Atlantic States Marine Fisheries Commission

Atlantic Herring Management Board

October 21, 2024
9:00 – 9:30 a.m.

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. Grout)*	9:00 a.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from August 2024	9:00 a.m.
3.	Public Comment	9:05 a.m.
4.	Set Specifications for the 2025-2027 Fishing Years *(E. Franke)* **Final Action**	9:15 a.m.
5.	Set Quota Period for the 2025 Area 1A Fishery *(E. Franke)* **Final Action**	9:25 a.m.
6.	Other Business/Adjourn	9:30 a.m.

The meeting will be held at The Westin Annapolis (100 Westgate Circle, Annapolis, MD; 888.627.8994) and via webinar; click here for details.

MEETING OVERVIEW

Atlantic Herring Management Board
October 21, 2024
9:00 – 9:30 a.m.

Chair: Doug Grout Assumed Chairmanship: 09/24	Technical Committee Chair: Vacant	Law Enforcement Committee Representative: Delayne Brown (NH)
Vice Chair: Vacant	Advisory Panel Chair: Vacant	Previous Board Meeting: August 6, 2024
Voting Members: ME, NH, MA, RI, CT, NY, NJ, NMFS, NEFMC (9 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from August 2024

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. Set Specifications for the 2025-2027 Fishing Years (9:15-9:25 a.m.) Final Action

Background

- In September 2024, the New England Fishery Management Council (NEFMC) recommended a 2025-2027 specifications package for Atlantic herring to be submitted to NOAA Fisheries **(Briefing Materials)**.

Presentations

- Overview of 2025-2027 specifications by E. Franke

Board action for consideration at this meeting

- Set specifications for the 2025-2027 fishing years for Atlantic herring, pending release of a rule by NOAA Fisheries

5. Set Quota Period for the 2025 Area 1A Fishery (9:25-9:30 a.m.) Final Action

Background

- Per Amendment 3 (Section 4.2.3), quota periods shall be determined annually for Area 1A using bi-monthly, trimester, or seasonal quota periods.
- For the current 2024 fishing year for Area 1A, the Board adopted a seasonal quota approach with 72.8% available June-September, and 27.2% available October-December.

Presentations

- Overview of Amendment 3 quota period system by E. Franke

Board action for consideration at this meeting

- Set quota periods for the 2025 Area 1A fishery

6. Other Business/Adjourn

Atlantic Herring Technical Committee Task List

Activity Level: Medium

Committee Overlap Score: Medium

Committee Task List

While there are no Board tasks for the TC at present, there are several annual activities in which TC members participate, both through the Commission and NEFMC.

- TC and NEFMC PDT jointly prepare OFL and ABC recommendations for 2025-2027
- Participation on 2025 Research Track Working Group
- Participation on NEFMC PDT
- Summer/fall collection of spawning samples per the spawning closure protocol
- Annual state compliance reports are due February 1

TC Members

Matt Cieri (ME DMR), Robert Atwood (NHFG), Micah Dean (MA DMF), JA Macfarlan (RI DEM), Kurt Gottschall (CT DMF), Rich Pendleton (NY DEC), Conor Davis (NJ DEP), Jamie Cournane (NEFMC), Jonathan Deroba (NOAA NEFSC), Carrie Nordeen (NOAA)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ATLANTIC HERRING MANAGEMENT BOARD

The Westin Crystal City
Arlington, Virginia
Hybrid Meeting

August 6, 2024

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

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ATTENDANCE

Board Members

Megan Ware, ME, proxy for Pat Keliher (AA)
Stephen Train, ME (GA)
Rep. Allison Hepler, ME (LA)
Cheri Patterson, NH (AA)
Doug Grout, NH (GA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Melanie Griffin, MA, proxy for D. McKiernan (AA)
Ray Kane, MA (GA)
Sarah Ferrara, MA, proxy for Rep. Peake (LA)
Jason McNamee, RI (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Dr. Justin Davis, CT (AA)
Robert LaFrance, CT, proxy for W. Hyatt (GA)
Craig Miner, CT, proxy for Rep. Gresko (LA)
John Maniscalco, NY, proxy for M. Gary (AA)
Scott Curatolo-Wagemann, NY, proxy for E. Hasbrouck (GA)
Jim Gilmore, NY, proxy for Assy. Thiele (LA)
Joe Cimino, NJ (AA)
Jeff Kaelin, NJ (GA)
Adam Nowalsky, NJ, proxy for Sen. Gopal (LA)
Allison Murphy, NMFS

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

Staff

Bob Beal
Toni Kerns
Tina Berger
Madeline Musante
Caitlin Starks
Jeff Kipp
Tracy Bauer
James Boyle
Katie Drew
Jainita Patel
Chelsea Tuohy
Emilie Franke

The Atlantic Herring Management Board of the Atlantic States Marine Fisheries Commission convened in the Jefferson Ballroom of the Westin Crystal City Hotel, Arlington, Virginia, via hybrid meeting, in-person, and webinar; Tuesday, August 6, 2024, and was called to order at 9:00 a.m. by Chair Megan Ware.

CALL TO ORDER

CHAIR MEGAN WARE: Good morning, everyone, my name is Megan. I am going to call the Herring Board to order this morning.

APPROVAL OF AGENDA

CHAIR WARE: We're going to start with Board Consent and Approval of the Agenda. Are there any additions or modifications to the agenda this morning? Please, raise your hand. Seeing none; the agenda is approved by consent.

APPROVAL OF PROCEEDINGS

CHAIR WARE: Next is approval of the proceedings from October, 2023. Are there any edits to the proceedings from October, 2023? Seeing none; those proceedings are approved by consent.

PUBLIC COMMENT

CHAIR WARE: Next, we have Public Comment. This is for items that are not on the agenda, so I'll look for any raised hands in the room, and Emilie will help me with those on the webinar.

REVIEW 2024 ATLANTIC HERRING MANAGEMENT TRACK ASSESSMENT

CHAIR WARE: We are not seeing any hands in the room, and I don't think we're seeing any on the webinar, so we will move on to Agenda Item Number 4, which is Review of the 2024 Atlantic Herring Management Track Assessment. We have John Deroba online today, the stock assessment analyst for Atlantic Herring, and he is going to provide an overview of the assessment. Thank you, John.

MR. JONATHAN J. DEROBA: Again, apologies if I'm a little crackly. I tried to troubleshoot it, but nothing I can do. I think you probably all know what this is, so let's just dive right in. Herring was last assessed and reviewed in June, 2022. We are still using the ASAP modeling framework. There are two fishing fleets, a fixed-gear fleet, which is largely Canadian, and a mobile gear-fleet, which is entirely U.S. based.

There are four surveys in the model, spring bottom trawl, fall bottom trawl, summer bottom trawl and an acoustic time series collected during the fall bottom trawl. Natural mortality is constant at 0.35, and we use F40 percent and biomass at F40 percent as proxy reference points. That assessment concluded the stock was overfished, but overfishing was not occurring.

Here is the catch time series in units of metric tons, with the U.S. mobile fleet in black and the fixed, mostly Canadian fleet in purple. Discards are only available for a portion of the time series, but they are relatively small compared to landings. I think the most noteworthy here is that catches have really declined in response to both management and low stock size in recent years. Here are the indices, so this is the spring bottom trawl, at least during the Bigalow years since 2009. The fall bottom trawl during the Bigelow years we get into this 2009. Summer bottom trawl, there have been no vessel changes for the summer bottom trawl, so this is actually a longer time series on screen, and the acoustic time series collected during the fall bottom trawl.

TOR 3, which they had just did a stock assessment, so I added two years of data and made no other changes, very much at the turn of the crank. I'm not going through the full suite of diagnostics, but the retro is major, so the retrospective pattern for F is in the top row and spawning stock biomass in the bottom row.

If you can't see the row value for F, it is negative 0.261 and there you can see SSB is 0.563. Time series of biomass total in reddish, spawning stock in blue, and exploitable in green. You can see the stock is low. Fishing mortality of the time series, the

black line F. report is the value we used for stock status. That is the average F over Ages 7 and 8.

The recruitment time series, you can see since 2013 we have had an unprecedented string of lousy recruitment. That blip you see, that increase in the terminal year is a statistical artifact. A few years ago, when we didn't have any survey data in 2020 due to COVID, I had to add a likelihood penalty, where in the absence of data the model will basically move terminal year recruitment towards the mean.

What you're seeing in that terminal year is the effect of that likelihood penalty, and should be taken with a grain of salt. Reference points, as is sort of a regional standards, the life history traits, length at age, maturity at age are based on a recent 5-year average. Again, F40 percent is the proxy.

When calculating F40 percent, selectivity only equals that from the U.S. fleet. That is to make sure that catches from Canada that we don't' control and aren't quota based, don't end up affecting our overfishing status, at least not directly. Recruitment is sampled from the empirical Cumulative Distribution, using estimates from 1992 to 2021.

The most recent two years are excluded, due to high imprecision, because the terminal year is 2023. But again, those '22 and '23 are excluded for the sake of sampling recruitment. Then we do long-term projections to calculate the spawning stock biomass proxy, and in this case, we do make some accounting of the fixed gear, the Canadian fixed-gear fleet, where we set F in the long term to equal a recent 10-year average, so F for calculating the B proxy equals 0.15.

There is a comparison of the previous and updated reference points, so F40 came down just a little bit, and the B proxy went up just a little bit. There is your relative stock status plot, so the vertical axis is the fishing mortality rate in 2023 over the F proxy, and the horizontal axis is spawning stock in 2023 over the spawning stock reference point proxy.

Vertical line at 0.5 would be our overfished. You can see we are less than 0.5, so the stock is overfished. The horizontal line at 1 would be our overfishing threshold. You can see we're below that, so overfishing is not occurring. The red line there is the adjustment for the retrospective pattern. Short term projections, fixed-gear catches, so again that Canadian fixed-gear fleet. The catches are held constant in all years and are equal to a recent 10-year average. The mobile fleet fishing mortality rate id based on the New England Council's Harvest Control Rule. Recruitment follows an auto regressive process. As I pointed out, recruitment has been really low lately.

To help prevent overly optimistic projections, that auto-regressive process basically says for the next few years recruitment is going to be kind of lousy, just like it has been recently. Eventually, recruitment does return to the long-term mean, but it takes a few extra years to get there. Projections are set using the 2023 recruitment estimate, but adjusted downward for the retrospective pattern, and that value, 1 million is the rho-adjusted 2023 recruitment estimate, but that is in units of thousands of fish, so that is really a trillion.

Here are the short-term projection results. Again, using a constant catch value for the fixed fleet, and in that weird header above this table, you can see the recent 10-year average of Canadian catch is 4,031 metric tons, and there is a U.S. fixed fleet, sort of. They caught 16 metric tons, so if you sum those two that is what the fixed-fleet catch is held constant at through all these projections.

Then again, the mobile fleet F, which is the far-left column, is following the New England Council's Harvest Control Rule. I think all the other columns are fairly self-explanatory. Probability of overfishing, probability of overfished, so on and so forth. You can let that sit there for a minute. I don't know what is interesting to folks, and I don't try to

read minds, so you can soak that in. It's disheartening.

Term of Reference 6 is, review research recommendations. What is on the slide all came from the New England Council's SSC last go round. They were all suggested to be addressed in the research track. Obviously, mechanisms behind low recruitment, some follow up on analyzing recruits per spawner. We are doing both of those things, by the way in the research track, to some extent.

Investigate whether F40 percent needs to be changed, given a lower productivity regime. We are not addressing that in the research track, at least not yet. That is really a much broader question than just Atlantic herring. Estimate Fmsy directly. We don't have a stock recruitment curve, so that's not a problem.

The next two, beginning with the word consider. We did a full treatment of selectivity in the research track, so that has been addressed. We are evaluating the use of an index of herring recruitment using seabird diet data. That is being done in the research track. We are reevaluating M in the research track, natural mortality.

Stock structure movement are not part of the research track terms of reference. We did do a pretty thorough treatment of that though. I don't know, it's getting to be a while ago, 8 or 9 years ago. Long story short, we don't have enough information to estimate movement rates, or to disentangle movement rates from just say recruitment, stocks relative recruitment among different stocks. That is going to be a tough nut to crack, so no progress on that one. These came from the last management track peer review report. DFO has changed the way they process catch, and they did not have very good documentation last go round. They have now provided that documentation in the links provided. Explore model-based indices of abundance, we did that to death a while ago, back in 2012. Continue collecting age data during the summer bottom trawl, that was done.

Evaluate the impact of borrowing age-length keys for the summer bottom trawl. We have not made any progress there. Explore the effect of the likelihood penalties I mentioned on recruitment, we've made no progress there, but I'm hoping the research track makes that point moot. Monitor the impact of missing 2020 survey data.

That has been done for various assessments in a variety of ways, and we're doing it for herring in the research track, at least somewhat. Again, reevaluate natural mortality. That is being done in the research track. Look for changes, temporal changes in recruits per spawner. That is being addressed in the research track.

Examine reproductive status and condition being addressed in the research track. Improve our understanding of fleet dynamics and its relationship to herring spatial dynamics. We've made no formal progress there, and that might fall out of the purview of a stock assessment, but the research track has done some outreach with user groups, and discussions about fleet dynamics.

Their response to sort of a shrinking stock, how it might affect various ports. Those types of conversations were being had. Analyze condition, growth and fecundity, that is being addressed in the research track. Next, I think I might be done with my slides. I am. Thanks, I can take any questions.

CHAIR WARE: Thank you, John. We'll see if there are any questions from the Board on the assessment. We will be talking a bit about the implications of some of these stock projections, so I want to hold off those questions and comments and just focus on questions on the assessment. We'll start with Doug Grout.

MR. DOUGLAS E. GROUT: Thank you, John, for this, even though it was a scratchy report we managed to get a good feel for it. I just haven't been involved with herring for a long time. My big question is, what has triggered these 10 or more years of low

recruitment? Has anybody in the assessment been able to figure out why we were doing fairly well for so many years, then all of a sudden boom, we're down at 10 years of poor recruitment?

MR. DEROBA: Yes, we don't have a smoking gun answer to that question yet. Things we are learning in the research track include haddock predation on herring eggs. Micah Dean at Mass DMF is doing some great work in the research track on that. We're exploring some bottom-up processes, like plankton availability, *Calanus finmarchicus* availability and how that might affect larvae. Temperature is sort of a big obvious one, especially in the Gulf of Maine Region. It might not be one thing, it might be multiple things, but the answer to your question is we don't know yet, but we are still exploring various avenues.

CHAIR WARE: Any other questions for John? Yes, Jeff Kaelin.

MR. JEFF KAELIN: Hi, John, it's Jeff Kaelin with the Commission today. I've got a question about the Canadian set-aside. You know like Doug I've been around herring management for a long time too. We used to take a look at the herring being set aside for the Canadian weirs as part of the spec process. But in this assessment, the assessment team used the 10-year average of Canadian catches, to create a value that in fact gives the Canadians more fish than the Americans are going to get this year for the first time.

When you take their 4,000 off the top there is less than that for the American fishermen. Why did the 10-year average, why was that chosen? What does the 5 or the 3-year catches in that sector look like? You said 16 tons was taken on the U.S. side with a fixed gear, so why are we using a 10-year average and were there alternatives in a shorter time period that better reflect what the actual catches are up there?

MR. DEROBA: The 10-year average really wasn't decided unilaterally by myself or the stock assessment process. When I first switched to using a 2-fleet model, which is getting back to probably 2018, maybe even before. I sat with the PDT at the time it was probably Dierdre Boelke as the Chair, and we did evaluate 10-year, 5-year, 3 years.

At that time 10 year seemed to be the best predictor of the next few years of Canadian catch. I've had conversations even during this assessment with Jamie Cournane and others about reconsidering that, but there was no strong evidence to deviate from the 10-year average. There is no reason we can't use something else.

The 10-year average is the status quo, and that's what I presented as part of a Level 1 management track. There is nothing preventing the PDT from reconsidering that value. I would just have to redo the projections with a different fixed-gear catch. It is not set in stone, but it was at one point the best predictor of upcoming Canadian catches and there is no evidence to the contrary yet.

CHAIR WARE: Any other questions? All right, thank you, John. I do just want to acknowledge how devastating these results are. I know everyone was hoping to see some rebuilding appearing, and we haven't. I think we have some tough conversations ahead, and we'll kind of foreshadow that at the end of our meeting today. But thank you, John, I appreciate your time.

CONSIDER APPROVAL OF FISHERY MANAGEMENT PLAN REVIEW AND STATE COMPLIANCE FOR THE 2023 FISHING YEAR

CHAIR WARE: Next, we have, Consider Approval of the Fishery Management Plan, and Emilie is going to walk us through that.

