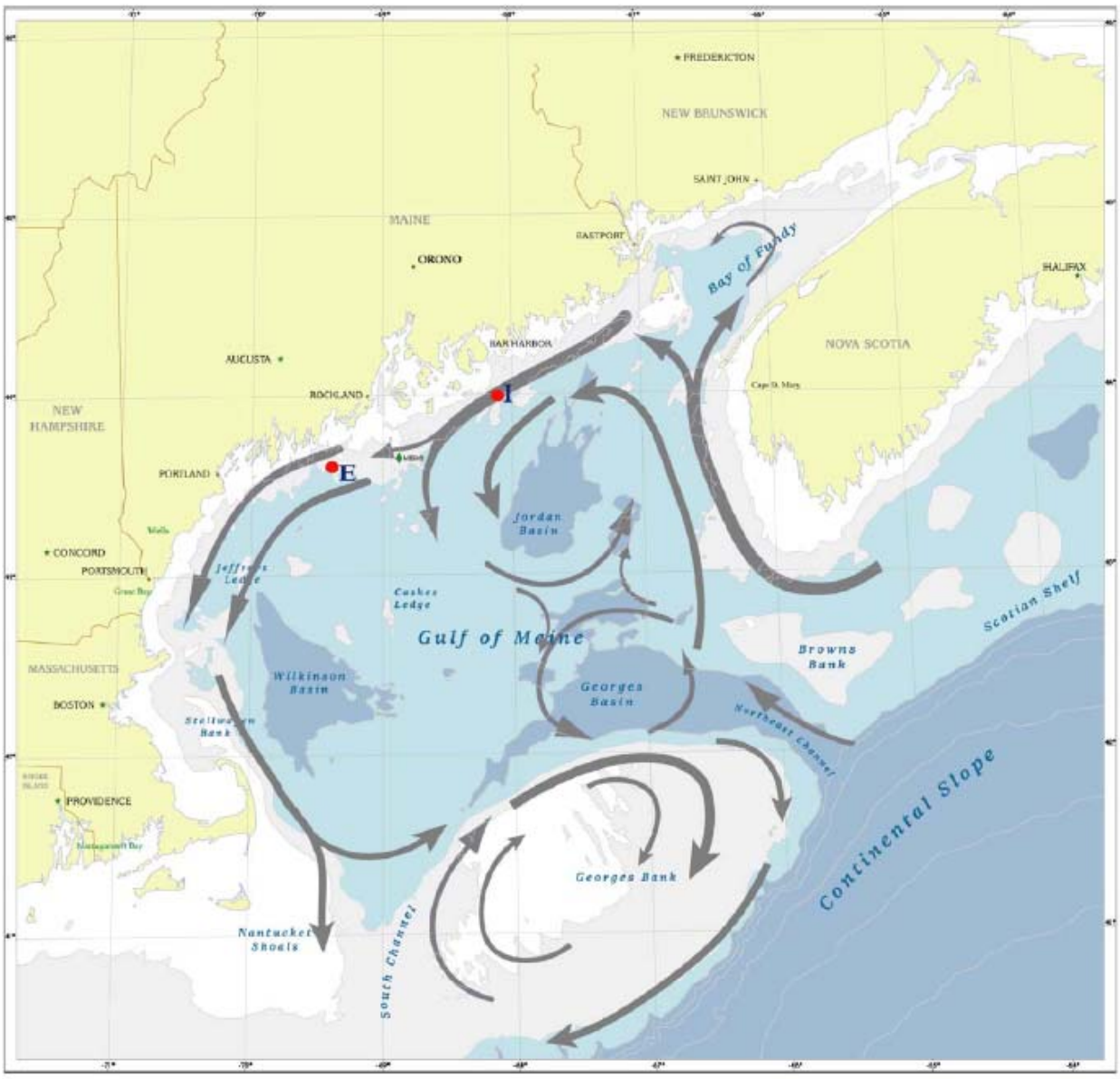


Figure 2. Finer scale circulation of Georges Bank and the Gulf of Maine. The EMCC and WMCC are delineated with the bifurcation near Penobscot Bay (Pettigrew et al. 2005).

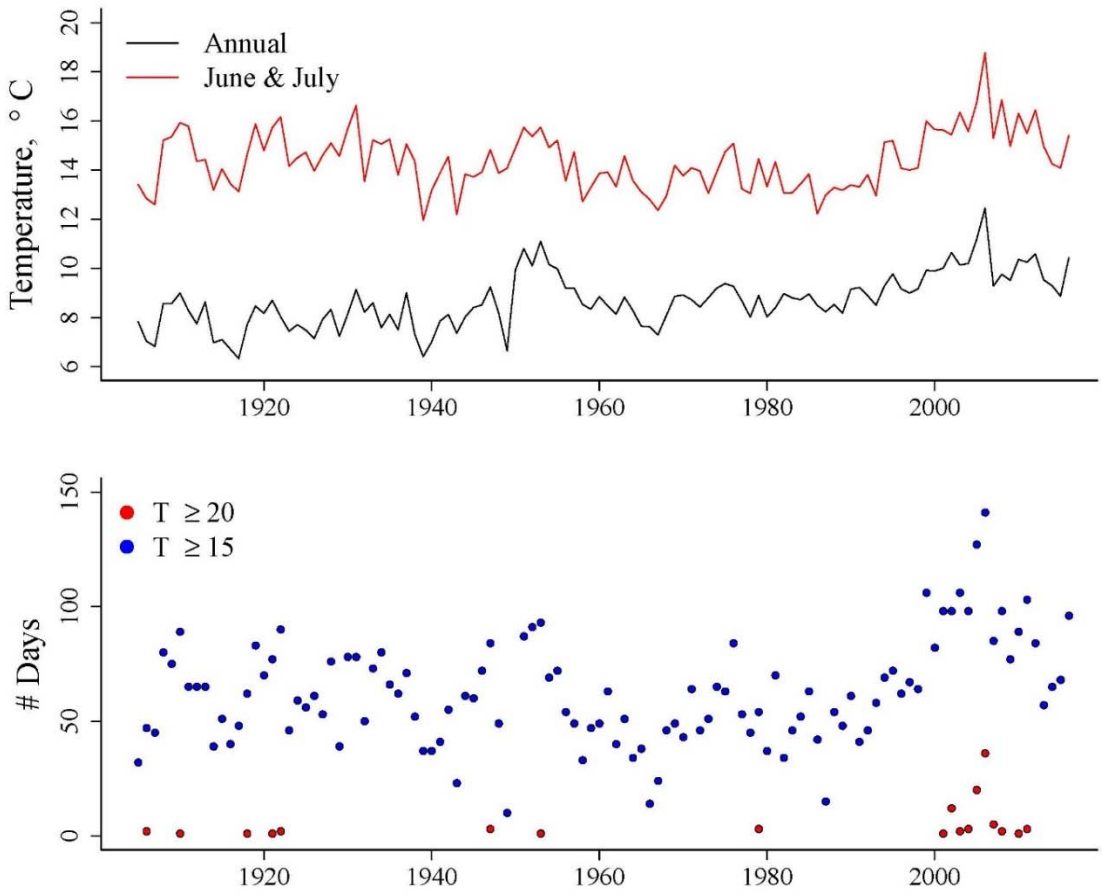


Figure 3. Long-term Boothbay Harbor, ME average sea surface temperatures (top) annually (black) and May-June only (red). Number of days per year ≥ 15 (blue) and 20ºC (red) from the same data are also presented (bottom).

2. Connectivity Between GOM, GBK, and Canada

A. Tagging Studies Show Some Migration Over Stock Boundaries

American lobster movement has been studied dating back to 1898, when Herman Bumpus released approximately 500 mature females near Woods Hole, Massachusetts (reviewed in Krouse, 1980). This tagging study, as well as others that followed through 1950 showed that lobster movement was limited to <18km. It wasn't until 1957-59 when Robert Dow tagged 162 non-legal lobsters (i.e. sublegals, ovigerous, v-notch and oversize) on the coast of Maine that it was discovered lobsters can take on extensive movements (Dow, 1974). One lobster in Dow's study traveled 138 miles in 7 months.

Since the early tagging studies conducted from 1898-1960, it's easy to get lost in the volumes of information available with regards to lobster movement. To date there have been well over 40 studies conducted with some form of active or passive tagging device. There are certain patterns that tend to hold true for lobster movement throughout the range and there are also some discrepancies and questions that remain unanswered.

It's well established in literature that smaller lobsters, in particular, early benthic phase lobsters are cryptic and move little from areas which provide shelter from predators (Wahle and Steneck, 1992). Larger immature lobsters show limited movement whereas movement increases as individuals

reach sexual maturity (Morrissey, 1971; Dow, 1974; Krouse, 1980; Campbell and Stasko, 1985; Campbell and Stasko, 1986, Campbell, 1989). Several research papers have shown that sexually mature lobsters tend to exhibit seasonal patterns of movement towards deep waters in the colder months and towards shoal waters in the warmer months (Cooper and Uzmann, 1971; Campbell and Stasko, 1986; Campbell et al., 1984; Krouse, 1980; Campbell and Stasko, 1986; Campbell, 1986). Authors of these papers have hypothesized that these directed movements are to obtain sufficient heat units for egg development. Furthermore, Aiken and Waddy (1992 and 1995) suggested that temperatures must decline to less than 8˚C in the winter for proper synchronization of the molt/reproduction cycle. There's a strong association between lobsters and temperature and it has been demonstrated they will behaviorally thermoregulate (Crossin et al., 1998) and can detect very small changes in temperature (Jury and Watson, 2000).

The abovementioned patterns are well documented and there's a general consensus on these topics among the scientific community. In contrast, attempting to use these past tagging studies to assess impacts of movement on stock structure has proven quite difficult. Tagging conducted in Canada near Grand Manan and on Browns Bank has shown some movement of animals throughout the Gulf of Maine and Georges Bank (Campbell and Stasko, 1985 & Campbell and Stasko, 1986). Furthermore, preliminary results from a tagging study conducted in the 1980s that was recently brought to the attention of the TC indicates that some lobsters tagged in offshore GOM moved both to GBK and to inshore GOM. The rate of exchange between these areas is still unclear, but further analyses will be pursued by TC members once this dataset is located (NMFS, unpublished).

Another approach to determining mixing between the stocks is to tag lobsters on Georges Bank and assess movement from tags recaptured inshore. Past tagging studies using this method have shown limited movement between the stocks (Cooper and Uzmann, 1971; Campbell et al., 1984). Between 1968 and 1973, a total of 5,500 lobsters were tagged on GBK and Browns Bank and none were recaptured inshore north of Cape Cod.

In an attempt to better determine movement between GBK and GOM; AOLA and NH Fish and Game were awarded a grant to tag ~4,000 lobsters on Georges Bank in 2015. Tag returns from this project are still being reported and final results will be available in 2019. Of the 3,500 tags deployed during the duration of this study, thus far, 100 have been recaptured. A large majority of these recaptures were from GBK; however, one lobster was reported "inshore" in Gulf of Maine and three returns were reported from Canada. Tag returns from this project will continue to be collected and updates will be provided to the Board. In addition, TC members from both Maine and New Hampshire are working with AOLA to secure funding to continue tagging on GBK and in the deep water of the GOM.

There are limitations associated with this type of tagging method, mainly that the days-at-large for many of these studies are on the order of weeks and spatiotemporal patterns of fishing effort can create biased patterns in tag-return rates. Empirical data from the most recent assessment suggests movement between stocks based on NMFS trawl survey data as there are high catches of females in the fall which are not present in the spring (ASMFC, 2016).

In conclusion, inshore tagging studies in the GOM have shown movement throughout inshore Gulf of Maine and to the OCC, but no movement to Georges Bank proper. Additionally, lobsters tagged on GBK have shown minimal movement to the Gulf of Maine; however, preliminary results from a newly re-discovered tagging dataset indicate that lobsters tagged in offshore GOM have been

reported to move to both GBK and to inshore GOM. Lobster movement appears to be quite complex with long distance movements between some areas, but little to no evidence of it in other areas. Although there appears to be some movement between GOM and GBK, the impacts of this movement on population structure, looking solely at tagging studies, cannot be determined at this time based. In an effort to better understand stock structure, the TC will further pursue analysis of the offshore GOM dataset that was recently brought to our attention and continue to analyze data from the 2015 GBK tagging effort.

B. Larval Connectivity

Coupled biophysical models have been used to describe the connectivity for larval lobsters in the Gulf of Maine system with different scales and parameters considered (Incze et al., 2010 and Xue et al., 2008). The management areas considered were a combination of Canadian regions, Maine Lobster Zones, and southern GOM areas in New Hampshire and Massachusetts (Figure 4). They found that source and sink larval dynamics are complex and likely a combination of self-recruitment in local areas, adjacent areas, and distant sources. Larval connectivity in the GOM depends on egg production, hatching location, hatch timing, larval development times, coastal current transport, drift by wind forcing, and the location and size of the receiving management zones (Incze et al., 2010 and Xue et al., 2008). Some of these parameters can be difficult to model, especially if the annual trends vary in strength and direction, like wind forcing (Xue et al., 2008).

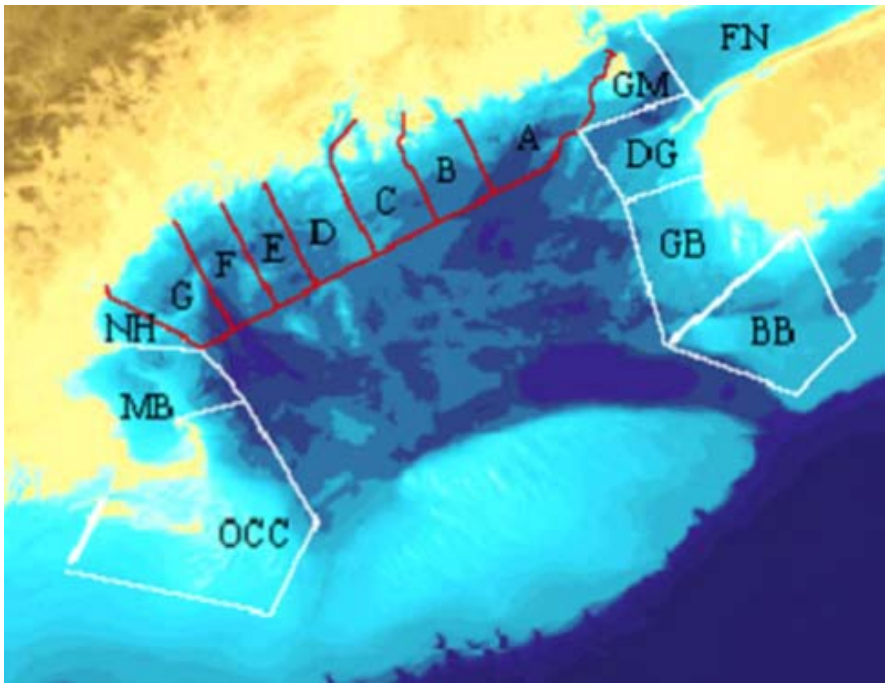


Figure 4. Management areas considered by modeling of small particles as proxy for larval connectivity. Red polygons A–G are Maine's Lobster Management Zones; others are: BB (Browns Bank); GB (German Bank); DG (Digby Neck); FN (Bay of Fundy); GM (Grand Manan); NH (New Hampshire); MB (Massachusetts Bay) and OCC (Outer Cape Cod). (Xue et al., 2008.)

As discussed in the first section, the prevailing direction of larval transport in GOM is via the GMCC in a counterclockwise cyclonic direction along the coast; however, the degree of the larval sink dynamics for each inshore management area can depend on the inter-annual variability of sea surface temperatures as well as the strength and interaction of subsections of the nearshore current, offshore wind forcing, and eddies. Incze et al. found that post-larvae in a management area

(Figure 4) were hatched in the same, adjacent, or nearby zones in the prevailing upstream direction, but it was also common that the sources could be diverse and distant (Incze et al, 2010). The predicted distance of travel depended on assumptions about larval mortality in addition to currents. There was less accumulation in the eastern regions and greater accumulation in western management areas, but overall Xue et al. found that 20-40% of the modeled particles remained in a local area. Eastern GOM, consisting of the Bay of Fundy and eastern Maine management zones, were primary sources for settlers for downstream areas with higher levels of egg production and the strong EMCC carrying the larvae downstream (Incze et al., 2010). Western Maine, especially just west of Penobscot Bay in Zones D and E, acted as sink areas. Based on field survey data from 1989-2001, there were more post-larvae in western Maine than there were in eastern areas confirming these patterns (Annis, 2004).

Also discussed in the first section are the three summer scenarios for the physical structure of the EMCC and WMCC (gate ajar, gate open, gate closed). Incze at al. (2010) determined these three scenarios impacted larval transport, especially for the zones at the interface of the two branches of the GMCC. When the gate was ajar or open, more larvae were predicted to travel to western zones while the gate closed scenario allowed for more offshore transport during the early to mid-summer months (Incze et al., 2010). Additional eastward drift from wind forcing primarily impacted the post-larvae along the coast because biologically they were most likely to be at the surface and subject to Ekman transport by the prevailing southwesterly summer winds (Xue et al., 2008). The modeled scenarios also tested the fate of larvae which hatch later in the season when the prevailing winds change direction, and predicted less eastward advection of larvae and therefore less offshore supply from US areas to the Canadian areas of Browns Bank and German Bank (Xue et al., 2008).

There continues to be uncertainty about the connectivity with offshore areas, especially as a source of larvae. Some preliminary modeling by Quinn et al. (in prep but not peer reviewed), expanded Incze and Xue's GOM models to the offshore banks, Nova Scotia and Gulf of St. Lawrence. Quinn's initial model predictions confirmed the limited connectivity between Gulf of Saint Lawrence and GOM and those regional population assemblages determined by genetic studies (Benestan et al., 2015). Quinn et al.'s model also implied that Georges Bank could be a partial sink for larval supply coming from southern Maine, New Hampshire, and Massachusetts. Harding et al. (2005) suggested that the exact source for post-larvae found near the offshore banks likely varies annually and depends on the strength and location of wind fields near and offshore. As noted above, Xue et al. confirmed this idea of inter-annual variability. There is evidence of additional high self-recruitment from the preliminary model predictions (Quinn et al., in prep), but post-larvae have been observed over Brown's and Georges Bank at the same time as the resident ovigerous females are hatching so there was no credible development period for those observed post-larvae to be locally recruited (Harding et al, 2005).

The connectivity of the inshore lobster population in the Gulf of Maine is high and depends on inter-annual environmental variability, hatching location, larval development, mortality, larval dispersion rates, relative egg production among zones, and transport pathways impacting losses and gains. There is modeled evidence for variable larval connectivity to the offshore banks, including Georges Bank. The role of each area as a sink or source may have specific consequences and implications with future environmental and management changes. While larval connectivity is very important, ocean currents and temperatures alone cannot control changes in all recognized connectivity and, it is important to also consider the biological process of growth, maturity, and adult lobster movement.

3. Size Distribution of Egg-Bearing Females

A. Evidence of Decreased Size At Maturity

While specific studies to update size-at-maturity have not been conducted recently, evidence from various states' commercial trap sampling programs indicates that there has been a downward shift in size-at-maturity. This coincides with multiple reports from fishermen stating they have been seeing smaller females with eggs than in the past. The TC examined the commercial trap sampling data for Maine (NMFS Areas 511, 512, and 513), New Hampshire (NMFS Area 513), and Massachusetts (NMFS Area 514) for changes in the proportion of females in 5 mm size bins that were egg-bearing. We used only those sizes that have always been below minimum legal size, to avoid any influence in changes in gauge size on the proportion egg-bearing. Each state and statistical area was analyzed separately, to examine geographic differences.

Increases in the proportion of females bearing eggs in the 76-80 mm CL size range are evident in all statistical areas, but are most dramatic in the more southern SAs, representing the southern portion of GOM (Figure 5a-e). In MA, which had the longest data set available for this analysis, increases in proportion egg-bearing in the 76-80 mm size bin started in the early 1990s, and over the time series have gone from 0.02 (2%) to around 0.14 (14%) (Figure 5e). Increases in the proportion of females bearing eggs are also evident in the 71-75 mm size class in the more southern SAs, specifically 513 and 514 (Figure 5c,d,e).

These data indicate that lobsters in the southern GOM, in particular, are maturing at smaller sizes. This suggests that spawning stock biomass estimates from the 2015 stock assessment may be slightly underestimated, since they were based on old maturity data. Other studies have documented similar changes in size at maturity (Landers et al. 2001, DNC 2013, Pugh et al. 2013, Gaudette et al. 2014). We strongly suggest that a standardized study to update maturity indices be funded and undertaken in all portions of the stock, to confirm this fishery-dependent based analysis.

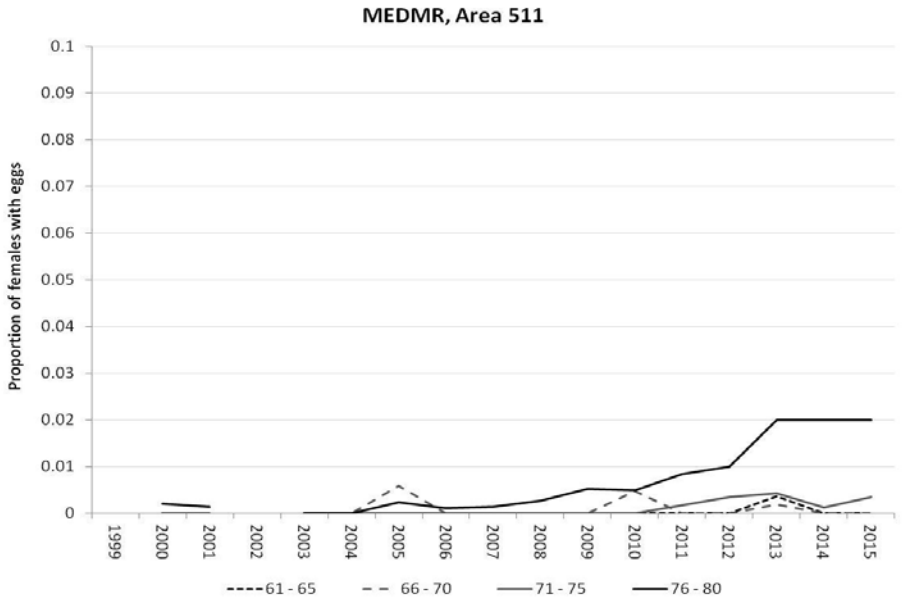


Figure 5a. Annual proportion of females that were bearing eggs in each 5 mm size bin (61 – 65 mm CL, 66 – 70 mm CL, 71 – 75 mm CL, 76 – 80 mm CL) for NOAA Statistical Area 511. Data from ME commercial trap sampling program, May – November, by NMFS Statistical Area.

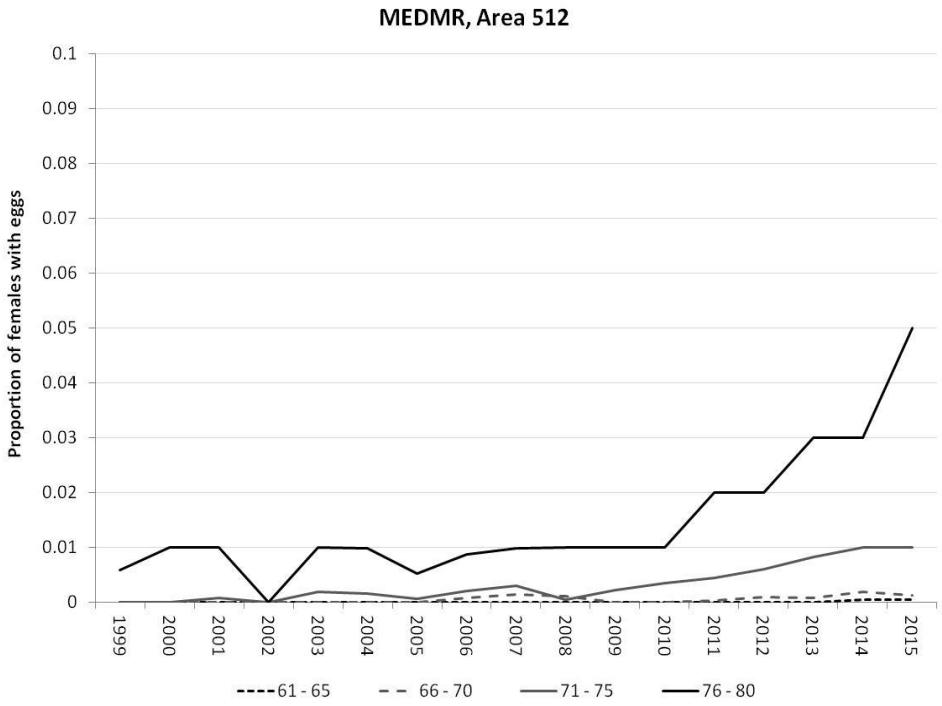


Figure 5b. Annual proportion of females that were bearing eggs in each 5 mm size bin (61 – 65 mm CL, 66 – 70 mm CL, 71 – 75 mm CL, 76 – 80 mm CL) for NOAA Statistical Area 512. Data from ME commercial trap sampling program, May – November, by NMFS Statistical Area.

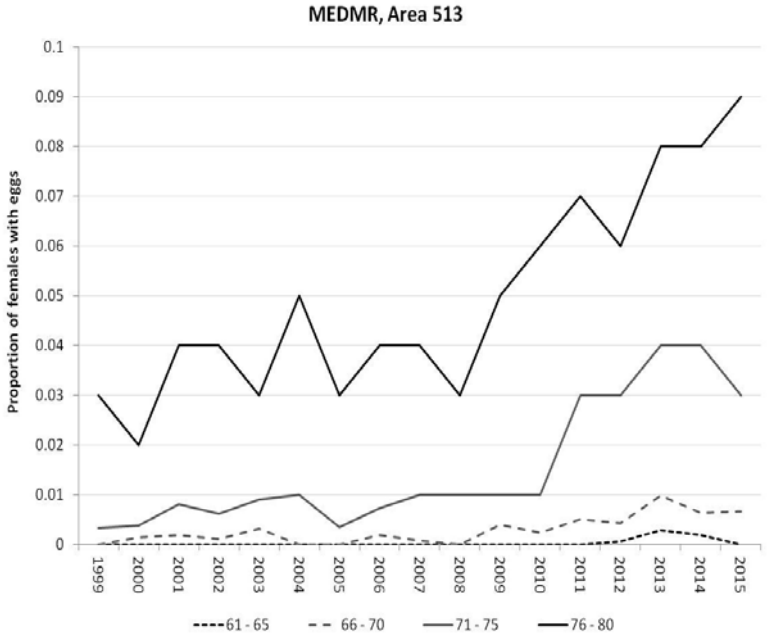


Figure 5c. Annual proportion of females that were bearing eggs in each 5 mm size bin (61 – 65 mm CL, 66 – 70 mm CL, 71 – 75 mm CL, 76 – 80 mm CL) for NOAA Statistical Area 513. Data from ME commercial trap sampling program, May – November, by NMFS Statistical Area.