MS. EMILIE FRANKE: Great, thank you, Chair. For the FMP Review I will go over sort of the standard sections. I will not go over the status of the stock, because we just heard about that. Again, the Board's action for consideration today is to consider approving the FMP Review for Fishing Year 2023,

State Compliance Reports and the 1 *de minimis* request that we have.

Starting with the status of the FMP. Atlantic Herring through the Interstate FMP are managed through Amendment 3, and then Addendum I and Addendum II. We do have complementary management plans between the Commission and the New England Council. Here for Fishing Year '23 are the preliminary landings from NOAA Fisheries quota monitoring for each of the 4 Atlantic Herring Management Areas. You can see that overall, about 76 percent of the total ACL was harvested. Area 1A and 3 were just slightly over their sub-ACLs and then Area 1B and 2 were under their sub-ACLs. Again, this is preliminary, NOAA Fisheries is still working on the final catch accounting for 2023. As far as state-specific landings, 2023 landings, Maine and Massachusetts typically account for the vast majority of herring landings.

The sort of big picture, 2023 landings were more than double than 2022 landings, but just to remind folks in perspective, you know 2022, 2023 were still pretty low, in terms of the ACLs as compared to the time series. Just a couple of reminders from the Plan Review Team for the Board that they wanted to highlight.

Just noting that some vessels do regularly land Atlantic herring outside of their homeport state. While some states might have 0 landings, there are still vessels from those states landing herring. Also, the PRT wanted to note that the overlap of Atlantic herring with other species can be quite challenging.

You know I know this has come up a lot in conversation, but for example, the mackerel possession limits can be limiting, in terms of the Atlantic herring harvest, especially in Areas 2 and 3. Then also, we have some fixed gear harvesters in Maine state waters that have noted, especially this past year, a lot of overlap with menhaden, mackerel, and alewives, which is great to see those species in the Gulf of Maine, but that can make it difficult for targeted fishing.

Then also, some of the Maine fixed-gear harvesters noted that they have seen some more larger adult herring in state waters in recent years. As far as the Area 1A days-out program for last year, you can see in green where the dates when landing was allowed. For Season 1 for Area 1A, that is June through September, landing days were open from July 16 through August 25.

Then the states went to 0 landing days, and then for Season 2, which is October through December, there were a short period of landing days, October 10 and 11, and then back to 0 landing days, and then the fishery landings were again permitted, starting November 5. That was after the transfer of 1,000 metric tons from the management uncertainty buffer to the Area 1A sub-ACL that is based on the Canadian catch.

Then the fishery did close in state waters on November 6. As far as the spawning closures in Area 1A. For the past few years, due to insufficient samples, the default closure dates have been used. There are 3 Are 1A closures, the Eastern Maine Spawning Area, the Western Maine Spawning Area, and the Massachusetts/New Hampshire Spawning Area.

In 2023, those three areas used the default closure dates in the FMP. As far as the PRT review, the PRT found that all states have regulations in place that meet the requirements of the FMP. New York is continuing to request de minimis status, and does meet the requirements, which is the average of the last 3 years of landings are less than 1 percent of the coastwide total.

Then the PRT this year does have two recommendations for the Board to consider. The first is the PRT recommends the Board discuss long-term funding solutions for the Maine DMR portside sampling program. That program samples a lot of biological attributes, age, length, maturity, sex, et cetera. The funding that is needed would support DMR staff traveling to other states to conduct out

of state sampling, so covering those other herring management areas, and conducting bycatch sampling as well. These data are important to inform not only the spawning closures, but also really critical for the stock assessment, which relies on an age-structured model. This funding that is needed is about $30,000.00 a year, and again, that would support the DMR staff traveling to other states.

However, the Board had previously thought about another avenue could be state staff collecting samples themselves, and potentially sending them to DMR. But either way, this is something for the Board to consider. This program has been sort of short-term funded through mid-2025. But there is still no long-term funding solution.

Then the other recommendation is the PRT recommends that the TC review the current Addendum II Area 1A spawning closures, and determine if there are any concerns with these prolonged periods of using the default spawning dates. The spawning closure protocol was set up, you know if there are enough samples that can dictate when spawning is occurring, and therefore when to implement the closures.

However, we've had not enough samples in recent years, and that is largely due to just the timing of the fishery. The fishery has contracted a bit, the Area 1A fishery, in terms of when it is prosecuted. The PRT recommends the TC have this discussion. The current dates may already be a conservative approach, but it could be beneficial for the TC to discuss. That's it, happy to take any questions.

CHAIR WARE: Thank you, Emilie. We'll see if there are any questions on the FMP Review, and then we'll talk about the two Plan Review Team recommendations. Yes, Rob.

MR. ROBERT LAFRANCE: I just was looking at the numbers, in terms of the percentage over the cap. I'm just wondering if you could explain, if there are any unique elements of, I guess it would be 1A and 3 that would put them over the percentages that were there. I know that there are going to be additional work on that, but is there any specific thing, unique elements of those particular elements that might cause them to be higher than the target?

MS. FRANKE: I also welcome other Board members or NOAA to chime in as well. But I know for Area 1A, you know the fleet tends to catch that quota and the Board has the days out to manage the effort, to make sure that the quota is available throughout the season. I think for the other areas there are a lot of factors.

Including I mentioned some of the species overlap constraints. Also, just opportunity, when are the fish available, you know the economic consideration for those folks. Is it worth it to pursue herring again? A lot of Board members could speak to this as well.

MR. LAFRANCE: Thank you for that clarification.

CHAIR WARE: I'll just comment as a state that is often managing those quotas. The quotas have just gotten so low that it's really hard to manage to those quotas. One day of fishing can put you over the top, or you can be 80 percent under. It's basically day to day monitoring of those quotas. Melanie Griffin.

MS. MELANIE GRIFFIN: Not a question, but maybe a request for a very minor edit. On Page 5 there is some background given on the assessments, and you know it goes into some detail about the 2022 assessment being peer reviewed, and I think it would just be nice to have a little text that notes the 2024 assessment as a Level 1 Direct Delivery. It's a very minor edit, but I think an important one for the record.

MS. FRANKE: Absolutely, Melanie, we'll make that edit.

CHAIR WARE: Any other questions? All right, let's talk about the Plan Review Team recommendations.

There were two recommendations, the first is about the portside sampling that DMR does. I was going to propose that we have the Administrative Commissioners get on a call sometime in September to talk about the best path forward. I think our best estimate right now is that funding will go through June, 2025.

If we can either figure out some more long-term funding solution or transition to having the states collect samples, I think that is a decision we'll need to make in the next few months. If there is any concern about that approach, speak now, otherwise, that is what I'll recommend to this Board. All right, thumbs up, excellent. The second one was about the Area 1A spawning closure dates. I don't know if there are any comments on that. If not, I can provide a suggested path forward. Yes, Doug.

MR. GROUT: Didn't several years ago, the TC did a very thorough analysis when we had data, and we had samples about when the best time or a default would be. What we're trying to get at, is the default times may have changed? Is that what you're trying. I mean the best time to close the fishery may have changed, and have the TC look at something? But what would they look at if there have been no samples collected?

MS. FRANKE: I think it's not necessarily that the default dates may have changed, but just sort of going back through the discussion and analysis, just to sort of confirm that it was sort of the most thorough approach, and sort of the most conservative way forward, given that we've had several years now with the default dates. Just sort of make sure that that is what we have.

CHAIR WARE: Jeff Kaelin.

MR. KAELIN: I don't see any reason whatsoever to go back and renew all of that now. I wasn't in favor as an industry person at the time to go to the default dates, but where we are now, we're going to have 4,000 metric tons of herring fishing in the United States waters this year, 4,000 tons. That is a trip for some boats. A plant just closed; boats are being tied up. To do a lot of navel-gazing about something that has been in place and working assumably well, and wasting everybody's time. I can't support it at all. I think we should set it aside until the fishery comes back. We're taking an 82 percent cut in our ACL in one year. I've been around the Council process since 1977, and never seen anything like that before, so there is no fishery. I think the funding for the sampling is extremely important, I totally agree with that. But as far as reviewing, taking the PDTs time, all the expertise there, to review that at this point in time when there is essentially no fishery. I have a hard time supporting that.

CHAIR WARE: Ray, did you want to comment?

MR. RAYMOND W. KANE: Yes, a question on one of your slides going back to the fixed-gear sector in Maine, the landings. What percentage of the 1A quota does the fixed-gear sector in Maine land? Because they are talking about seeing a lot of large herring, so do we know? Have we any idea?

CHAIR WARE: I think it's less than 1 percent. I mean whatever 16 metric tons divided by the total landing were, so very low. All right, so what I'm going to propose, hearing some of the comments is, I think we need to get through specifications first and see the impacts on that on the industry, before we start assessing the spawning again.

If folks are comfortable with that approach, I'm going to recommend that moving forward, and we can assess as folks want at future Board meetings. Okay, next one, we are now looking for a motion to approve the FMP Review, State Compliance Report and De Minimis for New York. Cheri Patterson.

MS. CHERI PATTERSON: **Yes, I move to approve the Atlantic Herring FMP Review for the 2023 Fishing Year, State Compliance Reports and *De Minimis* request for New York.**

CHAIR WARE: Great, motion by Cheri, second by Ray Kane. Is there any opposition to this motion? Seeing none; **the motion approves by consent**.

UPDATE FROM THE NEW ENGLAND FISHERY MANAGEMENT COUNCIL ON COUNCIL ACTIVITY

CHAIR WARE: All right, we're going to move on to Agenda Iten 6. We have Jamie from the New England Fishery Management Council is going to provide an update on Council Activity and I think some of the things we should be looking for as a Board, as we move through the specification cycle this year. Thank you, Jamie.

MS. JAMIE COURNANE: Thank you for the opportunity to present this update. Today I'm going to focus the presentation on specifications. I do have a few brief slides on Amendment 10, but I may not present those, given time. Right now, the Council is working on specifications for the next 3 years for Atlantic herring, to include the overfishing limits, acceptable biological catch, applying its Control Rule as well as the Rebuilding Plan for the species.

In the specifications package we also incorporate management uncertainty, the annual catch limits by sub-management area, and river herring and shad catch caps, which we expect will be status quo, and there are other components that are also set through specifications. Here we are in the middle of the timeline, progressing towards Council final action in September.

This stock assessment is a Level 1 Management Track, meaning it was direct delivery to the Plan Development Team and the Technical Committee. We've met jointly a few times to discuss the results. The Scientific and Statistical Committee met last week, July 30 and 31, wo make their recommendations for those species. We'll be working over the next few weeks and months to prepare the action for the Council's consideration, and you will also be meeting in October to set your own specifications. The plan is to submit this action as soon as possible to NOAA Fisheries, with a target implementation of January 1 of next year.

Here is the history of the U.S. Fishery Performance, looking back from 2008 forward to almost completed fishing year, which is 2022, and you can see the same information provided in the Table on the right. Over time there has been relatively high utilization in the fishery, with one year exceeding the overall ACL, and the current specifications we have for the fishery are shown in the tables below.

For 2023, which is now complete, 2024, which we're in the middle of, and 2025, which our new specification cycle would replace that time of year. The Plan Development Team and Technical Committee met and made recommendations for this stock, consistent with the Council's ABC Control Rule, using the rebuilding plans with updates provided in the stock assessment, and incorporated in an update estimate of Canadian catch uses the most recent and updated information available.

Here are the OFLs and the ABCs that we recommended coming out of the stock assessment. When the SSC discussed this last week on July 31, they made the same recommendation this time to the Council. Their rationale, which is a Council staff summary, the report is in progress and not available for you at this time.

We did provide the PDT and TCs report for you, for your packet. But this recommendation stays with the Council's ABC Control Rule. It recognizes continued poor recruitment and low spawning stock biomass. The SSC recognized that rebuilding progress is falling behind. This represents a major reduction from current levels.

They thought it was important to use the Control Rule, given that incorporates stakeholder input in the role of herring in the ecosystem. We were concerned about overly optimistic projections. The Council's Control Rule, if you're familiar with this, it explicitly accounts for the role of Atlantic herring's forage in the ecosystem, by limiting fishing mortality when biomass is greater than 50 percent of the ratio of spawning stock biomass, to spawning stock biomass MSY, then there is a higher level of fishing mortality allowed.

But when those decline, there is that linear of reduction in fishing mortality, it can even go to 0, in the case of our ratio being 10 percent. Looking at the short-term projections that John showed you earlier. Here in that window that identified where the ABC falls in these calculations, a few things to note that Atlantic Herring Committee and the Council will be thinking about is, in these projections in 2024 our current year.

If the fall ABC is caught, and the PDT and the TC talk about this, in its memo to the SSC, that there is a very high probability of overfishing greater than 90 percent, and something that we want to make sure managers are aware of. Another note that is really important is as we've had a couple of updates to stock assessments since the setting of the rebuilding plan, which took place in Framework 9. There have been revisions to the likely rebuild date for this stock, and now, based on the most recent projections, it looks like the time that we crossed the 50 percent probability of rebuilding mark is now 2031. Here are those projections so you can see them, again showing in this figure, if you look all the way to the right-hand side, in the second column from the right, you can see that rebuilding going over the 50 percent in 2031.

The next two slides talk about the implications of this reduction, and the first thing I want to note is this is all draft, subject to management's discussions and the Council's recommend-actions. The first two, OFL and ABC come from the SSCs recommendation provided to us last week. This is just for next year, to show this example.

Draft 2025 specifications would be an OFL of 18,273 metric tons. Applying the Council's Control Rule and the Rebuilding Plan, the SSC recommended the ABC of 6,741 metric tons. Table on the left-hand side shows you our current specifications, so you can compare those numbers as I walk through.

The next step is the Management Uncertainty Buffer. This has typically been the 10-year average of the Canadian catch, which this time updated is 4,031 metric tons. If managers use that same approach, they would deduct that 4,031 metric tons from the ABC to determine a U.S. ACL. That is 2,710 metric tons for the entire fishery.

Those would be distributed based on the current formula, unless that has changed, by percentage into these four management areas. You can see what the Area 1A, 1B, 2 and 3 quotas would be. If this total U.S. ACL is 2,710 metric tons next year, this represents about 14 percent of the total ACL we have right now this year.

That number is 19,141 metric tons. It's about 66 percent of the current in-season catch, and this is when we looked at it July 18, there has been a little bit more catch since then, but the point is the same. That if the fishery was operating as it is this year we would have already caught the ACL. Next, this would be the lowest ACL in the history of the fishery management plan, and the last time we had a low ACL in catch was 2022, this would be lower than that.

This will lead to negative social and economic commercial fishery impacts, and low catch limits in the four management areas. Would you like me to continue with the rest of the presentation? I know you're running short on time, or I can just provide that as a reference document for the Board. Thank you.

CHAIR WARE: Thanks, Jamie, yes, let's stop there given the time. Obviously, really important to talk about these specifications, and I appreciate the context from the slides. Are there any questions for Jamie? I'll just note, I think that August 22 and September 12 Herring Committee meetings of the Council will be quite important, and we'll come back as a Board in October to see what our next steps are. Ray Kane.

MR. KANE: Yes, thank you, Jamie. Going back to your slide on your area allocations, 1A. That is not

inclusive of historically, years past 1,000 metric ton that we get from Canada, right?

MS. COURNANE: If the slide advancer could go back one slide, thank you. That thousand metric tons that sometimes can shift from our Canadian estimate back into 1A, comes from the management uncertainty buffer. Here you see that is 4,031. If it was available and GARFO projected that the Canadians weren't going to exceed the threshold, then a thousand metric tons later in the fishing year, towards the very end, would be put back into Area 1A, so that would be potential 1A quota of 1,783, if that transfer happened.

CHAIR WARE: Any other questions for Jamie while she's online? Okay, thank you, Jamie, I appreciate your presentation. Those were some great slides.

OTHER BUSINESS

CHAIR WARE: All right, we are at Other Business. Is there any other business before this Board?

ADJOURNMENT

CHAIR WARE: If not, we will get a motion to adjourn. Doug Grout, so moves, second by Steve Train. Thank you.