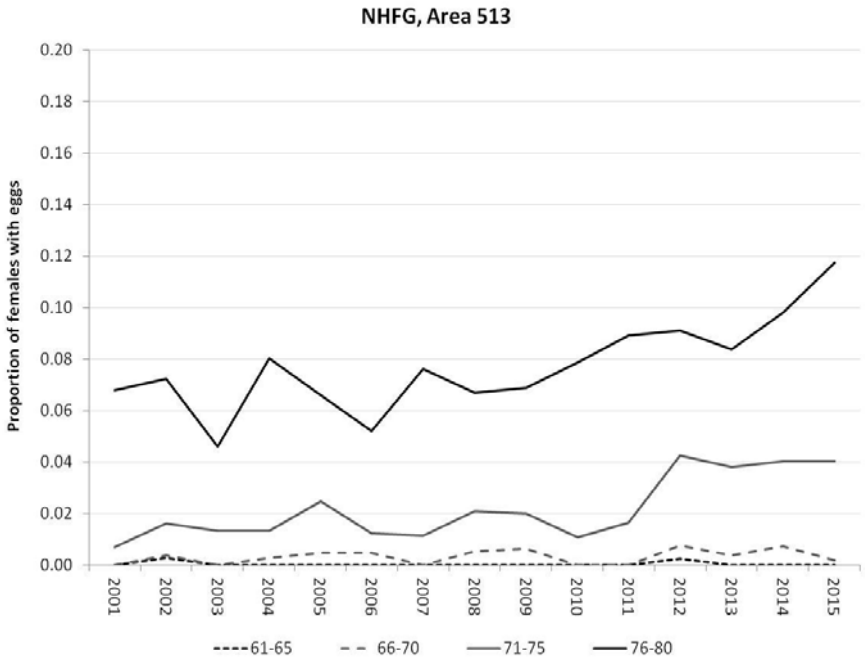


Figure 5d. Annual proportion of females that were bearing eggs in each 5 mm size bin (61 – 65 mm CL, 66 – 70 mm CL, 71 – 75 mm CL, 76 – 80 mm CL) for NOAA Statistical Area 513. Data from NH commercial trap sampling program, May – November, by NMFS Statistical Area.

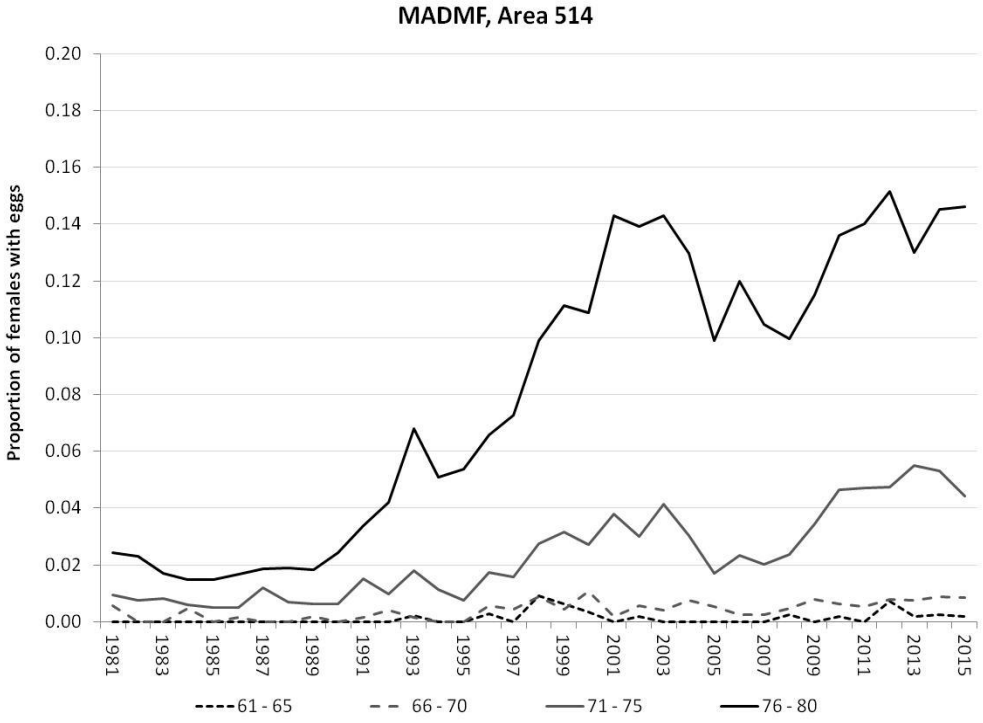


Figure 5e. Annual proportion of females that were bearing eggs in each 5 mm size bin (61 – 65 mm CL, 66 – 70 mm CL, 71 – 75 mm CL, 76 – 80 mm CL) for NOAA Statistical Area 514. Data from MA commercial trap sampling program, May – November, by NMFS Statistical Area.

B. Larval Studies Show Decreasing Trend of Stage IV Lobsters

Monitoring of indigenous populations of fish, shellfish and wildlife has been ongoing since the late 1970s at Seabrook Nuclear Power Station on the coast of New Hampshire. Normandeau Associates Inc. (NAI) has been contracted for this work by Nextera Energy and data from this environmental monitoring were generously provided to New Hampshire Fish and Game and the ASMFC Technical Committee to conduct the following analyses. As part of this environmental monitoring American lobster larvae have been sampled via neuston nets collected once a week from single tows at three locations. Collections were consistently taken from all locations starting in 1988. Additionally, both temperature and zooplankton populations have been monitored consistently along the coast of New Hampshire during the same time period.

Spawning stock biomass (SSB) in the Gulf of Maine (GOM) is at time series highs (ASMFC 2015). Additionally, Lobster Sea Sampling Programs for ME, NH and MA have recorded an increase in the proportion of female catch bearing eggs over the past 15 years in the southern SA's of 513 and 514 (Figure 6). This suggests high levels of egg production, which should presumably lead to increased larval abundance. Based upon neuston sampling from Seabrook Station Environmental Monitoring (SSEM), this high abundance of egg bearing lobsters has translated into a high abundance of stage I larvae in the water column (Figure 7). This time series shows a significant upward trend (Mann Kendall, $p<0.05$) and current levels are at or near time series highs. Additionally, the past seven years are above the time series median. In contrast, the time series for stage IV from SSEM neuston sampling shows a significant downward trend (Mann Kendall $p<0.05$) and the past four years have been below the time series median (Figure 8). The time series (1988-2015) for stage IV from SSEM shows a similar trend to the American Lobster Settlement Index (ALSI) from mid-coast Maine and the two surveys show a moderate to strong relationship (Figure 9, $r^2=0.6$, df=25, $p<0.05$, excluding 1990). The relationship between the stage IV sampled via neuston and YOY sampled via SCUBA based surveys is improved when limiting analysis to the most recent 15 years ($r^2=0.69$, df=14, $p<0.05$).

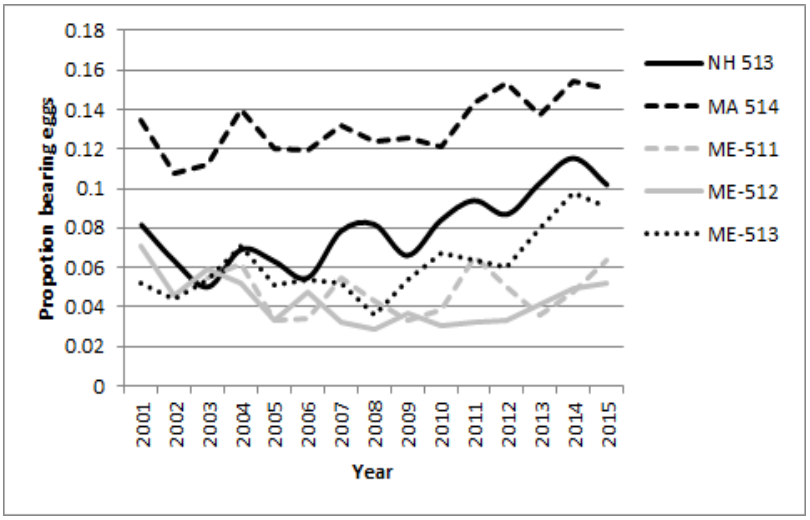


Figure 6. Proportion of female catch bearing eggs observed in Lobster Sea Sampling programs in ME, NH and MA.

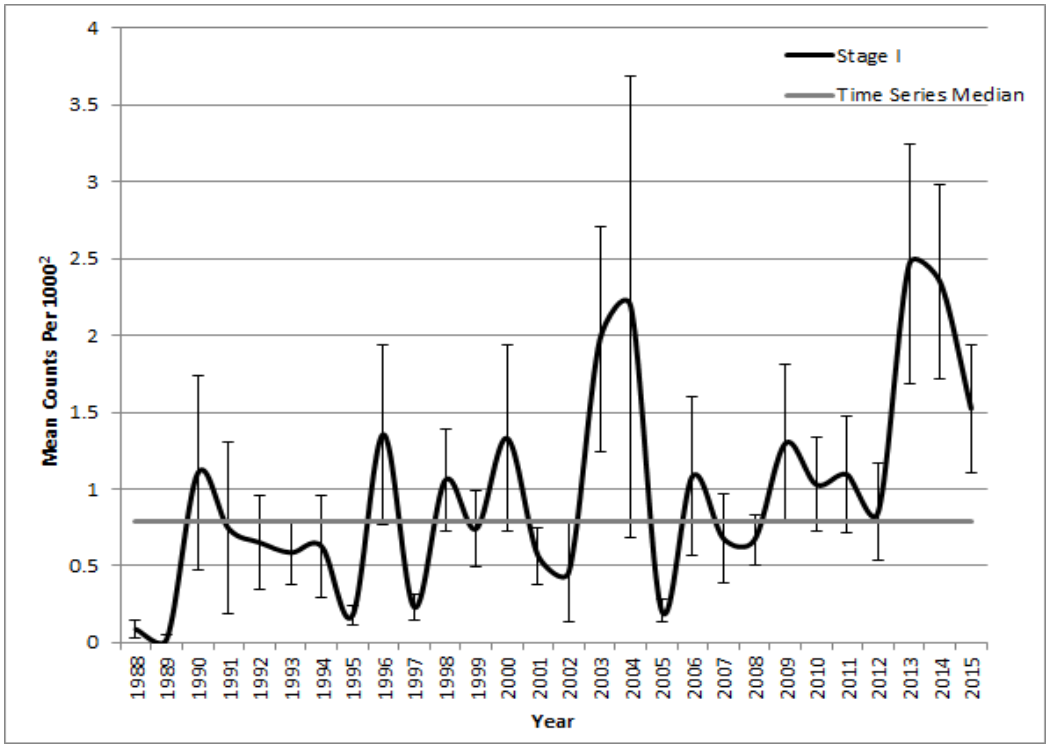


Figure 7. Mean count of stage I larvae collected from neuston tows on the coast of NH during SSEM.

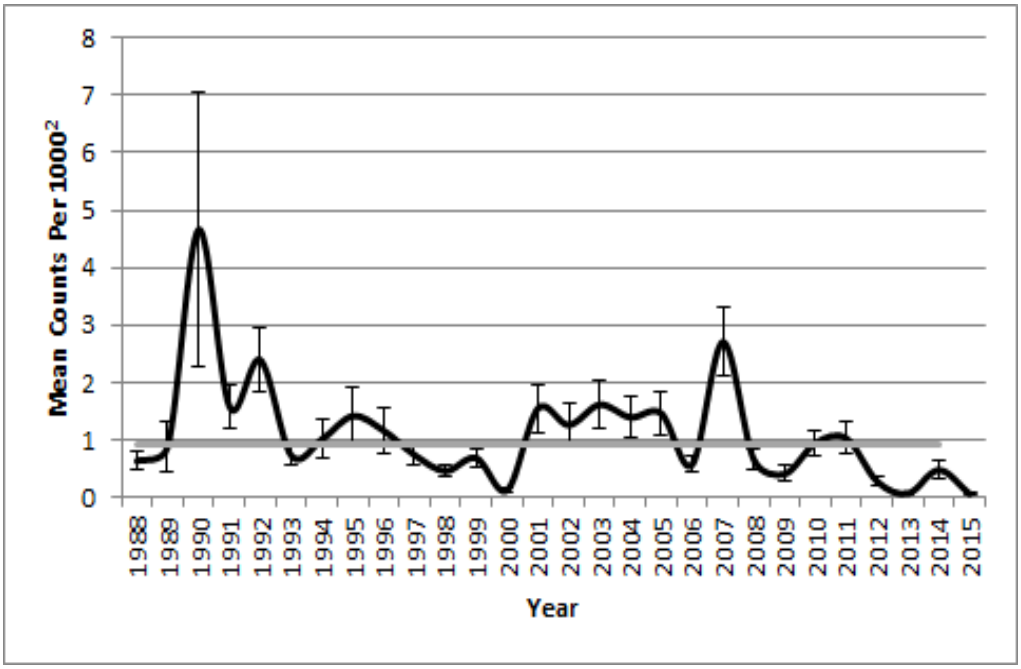


Figure 8. Mean count of stage IV larvae collected from neuston tows on the coast of NH during SSEM.

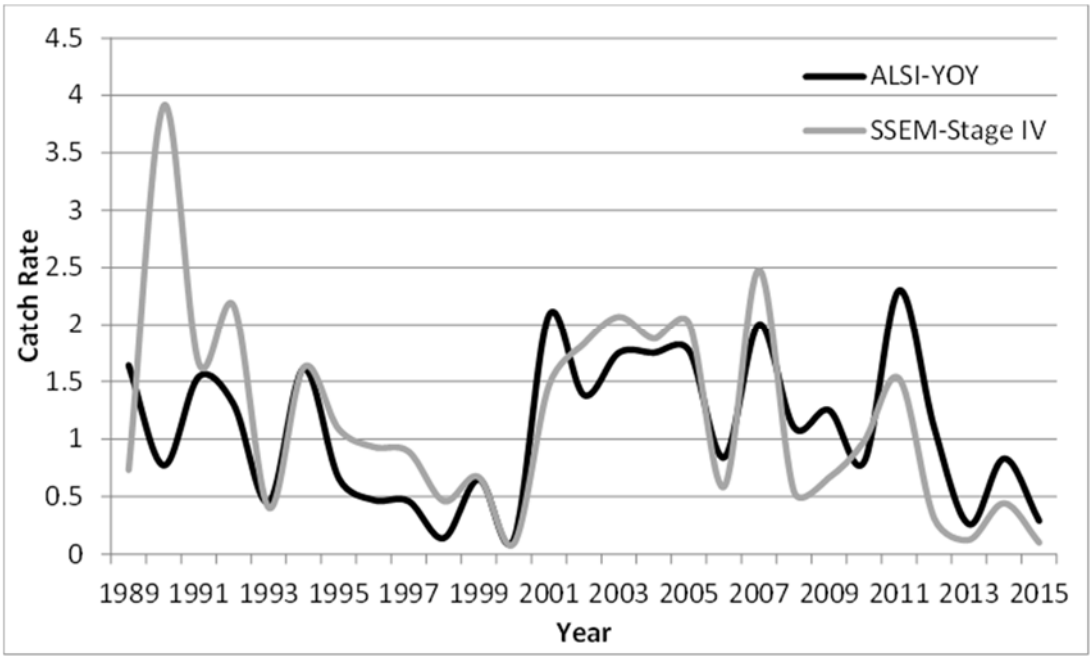


Figure 9. Time series of SSEM neuston sampling of stage IV larvae compared to YOY lobster index from ALSI (midcoast Maine).

Based on the available data, it is clear there is a record high abundance of SSB in the GOM and a higher than average abundance of stage I larvae along the coast of NH; however, this does not appear to be translating into stage IV and newly settled lobsters within the areas being sampled. There are obviously many factors at play and the possible explanations for this are certainly complex and numerous. For instance, changes in wind patterns or currents over the time series could be advecting the later stage larva to areas not being sampled by SSEM or ALSI (Hudon & Fradette, 1993). Two of the other factors that could be responsible for this disconnect are temperature and food availability which are discussed below.

SSEM takes both surface and bottom water temperatures during neuston sampling and monthly mean temperatures are presented in Figure 10. Although there does appear to be a modest increase in surface temperatures in the months of June and July throughout the time series, monthly mean temperatures do not exceed temperatures that would suggest an increase in mortality. In fact, total cumulative survival to stage V has been shown to be highest at 18 C (Mackenzie, 1988). Based on literature the temperatures recorded during sampling are in the optimal range for lobster larvae. These data suggest that temperature is not a major factor responsible for mortality within the sample area. Warmer water temperatures could lead to accelerated transition time from stage I to stage IV, or to changes in location of larvae in the water column leading to a change in catchability of the neuston net (Annis, 2005). However, the fact that the time series for stage IV from SSEM and YOY from ALSI correlate well, and the ALSI time series is at low levels as well, suggest catchability of the neuston net is not a major factor in estimating stage IV larvae in the water column.

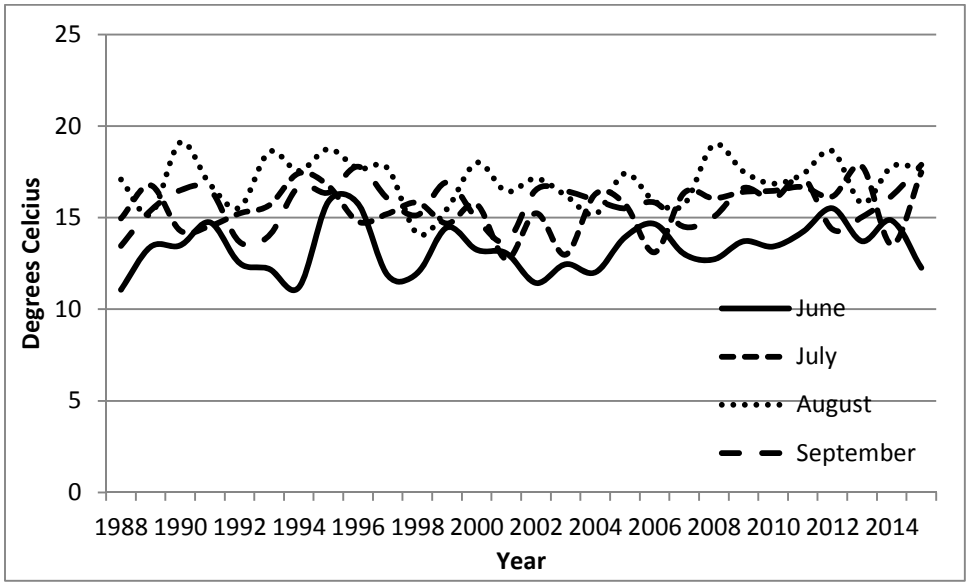


Figure 10. Mean monthly water temperature collected during neuston tows on the coast of NH during SSEM.

There is the potential that the food supply for larvae is limited throughout the inshore GOM. Lobster larvae feed on both phytoplankton and zooplankton. With record high SSB and record high stage I larvae in the water column, food availability could be a limiting factor in the development of larvae. Survival and rate of development to fourth stage are correlated positively with food quality; high survival requires that first stage larvae encounter an abundance of food (Eagles et al. 1986). Furthermore, research shows that reducing the food (copepods) provided by half reduces lobster survival to the post-larval stage from 60% to 20% and increases the time required to reach post-larval stage from 25-30 days to 50-55 days (Templeman, 1936). When decreasing the food by another half, few larvae reach stage II and none reach stage III. With this information in mind, it's plausible that larval food supply is a limiting factor in the development of larvae from stage I to stage IV. This theory is supported by data collected from SSEM on zooplankton populations. Several species of both holoplankton and meroplankton populations are decreasing throughout the SSEM sample area (NAI 2015). Trends from SSEM have been corroborated by larger scale trends of zooplankton in the Gulf of Maine where zooplankton size structure has decreased since the mid-2000s (Morse et al. 2016; Pershing et al., 2005).

The following populations of zooplankton have been declining in recent years: *Cance*r spp., *Calanus finmarchicus*, C. *typicus*, *Crangon septemspinosa*, *Temora longicornis, Centropages hamatus* (NAI, 2015). Additionally, some offshore species of zooplankton have been showing up in samples in recent years and in 2015, Lion's Mane Jellyfish were abundant on the coast, a time with abnormally low zooplankton in SSEM samples (NAI 2015). Lobsters are known to feed on a variety of phytoplankton and zooplankton species and once they reach stage III are known to prefer larger zooplankton species (Juinio and Cobb, 1992). Lobster larva are omnivorous, opportunistic feeders and diet will depend on geographic location and food availability. No natural diet studies are available for this local area, but in Rhode Island lobster post-larvae primarily feed on larvae of decapod crustaceans and copepods (Juinio and Cobb, 1992). Appendix I shows the time series of selected zooplankton species sampled by SSEM. One of the most common zooplankton species available locally is *Calanus finmarchicus*. There appears to be a relationship between the decline in *Calanus finmarchicus* and YOY from ALSI sampled during the time period of 2001-2015 (r^2=0.55,

p<0.05, excluding 2011). This is just one of many zooplankton populations that appear to be declining within the study area and this regression is meant to illustrate potential relationships.

There has also been a concern that the timing of egg hatch could be changing with warming water in the Gulf of Maine. This could potentially lead to changes in the success of settlement in any given year due to the mismatch theory, in which hatch time does not match up with food availability (Cushing, 1990). Data from SSEM show a higher proportion of larvae in the water column earlier in the season in recent years. Between 2001 and 2015, the proportion of total larvae sampled for the year that were in the water column in June has shown a significant upward trend (Figure 11, Mann Kendall, p <0.05). Furthermore, though not significant, the proportion of total larvae sampled in July shows a general upward trend and both August and September show a general downward trend. This shift in phenology is corroborated by Sea Sampling programs conducted in ME and NH. In Maine, there appears to be a higher proportion of eggs hatching early in the season in the 2009-2015 time period compared to the 2001-2008 time period (Figures 12, 13 & 14). Furthermore, sea sampling from NH shows there's a significant upward trend in the proportion of females sampled with eggs in the process of hatching or with signs of eggs that have recently hatched in July (Figure 15, Mann Kendall, p<0.05). The availability of food matching up with the time of hatch could also be a factor responsible for the lack of stage IV and newly settled lobster in the GOM in recent years.

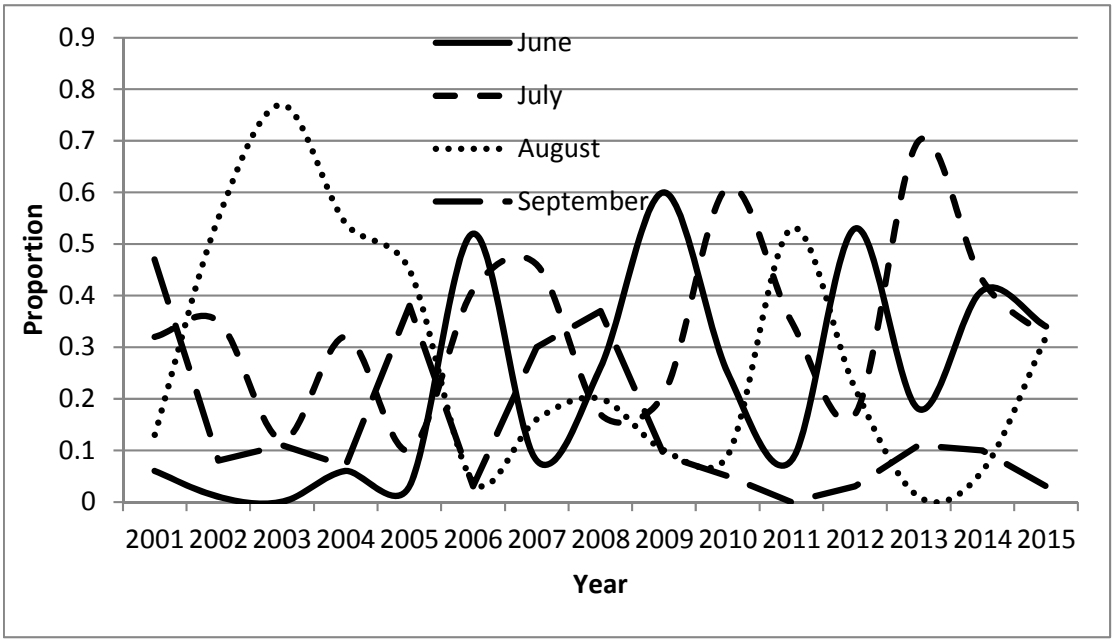


Figure 11. Monthly proportion of total annual larvae sampled during SSEM.