(Whereupon the meeting adjourned at 9:40 a.m. on Tuesday, August 6, 2024)

New England Fishery Management Council

FOR IMMEDIATE RELEASE
October 4, 2024

PRESS CONTACT: Janice Plante
(607) 592-4817, jplante@nefmc.org

Atlantic Herring: Council Takes Final Action on Fishing Year 2025-2027 Specifications; Requests In-Season Adjustment

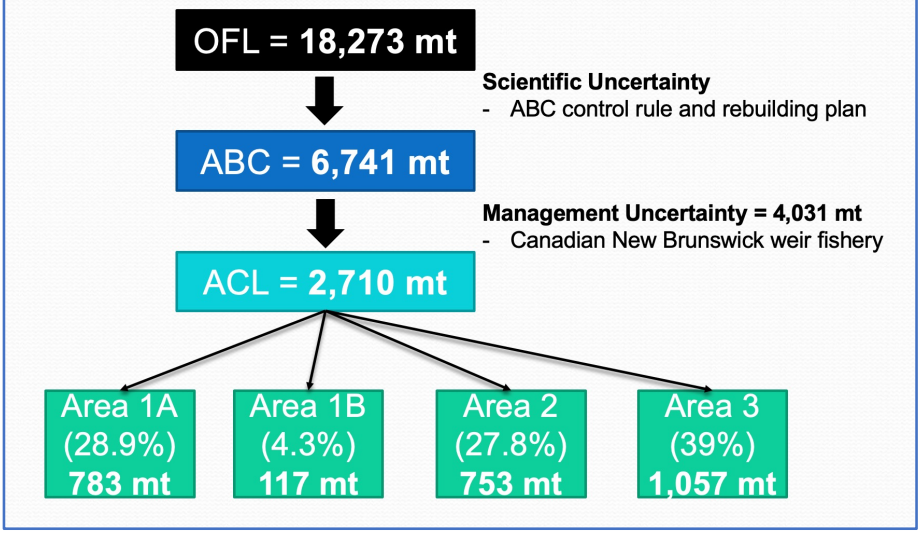
The New England Fishery Management Council took final action on fishing year 2025-2027 specifications for Atlantic herring when it met September 24-26, 2024 in Gloucester, Massachusetts. The Council also asked the Regional Administrator of NOAA Fisheries to use his existing authority to implement an in-season adjustment to reduce default 2025 specifications to the level recently recommended by the Scientific and Statistical Committee (SSC).

The Council's revised 2025 specifications, which are part of the new 2025-2027 package, are much lower than the default or backup 2025 specifications the Council developed in 2022 to cover the 2023-2025 fishing years. At the time, the Council knew it would need to update 2025 catch limits, but it included backups in a three-year package in case the next action was delayed.

BOTTOM LINE: The default 2025 annual catch limit (ACL) is 23,961 metric tons (mt). The ***revised*** 2025 ACL, which is based on the latest stock assessment, is 2,710 mt, marking an 89% reduction. For comparison, 2,710 mt equates to 14% of the 2024 ACL now in place.

The Council is deeply concerned about the magnitude of the needed adjustments and the inevitable social and economic impacts associated with the upcoming reductions in catch.

Proposed 2025 Atlantic Herring Catch Limits by Management Area



OFL = Overfishing Limit | ABC = Acceptable Biological Catch
ACL = Annual Catch Limit

THE FORMULA: Area-specific catch limits are determined by starting with the overfishing limit, which is reduced to account for scientific uncertainty, which results in the acceptable biological catch. The ABC is further reduced to account for management uncertainty associated with the 10-year average of catches in Canada's New Brunswick weir fishery. The resulting number is the annual catch limit, which then is divided into sub-ACLs based on the percentages shown in the green boxes above.

New England Fishery Management Council

The revised ACL, if approved by NOAA Fisheries as expected, will result in the lowest catch limits in the history of the Atlantic Herring Fishery Management Plan. The new catch limits will not support a directed commercial fishery for Atlantic herring. Area-by-area sub-ACLs are shown in the table below.

IN-SEASON ADJUSTMENT NEEDED: If the Council's new specifications package cannot be implemented by the January 1 start of the new fishing year and the higher default ACL remains in place, the fishing fleet could catch the total updated ACL or the area-specific sub-ACLs before the revised specifications are implemented. This likely would result in overfishing and further compound the anticipated social and economic impacts of the revised catch limits. Overfishing currently is **not** occurring.

The Council is seeking an in-season adjustment to prevent overfishing in 2025. It is asking the NOAA Fisheries Regional Administrator to reduce the 2025 overfishing limit (OFL) and acceptable biological catch (ABC) to the levels recommended by the Council's SSC as shown in the table at right. The Council also asked the Regional Administrator to follow the guidance in its revised specifications package to adjust the remaining specifications, including the sub-ACLs for Herring Management Areas 1A, 1B, 2, and 3.

NO CARRYOVER: Atlantic herring regulations allow for the carryover of unharvested quota two years down the road after catch accounting is complete. The carryover cannot be greater than 10% of the initial catch limit or sub-ACL.

For the 2023 fishing year, underages occurred in Area 1B and Area 2. The Council voted to ask the Regional Administrator to nullify the carryover from the 2023 fishing year into 2025. The

2025-2027 Atlantic Herring Specifications
in Metric Tons

Specification	2025	2026	2027
Overfishing Limit (OFL)	18,273	21,659	21,659
Acceptable Biological Catch (ABC)	6,741	10,885	10,885
Management Uncertainty*	4,031	4,031	4,031
Optimum Yield / Annual Catch Limit (OY/ACL)	2,710	6,854	6,854
Domestic Annual Harvest	2,710	6,854	6,854
Border Transfer	0	0	0
Domestic Annual Processing	2,710	6,854	6,854
U.S. At-Sea Processing	0	0	0
Area 1A Sub-ACL (28.9%)	783	1,981	1,981
Area 1B Sub-ACL (4.3%)	117	295	295
Area 2 Sub-ACL (27.8%)	753	1,905	1,905
Area 3 Sub-ACL (39%)	1,057	2,673	2,673
Fixed Gear Set-Aside	30	30	30
Research Set-Aside as % of Sub-ACLs	0%	0%	0%

* If landings in the New Brunswick weir fishery through October 1 are less than the associated "trigger," which currently is set at 2,600 mt, then 1,000 mt of the management uncertainty buffer will be added to the Area 1A sub-ACL and the ACL.

New England Fishery Management Council | 50 Water Street, Mill 2 | Newburyport, MA 01950
Phone: (978) 465-0492 | www.nefmc.org

New England Fishery Management Council

addition of carryover tonnage would result in sub-ACLs for Area 1B and Area 2 that exceed levels in the Council's 2025-2027 specifications.

The new specifications utilize the Council's ABC control rule for herring, which explicitly accounts for the role of Atlantic herring as forage in the ecosystem by limiting fishing mortality to 80% of what could be allowed at maximum sustainable yield. Herring is under a rebuilding plan. Although behind schedule, the resource is still expected to be rebuilt by 2031, thereby meeting the 10-year rebuilding target.

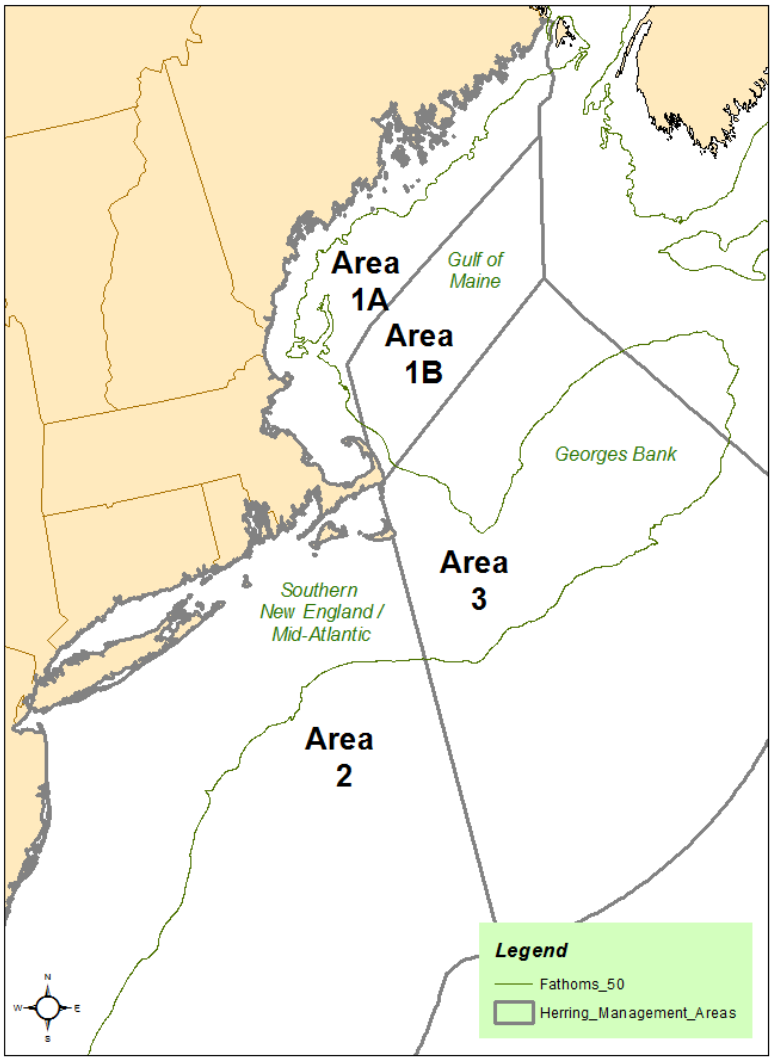
WHY ARE CATCH LIMITS SO LOW: The 2024 Atlantic Herring Management Track Stock Assessment determined that the spawning stock biomass – the percentage of the population that can reproduce and contribute new year classes of juvenile fish to the resource – is at 26% of its target. Recruitment – the newly born fish coming into the population – remains at very low levels (see graphic below). The stock assessment states:

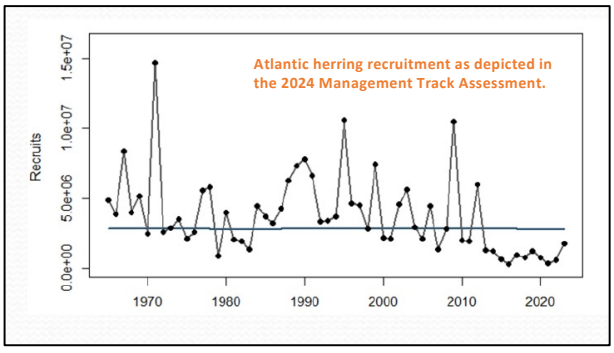
"A definitive explanation for the continued poor recruitment has not been identified. … Continued poor recruitment is the main issue driving stock status. Management decisions that reduced U.S. catches had the effect of avoiding overfishing."

Based on the 2024 Management Track Assessment, Atlantic herring is overfished but overfishing is not occurring. However, projections from the assessment indicated the possibility of overfishing was high if the full 2024 ABC for the fishery was utilized.

The Council tasked the Herring Plan Development Team with reviewing

Atlantic Herring Management Areas





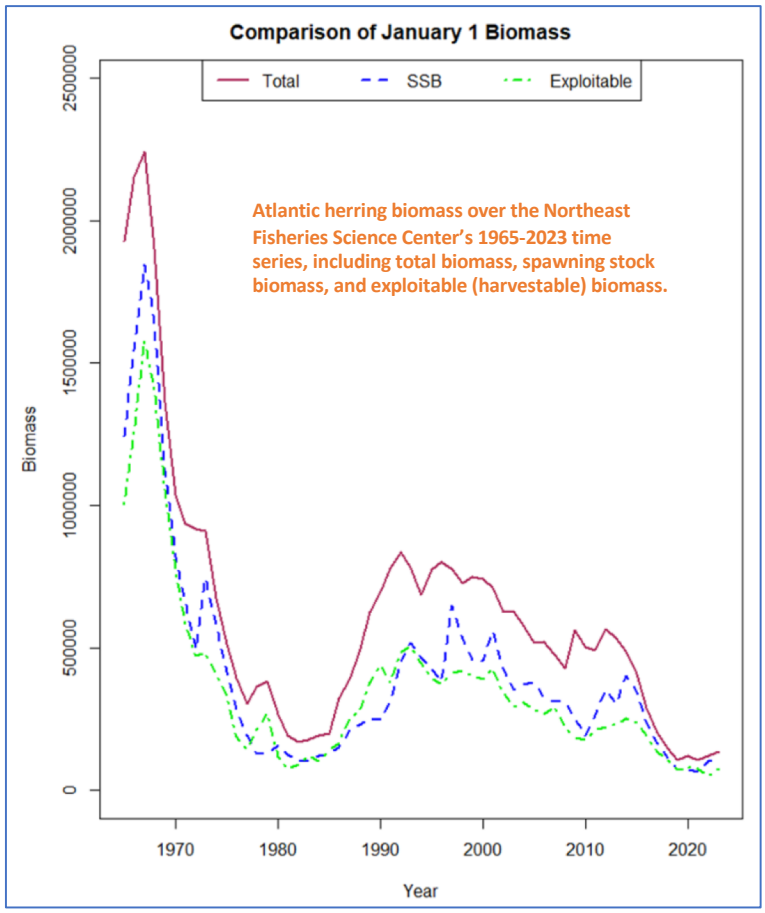
New England Fishery Management Council

preliminary 2024 year-end catch information for discussion at the January 2025 Council meeting. The Council does not anticipate the entire 2024 annual catch limit will be utilized, which would reduce the possibility of overfishing in 2024. As of late September, less than 41% of the ACL had been harvested.

A 2025 Atlantic Herring Research Track Assessment is underway. The peer review meeting for the research track will take place in March 2025 and will set the stage for the next Atlantic Herring Management Track Stock Assessment in 2026.

RIVER HERRING AND SHAD: The Council agreed to maintain the current river herring and shad catch caps in the 2025-2027 specifications package. These catch caps, shown in the table at right, have been in place for the past few specification cycles.

The Council voted to submit the new specifications package to NOAA Fisheries for review, approval, and implementation.




Atlantic herring

Questions? *Contact Dr. Jamie Cournane, the Council's herring plan coordinator, at jcournane@nefmc.org. Meeting materials related to the September 2024 herring discussion are posted here.*

River Herring/Shad Catch Caps	Allocation in Metric Tons
Midwater Trawl Gulf of Maine	76.7 mt
Midwater Trawl Cape Cod	32.4 mt
Midwater Trawl Southern New England and Mid-Atlantic	129.6 mt
Bottom Trawl Southern New England and Mid-Atlantic	122.3 mt

Atlantic States Marine Fisheries Commission

American Lobster Management Board

October 21, 2024
9:45 a.m. – 12:15 p.m.

Draft Agenda

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

1.	Welcome/Call to Order *(P. Keliher)*	9:45 a.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from August 2024	9:45 a.m.
3.	Public Comment	9:50 a.m.
4.	Progress Update on Benchmark Stock Assessment for American Lobster *(T. Pugh)*	10:00 a.m.
5.	Consider Annual Data Update of American Lobster Indices *(T. Pugh)*	10:10 a.m.
6.	Consider Addendum XXXI on Postponing Implementation of Addendum XXVII Measures for Final Approval **Final Action** • Review Options and Public Comment Summary *(C. Starks)* • Review Advisory Panel Report *(C.Starks)* • Consider Final Approval of Addendum XXXI	10:45 a.m.
6.	Consider Fishery Management Plan Reviews and State Compliance Reports for American Lobster and Jonah Crab for the 2023 Fishing Year *(C. Starks)* **Action**	11:30 a.m.
8.	Discuss Vessel Tracking Requirements of Addendum XXIX *(C. Starks)* **Possible Action**	11:45 a.m.
9.	Other Business/Adjourn	12:15 p.m.

The meeting will be held at The Westin Annapolis (100 Westgate Circle, Annapolis, Maryland; 88.627.8994) and via webinar; click here for details.

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

MEETING OVERVIEW

American Lobster Management Board
October 21, 2024
9:45 a.m. – 12:15 p.m.

Chair: Pat Keliher (ME) Assumed Chairmanship: 02/24	Technical Committee Chair: Tracy Pugh (MA)	Law Enforcement Committee Rep: Rob Beal (ME)
Vice Chair: Renee Zobel (NH)	Lobster Advisory Panel Chair: Grant Moore (MA) Jonah Crab Advisory Panel Chair: Sonny Gwin	Previous Board Meeting: August 6, 2024
Voting Members: ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, DC, PRFC, VA, NMFS, NEFMC (12 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from August 2024

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. Progress Update on Benchmark Stock Assessment for American Lobster (10:00-10:10 a.m.)

Background

- The benchmark stock assessment for American lobster is in progress with results expected in 2025.
- The Assessment Methods Workshop was held in July 2024. The Assessment Workshop is scheduled for Winter 2025.