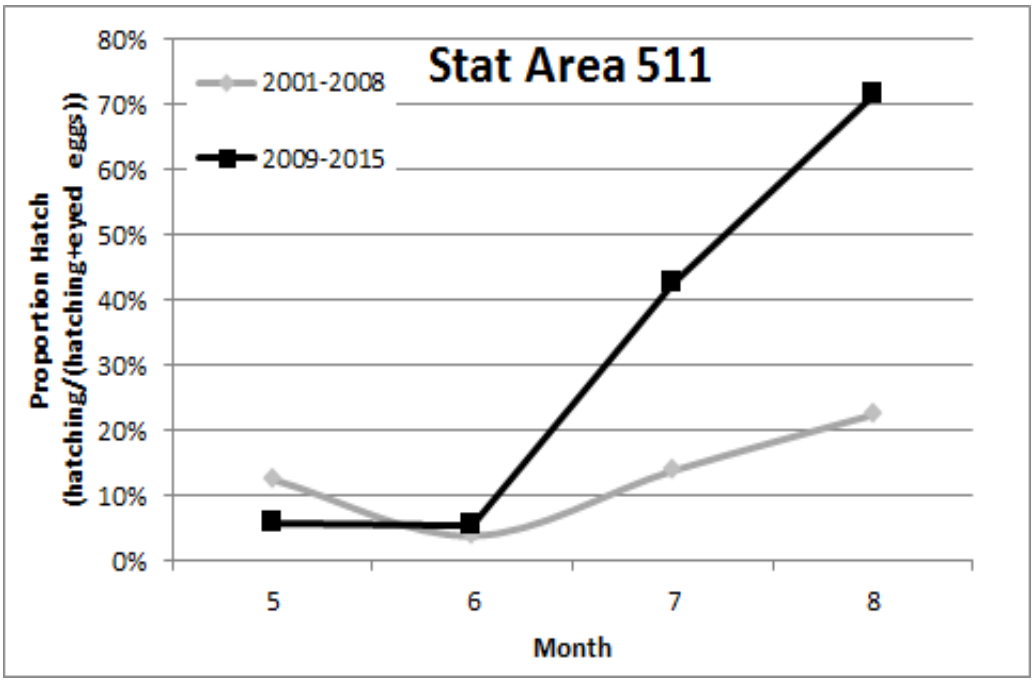


Figure 12. Proportion of eggs hatching by month for two different time periods in SA 511.

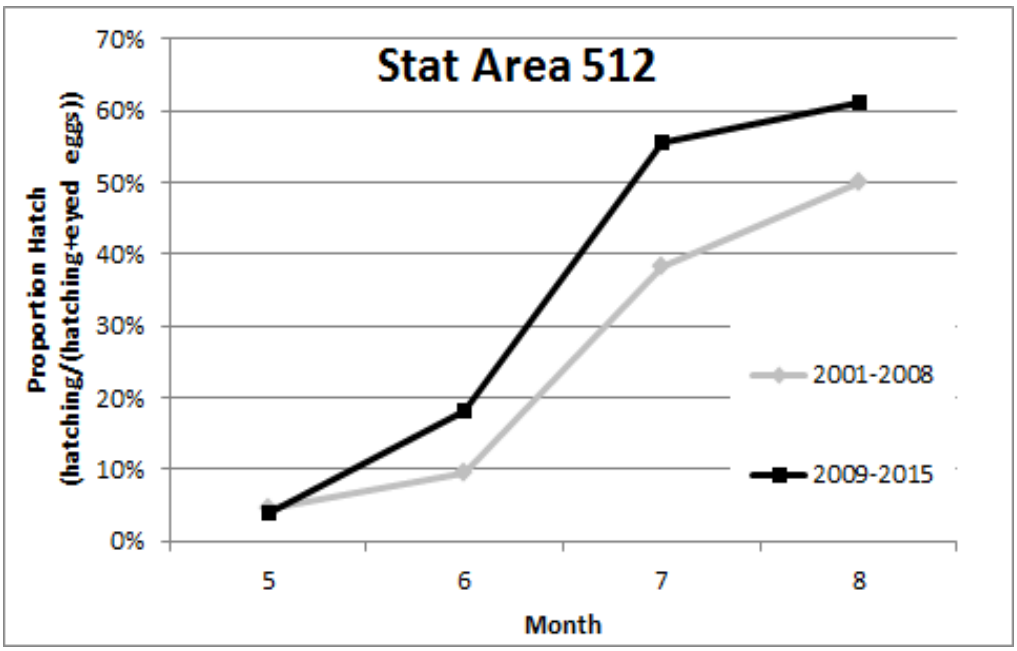


Figure 13. Proportion of eggs hatching by month for two time different periods in SA 512.

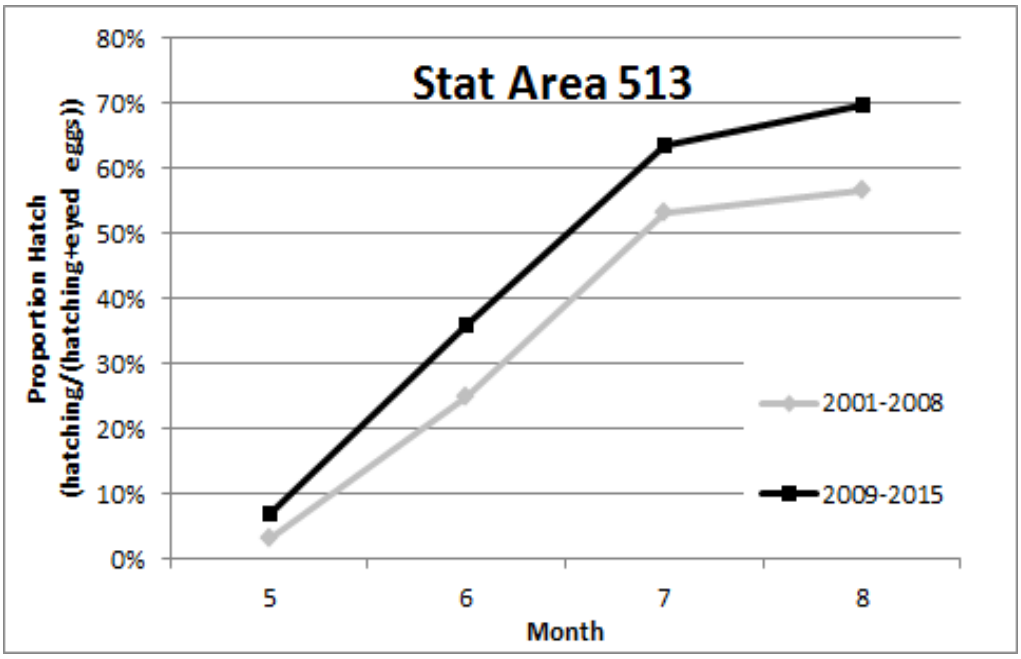


Figure 14. Proportion of eggs hatching by month for two different time periods in SA 513.

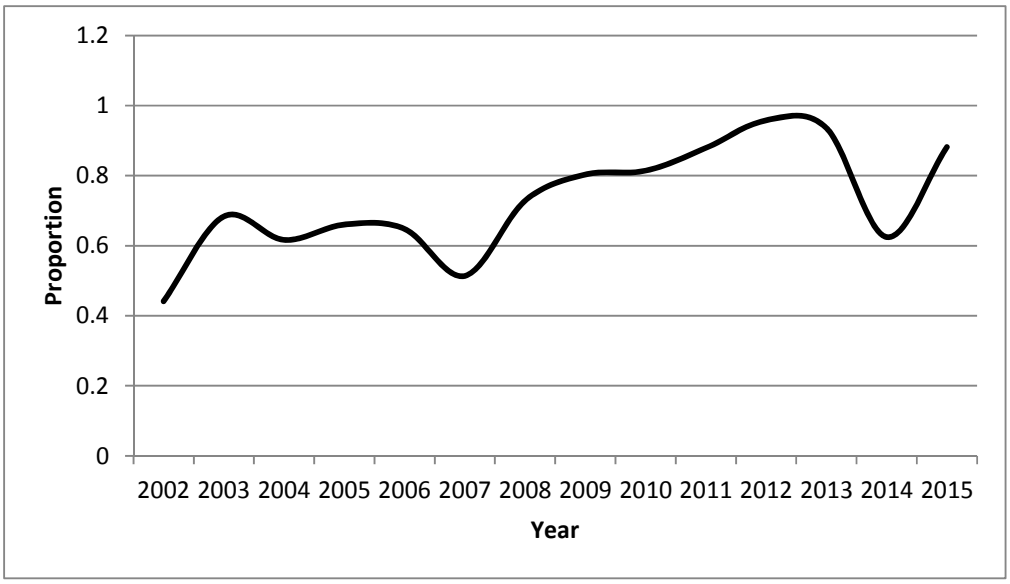


Figure 15. Proportion of total egg bearing lobsters with signs of eggs hatching or recently hatched in the month of July from NH Lobster Sea Sampling Program.

As stated above, there are several possibilities for why the ALSI has shown low numbers over the past four years. Water temperatures have increased in the Gulf of Maine and there's evidence that thermal habitat suitable for lobster settlement may be expanding (see *Section 4. Habitat Availability for Recruitment*). With a warming climate a myriad of changes may be taking place that affect the lobster population, including, but not limited to changes in wind/current patterns and predation by finfish. As with all natural systems, many factors are at play, but the above analysis does suggest that larval food supply may be one of the factors responsible for the recent declines in settlement in the Gulf of Maine.

4. Habitat Availability for Recruitment

The TC was interested in examining the relative abundance of coastal habitat to see how available benthic habitat might increase if coastal waters warmed to greater depths. If lobster recruits are constrained to shallow water due to sensitivity to cold water and there is an abundance of habitat marginally deeper than what has historically been recruitment habitat, then warming of this deeper habitat could be spreading recruitment across a greater area, resulting in declining densities in shallow habitat and a perceived drop in recruitment.

This analysis is preliminary and only examines the distribution or quantity of habitat by depth for the Gulf of Maine. It does not examine any analysis on the quality of habitat at greater depths or empirical evidence for changing bottom water temperatures or the extent of recruitment habitat.

To quantify the amount of bottom habitat with depth, we used the NGDC Coastal Relief Model bathymetry and cropped it to NMFS statistical areas 511 – 514. We then totaled the number of raster cells by bottom depth for each statistical area, converted to approximate square kilometers and calculated cumulative area with depth. Finally, we used total habitat less than 10 m depth (approximate habitat sampled by ALSI) for a baseline recruitment habitat and converted total habitat-at-depth to values relative to the 10m baseline.

Figure 16 shows the quantity of habitat (area in km^2) for each depth bin by statistical area. For interpretation, a generally flat profile would suggest consistently sloping bottoms with increased distance from shore while peaks in these profiles correspond to depths where habitats are comparatively abundant due to the presence of basins or flat-topped banks. Such "peaks" can be identified as various ocean floor features. For example the peak in habitat around 170m depth in statistical area 513 corresponds to the presence of Platt's Basin and the northern end of Wilkinson Basin in this statistical area, while the multiple small peaks between 30 and 80m in stat area 514 correspond to Stellwagen Bank and Jeffrey's Ledge. If waters warm sufficiently to include depths exhibiting such "peaks", the amount of available recruitment habitat could increase rapidly.

The majority of the benthic habitat in the Gulf of Maine is at depths between 150 and 250 meters. Shallower habitat (<50m) is generally constrained to the coastline with the exception of waters adjacent to islands along the central and eastern Maine coast and a couple of the shallower offshore banks in Massachusetts (Figure 17).

In general, stat areas 512 (mid-coast Maine) and 514 (MA) have the most shallow habitat while downeast Maine (511) has the least. Large "peaks" in habitat are lacking in shallow waters with only some moderate "peaks" shallower than 60m evident in stat areas 512 and 514. As a result, the cumulative amount of habitat in any given stat area increases almost linearly with increasing depth without evidence that incremental increases in depth will create sudden increases in available habitat.

Relative increases in potentially suitable habitat quantity vary across statistical areas (Figure 18). Relative to the total habitat <10m, available habitat doubles around 18 – 20m depth for stat areas 512, 513, and 514 but wouldn't double until around 27 m depth for stat area 511.

This preliminary analysis suggests that incremental increases in depths suitable as recruitment habitat would most probably result in similarly incremental increases in total recruitment habitat and small observed decreases in recruit densities in shallow water. If observed recruitment densities in shallow water decreased substantially, say by 50%, then the depths available to

recruitment would have to approximately double to get no net change in total recruitment. Moreover, in order for the diffusion of post-larvae over a larger area to be an explanation for the observed decreases in YOY indices, the available area over which they diffused would have to be more than double the original area available. This suggests that increased availability of habitat is not sufficient to solely explain decreases seen in the YOY indices.

These results are only preliminary and, as mentioned above, do not account for the quality of habitat at depth (for example, substrate type or complexity) or include data on the structure-of or changes-in water temperature profiles. A more in-depth analysis is certainly warranted.

A more comprehensive analysis of changes in recruitment thermal habitat in coastal Gulf of Maine is currently being conducted at the University of Maine in Damian Brady's and Rick Wahle's laboratories, supported by the NSF Coastal SEES, NOAA-FATE, and the UMaine Research Reinvestment programs. This study is combining local American Lobster Settlement Indices (ALSI) and bottom temperatures from ocean circulation model output to examine if the availability of thermal habitat has changed over recent years, explore the range of depths that may currently supply appropriate recruitment habitat, and if such changes can partially explain recent dynamics in the ALSI. An update on this research is expected within a year.

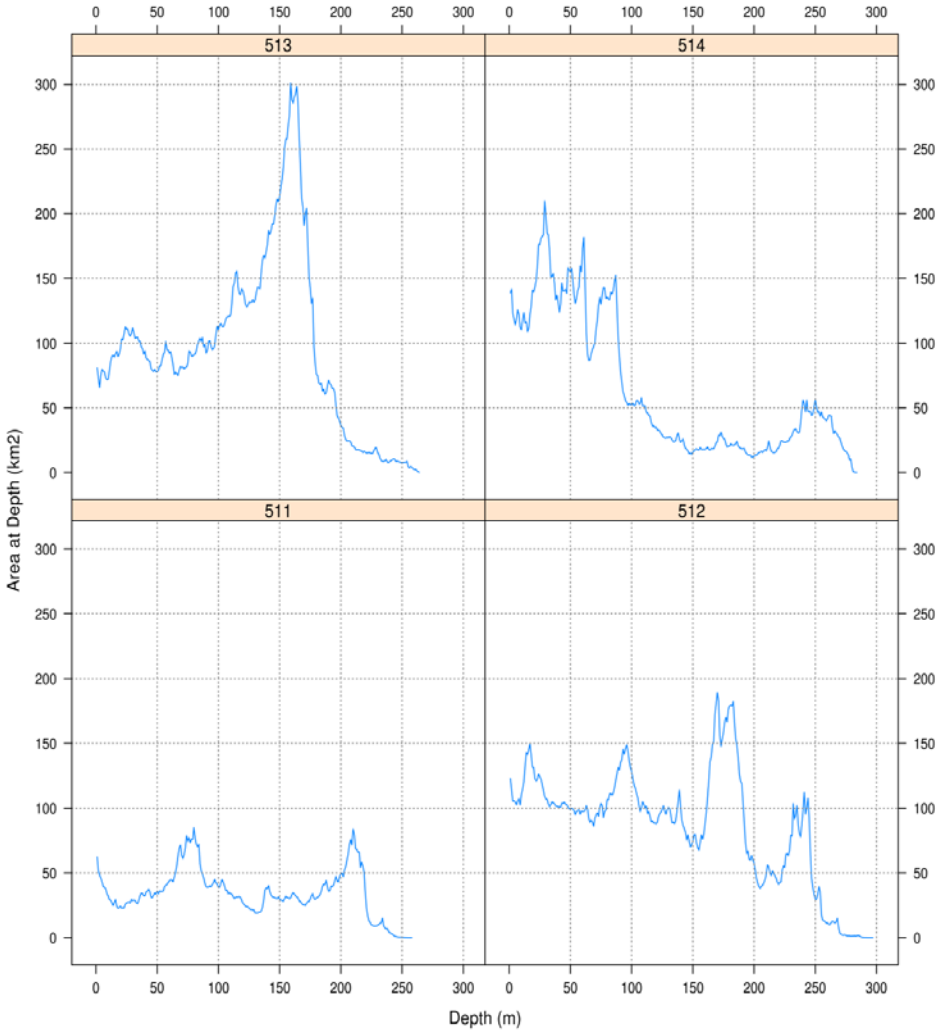


Figure 16. Area at depth (i.e. square kilometers of habitat for each 1m depth increment) by statistical area.

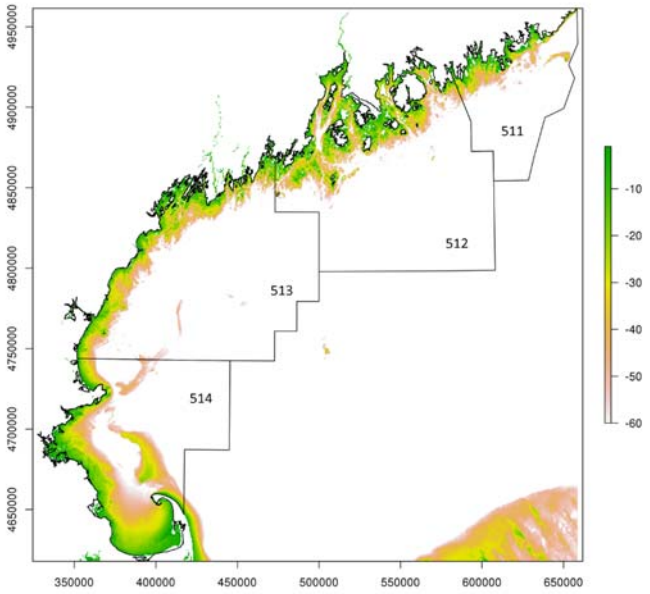


Figure 17. Coastal bathymetry (m) constrained to <60m.

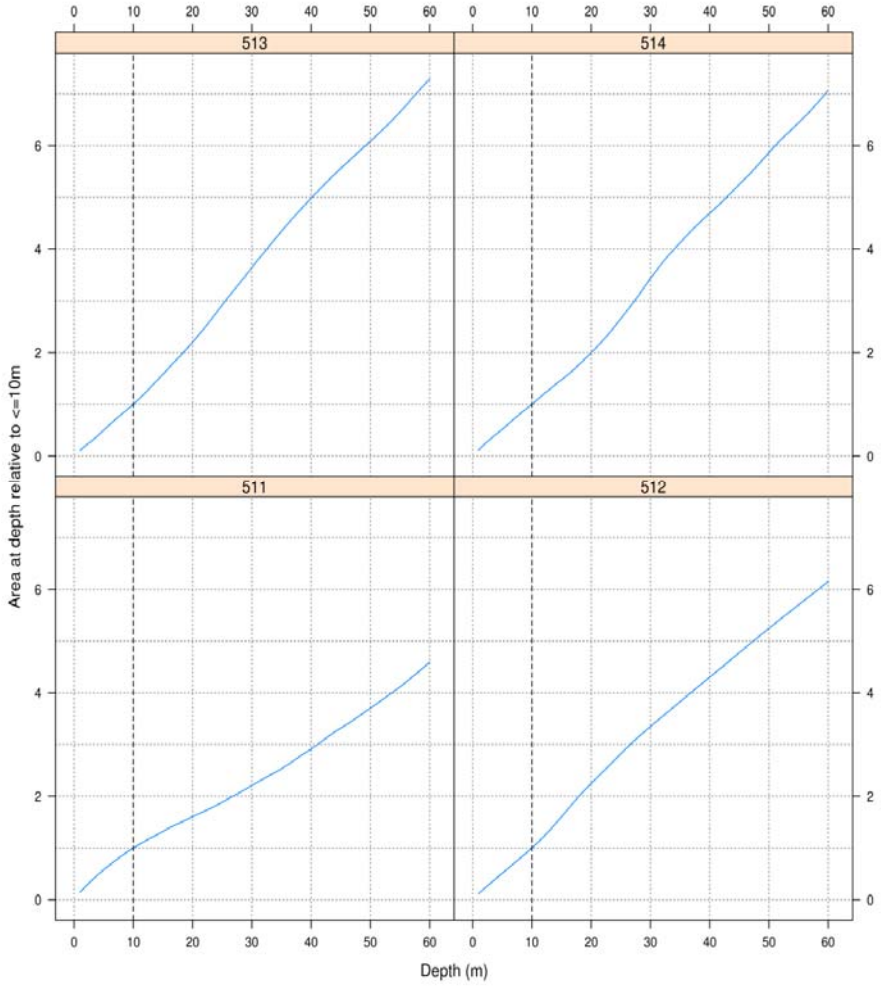


Figure 18. Cumulative area at depth, relative to total area <-10m. The vertical dashed line at 10m demarks the baseline shallow habitat that other depths are compared to. I.e. in Area 511, total habitat < ~27m is double the habitat <10m.

5. Stock-Recruit Relationship

The TC was tasked with presenting the trajectory of stock-recruit estimates for the GOM/GBK stock. A similar analysis was previously presented for the Southern New England (SNE) stock, which proved to be a useful tool for understanding underlying recruitment processes and identifying potential regime shifts in reproductive success. Such analysis for both stocks is presented below for comparison of the dynamics occurring in the different regions.

Information for this analysis comes from model outputs from the respective basecase 2015 assessment model. Recruitment numbers are model estimates for the number of lobsters that were needed to enter the model population in a given year to fit the observed data (landings, survey indices, and fishery and survey length compositions). Similarly, Spawning Stock Biomass (SSB) is derived from the numbers of female lobsters at-size in any given year as estimated by the model from the data-fitting process. It should be highlighted that these are model estimates and do not represent empirical data. As a result, changing the assumptions or tuning of the model will yield different results, though the general trajectories should be robust. It is also worth noting that there is no stock-recruit relationship included in the basecase models, so there was no constraint on the model for recruitment to be related to SSB. Thus, care should be used in interpreting these plots.

Since lobsters "recruit" to the assessment model at a minimum size of 53mm, it is necessary to lag recruitment estimates back a number of years to match them with the approximate year they were spawned. Due to different growth rates between stocks, the GOM/GBK recruits were lagged back five years (i.e. recruitment estimates for 2014 were matched to SSB estimates for 2009), while the SNE recruits were lagged four years. As a result of this biological lag, the most recent years are not included in this analysis because recruits spawned in recent years have not yet grown into the sizes tracked by the assessment model. Lag years are approximate based on growth studies but, again, general trajectories are robust to small changes in this assumption.

For both the recruit and SSB estimates, both the raw model estimates and smoothed time series are presented. The smoothed time series are included because raw model estimates can be erratic due to interannual variability, errors in model data input (i.e. sampling error, etc.), or model specification. The smoothed time series are intended to remove this variability to capture only the longer-term trends. Smoothed time series were calculated using a loess smoothing function with span of 0.4 or 40% of the time series. This span was visually selected for removing inter-annual variability that is probably "noise" while conserving the general dynamics. While both the raw model estimates and smoothed series are presented, only the smoothed series are discussed.

For GOM/GBK, recruitment increases throughout the time series (Figure 19), with the exception of 2008 and 2009 (discussed below). The relation between recruitment and SSB is nearly linear from 1981 – 2002, suggesting that recruitment per unit spawning biomass was stable over these years at a level favorable for increasing the abundance of lobsters. Between 2002 and 2007, spawning biomass remained relatively stable but recruitment continued to increase, suggesting that recruits per spawner increased over these years. This change in pattern likely indicates an external influence on recruitment success, such as an environmental driver. Recruit estimates decline marginally but remain high in 2008 and 2009. However, these two years are based on recruitment estimates from the terminal years of the model (2013 and 2014) and are, therefore, unstable and should be interpreted carefully.

The stock-recruit trajectory for SNE is complex, suggesting the potential for multiple shifts in reproductive processes. Recruits/spawner increase from 1979 to 1991 as both recruitment and SSB increase. From 1991 to 1996, recruitment declines despite increasing SSB as the recruitments from 1990 – 1992 grow and reach maturity. Between 1997 and ~2003 spawning biomass drops precipitously, though recruitment remains remarkably stable. Recruitment per spawner was considerably lower in this time period than in the 1980's. After 2003, spawning biomass remains fairly stable but recruitment begins an incremental decline, suggesting that recruitment per spawner and stock productivity are declining rapidly over these years.

Thus, there are contrasting dynamics between the two stocks. Since 2002, both GOM and SNE spawning stock biomass has remained fairly stable, with GOM at time-series highs and SNE near time-series lows; however, recruitment rates from these spawning stock have trended in opposite directions. This suggests that factors other than spawning stock biomass itself are strongly influencing recruitment processes. Possible accessory factors would include, but are not limited to, shifts in where lobsters are hatching-out, changing water circulation patterns that affect larval retention, and changing environmental conditions that affect larval and juvenile survival rates. Regardless, this decoupling of recruitment from SSB presents difficulties to management.

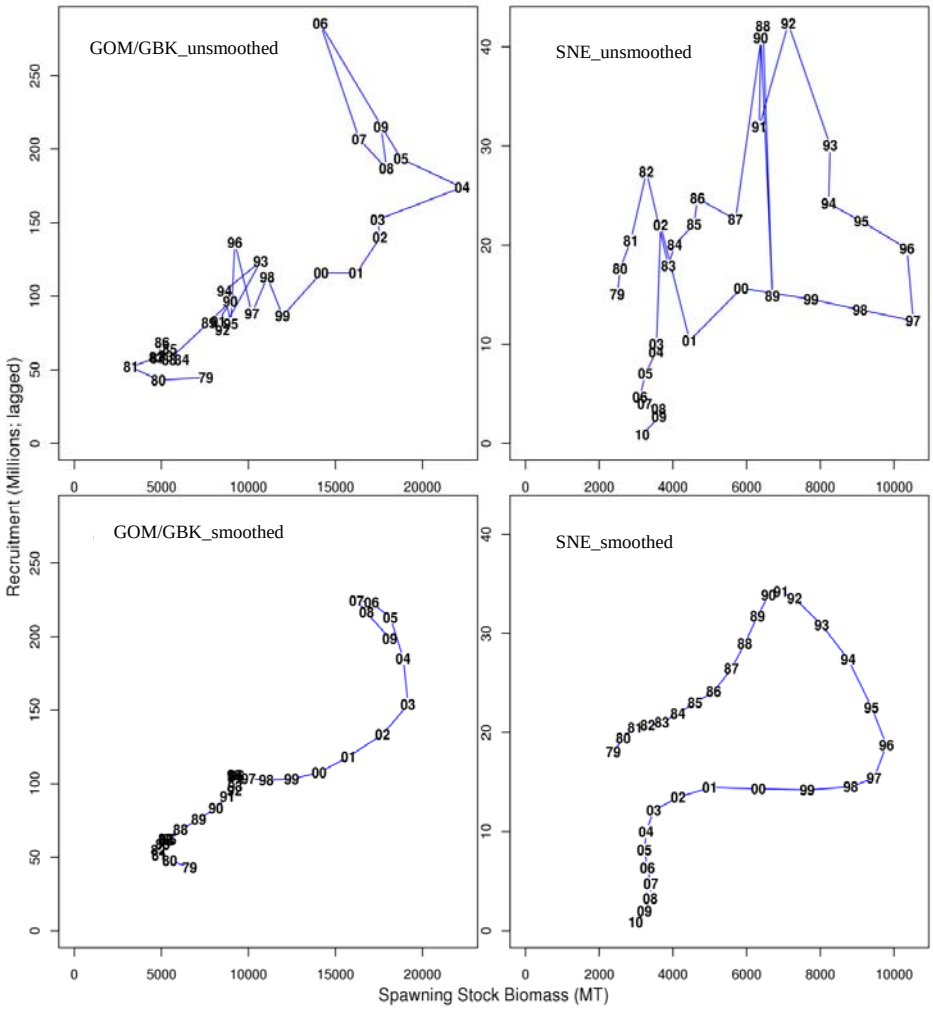


Figure 19. Model-estimated SSB and Recruitment trajectories for the GOM/GBK (left) and SNE (right), from the 2015 stock assessment. Both Raw (top) and smoothed (bottom) time series are shown. Recruitment estimates are lagged back to match the approximate year they were spawned. Numbers in the plots represent the last two digits of spawning year.

6. Biological Management Measures

Though the Gulf of Maine lobster fishery is currently at record abundances, some data suggest that young-of-year (YOY) recruitment has decreased in recent years, in which case landings may decrease in coming years. Out of a concern for this possibility, the Board asked the TC to provide advice on management measures that could be implemented to make the lobster population more robust to decreasing recruitment. Existing regulations protect egg-bearing and v-notched females, which helps protect the spawning stock. Thus, another reasonable management measure to consider is if lobsters are being fished optimally based on legal size regulations. In particular, if lobsters are being harvested at too small of a size, it may be possible to realize similar harvest in total pounds, by deferring harvest to a larger size.

An increase in the minimum legal size may have biological benefits that will increase the resiliency of the population to environmental changes and fishing pressure. This action would ensure that a higher proportion of lobsters are sexually mature before they are vulnerable to harvest. This may also increase the proportion of females who produce more than one clutch prior to harvest, which might be beneficial to larval fitness as some (albeit limited) information suggests that larger females produce larger larvae (Ouellet and Plante 2004) and may better manage the thermal environment to which their eggs are exposed (Cowan et al 2007).

Models that examine how a change in legal size affects population size, length composition, spawning biomass, and commercial harvest are necessarily dependent on, and sensitive to, life history parameters including natural mortality, probability of molting, and probable molt increment. Thus, it is important to understand how life history parameters are used in these calculations and how errors in these parameters affect the conclusions.

For a simplified example, one can examine the difference between harvesting an 82mm male lobster in a given year versus leaving that lobster in the population for an additional year. For lobster modeling in the Gulf of Maine, we generally assume a natural mortality (M) of 0.15. So the probability of losing a lobster to natural mortality in a given year is $1 - e^{(-0.15)} = 0.139$ or 13.9%. If a lobster survives to the next year, the lobster may or may not molt. Based on existing tagging studies and similar data sets, the probability of molting is 86.5% with 13.5% not molting. The probability of survival is combined with the probability of molting or not molting to estimate that 11.6% survive and don't molt and 74.5% survive and do molt. If that lobster does molt, it will on average grow ~11mm to 93mm CL, again based on data from tagging and growth studies. From available length-weight data, an 82mm CL male lobster weighs 0.97 pounds while a 93mm CL male weighs 1.44 pounds. We then combine these calculations to determine what the projected harvest would be if the lobster was caught in the next year (Table 1).

Based on the above assumptions, leaving the lobster in the population for an additional year and accounting for molt and mortality would yield ~1.19 lbs while harvesting the lobster immediately would yield ~0.97 lbs. Changing any of the above assumptions necessarily changes the outcome; increasing natural mortality, or decreasing the molt probability or molt increment would all decrease the projected next-year yield.

Table 1. Simplified example calculations for leaving an 82mm CL male lobster in the population for an extra year.

Scenario	Probability of Scenario	CL next year (mm)	Weight at size (lbs.)	Harvest (Probability * Weight)
Lost to Natural Mortality	13.9%	NA	NA	0
Survived, didn't molt	11.6%	82	0.97	0.11
Survived and molted	74.5%	93	1.44	1.07
			Projected Harvest (lbs.)	1.19

We used a population simulation model to examine the effects of different minimum legal sizes on projected lobster populations and fishery catch. The structure of the model is based on the assessment model and uses the same natural mortality, growth model (molt probability and increment), and estimated fishing mortality as the accepted GOM/GBK assessment model run from the 2015 benchmark. The calculations in the model are similar to the above example but marginally more complex as the model applies natural mortality, growth, and fishing mortality at quarterly intervals. Unlike the above example, lobsters are only available to the fishery when they reach the minimum legal size, rather than delaying fishing mortality for a set period of time. Finally, the fishing mortality rate, estimated from the assessment model, results in a portion of legal lobsters surviving for additional years. The same simulation model has been used over the past year for examining management options for the SNE stock.

Population Model Configuration

Most model inputs were based on inputs or outputs from the GOM/GBK assessment model, including:

- Size at maturity
- Recruitment length composition
- Recruitment seasonality
- Quarterly growth transition matrices
- Weight-at-length relationships by size
- Natural mortality assumed to be 0.15

Quarterly fishing mortality rates (F) were calculated from the average estimated F from the assessment model for 2011 – 2013 where estimates of F were stable.

Separate model runs were conducted for legal minimum carapace length (MCL) ranging from 72 to 95mm in 1mm increments. This range was chosen to provide contrast between model runs but to not greatly exceed the domain under which we understand lobster biology. Some proportion of the population above legal size is also not available to the fishery due to differences in minimum and maximum legal sizes between inshore and offshore LMA's, as well as the proportion of females at size that are egg-bearing or v-notched. For these simulations, proportion of legal lobsters at-size

above minimum legal size were the same as the inputs for the assessment model and were calculated based on biosample data and the spatial distribution of landings.

Because we explored some minimum legal sizes that are smaller than the currently assumed trap selectivity, we removed gear selectivity for all model runs, which makes all lobsters equally available to the fishery. This only has notable effects for model runs where MCL was smaller than the current minimum.

All model runs started with no population and had constant recruitment of one million individuals per year. This model initiation and recruitment was selected so that any differences between different legal size scenarios could be attributed only to the difference in MCL. Otherwise, starting with an assumed existing population abundance and size composition can create transient behavior in model projections, complicating interpretation of results. Model results like catch and population abundance are directly proportional to the assumed recruitment rate. As a result of using a convenient but arbitrary recruitment rate for the simulations, results are only valid for comparison among different projection scenarios.

Models were allowed to run for 25 years and the output examined to ensure that the populations had reached equilibrium abundance and size composition. Simulation model and analysis code are archived on NEFSC servers at:
/net/work4/LobsterGroup/Management/GOM_PostAssessment2015/LegalSizeAnalysis/script LegalSize_FixedR_FixedM_FnoF.R

Results

Note that data series in Figures 20, 21, 26, 27, and 28 exhibit a regular “wavy” pattern at 5mm intervals within the general trend. This is an artifact from changing MCL at finer scales than the projection model can fully resolve, as the model bins all lobsters at 5mm intervals. Thus, such fine-scale irregularities should not be interpreted.

Across the range of MCL examined (72 – 95mm), increasing the minimum size is predicted to increase total catch of the fishery by weight but decrease catch by number (Figure 20). Reducing the MCL to 72mm would decrease catch weight by ~25% but increase catch number by ~15%. In contrast, increasing legal size to 90mm is projected to increase catch weight by ~20% but decrease catch number by ~10%. Catch weight and number by sex are similar for males and females at smaller MCL but diverge at larger MCL with males exhibiting larger catch numbers and weights than females, presumably because female growth slows once they become reproductively mature and are more likely to be egg-bearing (Figure 21).

The length composition of the catch shifts with increasing MCL with larger size classes representing a larger portion of the catch at higher MCL (Figures 22 and 23). For at the current MCL of 82mm, the model estimated median catch size is 87mm (50% of catch between 83 and 91mm) and median weight is 538g (1.18 lbs). For a MCL of 90mm, median catch size is projected to be 95mm (50% of catch between 92 and 100mm) and median weight would be 703g (1.54 lbs).

As MCL increases, the number of lobsters at-size in the population also increases (Figure 24). If we apply the expected proportion of lobsters that are mature at-size to this population, we get an estimate of the mature population at-size (Figure 25). Because the current MCL is near the size that lobsters are expected to mature, increasing the minimum legal size results in dramatic increases in

the number of mature lobsters (Figure 25) and SSB (Figure 26). Additionally, the biomass of the population as a whole (>53 mm) will also increase as a result of changing MCL (Figure 27).

Population exploitation is calculated as the proportion of lobsters above a fixed size (78mm in this case) that are removed from the population by fishing within a year. Because changing the MCL directly changes the portion of the population that is available to the fishery, increasing MCL is expected to decrease exploitations rates (Figure 28). Projections suggest that an MCL between 85 and 86mm would achieve a 20% decrease in exploitation while an MCL of 90mm would result in a 40% reduction in exploitation.

Discussion

These simulation calculations suggest that increasing the minimum carapace length has the potential to produce similar total landings by weight, with a smaller number of lobsters but at larger sizes. However, because lobsters would survive longer before capture, such changes in MCL could results in a significant increase in the numbers of mature lobsters and SSB, potentially adding resilience to the lobster population. It is important to note that there is no stock-recruit relationship included in the current model configuration, so any benefits in recruitment and population abundance resulting from increasing SSB is not accounted for in this analysis.

These results are preliminary and would only be the first step in the research that would be necessary before any recommended changes to management would be appropriate. As mentioned in the methods, all results presented here are based on assumed growth rates, molt increments and natural mortality rates. Though the growth model was updated to include all available growth data for the 2015 assessment, much of the data are dated and may not be accurate for current lobster populations in the GOM. Also, relatively little growth data exist for larger sized lobsters, so projection results that are strongly influenced by the abundance of large lobsters are more uncertain.

The assumed rate of natural mortality (M) also needs further examination and validation. The current natural mortality rate is one of the major sources of uncertainty for similar analysis recently conducted for SNE. Targeted research and diagnostic analysis of the stock assessment model for SNE indicate an increase in M in recent decades but it is hard to determine what values are currently appropriate or how this value may change in the near future. This is less of a problem for the GOM as there is no strong evidence that M has changed markedly or is expected to change in the near future. However, the assumed value of M for the GOM, along with the assumption that M is the same for lobster of all size in the model, should be carefully examined.

The assumed rate of maturation is very influential on calculations for numbers of mature lobsters (Figure 25) and particularly changes in SSB (Figure 26). The TC generally agrees that the maturation rate used in the stock assessment needs updating and suspects that lobster are actually maturing at a smaller size than the maturity schedule used in these calculations. Shifting the maturity schedule to smaller sizes would increase the number of mature lobsters at smaller sizes for all MCL scenarios in Figure 25 and decrease the relative changes in SSB with increasing MCL in Figure 26.

Given the above concerns, this or similar analyses would benefit greatly from a closer examination and potentially updating the major parameters that determine the results. In the absence of additional data, meetings could be held with experts from industry, management, and research to

agree on appropriate ranges for input parameters and sensitivity analysis could be conducted across these ranges.

Additionally, it would be good to externally validate the results against another population model. We initially tested this population model against the projection model written into the stock assessment model and confirmed that both models produced the same results. However, it would still be potentially useful to validate model calculations from this model against a different model framework, like an Individual Based Model (IBM). Such an IBM has been developed in Yong Chen's laboratory at the University of Maine and is currently being used to examine different management actions. A formal comparison of results from the two models would be appropriate.

In addition to the concerns listed above, there are additional ecological assumptions that are not captured in the model and need to be examined. Primarily, the model assumes no resource limitations that would constrain the size of the lobster population. With the lobster population currently at record high numbers, it is unclear if the GOM ecosystem could actually support the 50% increase in lobster biomass projected for a 90mm MCL (Figure 27) or if habitat, food, or other resources would become limiting. It is also difficult to understand how these large-scale projections would scale down to local dynamics. If this increase in biomass could not be supported, it would be important to understand the factors that limit the carrying capacity of the lobster population to accurately project the effects of different management actions or appropriate scales for management.

Beyond the validity of the model projection and biological constraints, it is critical to consider the impacts that changing the MCL would have on the economics of the lobster fishery and fleet dynamics for a fishery as valuable and important as the GOM. While the above analysis suggests that landings of a similar biomass may be possible with a larger MCL, it does not address how changing MCL would actually impact the total revenue of the fishery. With a large enough increase in minimum size, entire market categories would disappear with landings being be pushed into larger market categories. Extensive economic analyses should be conducted before any major management action is implemented. Similarly, increasing MCL may serve to further push the fishery to deeper waters at greater distances from shore, complicating fishing operations for operators of smaller vessels.

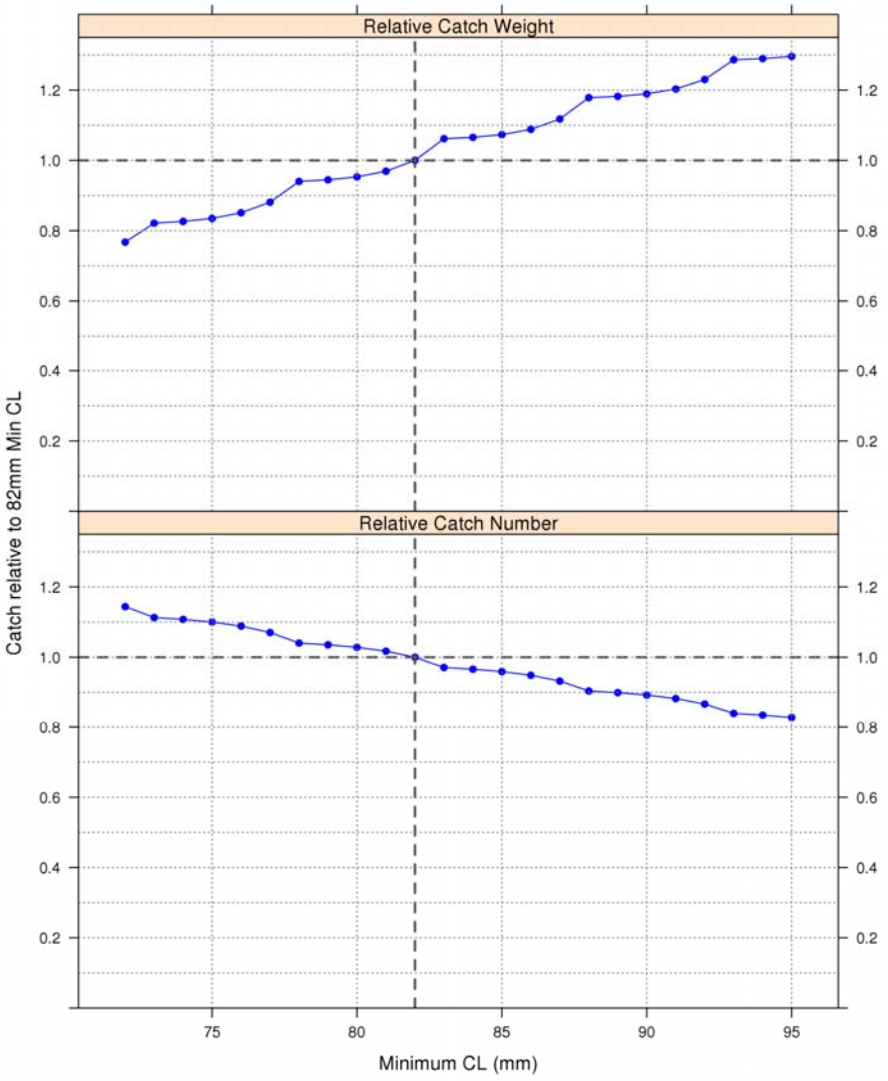


Figure 20. Projected changes in annual catch weight and catch number for different minimum sizes. Values are relative to an 82mm minimum size, so a value of 0.8 represents a 20% reduction, etc.

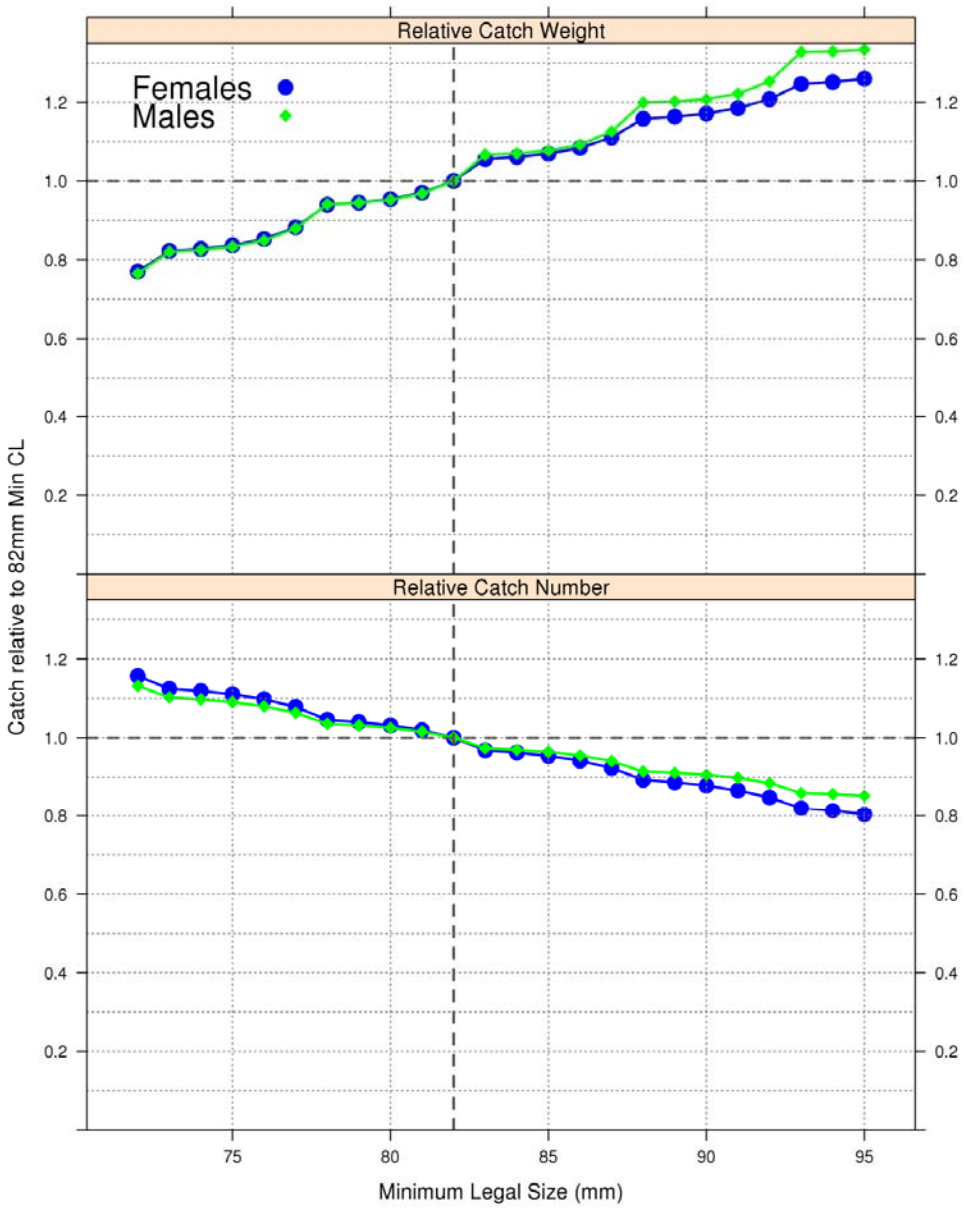


Figure 21. Projected changes in annual catch weight and catch number by sex for different minimum sizes. Values are relative to an 82mm minimum size, so a value of 0.8 represents a 20% reduction, etc.

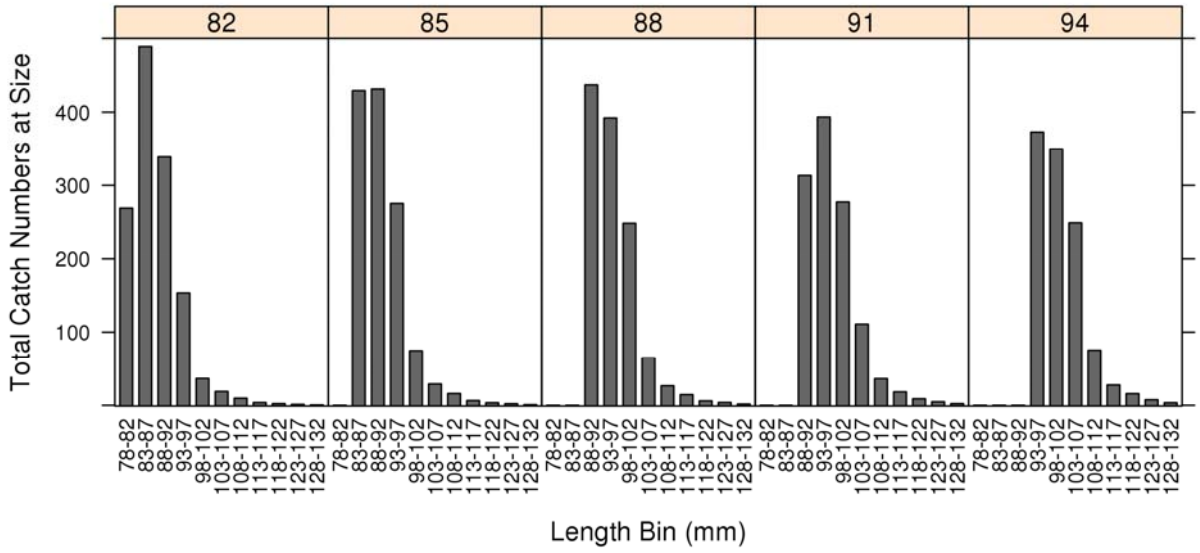


Figure 22. Projected size composition of catch under five different minimum legal size scenarios.

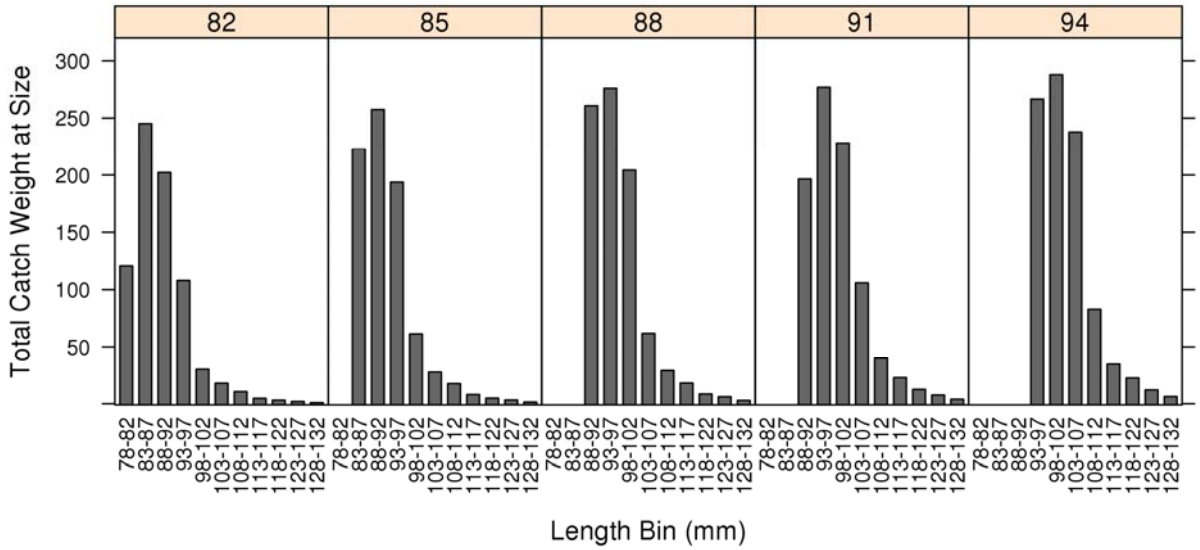


Figure 23. Projected weight composition of catch under five different minimum legal size scenarios.

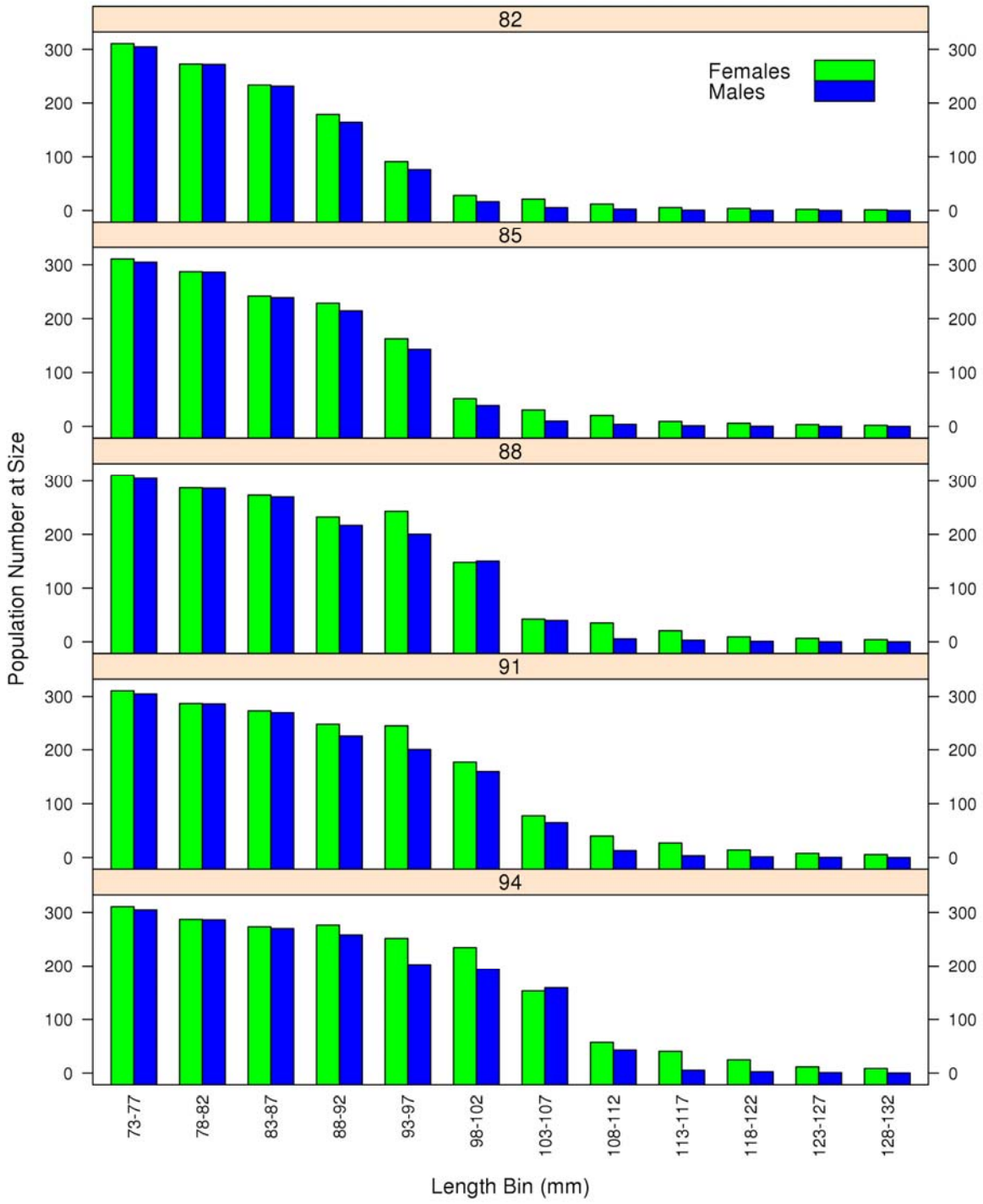


Figure 24. Projected population size composition by sex for five minimum legal size scenarios at equilibrium at the end of the Spring quarter.