Presentations

- Progress Update on Benchmark Stock Assessment for American Lobster by T. Pugh

5. Consider Annual Data Update of American Lobster Indices (10:10-10:45 a.m.)

Background

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

young-of-year settlement indicators, trawl survey indicators, and ventless trap survey sex-specific abundance indices.
- This is the fourth Data Update and provides an update of last year's review with the addition of 2023 data. Indicator status (negative, neutral, or positive) was determined relative to the percentiles of the stock assessment time series (i.e., data set start year through 2018) **(Briefing Materials).**

Presentations
- Annual Data Update of American Lobster Indices by T. Pugh

6. Consider Addendum XXXI on Postponing Implementation of Addendum XXVII Measures for Final Approval (10:45-11:30 a.m.) Final Action

Background
- In August 2024, the Board initiated Draft Addendum XXXI. The Addendum considers postponing implementation of some of the measures of Addendum XXVII, approved in May 2023. Specifically, the Addendum considers postponing implementation of v-notch definitions and the gauge and vent size changes triggered under Section 3.2 of Addendum XXVII until July 1, 2025 **(Briefing Materials).**
- One virtual public hearing was held in September. The public comment period ended on October 6, 2024 **(Briefing Materials).**
- The Lobster Advisory Panel met September 25, 2024 to review the options of Draft Addendum XXXI **(Briefing Materials).**

Board actions for consideration at this meeting
- Addendum XXXI Final Approval and Public Comment Summary by C. Starks
- Advisory Panel Report by G. Moore

Board actions for consideration at this meeting
- Consider Final Approval of Addendum XXXI

7. Consider Fishery Management Plan Reviews and State Compliance Reports for American Lobster and Jonah Crab for the 2022 Fishing Year (11:30-11:45 a.m.) Action

Background
- State compliance reports for American lobster and Jonah crab were due August 1, 2024.
- The Plan Review Teams reviewed state compliance reports and compiled the annual FMP Reviews for lobster and Jonah crab for the 2023 Fishing Year (**Briefing Materials**).
- Delaware, Maryland, and Virginia have requested and meet the requirements for *de minimis* in the lobster and Jonah crab fisheries.

Presentations
- FMP Reviews for American Lobster and Jonah Crab for the 2023 Fishing Year by C. Starks

Board Actions for Consideration at the Meeting
- Approve Fishery Management Plan Reviews and state compliance reports for American Lobster and Jonah Crab for the 2023 Fishing Year
- Approve de minimis requests.

8. Discuss Vessel Tracking Requirements of Addendum XXIX (11:45-12:15 p.m.) Possible Action
Background • In August the Board reviewed a report from the Vessel Tracking Workgroup on potential modifications to the 24/7 vessel tracking requirement which still ensure monitoring of fishing activity while acknowledging that fishermen also use boats for personal/nonfishing reasons, and reviewing existing processes for when Vessel Monitoring Systems (VMS) devices can be turned off. • The Law Enforcement Committee met in October to discuss enforceable definitions of fishing **(Briefing Materials).**
Presentations • Law Enforcement Discussion on Fishing Definition by C. Starks
Board Actions for Consideration at the Meeting • Determine next steps

9. Other Business/Adjourn (12:15 p.m.)

American Lobster and Jonah Crab TC Task List

Activity level: High

Committee Overlap Score: Medium

Committee Task List
Lobster TC • August 1, 2024: Annual Compliance Reports Due • Fall 2024: Annual data update of lobster abundance indices • Summer 2024-Spring 2025: Development of lobster stock assessment *Jonah Crab TC* • August 1, 2024: Annual Compliance Reports Due • Fall 2024: Annual data update of Jonah crab abundance indices

TC Members

American Lobster: Kathleen Reardon (ME), Joshua Carloni (NH), Jeff Kipp (ASMFC), Justin Pellegrino (NY), Corinne Truesdale (RI), Chad Power (NJ), Tracy Pugh (MA, Chair), Craig Weedon (MD), Somers Smott (VA), Renee St. Amand (CT), Burton Shank (NOAA), Allison Murphy (NOAA)

Jonah Crab: Corinne Truesdale (RI, Chair), Derek Perry (MA), Joshua Carloni (NH), Chad Power (NJ), Jeff Kipp (ASMFC), Allison Murphy (NOAA), Kathleen Reardon (ME), Justin Pellegrino (NY), Burton Shank (NOAA), Craig Weedon (MD)

Lobster Stock Assessment Subcommittee Members: Tracy Pugh (MA, TC Chair), Conor McManus (RI), Joshua Carloni (NH), Kathleen Reardon (ME), Burton Shank (NOAA), Jeff Kipp (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

AMERICAN LOBSTER MANAGEMENT BOARD

The Westin Crystal City
Arlington, Virginia
Hybrid Meeting

August 6, 2024

TABLE OF CONTENTS

INDEX OF MOTIONS

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

2. **Approval of Proceedings of April 2024** by consent (Page 1).

3. **Motion to initiate an addendum to delay the biological measures implementation date of Addendum XXVII until July 1, 2025. Specifically, biological measures under Section 3.1 that created common size limits for state-only and federal permit holders fishing in Outer Cape Cod would be implemented effective July 1, 2025. Similarly, management measures triggered under Section 3.2 would be implemented by July 1, 2025 starting with the Year 1 measures, and subsequent management measures (additional minimum size increase in Area 1 in year 3; vent size increase in year 4; maximum size reduction in Area 3 and Outer Cape Cod) would be implemented by July 1 of the calendar year for which they are required. Trap tag issuance regulations regarding the routine issuance of 10% additional trap tags in Areas 3 and 1 above the trap limit or allocation would remain unchanged** (Page 18). Motion by Dan McKiernan; second by Steve Train. Motion passes (9 in favor, 1 opposed) (Page 22).

4. **Motion to approve Addendum XXX, effective today** (Page 24). Motion by Doug Grout; second by Dan McKiernan. Motion passes with one abstention (NOAA Fisheries) (Page 26).

5. **Move to adjourn** by consent (Page 31).

ATTENDANCE

Board Members

Pat Keliher, ME (AA)
Rep. Allison Hepler, ME (LA)
Stephen Train, ME (GA)
Renee Zobel, NH, proxy for Cheri Patterson (AA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Doug Grout, NH (GA)
Dan McKiernan, MA (AA)
Rep. Sarah Peake, MA (LA)
Ray Kane, MA (GA)
Jason McNamee, RI (AA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
David Borden, RI (GA)
Dr. Justin Davis, CT (AA)
Rep. Joseph Gresko (CT) (LA)
Bill Hyatt, CT (GA)
Marty Gary, NY (AA)
Jim Gilmore, NY, proxy for Assy. Thiele (LA)
Scott Curatolo-Wagemann, NY, proxy for Emerson Hasbrouck (GA)
Joe Cimino, NJ (AA)
Adam Nowalsky, NJ, proxy for Sen. Gopal (LA)
Jeff Kaelin, NJ (GA)
John Clark, DE (AA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Roy Miller, DE (GA)
Michael Luisi, MD, proxy for L. Fegley (AA)
David Sikorski, MD, proxy for Del. Stein (LA)
Shanna Madsen, VA, proxy for Jamie Green (AA)
Sen. Danny Diggs, VA (LA)
James (JJ) Minor, VA (GA)
Allison Murphy, NMFS

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

Ex-Officio Members

Tracy Pugh, Technical Committee Chair

Staff

Bob Beal
Toni Kerns
Tina Berger
Madeline Musante
Caitlin Starks
Jeff Kipp
Tracy Bauer
James Boyle
Katie Drew
Jainita Patel
Chelsea Tuohy

The American Lobster Management Board of the Atlantic States Marine Fisheries Commission convened in the Jefferson Ballroom of the Westin Crystal City Hotel, Arlington, Virginia, via hybrid meeting, in-person, and webinar; Tuesday, August 6, 2024, and was called to order at 2:45 p.m. by Chair Pat Keliher.

CALL TO ORDER

CHAIR PATRICK C. KELIHER: I'm going to call the Lobster Board meeting to order. Good afternoon, everybody, my name is Pat Keliher; I am the Chair of the American Lobster Board. We are a couple minutes behind schedule. We've got a couple topics that may need a little additional time today, and I do have several members of the public that have traveled a long way, that I'm sure are going to want to speak during some of the topics where motions potentially are going to be made.

APPROVAL OF AGENDA

CHAIR KELIHER: Before we get to the meat of the agenda, do I have any objections to what the agenda is? Do I get approval of the agenda? Any modifications need to be made? Seeing none; approval of the agenda from April, 2024.

APPROVAL OF PROCEEDINGS

CHAIR KELIHER: Did everybody have an opportunity to review those? Any additions, changes needed? Seeing none; we'll approve those minutes by consent.

PUBLIC COMMENT

CHAIR KELIHER: Is there anybody from the public that would like to speak on items that are not on the agenda? Again, items that are not on the agenda. Anything not related to Addendum XXVII or XXX. Not seeing any members of the public that want to speak, great.

PROGRESS UPDATE ON BENCHMARK STOCK ASSESSMENT FOR AMERICAN LOBSTER

CHAIR KELIHER: We're going to go right to Jeff Kipp, who has got a quick update on the Benchmark Stock Assessment. Jeff.

MR. JEFF J. KIPP: I'll just be giving a brief update on the ongoing benchmark assessment for lobster. Just to touch on the assessment timeline milestones that we've worked through so far. We did have a data workshop back in February of this year, and that was virtual, working through review of our available datasets and identifying data tasks.

We did just recently complete our first assessment workshop a couple weeks ago in New Bedford. We have had several periodic webinars and a number of biweekly modeler meetings between these workshops, and will continue with those as needed, moving forward in the process.

Just to touch on the topics that were covered at that first assessment workshop. We reviewed development of continuity models. I got into growth modeling and environmental driver data and analyses. We then talked about advancements to the continuity models that we'll be working on from this point forward, and also some alternative index of abundance development. We did review the remaining timeline with that workload in mind, and the SAS did express some concern with that timeline. There was also a couple of challenges we've run into so far. We've had slow access to confidential data for some external collaborators we're working with outside of the Stock Assessment Subcommittee, and also it was noted that 2023 data, which is the terminal year of this assessment will not be complete until around the time of our tentatively scheduled final workshop later this fall.

The SAS is recommending extending the assessment timeline one commission meeting cycle, and we just note that this will sync the timeline if we do extend, with the completion of the 2020 benchmark assessment, which was presented to the Board at the 2020 annual meeting in October. The items up

on the screen in black text here show the remaining milestones for our assessment timeline.

The dates crossed out are the originally scheduled dates for these remaining timelines, and the text in red is what the SAS is proposing for the extended timeline to complete the assessment. We would have a final assessment workshop, and we're proposing shifting that to February of next year, with the peer review workshop shifted to August of next year.

Then plans to present the assessment and peer review reports to the Board at the annual meeting in October of next year. That concludes my update, so looking for if there are any concerns or comments on the proposed shift to the timeline, and just any questions on the assessment update in general.

CHAIR KELIHER: Back to the Board, does anybody have any questions or comments for Jeff, or any concerns about that delay? I see one hand, Jason.

DR. JASON McNAMEE: No concern. Jeff, I was just wondering, and you might not be able to answer this, but just wondering if you could expand a little bit. I'm curious as to what the data issues were. Maybe to tailor your answer, I guess what I would be most interested in, is there something we can fix there so it doesn't happen again, or it was just a thing and you had to work through it?

MR. KIPP: Yes, I don't know that there is something there that we can fix. It was sort of a unique situation where we were working with some external folks to get access to commercial data, and that is to develop some socioeconomic indicators that we are hoping to include to advance the set of Model 3 indicators that we developed in the assessment, to include more of those socioeconomic aspects.

Just with those folks not being official members of the Stock Assessment Subcommittee, giving that confidential data access was a challenge. A note that came along from that was that they were funded to do that work through Sea Grants, and also to help with the assessments as part of that funding. That funding mechanism is what allowed for that access to those data.

CHAIR KELIHER: Renee.

MS. RENEE ZOBEL: Yes, just to follow up on exactly that point, Jeff. I wrote that down as something that we run into a lot with our states and confidentiality regulations. I'm wondering if in the future, I know they were funded through Sea Grant, but if there is a way to contract them through ASMFC. I know that a number of states have regulations on the books where that would be an easy checkmark for access, versus somebody who is from an external or academic agency.

CHAIR KELIHER: Thanks, Renee, that is a good suggestion. Anybody else on the Board questions for Jeff? Seeing none, I mean the delay is what the delay is. We need to make sure that we're getting through that in a way that gives us the best results at the end of the time period. Seeing no other concerns, let's move right along in the agenda. Thanks for that, Jeff.

PLAN DEVELOPMENT TEAM REPORT ON CONSERVATION MEASURES FOR LOBSTER FOR AREA 2 AND 3

CHAIR KELIHER: Now we're going to go to Agenda Item Number 5, which is a Plan Development Team Report on Conservation Measures for Lobster for Area 2 and 3, and we're going to go to Caitlin Starks.

MS. CAITLIN STARKS: I'm going to go over the report developed by the Lobster Plan Development Team, PDT, in response to a task from the Board. This topic is related to the 2023 NOAA Interim Rule to implement the measures from Addenda XXI and XXII. Those two addenda were approved in 2013, and included the aggregate ownership task in LCMAs 2 and 3, and maximum trap cap reductions in LCMA 3.

At that time those measures were intended to scale the southern New England fishery to the size of the stock, which has been found depleted in the previous stock assessment. But because a federal rule to implement those measures was not completed until 2023, there were ten years between the approval of the original addenda and the federal implementation.

Because of that gap, the Lobster Board as well as industry members have expressed concerns that there were some significant changes in the fishery during that ten-year time period. The Board thought these changes should be investigated further, so in January past the PDT was reviewing the conservation measures originally set in Addenda XXI and XXII, and making recommendations for alternate measures to achieve those reductions, inclusive of recommendations from the Lobster Conservation Management Team or LCMT.

The Board received a preliminary report from the PDT at the spring meeting, and today I'll go through the final PDT report. The PDT report has a lot of information in it, and I'm going to have to move fairly quickly through them. But the first part of the report contains analogies of the changes that have occurred in southern New England since 2013, and this includes changes in permit issued, trap allocations, maximum traps fished, latent traps, trips and landings, and the development of the Jonah crab fishery.

The PDT also considered the input provided by the Area 2 and 3 LCMTs, and provided some conclusions and possible management responses for Board consideration. The Board received a summary of the LCMT 2 meeting at its May meeting, but the LCMT 3 meeting took place in June, so to start us off, I am going to pass it over to Dan McKiernan to give a summary of that meeting.

REPORT FROM LOBSTER CONSERVATION MANAGEMENT TEAM 3

MR. DANIEL McKIERNAN: The LCMT 3 had not met in a number of years, and the reason for the delay from the possible Aoril timeline to the summer was we had to reconstitute the Area 3 LCMT, which we did, working with the other state directors who had vessels fishing within their state in Area 3. We had a meeting and four members and one alternate attended. As is mentioned, the purpose of the meeting is to provide guidance and insights to the PDT, as they were undergoing their work, which was very challenging, because the lobster fishery has not been well documented historically, because of the uneven requirements for catch reports, and also the fact that these statistical areas had to be so large it's hard to parse the effort and the landings to one stock unit or the other.

What the PDT heard from the participating members of the LCMT was, and as you just mentioned, take a strong look at the movement of these permits. We did see, and you've got to be showing this really, but just briefly to the forecasted, movement of the permits from the west to the east or from the south to the north.

The trend toward Jonah crab trapping that, even though you're seeing fishing effort it's not on lobster, it's on Jonah crabs. Also, the consolidation that has occurred in the 10 to 12 years since those other Addendums, XXI or XXII were instituted. The water was kind of passed under the bridge, in terms of achieving those goals, because of the consolidation. I think the results you are going to show reflect that which the members suggested the PDT examine, so I'll stop there.

MS. STARKS: Moving back to the PDT report, I'll start by going through the analyses the PDT put together, and I want to note here at the beginning that the PDTs state and federal data where possible, to give the most complete picture they could, available state and federal datasets did not always align, and some data were not available, and that is specified in the report in those cases.

The first thing the PDT looked at is changes in the number of permits issued by state for Areas 2 and 3 using publicly available federal permit data. This table is showing the permits issued by state for Area 2. You can see the total number of federal LCMA 2 permits has decreased substantially between 2014 and 2013 across all the states.

This next table shows the federal data for LCMA 3 federal permits issued to vessels that also has steadily decreased from 105 permits in 2014 to 76 in 2023, and most states have seen a decrease in the number of LCMA vessels, except New Hampshire. The PDT also looked at state level data for Massachusetts and Rhode Island, and this figure shows a declining trend in active permits landing in Massachusetts between 2010 and 2022 for both LCMAs 2 and 3.

Area 2 is the blue line and Area 3 is the orange line. Just a quick note, on some of these figures they did add that vertical dash line at the 2013 year, so we can focus on changes after that point. The same declining pattern is showing in the Rhode Island data, but declines in the number of active permits is more pronounced in LCMA 2 than LCMA 3.

Moving on to changes in trap allocations. The PDT looked at allocations for LMA 2 and 3 permit holders, and as a note, we only had data since 2015 for this time series, because of missing data from Rhode Island for 2012 through 2014. This figure shows that in Area 2 allocations were reduced by 25 percent in 2016, and then an additional 5 percent each year between 2017 and 2021. Overall, between 2015 and 2023 there was a 45.4 percent reduction in the combined state and federal LCMA 2 allocations. Then for federal Area 3 allocation data, they reflect the 5 percent per year reduction in allocations that occurred over the 2016 to 2020 time period. The data show a 20.2 percent reduction in the allocation from 2013 to 2023. The PDT did note that these annual totals do not account for any allocation that is held on a permit that was in certification of permit history or CPH for a given year. Next the PDT looked at the maximum number of traps reported fished each year between 2013 and 2022, using data reported to NOAA Fisheries, as well as Massachusetts and Rhode Island.

For LCMA 2, these data show a decline over the past 10 years with a 39 percent reduction in traps fished. Unlike the Area 3's trap allocation, the maximum traps fished in LCMA 3 have been pretty stable over the last 10 years, with only a 4.3 reduction from 2013 to 2022. Then to assess the number of latent traps in each area, the PDT compared allocated traps and maximum traps fished.

For Area 2 this comparison covers the years 2015 to 2022, based on the available data, and over that time period latent traps in Area 2 were reduced by 54 percent. In Area 3 there was a 64 percent reduction in latent traps from 2013 to 2022, with the lowest number occurring in 2020. Again, these do not include permits that are in certification of permit history, so those permits could have latent traps associated with them that are not accounted for here.

The PDT also wanted to investigate the idea that fishing effort in LMA 3, which spans both lobster stock, could have shifted from southern New England to the Gulf of Maine/Georges Bank stock. Looking at the number of trips in each stock area, which are shown by the columns. You can see that they were fairly evenly distributed earlier in the time series, but then overall numbers of trips in southern New England have declined, while the number of trips occurring in the Gulf of Maine/Georges Bank stock has been more stable.

Then looking at the Area 3 landings from each stock area, we see that they have been skewed towards the Gulf of Maine/Georges Bank stock area across the time series, but the percent of total landings from the southern New England stock has shifted from approximately 30 percent of the total to less than 10 percent.

A caveat with this analysis is that before April 1, 2024, federal lobster only permit holders were not required to submit vessel trip reports, so federal data on activity and landings here is not comprehensive. The PDT wanted to get an idea of how representative the data are of the LMA 3 fleet, so they looked at the percent of permit holders that did have a reporting requirement throughout the time series. They found that on average about 80 percent of the vessels had a federal reporting requirement across that time series.

Next, hearing that input from the LCMTs about the Jonah crab fishery playing a role in the changes in the lobster fishery, the PDT examined data on Jonah crab landings and fishing effort. There are several important caveats to this analysis. First, the mixed crustacean nature of this fishery makes it difficult to determine whether a fishing trip should be considered directed effort for Jonah crab or not.

Based on input from the LCMT 3 June meeting trip where Jonah crab landings were 80 percent or greater of the total landings of Jonah crab and lobster were classified as directed Jonah crab trips. Note that that method that is used to determine what direct versus indirect trips are would definitely impact the analysis. Then second, Jonah crab, the fishery is heavily influenced by the market, so that has been variable over the last several years, and this is something that was supported by the LCMTs comments. It makes it difficult to understand what is causing some of the trends we see in the Jonah crab fishery.

That said, the PDT analysis shows the majority of Jonah crab landings are caught in the southern New England lobster stock area, and it's been like that since 2013. The percent of Jonah crab landings that come from southern New England versus the Gulf of Maine/Georges Bank lobster stock haven't varied by much, but it does show a slightly decreasing trend since 2013.

The number of trap pot fishing trips landing any quantity of Jonah crab from the southern New England stock area, which is shown by the blue line at the bottom, increased from 2010 to around 2018, followed by a decline in the number of trips landing Jonah crab. The red line at the top shows the number of trap pot fishing trips landing any quantity of Jonah crab from the Gulf of Maine/Georges Bank lobster stock area. As you can see that has been a lot more variable.

Then here we're looking at the number of directed Jonah crab trips, which again was defined as trips where Jonah crab comprised 80 percent or more of the total combined landings. For southern New England directed trips were highest from 2014 to 2018, but have been decreasing since then.

Then the number of directed Jonah crab trips in the Gulf of Maine/Georges Bank stock area has been variable, but since 2013 we see an increase and then a decrease. The PDT noted that there isn't really a clear relationship between the decline in the southern New England area and the changes in effort in catch in the Gulf of Maine/Georges Bank stock area in the most recent years, but that could be due to those market factors that could also be driving Jonah crab effort.

The part of the PDT task to consider input from the LCMTs was accounted for, and as you have heard, some of these analyses took those LCMTs advice into consideration. Additionally, the PDT responded to the few things raised at the LCMT meetings. First that LCMT 2 members talked about how in the last few years federal lobster permits have frequently been sold as part of other transactions that have resulted in those permits leaving the Area 2 fishery altogether.

Based on the PDTs analyses they agree that this trend is reflected in the data. Then the LCMTs also talked about the control date that was in the NOAA interim rule, which was May 1, 2022. They recommended changing it to a future date or removing it, and the PDT commented on this, saying that if a future control date were put in place that might cause some speculation and an increase in

effort if harvesters were to attempt to purchase more traps in advance to bolster their allocation.

If the Board doesn't want to pursue ownership caps as part of this management strategy for Area 2 and 3, then a new control date would not be needed. Then at the Area 3 meeting it was stated that the southern New England fishery has scaled itself back since 2013, with reduced effort also shifting east and moving to the Jonah crab fishery, and they mentioned that logbook data would be able to show these shifts. The PDT didn't have access to logbook data for this analysis, but they agree it could be helpful to look at them, and specifically looking at the number of trap hauls by stock area over time. The PDT also agreed with the LCMTs that it does seem there has been a shift in effort in landings to the Gulf of Maine/Georges Bank portion of LMA 3. The PDT discussed some possible approaches that the Board could consider if it was just to reduce exploitation of the southern New England stock.

However, the PDT did not really have recommendations on measures that could directly reduce the size of the fishery, which was the intent of Addenda XXI and XXII. As the analyses show, it appears that the size of the southern New England fishery has already been reduced, despite the rules from Addendum XXI and XXII not being implemented federally.

The options the PDT discussed for reducing exploitation of the stock were seasonal and spatial closures, v-notching, output controls like trip limits or quotas, and reducing latent effort. The PDT noted that these measures have been discussed by the Board previously, and that there have been various concerns with them, and those are discussed in Addendum XVII. I'm not going to go into a lot of detail.

But regarding the closures, the PDT noted they could reduce landings during high exploitation periods, but the industry does rely heavily on those periods. Then spatial closures may help, but we can't predict this gear would just be then moved outside of the closure area. Then for v-notching, it's been discussed to protect reproductive females, but there have been concerns raised by the TC about further skewing a sex ratio of the southern New England stock, as well as disease and increased regulatory discards.

Trip limits and quota management in the lobster fisheries have historically been met with opposition because of the logistical difficulties in implementing and enforcing them. The PDT noted that trip limits could essentially nullify the current trap allocation system, and also that the number of trips could increase to make up for lost traps per trip.

Quotas for lobster fishery would obviously require drastic administrative changes and probably it would have to impact the Gulf of Maine/Georges Bank fishery as well. Then the last bullet here focuses on ways to further reduce latent effort to prevent it from becoming active in the future. However, it was noted that this would be unlikely to improve the stock from current conditions. With that I am happy to take any questions.

CHAIR KELIHER: Not seeing any questions for Caitlin. Next steps, I would look to Caitlin and Toni. Dave Borden.

MR. DAVID V. BORDEN: I have a comment, Mr. Chairman if that is all right at this time. The PDT I think did a fine job and should be commended for the report. There were a couple of aspects that I agree with. They commented on the need to look at trap hauls. I think that's kind of critical, given the changes in the fishery.

If the PDT has the data available, and I'm not saying that they do, but if they do, and they can look at trap hauls in the southern New England portion of the stock, they are going to show a much more pronounced decrease than has been reflected in the report. Because what is happening is people are increasing their setover time, so the trap hauls have gone down. The opposite is taking place on the Georges Bank portion of the stock where the trap hauls are increasing, and I'm just using my

knowledge from my prior position with AOLA, and I think that is something to look at. On the issue of the committees, the Area 3 Committee and Area 2 Committee. The Area 2 Committee I think has made a lot of progress at the two meetings that were held, in terms of kind of refining their positions.

I think possibly if they met one more time, they could submit a written report that kind of summarizes those findings. I've listened to both of those discussions; I would point out. Area 3 is kind of a different group. I think that the PDT work really have to kind of progress on this, if they're going to look at trap hauls, and then after that is done, maybe the Area 3 group should meet again and look at the results and see if they have recommendations.

CHAIR KELIHER: Dan McKiernan.

MR. McKIERNAN: Yes, I agree with David. Great job by the PDT. I would also like to point out, since this Board voted in 2013 on the measures a lot has changed in southern New England. Today the fishery faces offshore wind development and all the displacement that we expect to see among all the Mass/Rhode Island Wind Areas, and also a three-month closure of right whales south of the islands.

I think when we enacted these rules a decade ago it was between us, the fishermen and the lobsters, and now you've got all these other forces that are affecting the industry's ability to make a living. I think that needs to be factored in going forward. But I do agree with David. I think each of the LCMTs should be given an opportunity to look at the results.

To David's point, I think there was some interest on the part of the Area 2 folks to maybe have a cap of the number of permits, so we should give them a chance to come back. The thing about Area 2 is a lot of those vessels have state permits as well, and our states have an owner/operator rule, so it kind of keeps the number or the scale of fleets that would be created down to a low level. But I would support reconvening each of those two groups, for purposes of reviewing this report.

CHAIR KELIHER: Anybody else on this topic? It seems like we've got some additional work to do with the LCMT. Oops, Caitlin has her hand, go ahead.

MS. STARKS: I just want to ask a clarifying question from David on looking at the trap hauls. We are in the middle of the lobster stock assessment, and that is something we could do through that process. I want to get a sense of the urgency of that analysis, and if we need to do that now, or if doing it through the stock assessment process would be satisfactory.

MR. BORDEN: Do you want me to respond, Mr. Chairman?

CHAIR KELIHER: Yes, please.

MR. BORDEN: I think the Area 2 folks were so close to concluding their position they could probably meet now. I think the Area 3 people a longer road to get to a discussion. If I could suggest anything, I would say do the Area 2 meeting and then let some of the rest of this work develop, and then have the Area 3 folks meet.

CHAIR KELIHER: I think what Caitlin is looking for though is, when do you want that data? Is the data on the trap analysis? Is it all right coming out through the assessment process in October, or do you want that information ahead of time?

MR. BORDEN: October would be fine. If they were to meet between now and then that is fine.

CHAIR KELIHER: That is 2025.

MR. BORDEN: You mean the assessment.

CHAIR KELIHER: Yes, not this bird season, next bird season.

MR. BORDEN: Yes, it's next year. There may be some benefit in having them meet before then.

MS. TONI KERNS: Question to you, David. Will this trap analysis aid in the Board's decision on whether or not you would want to take further action or not, or is it just an informative piece of information? Just trying to manage the state staff's time, and the work that they are trying to get done in the assessment, noting that they had to delay the assessment.

MR. BORDEN: As far as Area 2, I think that might be a recommendation you just eventually put on the table, and at the appropriate time include it in a subsequent addendum. I don't think it's time-critical to do it. I said that a couple of times.

CHAIR KELIHER: What I was going to suggest is there seems to be consensus on the LCMTs to need to meet again. Have that meeting, review what the PDT has done to date. See if additional analysis is needed after that time, and what the timeframe should be, based on those conversations. Does that work? Excellent, okay. Good on your end? Anything else for Caitlin on these reports? Toni.

MS. KERNS: I just want to state that at this time we have asked NOAA Fisheries to withdraw on the measures in the Addendum and that is holding. We did ask for exceptions for the transfers of multi LCMA trap allocations, and we have asked those to continue to move forward. Until this Board takes up anything else, then that stands and the only thing that NOAA would be moving forward is that multi LCMA trap allocation when they can.

CHAIR KELIHER: Yes, I don't think anything more is needed, until we get through that process, right? Okay, everybody in agreement there? Great. Nothing else from you, Caitlin? All right, well let's move right along.

COLBY COLLEGE ECONOMIC ANALYSIS OF THE LOBSTER GAUGE INCREASE

CHAIR KELIHER: Item Number 6 is a report on the Colby College Economic Analysis of the Lobster Gauge Increase. If you recall through the Addendum XXVII process, and then at the last meeting they had a lot of comments on the economics of the issues that we're dealing with. Economic analysis is not something we normally do, but we did receive a letter based on some work that was done in Maine. We've asked Amanda Lindsay to look at that information, so I think we have her, we phone in a friend here, she's online. Amanda, if you can hear me, the floor is yours, Amanda.

MS. AMANDA LINDSAY: I think I don't have control over the screen, is that correct?

MS. STARKS: Yes, correct.

MS. LINDSAY: Okay, so I'll just say next when I need the next slide moved. Okay, so obviously I am not Michael Donahue from Colby College, I am a different economist. I didn't have anything to do with that analysis that he did in April, but it is related to my area of expertise, and so I was asked to provide a little bit of context and maybe answer questions about the analysis that he did.

Just because I'm new here, I just wanted to give you a little bit of my background. I have a degree in Agricultural Resource Economics, and in particular my research focus is bioeconomic modeling, and specifically looking at marine fisheries management policies. I feel like I'm pretty well versed in what I need to know to evaluate what he did.

I'm new to Maine, but I spent the past year learning a lot about the lobster fishery in Maine, and so everything I'm talking about is really just focused on the perspective of that management Area 1 and Maine lobster fisheries. I'm going to run through some highlights for the policy analysis performed by Professor Donahue, but I also want to take a few moments to comment on analysis done by the Technical Committee, so I can help kind of contextualize the results.

I just have a few thoughts that I want to leave you with today. I'm sure we all know, but I just want to make it very clear that what we're looking at in particular is what would the economic impacts be

of increasing the minimum carapace gauge length for Maine lobsters. To my understanding this would be done over two stages.

The reason why it's such a big deal is DMR data suggests that a very large proportion of Maine's recent harvest would fall in this soon to be illegal range. Yes, so the big question is, how is this going to affect Maine lobster fishery? Why didn't Michael Donahue provide this analysis? In 2016 he was involved with a bigger project, it's called The Dollars to Lobster Project.

There are several, publicly available presentations, and documents that I looked over after I was asked to kind of review his letter that he wrote. That research really focused on the contribution of Maine dealers and buyers to the Maine economy. Both at previous analysis and this more recent one, he used this in-plan modeling software. If you've never heard of this before, it's an extremely common and standard modeling software used for economic analysis.

It's a type of general equilibrium modeling, and the software comes equipped with the best and updated federal and state datasets that are needed to kind of parametrize the model. However, there are features of the software that allow users to enter additional information as needed. In his previous 2016 work, Michael Donahue, with a team of researchers, collected a bunch of data from dealers in Maine, and then used that to populate his model. That was kind of a different model, to my understanding of his letter, and this one that he performed in April was really focusing on the harvesters and upstream enterprises. We can talk a little bit more about that if you're interested. This is kind of a freak food cartoon; economists typically don't use diagrams like this. But this is kind of like the way that I explain how this modeling process works, to kind of my non economist colleagues.

When you're doing this modeling software, you have to define the boundaries or the scope of your model. In this case, we would have had a model of the Maine economy. Because we're interested in this fishery policy, we have to explicitly make sure we have identified the number of harvesters, maybe the amount of capital that they are operating with, the relevant upstream enterprises, which are the input suppliers, and downstream enterprises as well.

But of course, Maine is more than just a lobster fishery, so the model also kind of represents all other economic sectors and household and government. These green and blue arrows, I use to represent the flow of goods and services and money. A researcher will go into this software program and create a model that is in what we call equilibrium. It's kind of a system at rest.

Then the researcher will introduce a policy shock. That policy shock is used to kind of mimic or represent what the direct impact of a policy would be. In the second image, I have indicated that these two arrows leaving the harvesters are now red, and they are smaller, to represent his assumption that Addendum XXVII would lead to a 10 percent reduction in landings value.

He introduces that shock to the system, and he lets a new equilibrium be found. You have this before picture of the economy, and you have an after picture of the economy. Comparing this before and after is how an economist would estimate the economic impact. In his report he identifies direct, indirect, and total economic impact, and so that led him to his conclusion that this would have approximately a 60-million-dollar impact on the Maine economy.

The letter was brief, I believe it was two pages. It was very clearly a quick analysis. I think he did a really excellent job identifying all of the caveats to his study, and I just wanted to point a couple of them out, which I think are really salient. Given how this modeling process works, the assumption that the Addendum XXVII would reduce landing values by 10 percent is an assumption.