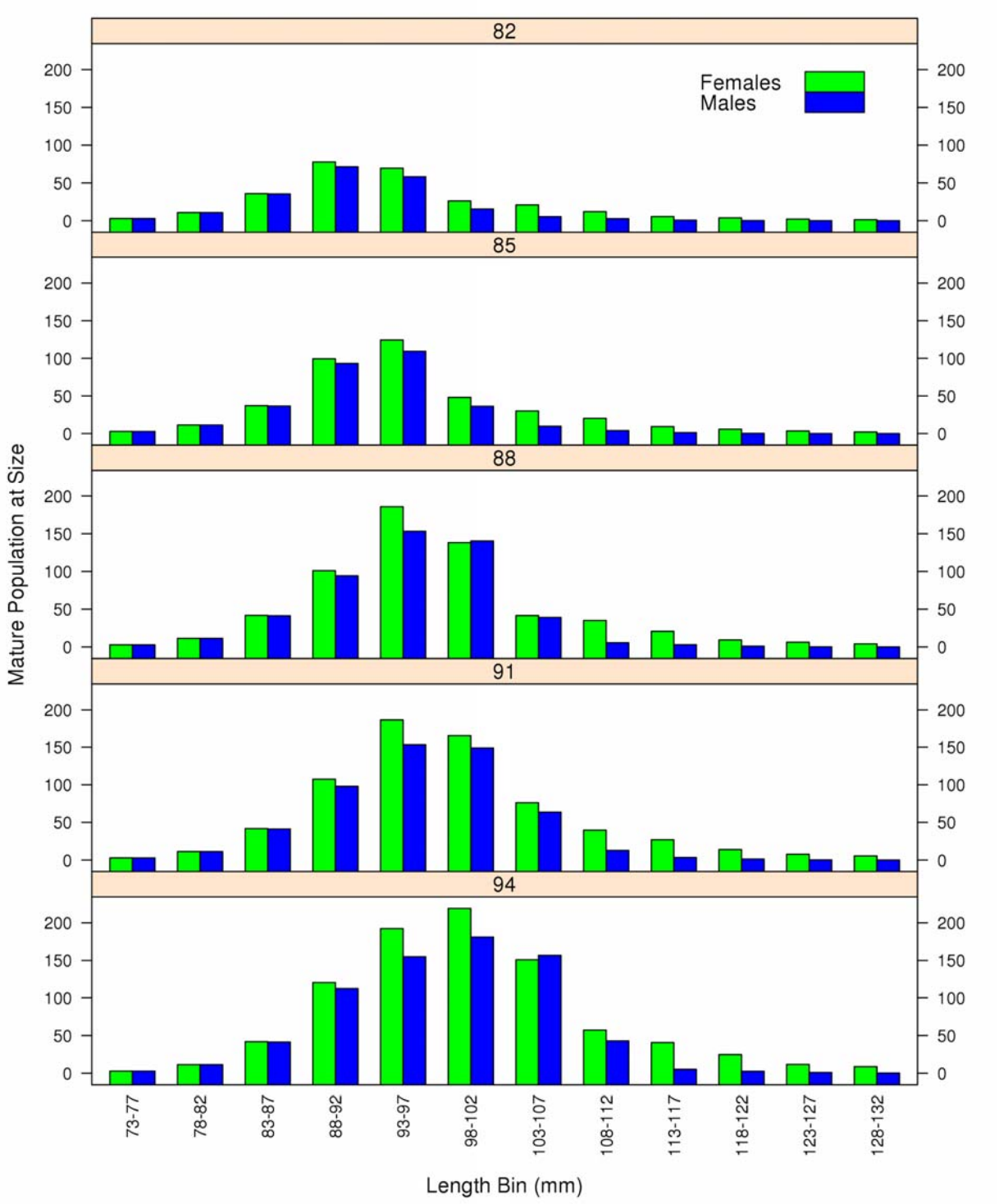


Figure 25. Projected population size and abundance of mature lobsters, by sex at equilibrium at the end of the Spring quarter for different minimum legal size scenarios.

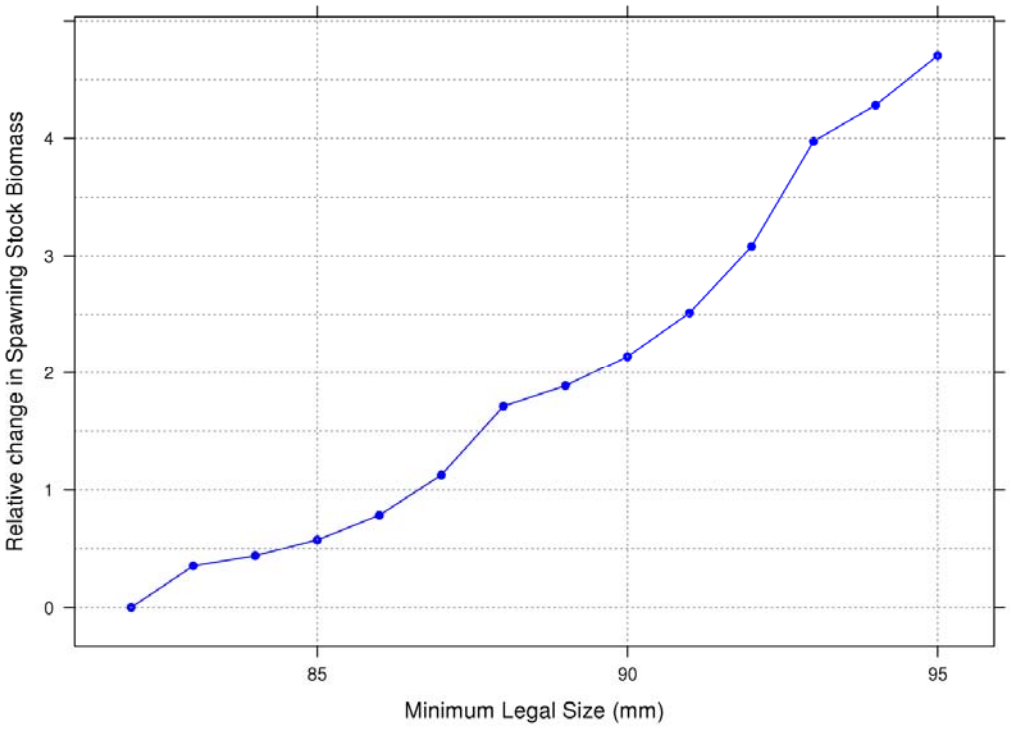


Figure 26. Projected changes in Spawning Stock Biomass at equilibrium at the end of the Spring quarter under different legal size scenarios. Values are relative to an 82mm minimum size, so a value of 1 represents a 100% increase.

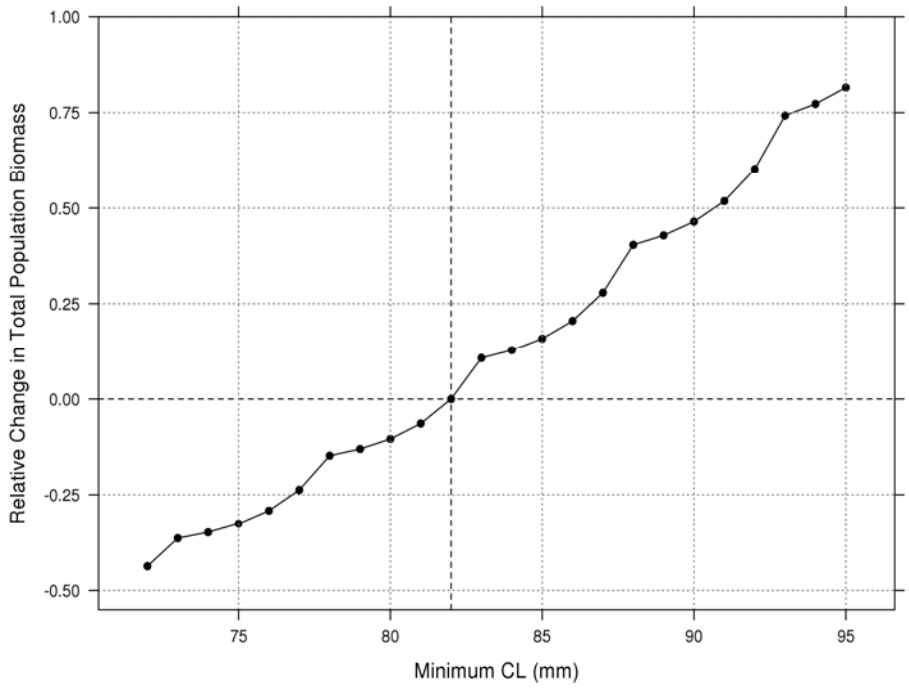


Figure 27. Relative total population biomass at equilibrium at the end of the Spring quarter for all lobsters >=53mm CL. Values are relative to the current minimum legal size of 82mm so a value of 0.5 represents a 50% increase in lobster population biomass.

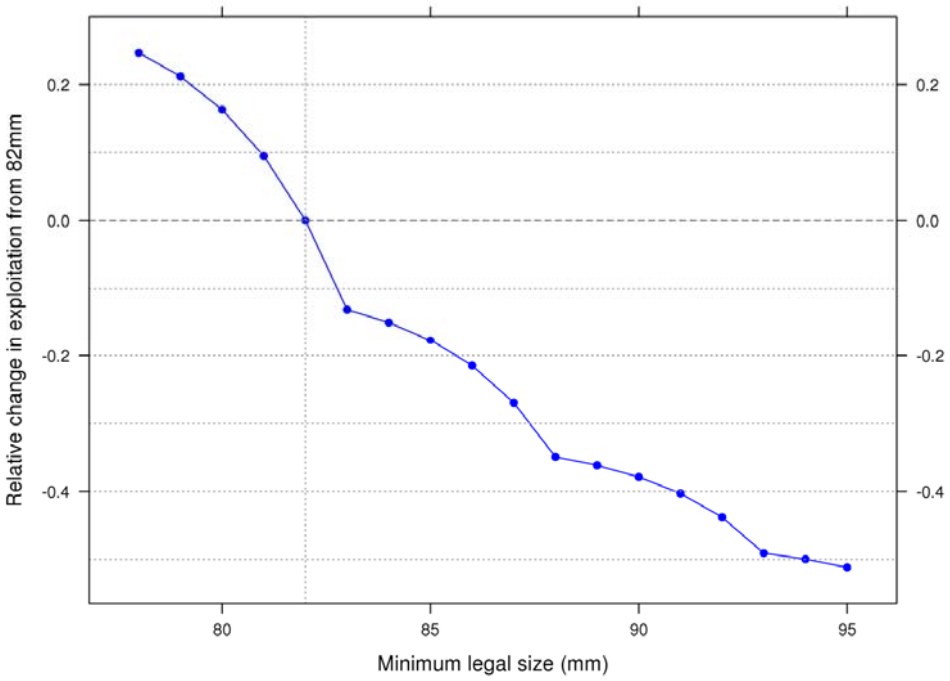


Figure 28. Projected changes in annual population exploitation under different minimum legal sizes. Values are relative to an 82mm minimum size so -0.2 represents a 20% reduction in exploitation.

7. Traffic Light Analysis

Given the desire to maintain high catch rates in the GOM/GBK, the Board asked the TC to develop a control rule, such as a Traffic Light Analysis (TLA), to trigger management action before the stock is overfished or overfishing is occurring. TLAs are currently used in the management of other Commission species, such as Atlantic croaker and spot. In both cases the TLA monitors the stock in between stock assessments and provides a simple metric to understand the condition of the population.

The TC discussed the potential application of a TLA to the GOM/GBK lobster stock and several concerns were raised by the group. The first concern was that the TLA was originally developed as a precautionary management tool for data-poor species. Given that significant data exist on the lobster population and sophisticated models have been developed to determine the stock's status, the TC raised concerns that a TLA could over-simplify and dilute the work already done to model the stock. Furthermore, the TC noted that model-free indicators have already been developed for the GOM/GBK stock which provide color-coded information on spawning stock biomass, recruit abundance, young-of-year indices, revenue, and landings. Noting the Board's desire to maintain high catch rates seen in the last 10 years, the TC also considered developing reference points based on a more recent time period. However, the TC discussed that periods of high reference abundance can occur even when recruitment is low. As a result, truncating the reference time period can be deceiving as the stock could be achieving the reference abundance target but experiencing poor recruitment. This scenario occurred in SNE where low YOY indices were seen in the early to mid-1990's when landings were at their highest.

Recognizing the Board's desire to be proactive in the management of the GOM/GBK stock, the TC has two recommendations which could inform the Board of changing conditions and enhance

resiliency of the stock. The first recommendation is to closely monitor the Ventless Trap Surveys (VTS) and Inshore Trawl Surveys (ITS) from Maine, New Hampshire, and Massachusetts. Currently, the young-of-year (YOY) indices are showing declines which could foreshadow poor recruitment in the stock. However, there may be other reasons, besides deteriorating stock conditions, which could be causing declines in the YOY indices. One reason could be changes in the distribution of newly settled lobsters. Given the YOY surveys are fixed site surveys, they may not be able to discern changes in the distribution of lobsters from decreases in settlement. As a result, the TC highlights the importance of monitoring results of the VTS and ITS, which can detect the abundance of sub-legal lobsters. Should the decline in the YOY indices indeed reflect a decline in settlement, this change will next be seen in the VTS and the ITS. The TC expects to see declines in the VTS 5-7 years after the declines the YOY survey. Distinct changes in the trajectory of abundance indices from the VTS and/or ITS would help confirm changing stock conditions and poor recruitment in the GOM/GBK stock.

Another recommendation is to modify the abundance reference threshold for GOM/GBK. In an April 2010 memo to the Board, the TC recommended that, when stock abundance falls below the 50th percentile, action be taken to increase the spawning stock and reducing fishing mortality.[1] Currently, reference abundance in the GOM/GBK can decline to the 25th percentile before management action is triggered to rebuild the stock. The TC again recommends that management action be triggered at the 50th percentile to increase resiliency in the stock.

While writing up this report, the TC also discussed adding an environmental indicator to the model-free indicators that are a part of the benchmark stock assessments. One of the clear conclusions of the 2015 stock assessment is that environmental factors, primarily water temperature, are impacting the lobster stock. Sea surface temperatures from Boothbay Harbor, ME show that the number of days in the optimal temperature range of 12-18^{o}C has increased since the early 2000's (ASMFC 2015). In contrast, the number of days above 20^{o}C, a number considered to be an important temperature threshold for lobsters, has increased in Woods Hole, MA and Long Island Sound, CT (ASMFC 2015). Given this information, the TC discussed creating a water temperature indicator for SNE and GOM/GBK to help illuminate these trends. Specifically, the indicator could look at anomalies from the mean number of days above 20^{o}C. While there was not enough time to complete this analysis for this report, the TC is willing to continue work on this indicator should the Board feel this is a worthy exercise.

As the Board considers potential control rules in the GOM/GBK, the TC cautions the Board against creating a biological trigger for an economic problem. Recent landings in the GOM/GBK have been unprecedented and are likely a result, in part, of ideal environmental conditions (including water temperatures) for egg production and settlement. The Board may not be able to manage the stock to maintain these record high abundance rates, especially as conditions in the Gulf of Maine continue to change. Furthermore, the TC notes that there may be declines in the population and the stock might still be considered healthy given its historical abundance levels.

[1] American Lobster Technical Committee memo to American Lobster Board, RE: American Lobster Reference Points. April 23, 2010. M010-034.

8. Research Holes and Data Gaps

In an attempt to highlight data gaps as well as on-going research in the Gulf of Maine, the TC discussed remaining questions regarding the biology and recruitment of lobsters, especially in regards to changing habitat conditions, and compiled information regarding on-going projections. This section is split into three parts: A) Research Needs; B) Assessment Model Development; and C) On-Going Research.

A. Research Needs

Maturity, Growth, and Age

Increases in water temperatures over the past several decades have likely resulted in changes to size at maturity and growth patterns. Maturity data used in the 2015 assessment are more than 20 years old, making it likely that available maturity and growth information are not representative of present rates. Evidence of decreased female size at maturity exists for both the GOM/GBK stock (Pugh et al. 2013) and the SNE stock (DNC 2013, Landers et al. 2001). Changes in sizes at maturity will subsequently affect growth, since female molting frequency decreases after reaching sexual maturity. Such phenomena have been documented for the SNE stock, as increased molt frequency and decreased molt increments have occurred (DNC 2013). Additionally, female maturity and growth are directly linked to reproduction, as females do not molt if they are carrying eggs. It is critical to collect updated information on maturity and growth in order to appropriately assign molt probabilities to lobsters in the U. Maine length-based model. When females mature at smaller sizes, their growth slows down earlier than what the existing transition matrices predict. This research would also inform age-length relationships, which may also have changed with increased temperatures. Future research should aim to confirm the transition matrices used in the University of Maine model and improve the current assessment, particularly at older ages/sizes.

Natural Mortality

Research is needed to examine new methods for determining age- or length-varying natural mortality, as well as looking at more rigorous ways of determining time-varying natural mortality for lobster. The former is of critical significance given the probable overestimation of natural mortality in older individuals. The latter is also critical given climatic shifts and changing predator fields. Additionally, interplay between natural mortality and the potential for under-reported harvest should be examined to determine how these factors may impact assessment outcomes. Quantifying differences in natural mortality with and without shell disease must be investigated as disease prevalence continues to be significant in certain areas of SNE and may be spreading northward.

Environmental Influence on Lobster Life History

As noted above, environmental conditions, particularly temperature, significantly influence lobster life history. Research should continue exploring relationships between environmental drivers and lobster population dynamics (maturity schedules, growth, mortality, recruitment, and movement). With oceanographic projections, relationships should look at how lobster life history may change with future climate change, particularly habitat suitability.

Post-larval settlement dynamics should be examined in relation to movement or re-distribution of a spawning stock and the habitat required for post-settling lobsters (e.g. temperature, substrate, water column structure, light, prey, predators).

Mating and Reproductive Success

Due to continued observations of female-skewed sex ratios in the GOM/GBK stock, questions regarding the reproductive capacity of these large females should be considered. Recent laboratory work showed that females who mated with smaller males, or who mated under female-skewed sex ratios, did not have completely filled seminal receptacles, and may have been sperm-limited (Pugh 2014). As such, information regarding the location and timing of the female molt (and thus mating) would be required to determine whether the skewed sex ratios and larger female size structure might impact female reproductive output. Additionally, sampling of the large females to determine whether they have mated would also be informative with regard to reproductive activity, as preliminary data indicated some large females had not mated (Goldstein et al. 2014).

Stock Connectivity

There is need for a comprehensive large scale tagging study to examine stock connectivity between GOM and GBK, as well as GBK and SNE. Historical tagging studies demonstrated movement from the inshore GOM to locations east of Cape Cod in the inshore portions of GBK, from the Scotian Shelf to GBK, and from inshore areas east of Cape Cod to inshore GOM (ASMFC 2015). What is lacking is a tagging study of lobsters in the fall/winter on Georges Bank proper, prior to seasonal migrations which occur in the spring. This information would be extremely valuable to strengthen data used to justify the merged GOM/GBK stock.

Tagging information provides insight into movement of ovigerous females that can be used to understand stock connectivity via larval transport. Hydrodynamic modeling of the GBK and SNE outer shelf areas, with particles assigned lobster larval behaviors, would add valuable insight to the possibility that northern stocks may provide a source of larvae ultimately recruiting to the SNE stock. See Ongoing Research VII below.

Tagging studies are often used to assess stock connectivity; however, information on the reporting rates of tagging studies is still unclear. A study which had both high and low reward tags would help elucidate fishermen behavior and expected tag returns rates in the fishery.

Fishery-Dependent Information

Analysis of fishing effort compared to economic indicators would be valuable in understanding the contributions of resource availability (e.g. SSB) and U.S. economic status on industry and recorded landings.

Accurate and comparable landings are the principal data needed to assess the impact of fishing on lobster populations. 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, have negatively affected the accuracy of catch and conservation discard assessment. This lack of accuracy then limits the ability of the model to accurately describe landings and stock conditions. It is imperative that funding for critical monitoring programs continues, and increased monitoring efforts for offshore areas are necessary, particularly those from which a large portion of landings originate. These types of programs are essential for accurate lobster assessments and must have dedicated funding.

There are some indications that lobster harvest were under-reported and this under-reporting was significant for extended time frames. Impacts of under-reporting should be investigated via simulation testing. One particular area that should be examined is the period prior to the

implementation of the 100/500 possession rule for non-pot gear, as landings by non-pot gear may have been a significant source of under-reporting.

A thorough investigation of methods for determining optimal biological sampling intensity based on variability in catch and spatial/temporal landings information should be undertaken. This investigation should explore other metrics that may be more variable than length composition (i.e. conservation discards, sex ratio, legal proportions), as well as an examination of the importance of data from different Statistical Areas to the assessment and the interplay with various levels of sampling from each Area.

B. Assessment Model Development

Natural Mortality

Incorporate varying natural mortality rates to produce scenarios of healthy vs. shell diseased populations of lobsters, and incorporate environmentally-explicit model between climate (e.g. temperature), shell disease prevalence, and mortality for forecasting SSB and catches.

Survey Data Aggregation

Examine the use of a hierarchical modeling technique (Conn, 2010) to aggregate survey information for the different stock areas as an alternative to internally weighting indices in the model or using area-swept information.

Settlement-YOY Survey

Incorporate settlement-YOY survey into the assessment to construct abundance indices for early age classes and understand mortality rates in the first few years of life.

Stock-Recruitment Relationship

Identify appropriate stock-recruitment functions, both traditional and environmentally explicit, to more accurately understand the feedbacks between spawning adults and recruitment, particularly under recent dynamics of recruit/spawner rates (i.e. SNE recruitment failure and GOM/GBK recruit/spawner increase).

Assessment Model Language

A priority that was emphasized by the Review Panel during recent SASC presentations and discussions was the rigidity of the UM model that is written in Advanced Differential Model Builder (ADMB, Fournier *et al.* 2012) and difficulty of reconfiguration. We recommend re-writing the UM model in a more flexible and efficient configuration, using either the ADMB or Template Model Builder (TMB, Kristensen et al. 2016) software platforms.

C. On-Going Research

I) In 2013 the Maine Department of Marine Resources contracted with the University of Maine for a five year $250,000 project designed to apply Kilada et al.'s (2012) approach to ageing for lobster. This work focuses on lobsters ranging in size from newly settled lobsters to fully recruited sizes. Regional temperature regimes will be tested as well as differences between laboratory and field scenarios. Anticipated deliverables should be directly applicable to future assessment and will include size-at-age estimates, molt increments and molt frequency.

II) The Maine Department of Marine Resources conducted a three-year study (2010-2013) where settlement was measured in randomly selected sites, based on depth and substrate, and compared to standardized sentinel locations in Mid-Coast Maine. Mid-Coast Maine is the region with the

longest time series for settlement, dating back to 1989. For this reason, it was important to investigate the patterns of settlement from fixed and randomly selected sites. Initial results indicate fixed and random stations have similar magnitude and trend with respect to settlement density for this region.

In other regions in Maine, there is evidence that thermal conditions may have changed, providing additional habitat for settlement. Annis et al. (2013) suggest that small differences in water temperature may shape settlement patterns through either behavioral avoidance of colder settlement sites or elevated post-settlement mortality of post-larvae settling at colder sites. Wahle et al. (2013) observed young-of-year lobsters as deep as 80 m. If available substrate has increased in eastern/northern Maine, simply as a result of increasing water temperatures, then fixed sentinel sites in shallow water may miss a broader pattern of settlement in the region. Researchers (Rick Wahle) at the University of Maine, Orono and NOAA have received funding from the University of Maine Research Reinvestment Program to study changing depth distributions of lobster recruitment. The study is using collectors to determine if lobsters are settling at greater depths than have historically been monitored. This research may provide insight into recent trends observed in the American Lobster Settlement Index. Work has also been funded through NOAA's Northeast Regional Sea Grant Consortium to research the genetic and phenotypic response of larval American lobster to ocean warming and acidification across New England's steep thermal gradient (Rick Wahle, Umaine; David Fields, Bigelow Laboratory for Ocean Sciences; and Spencer Greenwood, University of PEI). A number of projects have been funded to enhance and expand forecasting lobster fishery recruitment using the American Lobster Settlement Index (Rick Wahle, UMaine; A. Pershing, GMRI; L. Jacobson, NEFSC; D. Brady, UMaine; B. Beal, UMaine Machias; B. Shank, NEFSC).

III) Kathy Castro of the University of Rhode Island is currently assessing the impact of various vent sizes on retaining lobsters entering traps. Traps were stocked with lobsters of known sizes and sexes and released for 5 night soaks to see the degree of escapement.