He does not know if that number is the correct number. It could be greater, it could be smaller, but it is the assumption that he makes. Contingent on that being approximately true, then you can rely on those following results and what that would translate to in total effect. A few features about the model, it's a very theoretical model.

It uses the best available data, but of course it could be more precisely updated to reflect current market conditions. He made a note in his memo that he focuses on harvesters and upstream, and not the downstream enterprises, because he doesn't believe the 2016 data that he collected previously reflect current market conditions. The modeling framework that he uses doesn't explicitly model the fish stock or the behavior of the fishermen. The fishermen could be changing their location or intensity or soak times, or what have you, in response to the policy, which his framework isn't set up to kind of model. He also does not include the Canadian harvesters, which is important, because they are drawing from, at least in part, some of the same stock. They compete in the same market, and are subject to different regulations. That could have big implications to the market conditions the Maine lobster fishery is going to face after Addendum XXVII is implemented. The final point, he doesn't really mention this, but I believe it's important to emphasize, that his methodology is what I would call a static model.

It's using snapshots of the economy, in order to make the assessment. We don't know how long it would take for the stock for the economy to recover, because the model isn't designed to answer those types of questions. I think it's important, since I just had all these like really critical comments about his analysis, to put it in context of something that was provided for me in the draft document for the Board discussion, particularly related to Appendix B, which was an analysis provided by the Technical Committee.

I read through that as well, to kind of help me understand how it compares to the work that Professor Donahue did. I thought they were both very interesting. They seem like very rigorous, I mean standard procedures were followed, et cetera. In their report for the Management Area 1, the researchers predicted a decline in the number of individuals, but an increase in the harvested weight after the Addendum XXVII goes into effect.

I think it's really important to point out that that does not clearly tell us what the effect of landings value would be. It also doesn't explicitly model fishing behavior in the way that economists would, so it has that similar weakness. It's by design it doesn't model these economic linkages that are relevant.

What I thought was really interesting about the methods is that it is similar to Professor Donahue's work in that it is a static kind of equilibrium comparison of the stock, and we're not looking at the path of dynamic recovery. When I was asked to kind of look over these analyses and explain the discrepancy, I think the big takeaway I had was that they actually are very similar, even though one is looking at the economy and one is really looking at the stock.

I don't think that these two reports are mutually exclusive. I think it's very possible that both of the findings could be true at the same time. No one really asked, but because there is this kind of question is, what were the assumption of Professor Donahue, were they reasonable? I think they are very reasonable assumptions that he made.

I would think that this Addendum would have a big economic impact, at least in the short run. But what is probably the most important policy question is what would happen in the medium to long run? To answer that question, you need to know about the recovery of the fishery and the recovery of the economy. This kind of question, it's how big the gains are and when they occur. It could have a really big impact.

If the biomass and the harvest increase, as the Technical Committee predicts that they will. It could be the case that we would have net economic gains. However, if those gains are smaller, or they just take a long time to accrue, it could actually be a net economic loss. I wanted to throw out there that I did a little bit of a literature review when I was asked about these reports. There are a few things I think are really important and interesting to think about. There was this work done by two U Maine professors in the eighties. They were looking at the expected benefits and costs of a similar type of policy, a little bit different in terms of the gauge change. That had a biological element as well as an economic analysis.

I thought it was really interesting when I read it, the biological estimates, in terms of how it affects harvest. It seemed very similar to what was done more recently in 2021. The economics did not look so rosy, so they predicted that there would be gains eventually to harvest, but they would accrue too slowly, so it would be economically undesirable.

I wouldn't put too much stock in that analysis though, because the methods don't meet today's best practice standards. I wouldn't trust those numbers. I only was able to find this one other article looking at how changing minimum size affects harvest, but it was in a recreational fishing context. I'm sure there is more out there, particularly because this question seems very similar to policy changes in the stable fishery in Alaska.

But I didn't have the references to kind of look over and help maybe contextualize what is going on here. But I think the most important thing, and both documents I looked at brought this up. There is this question, a lot of unanswered questions about the market of lobsters, particularly what is this relationship between size and price.

It is well established by researchers that the size/price relationship is really important when you're thinking about management, so what the economic outcomes are. Most academic research focused on this positive relationship. When big fish get higher prices per unit or per weight, and how that kind of plays into the policy of protecting large breeding females.

But it sounds like in my experience over the past year and in these documents, there is this idea that for Maine lobsters there might actually be a negative size/price relationships of smaller chick lobsters are getting a better price or more desirable. I think that is really interesting, because it could have really big impacts to what are the economic outcomes of management policy.

I think there is like a lot of really important questions that we don't have the answer to, which is limiting our ability to predict what the true economic cost of this policy will be. That's it, that is all I have prepared, but I am happy to answer additional questions. Of course you can ask me now, but if anyone wants to reach out to me, my contact information is there.

CHAIR KELIHER: Great, thank you, Amanda. That was a lot to take in there. Your diagram for the non-economists in the room was probably appreciated, because I think everybody is a non-economist in the room. With that I would like to see if there are any questions from the Board for Amanda. Steve Train.

MR. STEPHEN TRAIN: On that last slide where you referred to Acheson and Reidman's predictions in the eighties, about a measure increase. Did you see what the data was from the eighties to the nineties after the last measure increase, to follow that up?

MS. LINDSAY: Oh, interesting. I have not, so I only stumbled across that article in the past like two weeks. I would say, I am not familiar with the formatting of that type of paper, so it really obscured a lot of their data and their methods, which is why I said I am a little skeptical of it. But that is a really interesting question.

I'm definitely going to check it out, to see if what they predicted manifested. I think the main

problem is that their ex-ante analysis, they were just looking at an increase up to, what was it, like the 88.9 or something, and I don't think that they would have told us what would have been that marginal benefit from just going from '81 to'83.

CHAIR KELIHER: Follow up, Steve.

MR. TRAIN: Follow up. We didn't make that full increase back then; we only went up a little. But the stock was running just slightly ahead of its 20-million-pound, hundred-year average. In the eighties we started approaching 30 and 40 million pounds, in the nineties, 60 million pounds by 2000, and over a hundred million pounds a few years ago.

MS. LINDSAY: Yes.

MR. TRAIN: I don't understand a prediction of an economic loss on a measure increase, when the last time we did it the data showed the other way.

MS. LINDSAY: It gets down to this question about the price, and how the price affects that measure of value, right. They also found, like in the Acheson, they were the eighties. They predicted that the volume in weight would increase, but the number of individual lobsters caught would decrease. Net-Net-Net, they predicted like harvest revenues would increase for Maine lobstermen after this policy took place.

The problem is that they predicted losses for five years, and then only on the sixth year would the benefits come. When you do the final cost benefit analysis, those initial years of losses were not made up for by the gains in their final year of their study. When I'm suggesting there is this question about whether or not this would be good or bad for lobstermen, it's kind of under this idea that when you enforce this increase of size, that at least temporarily the harvest is going to go down. They may go up five, ten years from now, but that might not be sufficient to make up for the losses accrued in the short run, or it could compensate for it. Like your example saying how we've just seen these steady increases over the past couple decades in our harvest. That is possible. My concern though is, without kind of knowing how long it's going to take and what that recovery looks like, it's hard to know what the economic impact will be.

CHAIR KELIHER: Thank you, Dan McKiernan.

MR. McKIERNAN: I'm a little confused with some of the final conclusions that were made about there being a negative relationship between the size of lobsters and value, because every lobster market I've gone into, the least expensive lobster per pound is the chicken size lobster, chicken are pound and a quarter. When you get up above a pound and a quarter, it is always an extra dollar at least per pound. I'm skeptical that that relationship is a negative one.

MS. LINDSAY: I don't know have any evidence to suggest it's one way or the other. I'm simply saying that in various papers and in some of these reports that I looked over, there was this suggestion that there was this relationship. I don't think that we know conclusively one way or another.

I have heard concerns of people in the lobster fishery that I've talked to over the past year, that because dealers have consolidated that dealers are buying large volumes of lobster, and if they can't get the size they want from one group of harvesters, they may shift a lot more of their buying to another region.

I think, do I have any evidence if it's true? No, I don't. I'm just saying that if this is true, if there are different features of the market, it could have bad consequences to this policy. There are a lot of kind of ways that this policy could get kind of distorted, when we think about what the economic benefits could be. Does that make sense?

MR. McKIERNAN: Yes, thank you.

CHAIR KELIHER: I think if there is one thing we've learned, well and kind of watch what is going on with lobster over the last few decades is how dynamic this market is. It's very hard to understand all of these relationships, I think in the end. But this has been very informative. Are there any additional questions for Lindsay? Not seeing anything.

From a Board perspective, is there anything more the Board would like to have looked at? Is there any information that we would like to pull from the TC, for instance, around these relationships? They've already looked at the data along the potential loss of harvest, what would be made up in yield that year. We know those are estimates. Is there anything more we need there? Is there any refining of that data that we would like to see? Steve Train.

MR. TRAIN: I would love to see the Technical Committee talk with economists and use some previous data, like the last time we went up on the measure, to see what the economic impact was the next year, three years, four years. Go that far back if they have to. But just to see beyond what we're seeing for spawning stock biomass and weight, just to see what the possible economic outcomes are after change, with history, not just raw data.

CHAIR KELIHER: I was commenting to Caitlin earlier. I'm not sure, and the economist and the TC would have to tell us. But I'm wondering if this is an apple-to-apple comparison, right, because the resource was in such a different state then versus what we're seeing now. It may be something we could ask the TC to think about when they come together again, to think about, is there a relationship there that should be looked at from the last gauge change to this one, and make that comparison.

MS. LINDSAY: May I make a quick comment?

CHAIR KELIHER: Sure, Lindsay, go ahead.

MS. LINDSAY: I would just say, I think that is the idea of looking at kind of historical evidence of how that increase affected harvest would be really great. I think it would also be interesting, it looks like in the methods described by the Technical Committee, I'm not sure if it's possible, but it seems like they might be able to summarize kind of the path of recovery, the methods.

The report that they provide say that they compare, they have the models run for 50 years to reach equilibrium, and then they do their analysis. I don't know if it would be perfect, but it would be interesting to see how long the population takes before it reads that new kind of level. It's not a perfectly dynamic analysis, but it could give us a sense of how long it would take to achieve some of those outcomes.

CHAIR KELIHER: I'm going to go to staff, Toni.

MS. TONI KERNS: I just want to note that the datasets that we have from the eighties versus the datasets that we have now are quite different. I don't even know if we have a complete view of what landings data looked like in the eighties. I just caution the Board on the information that you're going to get back.

It may be helpful if we talk to our TC Chair on the side and see what kind of work this will involve. Again, I'm still trying to keep that TC on track for the assessment, and what this will inform the Board of, in terms of its decision making. What action are we informing for?

CHIAR KELIHER: I think that is a really good idea, Toni. We've got some time here, depending on what happens with a later conversation today. There is a timeframe that we have to work within. There is potentially a second gauge change that this could be also very informative for as well. If there are no objections from the Board, why don't we have Toni talk to the TC Chair, Caitlin talk to the TC Chair, figure out what that workload would be, and then bring that back to the Board at the October meeting. Aloha, Mr. Reid.

MR. ERIC REID: Yes, Aloha to you. In Ms. Lindsay's effort, she said she did not take into account fishermen's behavior, which I'm assuming means at some point if you're losing money, you may exit the fishery. That is not accounted for. But Mr. Train is pointing out a study that was done some time ago.

Is there any way to capture how many people fell out of the fishery due to a gauge change and the negative impact? Of course, fishermen don't usually go too often to work at Walmart, but there was a cost to drop out of the fishery and perhaps enter another fishery, which are these things that produce maybe negative income in the short term for sure. But I'm just interested to know how do you look at the data in the effort, looking at data.

MS. LINDSAY: I think the questions you asked are definitely answerable by economists, not by the style of modeling that Professor Donahue has performed. His analysis is like a macroeconomic methodology that kind of summarize aggregate behavior, so like everybody in the fishery, not particular fishermen. The type of modeling that I do bioeconomic modeling, where you explicitly model economic decision makers, so fishermen, and you explicitly model the fish stock. With those types of tools, which are kind of classified as microeconomic analysis, you are able to kind of look at entry and exit into a fishery. Change in effort could also be fishermen buying larger boats and trying to fish further from shore, or like moving their effort around spatially.

I think the point Michel Donahue refers to that kind of limitation of his model just to say that in defense of his assumption that it will decrease landings 10 percent. Effort changing in behavior can affect what that impact is. Again, it could be the case that 10 percent number is incorrect, and it is also, I think as you say, it's a really important point.

It doesn't necessarily, I mean it does matter in the aggregate what happens, but it also matters what is happening to individual fishermen. Is everyone just making a little less money or are some fishermen forced out of the fishery completely? It's something to think about. Unfortunately, the current analyses that are out there cannot comment to that.

CHAIR KELIHER: Great, thanks Lindsay. I'm going to take one more question, we've got to move on. Dennis.

MR. DENNIS ABBOTT: I will have a question, but I think we have to keep in mind why we're where we are. There is a reason why we proposed a gauge increase. I think there was an understanding that there would be an initial loss of revenue. A lot of what we did started in the state of Maine.

I don't disagree with anything that Ms. Lindsay, Professor Lindsay stated in her report. I think it's beyond a perception of what is going on, as Representative Golden wrote us in his letter. A question I would have, and I would direct it at Steve Train, a long-time lobsterman with generations of experience in his past. Are you willing to take gauge increase for the long-term liability of your industry?

CHAIR KELIHER: You're asking one member of a 5,000-member fishery, Dennis, so with all due respect, and understanding exactly where Steve is, in relationship to the coast of Maine and how this is impacting him, versus Mid-coast and Downeast. I think it's a very different answer, depending on who you're talking with.

Your point though, Dennis, is well taken that we are trying to be proactive in the face of changes that we are seeing in our juvenile assessment. I think that is certainly why we're here. I would also just remind the Board that we are being proactive for the first time in how we act and how we work as a management board, and because of that it does have challenges that relate to the economic health of our fishery.

I think what I would like to do now is move on with the agenda. But suggest to that the issues that just came up that were raised by Eric Reid, along with

the others, becomes a conversation between staff and the TC Chair. We also know that we have a lot of data from sea sampling back into the sixties that potentially could come up. Maybe what needs to happen at some point is a conversation between Lindsay and the TC, because I think having that dialogue at that level would help answer some of these questions, like these technical questions that are coming up, I think could become part of a dialogue between the two entities. Then if that happens, they can bring that information back. Again, time is on our side here from a management perspective, depending on what happens later in this meeting.

But we will have the ability to have this information coming in as we're trying to make determinations of the next steps with the management approach for lobster. Is that all right? Okay, seeing that. Lindsay, I want to thank you again for your time here today. It was very informative, and we appreciate the input that you've given the Board.

REVIEW DISCUSSIONS WITH CANADA ON COMPLEMENTARY MANAGEMENT MEASURES

CHAIR KELIHER: With that I would like to move on to Item Number 7, which is Review the Discussions with Canada on Complementary Management Measures. I'm going to ask Toni Kerns to give this report, just for the reminder to the Board. There have been a lot of conversations between the U.S. and Canada based on Addendum XXVII impacts to both countries, the flow of lobster.

I had some very good conversations leading up to this meeting, where the idea of having some managers, as well as industry reps from zone councils and the LFAs in Canada, come together, talk about what these things mean, and so Toni will give an overview of the meeting. Before she does, I just want to point out that the document that was in the supplemental materials was one that was submitted to Maine DMR. That information did not have all of the U.S. reports that were given. Those were compiled, DFO Canada has not responded to that, so that is very much a draft document that is potentially going to change. Not a whole lot in it, if you had a chance to read it, that really is earth shattering. It's all stuff that we've certainly discussed in the past. I just want to make sure that was clear and on the record. With that, Toni, I'll turn it over to you.

MS. KERNS: For those folks around the table that were at the meeting, if you have anything to add when I'm done, please do so. As Pat said, we had some state staff and some U.S. lobster industry fishermen go up to Canada and meet with DFO staff and DFO fishermen from the maritime regions.

Those maritime regions include the lobster fishing areas that start at the tip of Cape Breton in Nova Scotia, and they go to the Bay of Fundy and the U.S. Canada Border in New Brunswick. We presented an overview of what is going on in United States, in terms of the changes in the size limit in the Gulf of Maine.

We provided information on what the status of our stock is doing, and then Canada provided an overview to us on the status of the maritime region's lobster fishing areas. We found that their lobster fishing areas are all in a healthy condition. Uniquely, they both have stock assessments and management areas for each LFA.

They will either use a catch-per-unit effort to look at the status of the stock, or they will have what they call a weight of evidence, which uses fishery independent surveys to give a status of their stock. They are all in healthy conditions, but they are starting to see some similar trends in declines that we are seeing in the Gulf of Maine. For Canada, in order to make changes in their management measures, they have harvest control rules with pre-agreed upon decisions for actions to be taken if a stock falls below a healthy condition. Otherwise, any change in management has to come from the bottom up, so starting with the LFA, industry making those decisions. In the case since all of their areas are in healthy condition any changes that

would be made now would need to start with those industry members.