IV) Researchers from VIMS (John Hoenig, Jeff Shields, Maya Groner) are currently working on environmentally explicit models to describe size-specific mortality rates for shell-diseased lobsters. These relationships will be evaluated for inclusion in the currently used projection model to understand future lobster population dynamics under diseased and non-diseased scenarios.

V) Researchers from Davidson Laboratory at the Stevens Institute, CT DEEP, and NOAA have recently evaluated habitat restrictions for lobster using high resolution climate change model for Long Island Sound. Future habitat work should draw on these techniques for other SNE states (RI and MA) as well as the GOM/GBK stock.

VI) Massachusetts Division of Marine Fisheries is currently conducting research into the sub-lethal effects of shell disease, specifically in relation to reproductive capacity. The research, funded by NOAA's Saltonstall-Kennedy grant, will examine male and female lobster reproductive capabilities relative to presence or absence of shell disease. Female mating success, initial fecundity (number and quality of eggs spawned) and realized fecundity (number of eggs expected to hatch) will be determined. Male spermatophore quality will be determined relative to disease status. Mating behaviors of diseased males and females will be examined, and compared to that of non-diseased lobsters. The results are intended to help understand the potential for rebuilding the SNE stock based on reproductive capacity, and to identify potential consequences of increased incidence of shell disease in the GOM stock.

VII) Researchers from Woods Hole Oceanographic, University of Massachusetts, Dartmouth, Mass DMF and NOAA are currently investigating the impact of climate change on larval connectivity, larval dispersal patterns and recruitment of lobster in Southern New England (SNE). This project, funded by the NOAA Saltonstall-Kennedy Program will help determine how changing spatial distributions of the spawning stock are impacting larval supply to SNE nursery habitats and provide management advice on measures that may help mediate recruitment failure.

VIII New Hampshire Fish and Game and AOLA were awarded funds to conduct a T-bar tagging study on Georges Bank in 2015. Recaptures from this study are still being reported by fishermen and information from this research is being shared with the ASMFC Lobster TC to assist in their ongoing stock connectivity analysis. Tagging proposals for future funding covering expanded spatial regions have been submitted.

IX) Researchers from Virginia Institute of Marine Science and Cornell University (Jeff Shields and Jeff Maynard) received SK funding to develop a predictive model integrating sea surface temperature and shell disease incidence in the Gulf of Maine. They plan to validate predicted shell disease incidence rates with data from state commercial at sea sampling programs.

X) Over the last few years, Dr. Heather Hamlin, Dr. Robert Bayer and Deborah Bouchard (University of Maine and Lobster Institute) have been engaged in lobster health research addressing the effects of a changing ocean ecosystem on lobster health in the context of rising water temperatures and ocean acidification. Focus has been on how these changes may directly impact lobster biology in regards to reproductive development and susceptibility to disease. A parallel component of these projects moving forward is to develop the ability and sensibility within Maine's lobster industry that early reporting and diagnosis of presumed diseased or deformed lobsters is critical to gauging the population's susceptibility to new and emerging pathogens. Funding for this work has been obtained from the Saltonstall-Kennedy Program (NOAA Fisheries), the University of Maine Research Re-investment Fund and the Lobster RED Board (State of Maine, Department of Marine Resource).

Literature Cited:

Aiken, D.E. and S.L. Waddy. 1986. Environmental influence on recruitment of the American lobster, *Homarus americanus*: a perspective. Canadian Journal of Fisheries and Aquatic Sciences. 43: 2258-2270.

Annis, E. 2004. Biology and ecology of larval lobsters (*Homarus americanus*): implications for population connectivity and larval transport. (Doctoral Dissertation). University of Maine, Orono, Maine.

Annis, E.R. Temperature effects on the vertical distribution of lobster postlarvae (Homarus americanus). Limnol. Oceanogr. 50, 1972-1982

Annis, E.R., Wilson, C.J., Russell, R., and Yund, P.O. 2013. Evidence for thermally mediated settlement in lobster larvae (*Homarus americanus*). Can. J. Fish. Aquat. Sci. 70: 1641-1649.

ASMFC. 2015. Stock Assessment Report of the Atlantic States Marine Fisheries Commission. American Lobster Stock Assessment. ASMFC American Lobster Stock Assessment Subcommittee. 438p

Atema, J. 1986. Review of sexual selection and chemical communication in the lobster, *Homarus americanus*. Can. J. Fish. Aquat. Sci., 43: 2283 – 2390.

Balch, W. M., Drapeau, D. T., Bowler, B. C., and Huntington, T. G. 2012. Step-changes in the physical, chemical and biological characteristics of the Gulf of Maine, as documented by the GNATS time series. Marine Ecology Progress Series, 450: 11 – 35.

Barret, L., Miron, G., Ouellet, P., and Tremblay, R. 2016. Settlement behavior of American lobster (*Homarus americanus*): effect of female origin and developmental temperature. Fisheries Oceanography. Doi:10.1111/fog.12187.

Benestan, L., Gosselin, T., Perroer, C., Sainte-Marie, B., Rochette, R., and Bernatches, L. 2015. RAD genotyping reveals fine-scale genetic structuring and provides powerful population assignment in a widely distributed marine species, the American lobster (*Homarus americanus*). Molecular Ecology 24: 3299-3315.

Brooks, D.A. Vernal Circulation in the Gulf of Maine. 1985. Journal of Geophysical Research 90(C3): 4687-4705.

Campbell A. 1989. Dispersal of American lobster, Homarus americanus, tagged off Southern Nova Scotia. Canadian Journal of Fisheries and Aquatic Science. 46(11).

Campbell A. and A.B. Stasko. 1985. Movement of tagged American lobsters, Homarus americanus, off Southwestern Nova Scotia. Can. J. Fish Aquatic. Sci. 42:229-

Campbell A., D.E. Graham, H.J. MacNichol and A.M. Williamson. 1984. Movements of Tagged Lobsters Releasesd on the Continental Shelf from Georges Bank to Baccaro Bank, 1971-73. Canadian Technical Report of Fisheries and Aquatic Sciences No. 1288

Campbell, A. 1986. Migratory Movements of Ovigerous lobsters, Homarus americanus, tagged off Grand Manan, Eastern Canada. Marine Biology. Vol 92 issues3: 393-404.

Churchill, J.H., Kritzer, J.P., Dean, M.J., Grabowski, J.H., and Sherwood, G.D. 2016. Patterns of larval-stage connectivity of Atlantic cod (Gadus morhua) within the Gulf of Maine in relation to current structure and a proposed fisheries closure. ICES Journal of Marine Science · September 2016.

Conn, P. 2010. Hierarchical analysis of multiple noisy abundance indices. Can. J. Fish. Aquat. Sci. 67:108-120.

Cooper, R. and J. Uzmann. 1971. Migrations and growth of deep-sea lobsters, *Homarus americanus.* Science. 171: 288-290.

Cowan, D. F., W. H. Watson III, A. R. Solow, and A. M. Mountcastle. 2007. Thermal histories of brooding lobsters, *Homarus americanus*, in the Gulf of Maine. Mar. Biol., 150: 463 – 470.

Crossin, G.T., S. A. Al-Ayoub, S.H. Jury, W.H. Howell, and W.H. Watson III. 1998. Behavioral thermoregulation in the American lobster *Homarus americanus.* Journal of Experimental Biology. 201: 365-374.

Cushing, D.H. 1990. Plankton production and year class strength in fish populations: an update of the match/mismatch hypothesis. Advances in Marine Biology, 26: 249-293

Dominion Nuclear Connecticut, Inc. (DNC). 2013. Lobster studies. *In:* Monitoring the Marine Environment of Long Island Sound at Millstone Power Station, Waterford, CT. Annual Report 2012. 91 – 124pp.

Dow, R. L. 1974. American lobsters tagged by Maine commercial fishermen, 1957-59. Fish. Bull. U.S. 72, 622-623.

Eagles, M. D., Aiken, D.E., and Waddy, S. L. 1986. Influence of light and food on larval American lobsters, Homarus americanus. Can. J. Fish. Aquat. SCi. 43, 2303-2310

Fournier, D.A., Skaug, H.J., Ancheta, J., Ianelli, J., Magnusson, A., Maunder, M.N., Nielsen, A., and Sibert, J. 2012. AD Model Builder: using automatic differentiation for statistical inference of highly parameterized complex nonlinear models. Optim. Methods Softw. 27:233-249.

Franks, PJS. and DM. Anderson, Alongshore Transport of a Toxic Phytoplankton Bloom in a Bouyancy Current – Alexandrium tamarense in the Gulf of Maine, Mar. Biol, 112(1), 153–164, 1992.

Gaudette, J., Tremblay, M.J., Silva, A.M., Denton, C., and Pezzack D.S. 2013. Reproductive Status of the American Lobster in Southwest Nova Scotia and the Bay of Fundy (Lobster Fishing Areas 34-38). DFO Can. Sci. Advis. Sec. Res. Doc. 2014/nnn. vi + xx p.

Geyer, W. R., Signell, R. P., Fong, D. A., Wang, J., Anderson, D. M., and Keafer, B. A. 2004. The freshwater transport and dynamics of the western Maine coastal current. Continental Shelf Research, 24:1339 – 1357.

Goldstein, J. S., T. L. Pugh, E. A. Dubofsky, K. L. Lavalli, M. Clancy, and W. H. Watson. 2014. A noninvasive method for in situ determination for mating success in female American lobsters (*Homarus americanus*). J. Vis. Exp., 84, e50498.

Hannah, C. G., C. E. Naimie, J. W. Loder and F. E. Werner. 1998 Upper-ocean transport mechanisms from the Gulf of Maine to Georges Bank, with implications for *Calanus* supply, Cont. Shelf Res., 17, 1887–1911.

Harding, G.C., Drinkwater, K.F., Hannah, C.G., Pringle, J.D., Prena, J., Loder, J.W., Pearre Jr., S., and Vass, W.P. 2005. Larval lobster (*Homarus americanus*) distribution and draft in the vicinity of the Gulf of Maine offshore banks and their probably origins. Fisheries Oceanography 14(2): 112-137.

Hudon, C. and Fradette, P. Wind-induced Advection of Larval Decapods into Baie de Plaisance (Iles de la Madeleine, Quebec). Can. Journ. Of Fish. And Aquat. Sci. 50, 1422-1434.

Incze, L., Xue, H., Wolff, N., Xu, D., Wilson, C., Steneck, R., Wahle, R., Lawton, P., Pettigrew, N., and Chenc, Y. 2010. Connectivity of lobster (*Homarus americanus*) populations in the coastal Gulf of Maine: part II. Coupled biophysical dynamics. Fisheries Oceanography 19(1): 1-20.

Landers, D.F., Jr., M. Keser, S.B. Saila. 2001. Changes in female lobster (*Homarus americanus*) size at maturity and implications for the lobster resource in Long Island Sound, Connecticut. Mar. Fresh. Res., 52: 1283 – 1290.

Janzen, C. D., Churchill, J. H., and Pettigrew, N. R. 2005. Observations of bay/shelf exchange between eastern Casco Bay and the western Gulf of Maine. Deep-Sea Research II, 52: 2411 – 2429.

Jiang, M., Borkman, D.G., Libby, P.S., Townsend, D.W., and Zhou, M. 2014. Nutrient input and the competition between *Phaeocystis pouchetii* and diatoms in Massachusetts Bay spring bloom. Journal of Marin Systems 134: 29-44.

Juinio, M.A.R., and Cobb, J.S. 1992. Natural diet and feeding habits of the postlarval lobster Homarus americanus. Mar. Ecol. Prog. Ser. 85, 83-91

Jury, S.H. and W.H. Watson III. 2000. Thermosensitivity of the lobster, *Homarus americanus*, as determined by cardiac assay. Biological Bulletin. 199: 257-264.

Kilada, R.W., S.E. Campana, and D. Roddick. 2009. Growth and sexual maturity of the northern propellerclam (*Cyrtodaria siliqua*) in eastern Canada, with bomb radiocarbon age validation. Mar. Biol. (Berl.), 156(5): 1029–1037. doi:10.1007/s00227-009- 1146-9.

Kristensen, K., Nielsen, A., Berg, C.W., Skaug, H., and Bell B.M. (2016). TMB: Automatic Differentiation and Laplace Approximation. Journal of Statistical Software, 70(5), 1-21.doi:10.18637/jss.v070.i05

Krouse, J.S. 1980. Summary of lobster, *Homarus americanus*, tagging studies in American waters (1898-1978). Can. Tech. Rep. Fish. Aquat. Sciences 932: 135-140.

Landers, D.F., Jr., M. Keser, S. B. Saila. 2001. Changes in female lobster (*Homarus americanus*) size at maturity and implications for the lobster resource in Long Island Sound, Connecticut. Mar. Fresh. Res., 52: 1283 – 1290.

Lynch, D. R., Holboke, M. J., and Naime, C. E. 1997. The Maine coastal current: spring climatological circulation. Continental Shelf Research, 17: 605 – 634.

MacKenzie, B.R. 1988. Assessment of temperature effects on interrelationships between stage durations, mortality, and growth in laboratory reared Homarus americanus Milne Edwards larvae J. Exp. Mar. Biol. Ecol. 116, 87-98

McManus, M.C., Oviatt, C.A., Giblin, A.E., Tucker, J., and Turner, J.T. 2014. The Western Maine Coastal Current reduces primary production rates, zooplankton abundance and benthic nutrient fluxes in Massachusetts Bay. ICES Journal of Marine Science 71(5):1158-1169

MERCINA. 2001. Oceanographic responses to climate in the northwest Atlantic. Oceanography, 14: 76 – 82.

MERCINA. 2004. Supply-side ecology and the response of zooplankton to climate-driven changes in North Atlantic ocean circulation. Oceanography, 17: 60 – 71.

Morrissey, T.D. 1971. Movements of tagged American lobsters, Homarus americanus liberated 16 off Cape Cod, Massachusetts. Transactions of the American Fisheries Society. 100: 117-120.

Morse, R.E., Friedland, K.D., Tommasi, D., Stock, C., and Nye, J. 2016. Distinct zooplankton regime shift patterns across ecoregions of the U.S. Northeast Continental shelf Large Marine Ecosystem. Journal of Marine Systems. doi. 10.1016/j.jmarsys.2016.09.011.

National Oceanic and Atmospheric Administration (NOAA). 2016. Ecosystem Status Report for the Northeast Large Marine Ecosystem. http://nefsc.noaa.gov/ecosys/ecosystem-status-report/executive-summary.html. accessed 28 December 2016.

Normandeau Associates Inc. 2015. Environmental Monitoring in the Hampton Seabrook area. Prepared for NextEra Seabrook LLC.

Ouellet, P. and F. Plante. 2004. An investigation of the sources of variability in American lobster (*Homarus americanus*) eggs and larvae: female size and reproductive status, and interannual and interpopulation comparisons. J. Crust. Biol., 24: 481 – 495.

Pershing, J.W., C.H. Greene, J. W. Jossi, L. Obrien, J.K.T. Brodziak and B.A. Bailey. 2005. Interdecadal variability in the Fulf of Maine zooplankton community, with potential impocts on fish recruitment. ICES J. Mar. Sci. 62, 1511-1523.

Pettigrew, N.R., Churchill, J.H., Janzen, C.D., Mangum, L.J., Signell, R.P., Thomas, A.C., Townsend, D.W., Wallinga, J.P., and Xue, H. 2005. The kinematic and hydrographic structure of the Gulf of Maine Coastal Current. Deep-Sea Research II, 52: 2369 – 2391.

Pettigrew, N.R., Townsend, D.W., Xue, H., Wallinga, J.P., Brickley, P.J., and Hetland, R.D. 1998. Observations of the eastern Maine coastal current and its offshore extensions. Journal of Geophysical research 103(C13): 30,623-30,639.

Pugh, T. L., J. S. Goldstein, K. L. Lavalli, M. Clancy, and W. H. Watson III. 2013. At-sea determination of female American lobster (*Homarus americanus*) mating activity: patterns vs. expectations. Fish. Res., 147: 327 – 337.

Pugh, T.L. 2014. The potential for sperm limitation in American lobster (*Homarus americanus*) as indicated by female mating activity and male reproductive capacity. Ph.D. Dissertation. Universoity of New Hampshire. 195pp.

Quinn, B.K., Chasse, J., and Rochette, R. in prep. Potential connectivity among American lobster fisheries as a result of larval draft across the species range in eastern North America. PeerJ Preprints | https://doi.org/10.7287/peerj.preprints.2464v1 | CC BY 4.0 Open Access | rec: 20 Sep 2016, publ: 20 Sep 2016.

Saba, V.A., Griffies, S.M., Anderson, W.G., Winton, M., Alexander, M., Delworth, T.L., Hare, J.A., Harrison, M.J., Rosati, A., Vecchi, G.A., and Zhang, R. 20160. Enhanced warming of the Northwest Atlantic Ocean under climate change. Journal of Geophysical Research: Oceans. DOI: 10.1002/2015JC011346.

Templeman, W. 1936. The influence of temperature, salinity, light and food conditions on the survival and growth of the larvae of the lobster. J. Biol. Board Can. 2, 485-497

Townsend, D. W., Rebuck, N. D., Thomas, M. A., Karp-Boss, L., and Gettings, R. M. 2010. A changing nutrient regime in the Gulf of Maine. Continental Shelf Research, 30: 820 – 832.

Townsend, D.W., Thomas, A.C., Mayer, L.M., Thomas, M.A., and Quinlan, J.A. 2004. Oceanography of the northwest Atlantic continental shelf. Ín The Sea: The Global Coastal Ocean: Interdisciplinary Regional Studies and Syntheses. Robinson, A.R., and Brink, K.H. (eds). Harvard University Press.

Waddy, S. L. and D. E. Aiken. 1992. Environmental intervention in the reproductive process of the American lobster, *Homarus americanus*. Invertebrate reproduction and development, 22: 1 – 3.

Waddy, S. L. and D. E. Aiken. 1995. Temperature regulation of reproduction in female American lobsters (*Homarus americanus*). ICES Mar. Sci. Symp., 199: 54 – 60.

Wahle, R.A. 2009. American lobster settlement index: looking back/ looking ahead. Workshop Proceedings, 19-21 June. Burnt Island, Boothbay Harbor, Maine USA. 24 pp.

Wahle, R.A. Bergeron, M.J. Tremblay, C. Wilson, V. Burdett-Coutts, M. Comeau, R. Rochette, P. Lawton, R. Glenn, and M. Gibson. 2013. The geography and bathymetry of American lobster benthic recruitment as measured by diver-based suction sampling and passive collectors. Marine Biology Research. 9: 42-58.

Wahle, R.A. & Steneck, R.S., 1992. Habitat restrictions in early benthic life: experiments on habitat selectin and in situ predation with the American lobster. J. Exp. Mar. Biol. Ecol. 157: 91-114

Xue, H., Incze, L., Xu, D., Wolff, N., and Pettigrew, N. 2008. Connectivity of lobster populations in the coastal Gulf of Maine. Ecological Modeling 210: 193-211.

Appendix 1: Figures from SSEM of zooplankton time series.

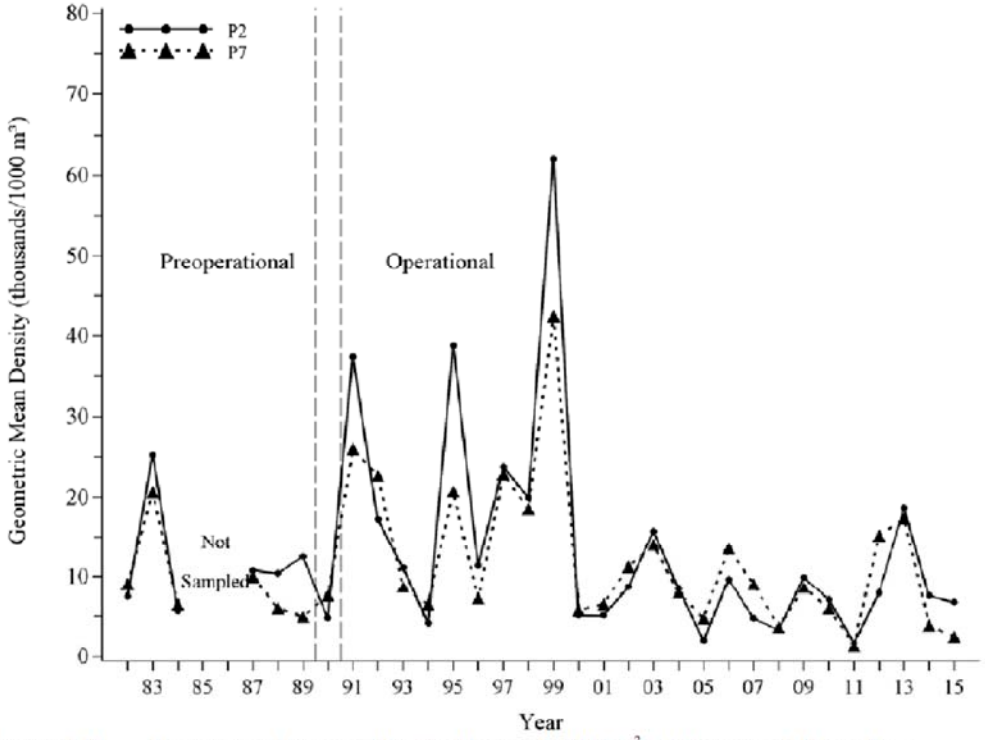


Figure 6-10. Annual geometric mean density (thousands/1000 m^3) of *Cancer* spp. larvae from 1982-2015 (data between dashed lines excluded from the ANOVA model). Seabrook Operational Report, 2015.

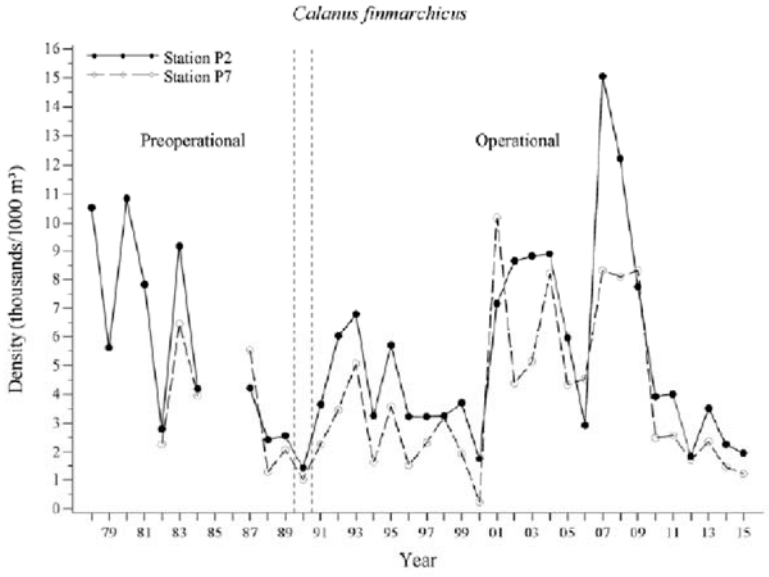


Figure 3-8. Annual geometric mean density of *Calanus finmarchicus* at Stations P2 and P7 from 1978 to 2015. Seabrook Operational Report, 2015.

Atlantic States Marine Fisheries Commission

DRAFT ADDENDUM II TO THE INTERSTATE FISHERY MANAGEMENT PLAN FOR JONAH CRAB

Coastwide Standard for Claw Landings and Bycatch Definition

Vision: Sustainably Managing Atlantic Coastal Fisheries

November 2016

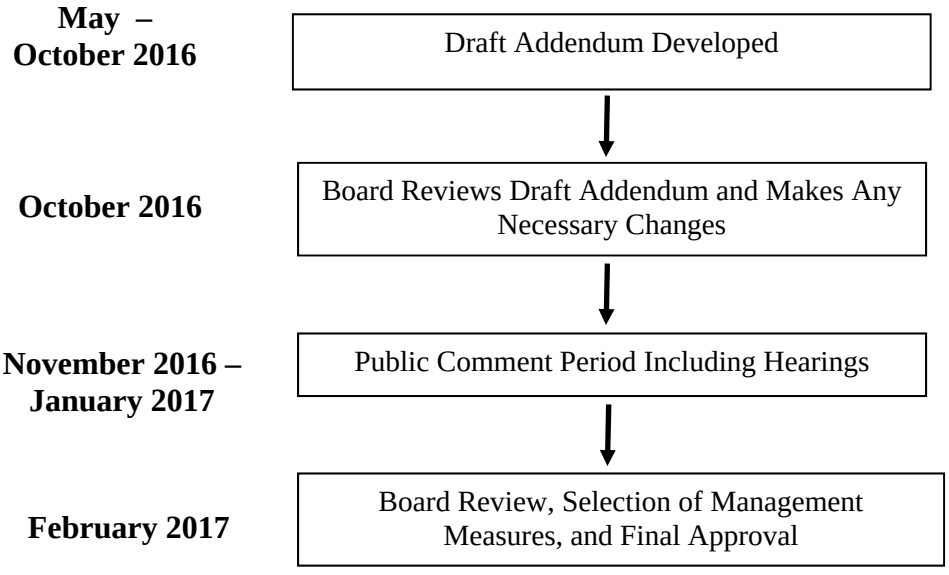
Public Comment Process and Proposed Timeline

At its May 2016 meeting, the American Lobster Management Board (Board) discussed concerns over the equity of the current claw provision in the Jonah Crab Fishery Management Plan (FMP). As a result, the Board initiated Draft Addendum II to consider establishing a coastwide standard for Jonah crab claw landings. At its October 2016 meeting, the Board added a second issue to the document to consider establishing a definition of bycatch in the Jonah crab fishery.

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 **January 6, 2017 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: Megan Ware
Atlantic States Marine Fisheries Commission
1050 N. Highland St. Suite 200A-N
Arlington, VA 22201
Fax: (703) 842-0741

Email: mware@asmfc.org
(Subject line: Jonah Crab Draft Addendum II)



1.0 Introduction

The Atlantic States Marine Fisheries Commission (ASMFC) coordinates the interstate management of Jonah crab (*Cancer borealis*) in state waters (from 0-3 miles offshore). ASMFC manages Jonah crab through an Interstate Fishery Management Plan (FMP), which was approved in August 2015 under the authority of the Atlantic Coastal Fisheries Cooperative Management Act (1993). Management authority in the exclusive economic zone (EEZ), which extends from 3-200 miles offshore, lies with NOAA Fisheries. The management unit for Jonah crab includes the Atlantic states from Maine through Virginia. The biological range of the species is primarily from Newfoundland, Canada to Florida.

The American Lobster Management Board (Board) initiated Addendum II to the FMP to consider a coastwide standard for claw landings in the Jonah crab fishery. The FMP currently specifies a whole crab fishery with the exception of individuals from New Jersey, Delaware, Maryland and Virginia who can prove a history of claw landings before the June 2, 2015 control date. The FMP allows claw landings for these fishermen due to the historic practice of declawing Jonah crab in the Delmarva Peninsula. After final action was taken on the FMP, claw fishermen were identified in New York and Maine. In accordance with the FMP, these New York and Maine fishermen are required to land whole crabs.

Given concerns regarding the equity of the current claw provision (namely that some fishermen with a history of claw landings are allowed to continue this practice while others must land whole crabs) and the fact that the fishery is primarily executed in federal waters, the Board requested NOAA Fisheries provide regulatory guidance on the claw provision in the FMP. In a letter dated February 29, 2016, NOAA Fisheries highlighted potential challenges with implementing the current claw regulation since it does not provide equal opportunities to like participants across the fishery. As a result, the Board directed the Plan Development Team (PDT) to draft an addendum to consider a range of options that would establish a coastwide standard for claw harvest in the Jonah crab fishery.

At its October 2016 meeting, the Board added a second issue to Draft Addendum II to consider establishing a definition of bycatch in the Jonah crab fishery. Per Addendum I, there is a 1,000 crab per trip bycatch limit for non-trap and non-lobster trap fishermen. While the bycatch limit is intended to accommodate incidental catch, no definition of bycatch is provided. As a result, the bycatch allowance may support a small-scale fishery as fishermen harvesting Jonah crab under the bycatch limit may land 1,000 crabs per trip and nothing else. In order to reflect the intention of the bycatch limit, to account for Jonah crab caught while targeting another species, the Board added options to Draft Addendum II to establish a definition of bycatch in the fishery.

2.0 Overview

2.1 Statement of the Problem

The Jonah Crab FMP established a whole crab fishery with the exception of individuals from New Jersey, Delaware, Maryland, and Virginia, who can prove a history of claw landings before June 2, 2015. However, following approval of the FMP, fishermen from New York and Maine who were landing claws were identified. These individuals are currently only allowed to land whole crabs. Given concerns about the equity of the current claw provision, as well as potential challenges implementing the regulation in federal waters, the Board initiated this addendum to consider establishing a coastwide standard for claw harvest in the Jonah crab fishery. In October, the Board added a second issue to the Addendum to consider establishing a definition of bycatch in the Jonah crab fishery in order to prevent the creation and expansion of a small-scale fishery.

2.2 Background

Jonah crab has long been considered a bycatch of the lobster fishery; however, in recent years there has been an increase in the targeted harvest of Jonah crab. Since the early 2000s, landings of Jonah crab have increased 650%, creating a mixed crustacean fishery which can target lobster or crab at different times of the year based on slight, legal gear modifications and small shifts in the areas in which traps are fished. This rapid increase in landings can be attributed to a number of factors including a decrease in the abundance of lobsters in Southern New England, causing fishermen to supplement their income with Jonah crab, and an increase in the price of other crab (such as Dungeness), creating a substitute market for Jonah crab. There is also speculation that the increase in landings reflects an increase in abundance of Jonah crab. While a stock assessment has not been completed for the species, data from the Rhode Island Fish Trawl Survey suggests that the abundance of cancer crabs has increased since 1959. As a result of the immense growth in this fishery, ASMFC approved a FMP for Jonah crab to support the implementation of a unified coastal management program which promotes the conservation and full utilization of the Jonah crab resource.

Landings in the commercial fishery fluctuated between approximately 2 and 3 million pounds throughout the 1990's but steadily rose to over 17 million pounds in 2014. A similar increase occurred in the economic importance of the fishery as ex-vessel value rose from roughly $1.5 million in the 1990's to an estimated $13 million in 2014. Landings in 2014 predominately came from Massachusetts (70.4%), followed by Rhode Island (24.5%).

While the majority of Jonah crab is harvested as whole crabs, fishermen from numerous states, including Maine, New York, New Jersey, Delaware, 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. Claws can also be harvested for personal consumption; however, these landings are not well documented. A historic claw fishery takes place along the

Delmarva Peninsula. These traditionally small boat fishermen harvest Jonah crab claws because they do not have a seawater storage tank on board to store whole crabs. As a result, landing claws avoids economic inefficiencies for this small fleet.

Jonah crab is also landed as bycatch in non-trap gear, such as bottom otter trawls and gillnets, and non-lobster trap gears, such as whelk pots, crab pots, and fish pots. Non-trap gears account for roughly 0.1% of Jonah crab landings annually, with total non-trap landings varying between 2,986 pounds in 2011 and 13,211 pounds in 2014 (Table 1). Landings by non-lobster trap gears are a bit higher. Data submitted by NOAA Fisheries show between May 1, 2013 and August 31, 2015, 194 trips landed Jonah crab with whelk pots, crab pots, and fish pots.[1] Of these, 80 trips landed 100 crab or fewer and 115 trips landed 200 crab or fewer. Approximately 45 trips landed between 200 and 500 crab and 40 trips landed more than 450 crab. Trips with the highest landings came from whelk pots.

Table 1: Number of trips landing Jonah crab with non-trap gear and estimated total landings (2010-2014). Provided by New England Fishery Management Council (NEFMC).

Year	Number of Permits Landing Jonah Crab w/ Non-Trap Gear	Number of Trips Landing Jonah Crab w/ Non-Trap Gear	Total Non-Trap Jonah Crab Landings (lbs)	% of Year's Total Jonah Crab Landings
2010	21	87	10,815	0.099%
2011	23	62	2,986	0.032%
2012	14	45	4,099	0.035%
2013	22	89	6,081	0.038%
2014	17	113	13,221	0.078%

Jonah Crab Claw Landings

Information on the magnitude of the Jonah crab claw fishery is limited. As a result, it is unclear how many fishermen are landing claws or the magnitude of pounds being harvested. The primary obstacle in obtaining this information is that trip level harvester reporting has not been required in all jurisdictions. Furthermore, prior to the implementation of the Jonah Crab FMP, many states did not require trip-level dealer reporting to delineate between whole crabs and claws.[2] As a result, data on the Jonah crab claw fishery is incomplete. Refer to Appendix 1 for a summary of state reporting in the Jonah crab fishery prior to the implementation of the FMP.

Table 2 shows claw landings reported to the ACCSP Data Warehouse between 2010 and 2015. Total claw landings from 2010-2015 were just under 150,000 lbs; however, this is likely an underestimate given that Jonah crab dealer reporting has not always specified market category and claws harvested for personal consumption are often not reported.

[1] Data provided by NOAA GARFO from the Vessel Trip Report database. Assumes that 1 crab=1 pound.
[2] As a part of the Jonah Crab FMP, states were required to implement Jonah crab dealer reporting which specifies market grade by June 1, 2016.

Claws are primarily landed by pots and traps, with lobster pots accounting for up to 95% of the claw landings (a majority of pots and traps are not specified in the data reports so it is unclear what percentage of these landings are from lobster pots versus fish pots). Gill net and otter trawl fishermen comprise 2.7% of claw landings. When these gears encounter Jonah crab, fishermen harvest the claws because they are often forced to detach the claws in order to remove the crab from the net.

Table 2: Jonah crab claw landings in the management unit (ME through VA) from 2010-2015. (Source: ACCSP Data Warehouse.) The unspecified 'pots/traps' category could include lobster pots, fish pots, conch pots, and crab traps.

Year	Pots/traps (Type not specified)	Lobster Pot	Fish Pot	Gill Net	Otter Trawl	Total
Jonah Crab Claw Landings from 2010 – 2015 (lbs)	75,847	66,296	3,081	2,115	1,958	149,297
Percent of Total	50.8%	44.4%	2.1%	1.4%	1.35%	100%

While prior to the FMP Maryland did not require reporting to differentiate between claws and whole crabs, efforts were made to determine the market category of Jonah crab landings from trip level reports. ACCSP confidential dealer reports and state fishing report data were analyzed. Available fishermen were interviewed and a Jonah Crab Advisory Panel member described the practices of the fleet over the time period. From these efforts, Maryland staff determined that between 2000 and 2015, only one fishing vessel predominately landed whole crabs while the remainder of the fleet (n=18) landed both claws and whole crabs. The information also showed that the number of trips landing claws has increased from approximately 19 trips in 2011 to 70 trips in 2015. The amount of claws landed on these trips ranged from just a few pounds to a couple thousand pounds. These vessels used a variety of gears including lobster pots, conch pots, otter trawls, and gill nets.

<u>Jonah Crab Claw Morphometric and Mortality Data</u>

To date, the life cycle of Jonah crab is poorly understood. Several studies have recently been conducted to better understand the biology of this species. As part of a Saltonstall-Kennedy Grant awarded in 2015 to collect biological data in the Jonah crab fishery, the Massachusetts Division of Marine Fisheries measured the carapace width and claw length of several hundred Jonah crabs from Southern New England (inshore and offshore) and Georges Bank. From this data, the relationship between carapace width and claw length was examined (Figure 1). The data suggests that, for a male crab whose carapace width meets the minimum size of 4.75" (120.65 mm), an average (expected) claw length would be 2.47" (62.84mm).

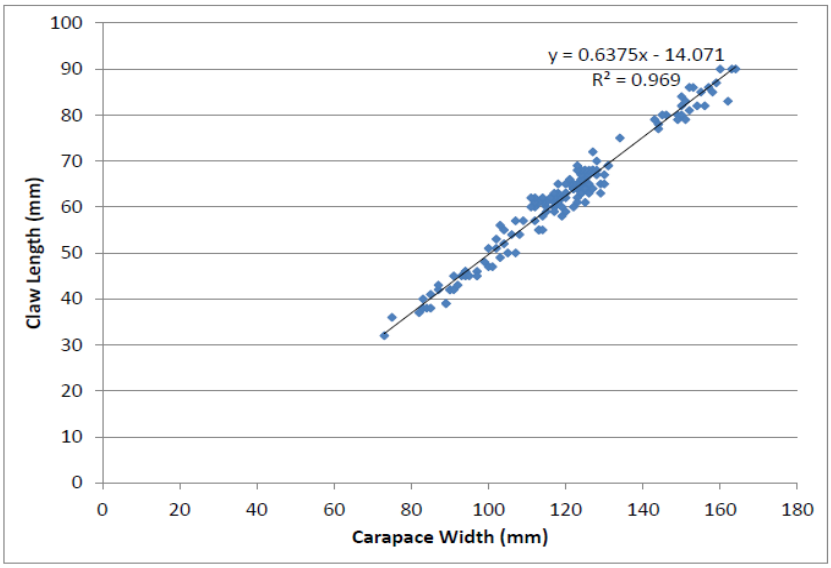


Figure 1: Linear regression between the carapace width and claw length of male Jonah crabs (n=153). Measurements from regenerated claws were removed using a least square method. Regional differences in claw length may be masked since crabs from Southern New England and Georges Bank are presented together (Source: MA DMF).

Morphometric data was also collected on female Jonah crabs in Georges Bank and Southern New England. Figure 2 shows that, for a female crab whose carapace width meets the minimum size of 4.75" (120.65mm), the expected claw length would be 2.06" (52.33mm). This is smaller than the expected claw length for males. Furthermore, 100% of female crabs sampled had claw lengths less than 2.75" (69.85mm).

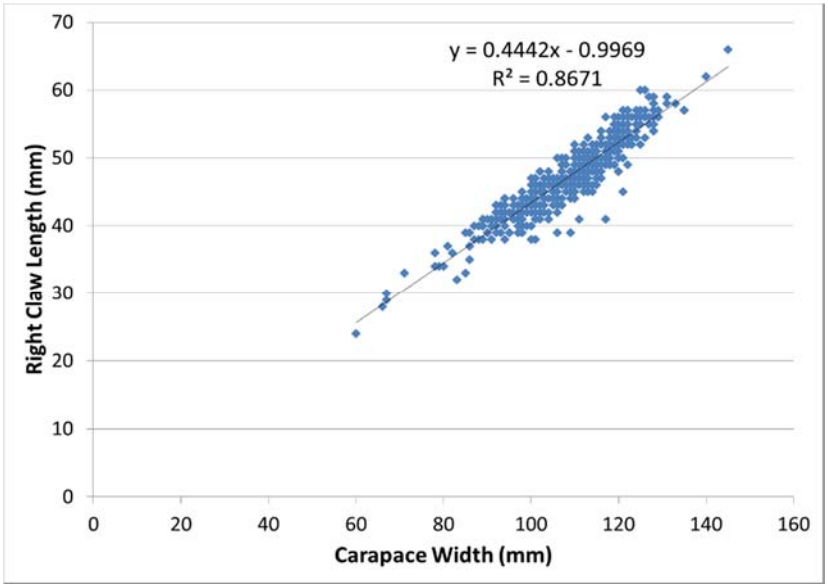


Figure 2: Linear regression between the carapace width and claw length of female Jonah crabs (n=480). Measurements from regenerated claws were removed using a least square method. Regional differences in claw length may be masked since crabs from Southern New England and Georges Bank are presented together (Source: MA DMF).

Preliminary data is also available from a small scale laboratory study which is investigating Jonah crab claw removal and its impacts on survivorship. The study, conducted by New Hampshire Fish & Game and the University of New Hampshire, looked at the biological implications of claw harvest by subjecting crabs to one of three treatments: one claw removed, two claws removed, and no claws removed. Crabs (n=232) were monitored in seawater trays over a four week period and their activity levels and survival were evaluated. Preliminary results suggest that 19% of crabs died when no claws were removed, 56% of crabs died when one claw was removed, and 74% died when both claws were removed. There is 100% mortality when whole crabs are harvested.

Federal Adoption of the Jonah Crab FMP Claw Provision

Given that the Jonah crab fishery is primarily executed in federal waters and there is a need for NOAA Fisheries to enact complementary measures in the EEZ, the Board sent a letter to NOAA Fisheries asking for preliminary guidance on the current claw provision. In a letter dated February 29, 2016, NOAA Fisheries responded to the Board's request, highlighting several concerns with a claw fishery in federal waters. Specifically, NOAA Fisheries reiterated the Law Enforcement Committee's position that a claw fishery could "complicate effective enforcement of a minimum-size standard, and introduce an opportunity to move undersized crabs through the system".[3] Additionally, NOAA Fisheries stated that it "may prove challenging"[4] to implement the current claw provision due to Magnuson-Stevens Fishery Conservation and Management Act's National Standard 4, which requires that management measures "not discriminate between residents of different states"[5]. NOAA Fisheries noted their support of the Commission's public process, encouraging the Board to consider changes to the Jonah Crab FMP through an addendum which encompasses a range of alternatives and is released for public comment. Refer to Appendix 2 for a copy of the NOAA Fisheries letter received by ASMFC.

Given that the current claw provision does not provide the same fishery opportunities to like participants, the Board initiated this addendum to the Jonah Crab FMP to consider establishing a coastwide standard for claw harvest. The Draft Addendum considers a range of options including a strictly whole crab fishery and the allowance of claw harvest coastwide.

Definition of Bycatch

The Jonah Crab Fishery Management Plan (FMP) established a 200 crab per day, 500 crab per trip incidental bycatch limit for non-trap gear. This bycatch limit was increased to 1,000 crab per trip under Addendum I to accommodate several mobile gear trips which were above the original allowance. Furthermore, Addendum I established a 1,000

[3] John Bullard to Robert Beal. 29 February 2016. Re: Jonah Crab Claw Fishery.
[4] John Bullard to Robert Beal. 29 February 2016.
[5] Ibid.

crab per trip incidental bycatch limit for non-lobster traps, which include fish pots, whelk pots, and crab pots.

The increase of the bycatch limit has raised concerns that the allowance could support a small-scale fishery. While the intent of the bycatch limits prescribed in Addendum I are intended to accommodate incidental catch, no definition of bycatch is provided in the Addendum. As a result, fishermen harvesting Jonah crab under the bycatch limit may, in fact, 'direct' on Jonah crab by landing 1,000 crabs per trip. Moreover, there is the potential for a small-scale fishery to develop in which fishermen can land 1,000 crabs per trip and nothing else. This does not reflect the intention of the bycatch limit: to account for Jonah crab caught while targeting another species.

3.0 Management Program

3.1 Claw Harvest

This section proposes to replace "Crab Part Retention" in *Section 4.1* of the Jonah Crab FMP.

Option A: Status Quo

Under this option, only whole crabs which meet the minimum size of 4.75" may be retained and sold with the exception of individuals who can prove a history of claw landings before the June 2, 2015 control date in the states of New Jersey, Delaware, Maryland, and Virginia.

The PDT notes that if the Board pursues this option, it may be necessary to specify the size and volume of claws which may be harvested.

Option B: Coastwide Whole Crab Fishery

Under this option, only whole crabs which meet the minimum size of 4.75" may be harvested and sold coastwide. Once landed, claws may be detached from the whole crab and sold. There is no minimum size for claws detached at the dock.

This option would eliminate the provision that those who can prove a history of claw landings before June 2, 2015 in the states of New Jersey, Delaware, Maryland, and Virginia can land detached claws.

Option C: Claw Harvest Permitted Coastwide

Under this option, claws may be detached and harvested at sea. If the volume of claws detached at sea is under 5 gallons, there is no minimum claw length; however, if the volume of claws detached at sea is greater than 5 gallons, all claws must meet a minimum claw length of 2.75". Claw length is measured along the bottom of the claw, from the joint to the lower tip of the claw. This minimum claw length is more conservative than the expected claw length of 2.5" for a Jonah crab at the 4.75" minimum carapace width and was chosen to ensure claws are harvested from neither

sublegal crabs nor berried females. Two claws may be harvested from the same crab. Bycatch limits will remain in effect per Addendum I such that a fisherman fishing under the bycatch allowance may land up to 2,000 claws (1,000 whole crabs = 2,000 detached claws). For reference, 2,000 claws is equivalent to approximately eight 5-gallon buckets. Lobster permit holders are not constrained by the bycatch limit and can land an unlimited number of claws.

Fishermen may also harvest whole crabs which meet the 4.75" minimum size under this option. Once landed, claws may be detached from whole crabs and sold. There is no minimum size for claws which are detached at the dock.

This option would eliminate the need for the provision that those who can prove a history of claw landings before June 2, 2015 in the states of New Jersey, Delaware, Maryland, and Virginia can land detached claws.

3.2 Bycatch Definition

This section considers adding a definition of incidental bycatch in the Jonah crab fishery to Sections 3.1 and 3.2 of Addendum I.

Option A: Status Quo

Under this option, there would be no definition of bycatch in the Jonah crab fishery. Fishermen using non-trap gear and non-lobster trap gear could land Jonah crab up to the bycatch limit without having another species on board.

Option B: Bycatch Defined as Percent Composition

Under this option, Jonah crab caught under the incidental bycatch limit must comprise at all times during a fishing trip an amount lower, in pounds, than the target species the deployed gear is targeting.

A target species are "those species primarily sought by the fishermen in the fishery" and are "the subject of directed fishing effort."[6] Potential target species of non-lobster traps, such as fish pots, crab pots, and whelk pots, include but are not limited to whelk, conch, crabs (other than *Cancer borealis*), scup, black sea bass, tautog, flounder, and eel. Potential target species of non-trap gear, such as bottom otter trawls and gillnets, include but are not limited to butterfish, herring, shrimp, skates, scallops, halibut, black sea bass, stripped bass, bluefish, cod, crab (other than *Cancer borealis*), dogfish, flounder, croaker, hake, scup, squid, tautog, weakfish, monkfish, polluck and shad. Groundfish, as a compilation of multiple species, are considered a target species.

4.0 Compliance

If approved, states must implement the management measures in Addendum II by Month, 201X.

[6] NOAA Fisheries Glossary. 2006, rev. 2006. NOAA Technical Memorandum NMFS-F/SPO-69.

5.0 Recommendation for Federal Waters

The management of Jonah crab in the EEZ is the responsibility of the Secretary of Commerce through the National Marine Fisheries Service (NMFS). 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 Literature Cited

ASMFC, 2015. Interstate Fishery Management Plan for Jonah Crab. Atlantic States Marine Fisheries Commission, Arlington, VA. 73p.

The University of Rhode Island Graduate School of Oceanography. 2016. 2015 Annual Fish Trawl Survey Report. 6p.

Appendix 1: States Jonah crab reporting prior to implementation of the Jonah Crab FMP.

	NMFS	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA
Is it lawful for harvesters to land Jonah crabs and NOT report?	No for most federal permit holders. Yes for federal lobster-only permit holders and Jonah crab-only harvesters with no other federal permits	Yes	No	No	No	No	No	Yes, only if the vessel does not have a federal permit and is fishing state waters.	No	No	No
Trip-level harvester data collected delineates landings as whole crab vs. claw	No	No	No	No	No	No	No	No	No	No	Yes (though not always done in the past)
Trip-level dealer data is collected that would capture Jonah crab transactions	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes, through SAFIS for vessels with federal permit.	No	Yes	Only for federal water harvest that is sold to a federal dealer and can be tied back to a VTR
Trip-level dealer data delineates transactions as whole crab vs. claws	No	Yes	No	Yes	Yes	Yes	Yes	No	No	No	No

Appendix 2

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

FEB 29 2016

Robert Beal
Executive Director
Atlantic States Marine Fisheries Commission
1050 N. Highland St, Suite A-N Arlington, VA 22201

Dear Bob:

Thank you for your February 17, 2016, letter requesting preliminary guidance on the development of a claw-only Jonah crab fishery under the Interstate Fishery Management Plan for Jonah Crab. As your letter points out, I cannot provide definitive, final guidance on this issue because the Lobster Board continues to discussion revisions to claw-only measures and my staff have not yet completed the rulemaking process to implement the management measures recommended in the Jonah Crab Plan. I can provide guidance on preliminary conservation, enforcement and legal issues associated with a claw-only fishery.

As you noted, I urged the Lobster Board in my July 16, 2016 letter to develop a whole-crab fishery, as the Jonah Crab Plan did "not contain information on the post-release survivability of Jonah crab after one or both claws has been removed." My staff echoed this concern at the August 2016, Lobster Board meeting. Since that time, the University of New Hampshire and New Hampshire Fish and Game have undertaken a small scale laboratory study to evaluate the impacts of claw removal on the health and behavior of Jonah crabs. Preliminary results from these trials indicate high levels of mortality (approximately 50 percent for crabs with one claw removed and approximately 75 percent for crabs with both claws removed). Unless additional information becomes available indicating that post-claw removal survival is higher than this preliminary study suggests, I believe the Lobster Board would have a difficult time justifying that a claw-only fishery is a sustainable practice and is consistent with the Jonah Crab Plan goals and objectives.

As you noted, the Law Enforcement Committee previously weighed in on the option for a claw- only fishery, stating "Introducing an option to retain parts or remove claws will complicate effective enforcement of a minimum-size standard, and introduces an opportunity to move undersized crabs through the system. Adding an additional measurement standard for claws, such as a count-per-pound or something similar, will greatly complicate enforcement requirements to monitor and inspect fishing." Staff from NOAA's Office of Law Enforcement participated in that discussion and concurred with the Committee's recommendation. In addition, the Office of Law Enforcement has indicated that implementing multiple sets of requirements, such as whole and claw-only provisions, in a single management area complicates and weakens enforcement. This is why we have historically supported one set of regulations that can be applied consistently across jurisdictions and areas. I believe the Lobster Board should

discuss and closely evaluate the potential enforcement concerns associated with a claw-only fishery.

As you know, any regulation promulgated under the Atlantic Coastal Fisheries Cooperative Management Act must be in accordance with the Magnuson-Stevens Fishery Conservation and Management Act's National Standards. Your letter referenced National Standard 4, which states in part that "Conservation and management shall not discriminate between residents of different states…" During our rulemaking process, we would formally review whether the Commission- recommended Jonah crab measures comply with National Standard 4, including whether it is a conservation measure without discriminatory intent. It may prove challenging for us to implement the claw-only exemption, as constructed in the August 2015 Jonah Crab Plan because of National Standard 4. My recollection of the August claw-only discussion is that additional development of claw-only permitting requirements and management measures would be necessary prior to implementation. Once developed and recommended, these measures would be subject to a formal review under National Standard 4.

While I remain in favor of a whole-crab fishery, I am supportive of the Commission's public process. Changes to the Jonah Crab Plan should be considered by Lobster Board through an addendum that encompasses a range of alternatives and subsequently released for public comment.

Thank you for the opportunity to provide additional comments on this important issue. If you have any questions, please contact Allison Murphy at (978) 281-9122 or allison.murphy@noaa.gov.

Sincerely,

John K. Bullard
Regional Administrator

cc: David Borden, American Lobster Board Chairman
Megan Ware, ASMFC Fishery Management Plan Coordinator

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: Megan Ware, FMP Coordinator

DATE: January 12, 2017

SUBJECT: Public Comment on Draft Addendum II to the Jonah Crab FMP

The following pages represent a summary of all public comment received by ASMFC as of January 6, 2017 at 5:00 p.m. (closing deadline) on Draft Addendum II to the Jonah Crab Fishery Management Plan.

A total of 7 written comments were received during the public comment period. 5 of those comments were from the following groups and organization: Atlantic Offshore Lobstermen's Association, Massachusetts Lobstermen's Association, Maine Lobstermen's Association, National Marine Fisheries Service, and Maine Coast Fishermen's Association. Individual written comments were submitted by two individuals. A summary of the written comment is provided (page 2) and individual comment letters follow this memo. In the heading of the summary tables, the following abbreviations are used:

- "I" stands for individuals in favor
- "G" stands for groups in favor

Eight public hearings were held in the following states: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, Delaware (joint with Maryland), and Virginia. In total, approximately 40 individuals attended the public hearings or called state agencies to provide comments. A brief summary of the comments received at the public hearings is provided (page 3), followed by detailed summaries for each hearing (pages 4-9).