We provided the rationale of why we're making this change in the size limit for Area 1, and there were some of the LFA industry members that were open to an idea of a change in the size limit, because they are also seeing some changes. There are others that are a little bit more hesitant to want to make that change.

I think that is partially due to the fact that Canada approaches their management slightly differently than the United States does, in that they do have size limits, but they also have some seasons, and some areas have pretty restricted seasons in place. That difference is meaningful to those fishermen.

We also talked about what happens in imports in the United States if the size limit comes into play, and whether current practices for product that is just moving through the country, so bonded products, meaning it is either being trucked or flown through the United States, bound to another country, and whether that product would be subject to these new size limits or not.

I did speak with custom agents from NOAA, and currently bonded product is not subject to the U.S. size restrictions, and that would continue to happen if we do make a change in the size limit, that bonded product could still move through country and not be subject to the changes in the size limit. That bonded product needs to stay sealed; it cannot be manipulated in any way.

As soon as it is transferred or manipulated, then it is no longer considered bonded product. I think at the end of the day, I think there is some interest in Canada to allow their industry to go home and talk to their LFAs, to continue discussions on whether or not they would be interested in either matching our size limit, or coming closer to that size limit.

But they need some more time to think about it. They definitely would not be able to make a change in the regulation prior to January 1, when our size limit comes into place. Some of the things that came out in the discussion is, would you be able to delay, not delay that size limit increase or not? We sort of left it on the table that we would come back to this Board and have some discussions on what we may or may not be able to do. Is there anything else that Dan, Cheri, or Pat would want to add to that summary?

CHAIR KELIHER: I think you really covered it. Dan, do you have anything you want to add?

MR. McKIERNAN: No. Toni, that is a great description, and it was an eye opener for me to hear the Canadian system, when overfishing or overfished status isn't in play it's a bottoms-up. Really, I credit Pat for convening this meeting, but it was really an opportunity for us as managers to kind of get those fishermen together, the Maine Zone council members and the Canadian LFA industry reps, Lobster Fishing Areas. There was a lot of good exchange. I sense there was some interest among the Canadian fishing representatives to consider this. But as you said, they couldn't possibly do it by the first of January, the would be convening a group called MARLAC, which Pat, you can help me with what that is. But it's an annual meeting of the tribes of the fishing industry and DFO to talk about future management options. If Canada were to follow suit with us, it would probably be sometime in 2025.

CHAIR KELIHER: Cheri, did you want to come to the public microphone? We're going to forego the rule of three here for the table. Yes, step away from the table, Renee, no, I'm just kidding. Go ahead, Cheri.

MS. CHERI PATTERSON: Dan and Toni really did cover it well. However, there was one thing I wanted to mention is that when asked how long it could take them to pull together regulations, we were informed that June 1st would be the timeframe that if they were interested in doing this, that they could pull these regulations together.

CHAIR KELIHER: I think the conversations with Canada, I think certainly have been affected properly, and I think they were very positive. I think what Canada was feeling on the LFA side was the fact that this was being forced on them by the U.S. There was certainly those type of concerns expressed around the table from the LFA Reps that wanted to be able to have these conversations in a way that was going to be more informative in a time that allows them to be able to have really meaningful conversations with the harvesters.

We had a lot of complaints from our Canadian LFA Reps that were there to say, our fishermen are fishing right now, that is why they are not at the table, which I pointed out that every fisherman from the U.S. that were there gave up fishing to be there. I think frankly a lot of it is culture, how things take place, how the meetings happen when their fisheries are happening.

They have very few, it seems to me, very few of those kinds of back and forth between harvesters and DFO. I do want to make sure it is clear for the table that we're talking about the LFAs in Canada that touch the Gulf of Maine. The Gulf of St. Lawrence, those LFAs around Newfoundland, Magdalen Islands in particular.

Those fisheries are going gang busters, like the Gulf of Maine fishery here was going back in the early 2000s up until 2016, where we set harvest records. We're not expecting to see any change from about the St. Lawrence Region, we're talking about the LFAs possibly around Southwest Nova Scotia and the Inner Bay of Fundy making those type of considerations.

We're expecting that those will be meaningful conversations that are likely happening since that meeting, through until the MARLAC, which I can't remember what the acronym is either, and I'm not going to phone Toni. Toni is going to look in her notes. But that meeting will happen in September.

We will certainly be more informed after that. Any questions from the Board regarding these conversations with Canada? I would say from my standpoint, the idea of having if we can see changes both in the U.S. and Canada from a gauge perspective on both sides of the border, certainly that will be a much bigger conservation benefit for the Gulf of Maine. Dan.

MR. McKIERNAN: Yes, one other positive outcome of the meeting was I think there was a consensus that the U.S., our Technical Committee should have a regular check in with the Canadian folks who are basically assessing the same stock on the other side of the line. I look forward to that in the future.

CHAIR KELIHER: Yes, I think what we saw, as Toni reported, very different management approaches using very similar, well not even similar datasets, right? We're assessing juvenile side of the stock, where they are using CPUEs and looking at landings, so very different approaches, but trying to achieve the same outcome. I think having that science exchange is going to be really important. Jim Gilmore. Nice to see you, Jim.

MR. JAMES J. GILMORE: Just years back when I know New York's fishery pretty much collapsed, whatever. But there was this issue sort of a similar thing, where all the lobsters were coming from Maine, and there was an issue about exactly what Toni had gone into, they had to be sealed. But there was really not much of an issue for us, because we didn't have a fishery, so we didn't have to do a lot of oversight out of that.

But you in the north, now you are going to have more of Canadian lobsters coming in. Is that going to be an increased work load for you, because now you could have different gauges, different markets, so now you are going to have to watch that a lot more closely than we had to. Just curious if you thought about that.

CHAIR KELIHER: We thought a lot about it. I think that is what we'll really one of the conversations around Addendum XXX that we have coming up on the agenda, and how we would deal with that. The

conversation around bonded produce, just so it's clear for non-border states. Bonded product coming through the United States is really driven by the fact that the country of origin, in this case being Canada, doesn't want to pay tariff and taxes at every country that it stops in to its final destination, so it's bonded and sealed.

Toni talked about having the conversation with NOAA Law Enforcement Agent that deals with that stuff. We do border inspections with NOAA OLE, and Homeland Security; Maine Marine Patrol does. We're not looking at any shipment or any truck coming into the state or through the state of Maine or through the United States that is a sealed bonded truck.

That is all done in the country of origin. It is all done based on the regulations of where that shipment is going. The only shipments that we look at are ones that we know are going to come into the United States, to make sure that they are consistent with our regulations here. Dan.

MR. McKIERNAN: Pat, I'm not sure you've been clear enough. The bonded product is heading out of country, typically through the airport.
CHAIR KELIHER: Yes, I'm sorry, bonded product is leaving Canada, going to a U.S. airport, and then flying overseas. Yes, anything else on this item? Dan.

MR. McKIERNAN: Well, we have two orders of business today that is coming up. One is Addendum XXX and the other is, I would like to start a discussion on doing what we just discussed was a topic of conversation in Canada, which is a potential delay in the implementation of XXVII. Which would you rather take first? The delay, okay. I have a motion that I have shared with staff, and consistent with the mood and the theme and the details of our conversations, I am interested in a small delay to the middle of the year in 2025, to implement the biological measures of Addendum XXVII.

When I say the biological measures, what I mean is the gauge increase, as well as the standardization rules that are going to affect Outer Cape Cod. But I'm not including the trap tag issues that Cheri and I both have to implement for 2025, which is no longer giving out 10 percent. That is kind of mentioned in the body of the motion.

By delaying this until July 1st, it certainly sends a signal to Canada that we want to minimize the impact on their fishery in the year 2025, because most of those fisheries finish by June 30th. Pat, that was one of the reasons the Canadians were complaining because they only had two days left of fishing, because it was the last few days of June, and they just wanted to get their final days in, because then they pull their gear out for the rest of the year.

This would delay for six months, and as far as the Massachusetts fishery goes, our fishery is closed in our state waters in Area 1 until the right whales leave, which is typically the first week of May, and the shed really kick in until the end of June. I'm interested in delaying this until July 1st, and I would be interested in hearing any other discussion, especially from my New Hampshire neighbor, since this Area 1 fishery is shared by the three states of Maine, Mass and New Hampshire.

CHAIR KELIHER: Dan, if you would, would you read the motion, then I'll ask for a second.

MR. McKIERNAN: **Move to initiate an addendum to delay the biological measures implementation date of Addendum XXVII until July 1, 2025. Specifically, biological measures under Section 3.1 that created common size limits for state-only and federal permit holders fishing in Outer Cape Code would be implemented effective July 1, 2025. Similarly, management measures triggered under Section 3.2 would be implemented by July 1, 2025 starting with the Year 1 measures, and subsequent management measures (additional minimum size increase in Area 1 in year 3. Vent size increase in Area 1 in year 4; maximum size reduction in Area 3 and Outer Cape Cod) would be implemented by July 1 of the calendar year for which they are**

required. Trap tag issuance regulations regarding the routine issuance of 10% additional trap tags in Areas 3 and 1 above the trap limit or allocation would remain unchanged. It would mean leaving the trap tag issuance intact and then creating a new addendum, which would alter the effective date of the biological measures.

CHAIR KELIHER: Great, thank you, Dan, do we have a second? Steve Train seconds. Discussion on the motion. Renee.

MS. ZOBEL: Dan, may I ask you a question about why July 1? In the meeting with Canada, we heard that they said they could move potentially move forward regulations by June 1. June 1 also happens to coincide with one of the dates of lobster management, not the permit year but the trap tag issuance year. Just curious on why not stick with kind of known management date instead of going to July 1.

MR. McKIERNAN: Renee, it is my impression that many of the Canadian fisheries remain open until June 30. This would hold harmless, not the dealers, per say, but it would hold harmless the harvesters until that date, until the end of their season. Otherwise, you're asking them to make s significant change toward the tail end of their season.

As far as our May 1 fishing year. We have a start date of fishing year and trap tag gear, and one is May 1, one is June 1. That doesn't make any sense to me, so what is the difference having a third stock date. I'm easy on that, but that was the rationale, to try to get to the end of the Canadian harvest seasons that at least we know about. I am not an expert in all of the Canadian seasons, but I believe June 30 is a common closure date. Pat, am I right?

CHAIR KELIHER: Yes, I think based on the conversations with Canada we heard from most of the majority of the LFAs their seasons were just ending, and we met at the end of June. Any additional questions? Steve Train.

MR. TRAIN: Not a question, just the reason I seconded that, and I might have surprised some people, because I know I've been advocating this. We have definitely seen issues with the fishery, is the dealer is really messed up with this too, the processors especially, and they need more time to figure out what they are going to do as we wait for the Canadians to come onboard if they are going to. This will give them one more season of Canadian product in the spring where they don't have to worry about it. Then if Canda doesn't come onboard, at least I've got another year to make a plan. I'm hoping Canada comes aboard.

CHAIR KELIHER: Any other questions from the Board? I know there is a lot of people here who came a long way from the public. Is there any member of the public who would like to make a comment on this motion? Kristan Porter. I'm going to keep you guys to just a couple minutes, if you would, please. We won't time you, but Caitlin has got a big hook if you run too long.

MR. KRISTAN PORTER: Thank you, Mr. Chairman. My name is Kristan Porter, I am President of the Maine Lobsterman's Association. I fish out of Cutler, Maine. I just want to support this motion made by Commissioner McKiernan. I guess a couple more things I want to add. I too was at the meeting in Canada.

The meeting went very well. I think there is some support for this from some of the fishermen in Canada, but I think there is also going to be some pushback. I think there is also, we need to know what may happen if we all can do this together. There are also some issues if they decide they don't. One of those issues is where I fish in the gray zone. They need to figure out how that is going to work, you know with two people fishing the same area on a different measure.

The July 1 delay would definitely help us for next year, because they move in there. Their season ends on June 30. At least next spring we would have the same measure for at least that amount of time, until we can get this straightened out. The other issue, I just want to say to that is kind of coastwide

is July 1 works better, because you're just about to the molt. Springtime typically is a harder go, and you're fishing on stuff that is closer to the measure. Economic impact to fishermen would be better for July 1.

Because you have the new molt coming rather than making a hard rub of it in the spring. Those are just the points I want to make that didn't get stated here. But I do think that July 1 is a better fit for everybody. I know there are some processing/dealer issues that probably others will talk about, but thank you.

CHAIR KELIHER: Thanks, Kristan, anybody else in the public? Drew. Billable hours, Drew, so I'm going to leave you to a minute.

MR. DREW MINKIEWICZ: I work on a flat rate, so don't worry about it. Drew Minkiewicz for the North American Lobster Alliance. The North American Lobster Alliance is the dealer and processors from Maine to Massachusetts. We support this motion. For the dealers, July 1 is an important date, because of the Canadian fishery.

The processors only process around eight months of the year. April, May, and June, almost 100 percent of the lobsters that they process come from Canada, because there is not enough supply in the United States from the fishery to supply them. It's a necessity. If they don't process those months, they are not a profitable company.

They will go out of business. They need those months to get the product ready going into the summer season, where people buy more lobsters. This is crucial to allow for them to adjust and to see if the Canadians come along. Leaving aside whether or not Addendum XXX is correct, and whether or not 3 and 1/4 is the standard to go for, that is another discussion. But the intent is to at least at the state level, prohibit possession of anything under 3 and 1/4. This is critical for the processors.

We hope that you will pass this and that we can continue to work collaboratively in addressing how to conserve the species, and also conserve the dealers and processers in this process. I will note that at the Canadian meeting the dealers and processors were not invited to the meeting. We do wish to be at the table to be part of this process.

There is a lot of discussion about bonded product coming through the United States. To be very clear, that helps Canadian dealers, that is of no assistance to U.S. based dealers and processors, because once you possess the United States it is no longer bonded, that exemption goes away. I find it interesting that out of the Canadian meeting there were concerns about the Canadian dealers and what would happen from this.

But there were not any proposals or prospects addressing the issues facing U.S. based dealers and processors. We want to be at the table to be part of the solution, as we look to make sure this fishery continues to be viable going to the future, and also the business model of my clients remains viable. Thank you.

CHAIR KELIHER: Thank you, Drew, anybody else from the public? Ginny Olsen and then Dustin Delano. Can you hit the button, Ginny? There you go.

MS. VIRGINIA OLSEN: I just wanted to say that this delay would give us some time to actually evaluate the number of Maine fishermen that are still fishing and have not left the fishery, now that we have mandatory reporting and latency. I think it's important to see how that impacts the conservation in Maine.

I also wanted to follow up on that bonded comment. I agree 100 percent. The unintended consequences of these sort of things are, if we don't have the size that the market is looking for, meaning the restaurants and wholesalers out there, then they are going to go to another source and if they have that size, be it in Canada, then they can easily say, you know to get these ten crates of lobsters you need to take these ten crates more,

and that takes another sale away from Maine. Thank you.

CHAIR KELIHER: Thanks, Ginny, I appreciate it. I think that question about harvesters leaving the fishery is something we do need to be keeping our eye on. I'll look at Jeff, I mean I would think, is that from an assessment standpoint that effort side of the assessment. Are we looking at anything like that? Maine had 250 harvesters leave the fishery this year. We're going to see more going in the future Then we're not talking just latent licenses. It's something we probably need to look at from all of the states from Gulf of Maine perspective going forward. Dustin Delano.

MR. DUSTIN DELANO: Thank you, Chair, my name is Dustin Delano from the New England Fishermen Stewardship Association. I'm also one of those people that left the fishery, unfortunately, but I just want to also give my support for the July 1 delay, and to express my appreciation to the three Commissioners that went to Canada and initiated these conversations.

You already received comments from us in your supplemental about why the July 1 date is crucial, but there are many benefits that have already been laid out here from harvesters, and from the dealer perspective as well. The hurdles of possession would be a problem with a June 1 implementation, and cause for a lot of these dealers to have to shift the way they do things in the middle of a very busy time. We appreciate your consideration, and hope that you will move forward with the motion.

CHAIR KELIHER: Great, thanks, Dustin. Dan McKiernan, before I call the question.

MR. McKIERNAN: No, I have one other question I would like to propose before we take a vote. That would be, what can the timing be of enacting the rules, and I guess this is a question for the three states that have Area 1 fisheries, and maybe Rhode Island. I would like to see it enacted sooner than later, so that the gauge manufacturers really do produce the gauges, and this isn't perceived as a perpetual kicking of the can. If you would allow me, Pat, to some just re-consensus about what our limitations are on rulemaking. What is the fastest we could get rules on our collective books, Pat?