Written Comment Summary

ISSUE 1: CLAW HARVEST (*Section 3.1)*

Option	I	G	Total
A: Status Quo	1	1	2
B: Coastwide Whole Crab Fishery	1	2	3
C: Claw Harvest Permitted Coastwide	0	2	2

Two groups and 1 individual supported Option B: Coastwide Whole Crab Fishery. They noted concern with the post-release mortality associated with the claw fishery and stated that the claw fishery could undermine the primary management tools adopted in the FMP, mainly the minimum size and prohibition on egg-bearing females. One organization also noted potential enforcement challenges with a claw fishery. Two groups supported Option C: Claw Harvest Permitted Coastwide to afford fishermen along the entire Atlantic coast the opportunity to participate in the claw fishery. One group and one individual supported Option A: Status Quo. One individual did not think that fishermen in different parts of the resource should be treated the same and one group encouraged continuation of the provisions in the FMP until greater research on the claw fishery can be conducted.

ISSUE 2: BYCATCH DEFINITION *(Section 3.2)*

Option	I	G	Total
A: Status Quo	0	1	1
B: Bycatch Defined by Percent Composition	0	3	3

Four groups commented on Issue 2 and three support Option B: Bycatch Defined by Percent Composition. Several organizations commented that a bycatch definition would minimize the development of a small-scale fishery or targeted bycatch fishery under the 1,000 crab bycatch limit. One organization supported Option A: Status Quo as they did not see a problem with the current bycatch allowance.

Public Hearing Summary

Issue 1: Claw Harvest

Comments on the claw fishery were received at the New Hampshire, Massachusetts, and New York public hearings. Majority of fishermen in New York supported claw harvest coastwide (Option C). They commented that pot fishermen rely on Jonah crab claw harvest during the summer months when whole crabs do not survive without refrigeration. Others noted that gill net fishermen are unable to harvest whole crabs since it is difficult to remove the crab from the net without breaking off the claw. In Massachusetts, one individual expressed concern over the high mortality rates associated with claw harvest. Another participant recommended that claw harvest should be limited to the claw, as opposed to the full arm of the crab. In New Hampshire, several participants expressed reservations about a claw fishery. One participant recommended the fishery strictly land claws and not whole crabs. Another participant commented on the impacts that a claw fishery may have on the ecosystem function of Jonah crab.

Issue 2: Bycatch Definition

Comments on this issue were only received at the New York public hearing, where three participants were in favor of defining bycatch as a percent composition (Option B). One individual stated that the current 1,000 crab bycatch limit is too high. Another participant stated that bycatch by mobile gears should be limited by effort controls rather than a volumetric standard; he supported trawlers having a limited number of days to fish but no catch limits as a way to reduce bycatch.

Jonah Crab Draft Addendum II Public Hearing

Portsmouth, New Hampshire
December 6, 2016
18 Participants

Attendees: Don Swanson (CCA NH), Aaron Kornbluth (Pew), Erica Fuller (Earthjustice), Pam Gromen (Wild Oceans), Peter Whelan, Morgan Callahan (Pew), Le Swiberg, Matthew Larkin, Fred Clews, Pete Tilton, Erik Anderson (NHCEA), Karen Alexander (U Mass Amherst), Bill L. (UNH), Mark Zankel (TNC), Mark Godfrey, Geno Marconi

Staff: Ritchie White (Commissioner), Dennis Abbott (Commissioner), Doug Grout (NH FGD), Toni Kerns (ASMFC)

Issue 1: Claw Harvest
Commenters did not provide specific direction on the management measures included in the document but did provide these overall comments.

- The addendum provides an opportunity for a sustainable Jonah crab fishery.
- Several participants had reservations with a claw harvest and expressed concern that claws would not store well.
- Another commenter was in favor of just a claw fishery.
- The last commenter spoke about the value of Jonah crab as a food source for other species. The participant expressed concern that the harvest of crabs does not account for its ecosystem function. If the crab dies then it can no longer serve its ecosystem function. By taking two claws, the crab has less of a chance for survival while mortality declines when only one claw is taken.

Issue 2: Bycatch Definition

No comments received

Jonah Crab Draft Addendum II Public Hearing

Bourne, Massachusetts
December 12, 2016
8 Participants

Attendees: Raymond Kane, Daniel McGonaghe (MEP), Allison Murphy (NMFS), Peter Howard

Staff: Dan McKiernan (MA DMF), Derek Perry (MA DMF), Nichola Meserve (MA DMF), Megan Ware (ASMFC)

Issue 1: Claw Harvest

- One individual expressed concern that claw harvest could increase mortality in the fishery.
- Another individual recommended that if there is going to be a claw fishery, only claws and not the full arm should be harvested.

Issue 2: Bycatch Definition

No comments received

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Marine Resources
205 North Belle Mead Road, Suite 1, East Setauket, NY 11733
P: (631) 444-0430 | F: (631) 444-0434 | FW.Marine@dec.ny.gov
www.dec.ny.gov

M E M O R A N D U M

To: Megan Ware
From: Kim McKown
Subject: ASMFC NY Jonah Crab Addendum II Public Hearing Summary of Comments
Date: December 9, 2016

NYSDEC and Cornell Cooperative Extension conducted a public hearing on ASMFC Jonah Crab Addendum II on December 5, 2016 at Cornell Cooperative Extension Office in Riverhead, NY. There was one attendee. In addition, four fishermen who couldn't attend the meeting called NYSDEC to give their comments.

ASMFC: Emerson Hasbrook (ASMFC Commissioner), Kim McKown (ASMFC Lobster TC)

Meeting Attendee: Jim King

Phone Comments: Vincent Damm, Frank DiMeglio, Anthony DiMeglio, Peter DiMeglio

Issue 1 – Claw Harvest:

Option B: Coastwide whole crab landed
Two fishermen supported landing whole crabs. One fisherman believes the majority of the Jonah crab landings is whole crabs. The fourth fisherman would rather be allowed to land claws, but feels the rules need to be consistent for all states –either fishermen in all states can land claws or everyone must land whole crabs.

Option C: Claw harvest permitted coastwide
Two fishermen support being able to land claws.

Comments on Claws at Addendum I meeting:
The seven fishermen who attended New York's public hearing on ASMFC Jonah Crab Addendum I had comments on the claw fishery (attached is the meeting summary for Addendum 1, comments on claws are in other issues). Only one of the seven fishermen who attended the Addendum I hearing commented on Addendum II – so these are not duplicate comments. All of the Addendum I attendees supported a claw fishery. The pot fishermen rely on harvesting claws in the summer. Gillnetters are unable to harvest whole crabs, so they rely on harvesting claws throughout the year.

Issue 2 – Bycatch Definition:
Option B: Bycatch defined as percent composition
Three fishermen supported a bycatch definition. One of the fisherman who supported the bycatch definition thought 1,000 crab bycatch was too much. Another fisherman who supported the bycatch definition thought trawlers should have effort limitation and be able to keep everything they catch for a certain number of days and then not fish. He thought it would help to decrease bycatch mortality.

Other Issues:
There were many comments about the number of black sea bass the fishermen have been seeing. They feel they should be able to get a larger bycatch of black sea bass.

The fishermen also saw a lot of lobsters this year, particularly egg bearing females.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Fish, Wildlife and Marine Resources, Bureau of Marine Resources
205 North Belle Mead Road, Suite 1, East Setauket, NY 11733
P: (631) 444-0430 | F: (631) 444-0434 | FW.Marine@dec.ny.gov
www.dec.ny.gov

Jonah Crab Draft Addendum I Public Hearing Summary

East Setauket, NY
April 6, 2016 – 6:30 pm
1 Attendee

ASMFC: James Gilmore (ASMFC Commissioner), Emerson Hasbrook (ASMFC Commissioner), Kim McKown (ASMFC Lobster TC)

Attendees: John Aldridge

Issue 1: Bycatch by non-trap gear
Mr. Aldridge would support any of the options.

Issue 2: Bycatch by non-lobster trap gear
Mr. Aldridge would support any of the options.

Other Issues:
Mr. Aldridge indicated that prohibition of landing and sale of claws would be very detrimental to his business. It's an important fishery in the summer time when the whole crabs don't survive without refrigeration. He could deal with a claw size limit. He recommended that we review how the State of Florida implements the claw size limit on the stone crab fishery. He mentioned that FL has a gauge to measure the claws, and suggested we look into it. He would like to be able to harvest both claws from the crab, which is allowed in the FL stone crab fishery.

Mr. Aldridge fishes for Jonah crab with crab pots, which have modified heads that limit the number of lobsters caught and are also not as tall as lobster pots. It's critical for his business that these pots be included in any rules for the fishery.

Montauk, NY
April 14, 2016 – 5:00 pm
6 Attendees

ASMFC: Rachel Sysak (ASMFC Jonah Crab PDT), Kim McKown (ASMFC Lobster TC)

Attendees: Chuck Mallinson, Vincent Dam, Thomas Eckardt, Brian Rade, James Auteri, Anthony Sosenski

Issue 1: Bycatch by non-trap gear
The majority of the fishermen supported the status quo (200 crabs per day/ 500 crabs per trip). They felt this was an adequate amount for bycatch but would prevent non-

directed fishermen from targeting Jonah crab. If the harvest and sale of claws are permitted, they would support a 400 claw per day or 1,000 per trip bycatch limit (2 claws per crab).

One fisherman supported 1,000 crabs per day. He felt this was a reasonable amount of bycatch for a fisherman to make a living.

Issue 2: Bycatch by non-lobster trap gear
All the fishermen supported Option B - 200 crabs per day/ 500 crabs per trip. In general they felt this was adequate amount for bycatch but would prevent non-directed fishermen from targeting Jonah crab.

Other Issues:
All the fishermen rely on the harvest and sale of claws. Both directed pot fishermen and gillnetters have difficulty keeping whole crabs alive in the summer, and rely on the harvest of claws. In addition, many crabs have recently molted in the summer and are not readily salable, but the claws are.

Gillnetters are unable to harvest whole crabs. Jonah crab clamp down on gill nets, making it difficult to impossible to remove them without removing their claws. Gillnet fishermen remove the claws from the crabs and throw the live crabs back in the water. The gillnetters feel there should be a 400 claw per day/1,000 claw per trip bycatch limit.

Most of the Jonah crab fishery takes place in Federal waters. There was some concern/questions about how the Federal and State permitting would be worked out.

There was a lot of discussion about the number of black sea bass the fishermen have been seeing. They feel they should be able to get a larger bycatch of black sea bass to make up for the fact the lobster stock has declined.

ATLANTIC OFFSHORE LOBSTERMEN'S ASSOCIATION

Grant Moore, President
exec@offshorelobster.org

David Borden, Executive Director
dborden@offshorelobster.org

November 21, 2016

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

Dear Megan,

I'm writing on behalf of the Atlantic Offshore Lobstermen's Association to provide comments toward the Draft Addendum II to the Interstate Fishery Management Plan for Jonah Crab.

The Association agrees with NOAA Fisheries' assessment that the limited claw only provision, as currently written in the FMP, likely violates National Standard 4. Therefore, we oppose a geographically limited claw fishery as defined by the status quo option (Section 3.1., Option 1).

Further, the Association is concerned that permitting coastwide claw landings would provide an avenue around minimum size regulations. Without a better understanding of the jonah crab stock, post-release survivability of claw excised animals, and the relationship of crab width to claw length, we feel a claw only fishery has the potential to undermine the FMP's primary management tools. Therefore, the Association supports a coastwide ***whole crab only*** fishery (3.1, Option B) or an option that permits only limited coastwide landings of claws for personal use, based on a volumetric standard.

Finally, the Association supports a bycatch definition as defined in Section 3.2 Option B. This definition is consistent with the Lobster Board's stated goal of allowing for historic levels of incidental catch, while limiting proliferation of the fishery.

I appreciate the opportunity to comment.

Sincerely,

J. Grant Moore
President

MAINE COAST FISHERMEN'S ASSOCIATION

Jan 5, 2017

Megan Ware
Fishery Management Plan Coordinator
Atlantic States Marine Fisheries Commission
1050 North Highland Street, Suite 200 A-N
Arlington, VA 22201

Dear Ms. Ware,

Please accept these comments on behalf of the Maine Coast Fishermen's Association regarding Draft Addendum II to the Interstate Fishery Management Plan for Jonah Crab.

The Maine Coast Fishermen's Association (MCFA) is an industry-based nonprofit which identifies and fosters ways to restore the fisheries of the Gulf of Maine and sustain Maine's historic fishing communities for future generations. Established and run by Maine fishermen, the objectives of the Association are: to provide a voice for our fishing communities; to rebuild the Gulf of Maine ecosystem; and to help build viable fishing businesses on our coast. With members living in communities from Kittery to Mount Desert Island, our members represent a diverse range of fisheries but have come together as one voice to weigh in on important management issues facing Maine fishermen. As such, we are extremely interested in allowing Maine fishermen to have access to a robust and sustainable Jonah crab fishery in the Gulf of Maine, and we hope that the ASMFC will work with us towards that goal.

In Public Information Document (PID) section 3.1 on Claw Harvest, we encourage the ASMFC to support Option C, which would permit claw harvest coastwide. This would allow all fishermen in various fisheries to participate in the Jonah Crab claw harvest, not just those in mid-Atlantic states who can prove a history of claw harvest.

In PID section 3.2 on Bycatch Definition, we support Option A, or the status quo in which there is no definition of bycatch in the Jonah Crab fishery. We do not see a problem with allowing fishermen to possess amounts of Jonah Crab up to the bycatch limit on their vessels without having a larger amount of another species onboard.

Thank you very much for your attention to this important issue.

Sincerely,

Ben Martens
Executive Director

14 Maine St, Box 40 | Brunswick, ME 04011 | Tel (207) 619.1755 | Fax (866) 876.3564 | www.MaineCoastFishermen.org

Massachusetts Lobstermen's Association, Inc.
8 Otis Place ~ Scituate, MA 02066
Bus. (781) 545-6984 Fax. (781) 545-7837

December 29, 2016

Megan Ware, Fishery Management Plan Coordinator, Via email: mware@asmfc.org
1050 N. Highland St, Suite A-N,
Arlington, VA 22201

RE: Comments Jonah Crab Draft Addendum II

Dear Ms. Ware,

On behalf of its 1800 members, the Massachusetts Lobstermen's Association (MLA) respectfully submits this letter of comment on the Jonah Crab Draft Addendum II to the Atlantic States Marine Fisheries Commission's (ASMFC) Interstate Fishery Management Plan (FMP) for Jonah Crab.

Currently under the Jonah Crab FMP, Draft Addendum I which established a bycatch allowance of 1,000 crabs per trip for non-trap gears and non-lobster trap gears (i.e., fish pots, crab pots, whelk traps) has inadvertently created a small scale directed fishery on the resource. We are extremely troubled about the increased exploitation on the Jonah Crab resource as a "targeted bycatch" and are encouraged and support the establishment of a definition of bycatch. The "*Addendum also considers establishing a definition of bycatch, based on a percent composition of catch, in order to minimize the expansion of a small-scale fishery under the bycatch allowance*." The bycatch of any species should not be the major harvest of the day.

Established in 1963, the MLA is a member-driven organization that accepts and supports the interdependence of species conservation and the members' collective economic interests. Whereas, many of our members are currently fishing for Jonah Crabs and scores more are landing them as a legitimate bycatch. The MLA continues to work conscientiously through the management process with the MA Division of Marine Fisheries and the Atlantic States Marine Fisheries to ensure the continued sustainability and profitability of all the resources in which our fishermen are engaged in.

The MLA supports the FMP which has established a whole crab fishery with the exception of fishermen from NJ, DE, MD, and VA who have a history of claw landings prior to June 2, 2015. Subsequently claw fishermen from NY and ME were identified in the FMP and at this time the fishermen are required to land whole crabs. The MLA encourages more research be done on the impact of the claw only fishery on the species/resource to look at the good, the bad and indifferent impacts.

We sincerely hope and trust that you, the Atlantic States Marine Fisheries Commission, will consider our comments and concerns and will continue to make informed and pragmatic recommendations allowing the continued success of the newly emerging Jonah Crab fishery. We look forward to continuing to work with the Commissions Jonah Crab Section through the management process.

Sincerely,

Beth Casoni

Executive Director

MAINE
Lobstermen's Association, Inc.
2 Storer St, Ste 203 * Kennebunk, ME 04043
207-967-4555 * 866-407-3770 * www.mainelobstermen.org

Megan Ware
ASMFC
1050 North Highland St, Suite 200A-N
Arlington, VA 22201

January 5, 2017

Dear Ms. Ware:

The Maine Lobstermen's Association (MLA) has reviewed draft Addendum II to the Jonah Crab Plan. Maine lobstermen have long harvested Jonah crab as a side fishery for both commercial and recreational purposes. While crabs can be very cyclical in Maine, many lobstermen consider this crab harvest to be a part of their traditional fishery.

The passage of the ASMFC Jonah Crab Plan hurt many Maine lobstermen by making it illegal to harvest Jonah crab claws. While some lobstermen will harvest whole crabs, many have traditionally snapped off the claws and returned the crabs to the sea. The passage of the Jonah Crab Plan has made this practice illegal.

The MLA strongly supports Section 3.1, Option C, to allow claws to be detached and harvested at sea, without a minimum size, if the volume of claws is less than 5 gallons. This would allow a long standing tradition for Maine lobstermen to continue legally.

Thank you for consideration of these comments.

Sincerely,

Patrice McCarron

Patrice McCarron
Executive Director

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

DEC 2 0 2016

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

Dear Bob:

Thank you for accepting our comments on draft Addendum II to the Interstate Fishery Management Plan for Jonah Crab. During the development of the addendum, we have and continue to support a whole crab fishery for Jonah crabs. Recall that we wrote a letter on February 29, 2016, raising several concerns with the proposed claw fishery described in the Jonah Crab Plan:

- Biological concerns: Preliminary study results indicate limited survivability of clawless crabs. It is true that some percentage of clawless crabs will survive and may regenerate harvested claws. However, there appears to be a high post-release mortality on clawless crabs that results in waste that could be avoided if the whole crabs were landed. This would not preclude marketing claws separate from leg and body meat or even ancillary products, such as fertilizer, derived from processing remainder of the whole crab.
- Enforcement concerns: A claw fishery weakens enforcement of minimum carapace width size. Differing whole-crab and claw-only fishery standards (minimum sizes, counts, etc.) will complicate enforcement requirements to monitor and inspect this fishery.
- National Standard 4 concerns: The Jonah Crab Plan did not provide adequate justification for including measures that varied by state and may prove to be discriminatory.

We appreciate that the Lobster Board attempted to address National Standard 4 concerns by developing a coastwide measure in Addendum II. That said, we do not support the option that would allow an unlimited, coastwide claw fishery. It would allow an expansion of the claw fishery, which goes against the Lobster Board's intent of capturing the small-scale claw fishery practices that pre-dated adoptions of the Jonah Crab Plan. The minimum claw size included in this option may help to address undersized crabs from entering the market, but it does not address the enforcement concern of minimizing complication.

While we prefer a whole-crab fishery, allowing the retention of a small, specified amount of claws may be a good compromise. A previous draft of Addendum II included an option that would allow a small, volumetric limit (i.e., one 5-gallon bucket) on claw harvest. A limit such as this prevents expansion of the claw fishery, captures historic claw harvesting practices, and helps minimize complication for enforcement.

Addendum II also includes a measure that would define incidental catch. NOAA's Office of Law Enforcement supports developing such a definition. They believe that the definition will minimize targeting of Jonah crab and decrease gear conflicts. I look forward to receiving input from the Law Enforcement Committee and hope that the Lobster Board will carefully evaluate its recommendations to ensure that robust, enforceable measures are developed for the Jonah crab fishery.

Thank you for the opportunity to provide additional comments on Addendum II. If you have any questions, please contact Allison Murphy at (978) 281-9122 or allison.murphy@noaa.gov.

Sincerely,

John K. Bullard
Regional Administrator

cc: David Borden, American Lobster Board Chairman
Megan Ware, ASMFC Fishery Management Plan Coordinator

Megan Ware

From: Thomas Biesiadecki <tomymarlin@gmail.com>
Sent: Wednesday, December 07, 2016 4:46 PM
To: Megan Ware
Subject: Jonah Crab addendum II

To Whom It may concern;
My name is Thomas Biesiadecki and I am the owner and operator of the F/V Marielle Renee. Fed permit# 241238. I have been in the lobster fishing industry for 17 years as the owner. I have over the years landed many a Jonahs crab both whole and claws. Most for sale and a lot for personal consumption. I feel that some of the proposed options have some definite down sides to them. As far as being allowed to land a whole crab and then declawing it at the dock only to discard the rest of the crab kind of defeats the purpose of conservation, when the crab can be returned to the ocean to be allowed to regenerate new claws to be harvested some time down the road. Trap fisherman should be exempt from having to qualify for either claw or whole crab harvest on the grounds that it is a natural occurrence to catch crabs in traps while lobster fishing. There should be rules implemented to restrict the entry into the Jonah crab fishery based on either historical participation or landings that would eliminate the threat of small scale fisheries. I am currently restricted to closures in my fishery. Currently I can harvest lobster in the area(4)&(5) for about 6 months in New Jersey, with the May closure and the fact that there is no fishing to speak of in the months of February and March I have to live with the fact that my season has been all but taken away from me, I feel that making the Addendum read so that all states should be on a level playing field when it comes to the way Jonah crabs are harvested is ridiculous. New York and Mass should be held to the laws that there state has implemented. I would hope that consideration of harvest techniques would direct the panel to implement the proper management measures to ensure a sustainable fishery going forward.

Hanging on for Dear Life!

Thomas Biesiadecki

Megan Ware

From: Peter Howard <fishycaptain@yahoo.com>
Sent: Thursday, December 15, 2016 11:53 AM
To: Megan Ware
Cc: Peter Howard
Subject: Jonah Crab Draft Addendum II

Megan, I was at the meeting on December 12th in Bourne Ma. I felt it was a good albeit short meeting.
Prior to this meeting I had no idea that some fishermen had historical data indicating they had been involved in a claw only jonah crab fishery.
During the meeting slides were shown with mortality rates for whole crabs along with crabs with one or both claws removed. The data set shown wasn't promising. These crabs have a very high mortality rate when claws are removed. while I understand that crabs can regenerate claws, this happens usually when a crab drops a claw either during molting or when fighting. They have the ability like lobsters to just let a claw drop and later in that crab's life start to regenerate that claw.
There is some physiological trait in these creatures that prevents them from bleeding to death when the claw is dropped.
Having said that, it is my opinion that removing claws from live crabs is the same thing as finning sharks. In the U.S. finning is illegal.
My opinion is that a claw only fishery should be discouraged coastwide. The practice of declawing live crabs and tossing the rest away is wasteful and inhumane.
I don't even think fishermen who have been doing this should be allowed to continue to do this. However, recognizing that those fishermen who have prosecuted this type of fishery may be hurt, I suppose grandfathering those with historical landings should be allowed to continue.
My vote is for a whole crab fishery all up and down the coast. Thanks, Peter Howard 18 Ninth Rd. Marshfield, Ma. 02050 781-837-8198

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

December 21, 2016

To: American Lobster Management Board

From: Law Enforcement Committee

RE: Comments on Jonah Crab Draft Addendum II

The Law Enforcement Committee (LEC) of the Atlantic States Marine Fisheries Commission (ASMFC) has reviewed the proposed management options in Draft Addendum II to the Interstate Fishery Management Plan for Jonah Crab (Public Comment Document). The LEC has provided written comments regarding aspects of the developing management plan for Jonah crab in memoranda dated July 24, 2015; January 15, 2016; and April 10, 2016.

Eleven members responded with written comments and offer the following recommendations for the proposed management measures:

CLAW HARVEST
All responding members supported **OPTION B: Coastwide Whole Crab Fishery.**
This recommendation is consistent with previous positions regarding a claw harvest allowance and the LEC continues to believe that this is clearly the most enforceable option. It eliminates what would be cumbersome and potentially confusing measurement standards. It would ensure that all crabs harvested would meet the minimum carapace size designed to protect egg-bearing females. It would be clear regarding what is able to be sold. It would make regulations consistent among the states and among all fishermen. The LEC has consistently recommended this approach and believes it meets multiple standards as elucidated in the *Guidelines for Resource Managers on the Enforceability of Fishery Management Measures, Second Ed., 2015.*

BYCATCH DEFINITION
Ten of 11 members supported **OPTION B: Bycatch Defined as Percent Composition.**
Although bycatch limits are generally a low-ranked management measure with regard to enforceability, this proposed measure is considered a reasonable approach that can be understood and verified by fishermen and officers. Several comments recognized that Option A may be inherently simpler but would require a low bycatch limit to be distinguishable from directed fishing operations. The LEC has previously supported bycatch limits of 200 crabs per calendar day and up to 500 crabs per trip for all gear types.

The LEC appreciates the opportunity to provide advice in the continued development of a Jonah Crab fishery.

January 3, 2017

Kim McKown

kim.mckown@DEC.ny.gov

Dear Ms. McKown

I apologize for responding so late in the process. It is difficult to get comments from the LCMT members who are still interested in the ASMFC's agenda. This is largely because area six (6) Lobstermen have moved on to other fisheries. Also I'm sorry to say that area six (6) Lobstermen have no faith in the ASMFC stock assessment, its interpretation and suggested management tools. We have gone from over fishing, lack of egg production, recruitment failure, pesticides, global warming and now "environmental factors". We have had gauge increases, vent increases, maximum size restrictions, trap reductions, banning pesticides, and seasonal closures. The computers have suggested a cure for everything at the expense of the fishermen.

Now you want to increase egg production by 20 to 60% so that **IF** "environmental conditions become favorable". Right now the bulk of the lobsters are caught between Maine, Nova Scotia and New Brunswick. I suppose the environmental conditions are favorable there.

The habitat might be shifting north but the species is not going extinct. Increasing egg production in area six (6) may be like planting corn in the desert.

We have seen more lobsters in area six (6) then we have seen in years, both legal and sub-legal. Apparently your stock assessment does not agree with our stock assessment. Our position as usual is status quo. Give what we have now a chance to work. Of course you could make all the fishermen happy for a change and let us harvest some Black Sea Bass which is a known predator of lobster.

Sincerely,

George J. Doll Jr.

NY Chair of LCMT area 6.

Cc. Megan Ware mware@ASMFC.org
Tina Berger tberger@ASMFC.org
Emerson Hasbrook ECH12@cornell.edu