CHAIR KELIHER: From Maine's perspective, it takes us about 100 days to do regular rulemaking. I have not thought about it from our regulatory workload that we have right now. But we go through both in the fall we'll be doing our scallop and urchin regs, so it would come after that cycle. We would probably start the process, probably after the first of the year, for implementation in the spring. Late winter, early spring for Maine.

MR. McKIERNAN: Is it possible for you to do it by the winter meeting, or is that too soon?

CHAIR KELIHER: To have it implemented by the winter meeting? We would not. Not with the current regulatory workload that we've got in place right now.

MR. McKIERNAN: Okay.

CHAIR KELIHER: Yes, definitely by the spring meeting though.

EXECUTIVE DIRECTOR ROBERT E. BEAL: Thank you, Chair. If this motion passes, the Board is going to need to talk about a timeline for developing and approving the Addendum and public comment. Is it draft at the annual meeting, final approval at the winter meeting, or is there something faster that this Board has in mind? I think that is probably a conversation for after. We don't need to know or have that conversation until we get an addendum.

CHAIR KELIHER: That's a good placeholder for that, thank you, Bob. Renee.

MS. ZOBEL: I can just speak to our process. If it's through an ASMFC Fishery Management Plan Action, we can move very quickly. We could have it

on the books fairly quickly, and have the public process.

CHAIR KELIHER: Alli Murphy.
MS. ALLISON MURPHY: Sorry to delay the vote here with a quick comment. I think I made similar comments last fall when a potential delay was discussed previously. I am going to speak against this motion. I think we talked earlier in this discussion about how these measures were intended to be proactive, and every time we delay these measures, we limit their benefit. We continue to urge the Board to be as aggressive and proactive as possible in setting Addendum XXVII resiliency measures.

CHAIR KELIHER: Great, thank you, Alli. Last call for comments on the motion. Do we need a minute to caucus? You don't need a minute to caucus. I know we have one objection. Are there any other parties who object to this motion or nulls? If not, Toni, how do you want to handle that?

MS. KERNS: You can just ask if there are no objections, and if there are none then carry forward.

CHAIR KELIHER: Well, we have one objection. Do you need a caucus? Listen, we've been up since 3:00 a.m. Don't confuse me now. **All those in favor of the motion on the Board please raise your hand. Nine, hands down please. All those opposed, one. Any null votes? No null votes. Motion passes 9-1.** Okay, thank you. I'm going to turn back to Dan McKiernan.

MR. McKIERNAN: Can I ask about the timing of what staff perceive?

MS. KERNS: I think the Board has two options here. This is a pretty simple document. All it is doing is saying we are going to delay the Addendum. We'll write up a statemen of the problem, sort of a summary of a little bit of the conversations that we've been having with Canada, and why we are delaying the document, and then it will have one option in the document.

Staff can write that document up and e-mail it out to this Board, and this Board can e-mail approve the document. We can have it out for 30 days, whether or not we need to do public hearings in-person or not would potentially make a difference on whether or not we could bring then public comment back for final action in October.

That is an extremely fast version of us doing something, and we would need your cooperation, in terms of moving things along and getting information from you all very quickly. The other thing that we can do is wait to approve the document in October, and then do a special meeting of the Board in probably mid-December. That will be still fast, but the other version is so that we can get this done prior to January 1.

CHAIR KELIHER: Thank you, Toni, Dan.

MR. McKIERNAN: Pat, I would seek your guidance. Do you think if we fast track this and got it approved at the fall meeting that would send the signal to Canada that they could proceed? Would that be a preferred time?

CHAIR KELIHER: Yes, I think so. I think I agree with that assessment, Dan. I think it gives a good signal to Canada that we're doing this in good faith, for them to carry out some additional conversations with the LFAs, understanding that their timeframe is coming in September, but we would be voting on it at the fall meeting.

I say that, I look back to staff to make sure. I like the concept of a very simple document here. I think we've just heard from members of the industry who are supportive of this approach. I would recommend that we just have one coastwide webinar for a hearing, just to simplify this. I don't know if there are any objections from the other states, but the simpler the better here. Then we would compile that information and bring it to the Board in October. Bob.

EXECUTIVE DIRECTOR BEAL: Just one additional comment to what Toni said. If this Board is a little bit uneasy about approving an Addendum via e-mail vote, we could do a quick webinar of the Board and they could go over it, make any comments on edits and that sort of thing. If that part is hanging anybody up, we could do a webinar.

CHAIR KELIHER: Is that something we could determine on the fly, Bob, yes? Does that sound good to the Board? Okay, so with that in mind we will take the faster track from a timeframe, simplified document, e-mail to the Board. The Board would determine at that time whether we can do with a simple e-mail vote and dispense with that, and then we would schedule a single webinar, coastwide webinar, to garner public comments on the document with final review, and vote at the annual meeting in October. Seeing all nods around the table, great, thank you very much. Dan, do you have anything else on this? Nothing.

CONSIDER ADDENDUM XXX ON THE MITCHELL PROVISION FOR FINAL APPROVAL

CHAIR KELIHER: I'm going to wait for my computer to wake up. Moving right along, we're going to go to Item Number 8, which is Consider Addendum XXX on the Mitchell Provision for Final Approval. This is a final action on this document, so I am going to give the floor over to Caitlin for an update, reviewing the options and the public comment summary.

MS. STARKS: This is consideration of Lobster Draft Addendum XXX, which is on this foreign import minimum size recommendation that would come from the Commission. Just a quick reminder on the timeline of the development of this document. The Board initiated the Addendum back in January of 2024, then approved it for public comment in March. I'm going to keep going while she pulls that up. The document was approved for public comment in March, and then the public comment period and hearings were held from March until early June. At this meeting, the Board is reviewing the public comments and considering the Addendum for final approval.
Then if this Addendum is approved, the Commission's recommendations would be forwarded to NOAA Fisheries. As a reminder, the Board initiated Draft Addendum XXX to address how gauge size changes like those triggered by Addendum XXVII would affect foreign imports of live American lobsters.

As we've discussed, last fall the trigger index established in Addendum XXVII declined by over 35 percent from the reference period, which triggered the implementation of a series of management measures, to protect the Gulf of Maine/Georges Bank spawning stock biomass. The first of those measures is the gauge increase in LMA 1, and then to allow more time to communicate with Canada about those management measures between the two countries, the implementation date was delayed to January 1, 2025.

I'll skip the tables, since it is not showing. But the issue of imported lobster is related to the Mitchell Provision of the Magnuson-Stevens Act, which prohibits the import and sale of lobsters smaller than the minimum possession size in effect under the Commission's FMP. The Mitchell Provision was intended to prevent smaller lobster than what the U.S. industry could catch from coming into the U.S. market. Given that the 2025 and 2027 changes in minimum size for LMA 1 would also change the minimum size for lobster entering the U.S. under the Mitchel provision.

The purpose of Draft Addendum XXX is just to clarify the Commission's intention regarding the LMA, which would be (muffled microphone) and then 3 and 3/8 inches in 2027. This is consistent with the intention of the Mitchell Provision to limit live lobster imports into the U.S. to be no smaller than what the U.S. industry can legally land.

PUBLIC COMMENT SUMMARY

MS. STARKS: Can you go to the public comment summary? I'm going to go through the public comment summary. As I mentioned, our public comment period for Addendum XXX was in March to early June, and during that time we held two virtual public hearings. The combined public attendance at those two hearings was 35 individuals, although some of those folks attended both hearings. At the hearings five public comments were provided. Then a total of 117 written comments were received as well, including 13 letters from organizations and the remainder from individual stakeholders. The table on the bottom is giving an overview of the support or opposition to the proposed action in Addendum XXX.

As you can see, a significant number of comments did not address the Addendum directly, and those are counted in a separate "other" category. Of the comments in support for Addendum XXX, the reasons given were one, that allowing imports to be smaller than the new gauge size would increase the negative economic impacts to harvesters, and two, that if imports are not handled as recommended in Addendum XXX, then U.S. lobstermen would be put at a huge disadvantage and would lose money and be put out of business.

The comments that opposed Addendum XXX generally focused on these three issues. First, the negative impacts to the processors that would result from restricting imports to the U.S. minimum size in effect. Some examples were that it would disincentivize processors from operating in the U.S. that the Canadian chick lobsters are what keep those U.S. processors going before the U.S. lobster season can supply them, and they estimated a 20-million-pound reduction in Canadian lobster imports, and a loss of 128 million dollars to the domestic industry.

Comments also mentioned concerns about supply chain disruption, and noted that Canadian dealers don't have sufficient workforce and facilities to physically grade large volumes of lobster by gauge size. Some general comments were submitted by Canada. These raised the question of how this action considers mutual obligations under trade agreements between the U.S. and Canada, as well as questions related to the necessity of the action.
How achievement of the objectives will be measured, what alternatives have been considered, and the relevance of this action for lobsters traveling in-bond, which we have discussed. The other comments submitted were largely about the LCMA 1 gauge increase that was triggered by Addendum XXVII, and asked for that measure to be canceled or postponed.

CONSIDER FINAL APPROVAL OF ADDENDUM XXX

MS. STARKS: Some of those comments also mention that trap limits should be considered instead, larger lobsters should be protected rather than smaller ones, and that the U.S. and Canada should have the same minimum gauge size. With that, we have the final approval of Addendum XXX up for Board consideration today, and I am happy to take any questions.

CHAIR KELIHER: Any questions for Caitlin? Seeing no questions for Caitlin, what is the pleasure of the Board? Doug Grout.

MR. DOUGLAS E. GROUT: I would like to make a **motion to approve Draft Addendum XXX.**

CHAIR KELIHER: Okay, we have a motion by Doug Grout, seconded by Dan McKiernan. Doug or Dan would you like to give any additional rationale?

MR. GROUT: Not anything additional, other than I think it's important and that I think it's something that in the original document is what we intended, the original Amendment XXVII.

CHAIR KELIHER: Go ahead, Caitlin.

MS. STARKS: I just wanted to clarify, if your intent was to have it be effective today, and if so, can you read it into the record again, because we added a word.

MR. GROUT: Be glad to. **Move to approve Draft Addendum XXX, effective today.**

CHAIR KELIHER: Dan McKiernan.

MR. McKIERNAN: Yes, the only comment I would like to make is based on the conversation we had earlier as a Board about the so-called bonded product. It's my understanding bonded product, as you mentioned is coming into the country but heading out of the country going to a foreign country overseas, capitalizing on Logan Airport primarily, I guess, that wouldn't be affected by this. As was mentioned by Toni, it's for product that comes in that is intended to be comingled and opened, et cetera.

CHAIR KELIHER: Eric Reid.

MR. REID: There is a lot of rules with bonded product. You can't just take a bonded truck and drive up to Southwest Airlines and unload it. You have to go through a bonded warehouse, you know an agent to this bond, that there are a lot of rules. The amount of safeguards, I guess is what I should say. I'm not worried about that in any way, shape or form.

CHAIR KELIHER: Steve Train.

MR. TRAIN: Judging by the last vote we made that is going to actually change our sizes in July of '25, is there a rush to implement this today, or could we put the same effective date on it? The reason I ask is because we made changes in the last six months, and I don't know if we want to have to change a lot of things all at once.

CHAIR KELIHER: Thanks Steve, Toni.

MS. KERNS: Steve, it doesn't make the change for the size limit to be effective today, it's just showing our intention of, if and when size limits change that it is our intention that the Mitchell Provision pertains to those changes in size limit. It is just stating our intention of what that size limit change means.

I think it is good that people understand what our intention is, and so making that known to everybody provides clarity for individuals when they're trying to understand how these rules may or may not apply to them in the future. That would be the rationale of why you would have it effective today.

MR. TRAIN: Thank you.

CHAIR KELIHER: Additional comments or questions from the Board? Not seeing any; I would like to quickly go to the public, because I know we've got people here that have traveled to speak on this issue. The first on the list is Bob Blais from East Coast Seafood.

MR. BOB BLAIS: Thank you. Yes, I'm Bob Blaid, East Coast Seafood. We have been in the lobster business since our inception in 1981. We own a Canadian lobster company, we're a Maine dealer or Mass dealer. We're a Massachusetts lobster processor. We cover all the bases here. The restrictions that we're imposing here with Amendment XXX is going to reduce number of lobsters coming through New England dealers and New England processors. It is going to inhibit our ability to stay in the processing business in the United States.

We're only processing for eight months as it is. We rely on Canadian lobsters when there are no domestic lobsters available. Those months are April, May and June or May and June primarily, and then at the end of the year from the amount of time is November into December. By reducing, by limiting us on what we can bring into the country limits what we can process, and may not be beneficial to process at all, to keep all that processing plan and equipment around without any activities on that end of it.

CHAIR KELIHER: Thank you, Bob. Bob, I am going to have to keep people to one minute, because we've already got public comment on this. I'm going to let you just wrap it up, if you would, please.

MR. BLAIS: Okay. I don't understand how we're protecting the Canadian fishery in with the bonded plan of being able to bring product through the country and not go through dealers. It should be allowed to bring any size lobsters into the country. I don't agree with the Mitchell bill, and since then we've had NAPTHA and USMCA and I believe those three practice it now really makes the possibility that the Mitchell bill conflicts with the current USMCA.

CHAIR KELIHER: Okay, thank you, Bob, thank you for your comment. Anybody else on this topic? Drew. Again, Drew, we're keeping everybody to one minute on this one.

MR. MINKIEWICZ: Got you, Drew Minkiewicz with the North American Lobster Alliance again. I just want to say, in the summary of the comments it was not noted that we commented that 3 and 1/4 inches is still the minimum size in effect in the lobster management plan, so under the Mitchell Provision it is still 3 and 1/4 inches, just with that plan.

This is an unnecessary action. Also, just looking at the comments for, I would disagree with the factual accuracy of the comments supporting Addendum XXX, and I would also note that there is no conservation benefit to what you're doing here. This is not helping the lobster fishery or the conservation of lobster in any way, shape, or form. Thank you.

CHAIR KELIHER: Thank you, Drew. I'm going to turn to Toni, you've got a quick comment?

MS. KERNS: Just to clarify for the record. The coastwide minimum size is a floor in which no LCMA may go below, it is not a size limit that any LCMA would have in effect at the time the measures change. In the Mitchell Provision it says, "in effect in the Commission's plan," and the size limits are done via each LCMA, so the coastwide floor doesn't apply to the Mitchell Provision.

CHAIR KELIHER: Back to the Board. Any additional comments? Seeing none; do we have any opposition to this motion? **This is final action, we have to have a vote, is it a roll call vote, Toni?**

MS. KERNS: We can have states raise their hand and I can just call out.

CHAIR KELIHER: You; will read the names, okay, great. All those in favor of the motion that is on the board, please raise your hand.

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

CHAIR KELIHER: Great, and any null votes?

MS. KERNS: No.

CHIAR KELIHER: Nulls, abstentions.

MS. KERNS: NOAA Fisheries.

CHAIR KELIHER: **Great, motion passes 9, 0, 0, 1, you had 10? Motion passes**. Okay, that concludes the conversations and final action around Addendum XXX.

VESSEL TRACKING WORKING GROUP REPORT

CHAIR KELIHER: We're going to move right along to Item Number 9, which is a Vessel Tracking Working Group Report. Caitlin is going to give an update on the Work Group, and then considering the time I'm going to have a couple comments about maybe the next steps here with this approach.

MS. STARKS: The Board tasked that the Vessel Tracking Work Group was responding to was to task the Addendum XXX Vessel Tracking Implementation Group with input from the LEC. This was in response to industry raising concerns about privacy, related

to the Addendum XXIX requirement for the tracking devices to be on at all times.

The Board task specified that the Work Group should investigate modifications to the 24/7 vessel tracking requirement, which still ensure monitoring of fishing activity while acknowledging that fishermen also use their boats for non-fishing reasons or other personal reasons. The task included getting input from the LEC, and reviewing the existing processes for when VMS devices can be turned off.

I'll start off with the VMS processes. The important takeaways that the Work Group found are summarized here on this slide. The first thing to note is that the VMS regulations for Atlantic fisheries required VMS devices to be on and collecting data 24 hours a day unless they are authorized to power down. Exemptions are only given to allow a device to power down in specific circumstances, and those are when the vessel will be out of the water for over 72 hours. When a vessel signs out of the VMS program for more than 30 consecutive days, and does not move from its mooring until that VMS device is turned back on. Then if the vessel is issued a Limited Access General Category Scallop permit, is not in possession of scallops, is tied to its permanent mooring, and has notified NMFS of the power down. The regulations also require a letter of authorization from NMFS to be issued to the vessel owner, and that must be applied for via written request and provide information to NMFS, including the vessel location.

The Work Group also noted the following additional information related to VMS. First it clarified that VMS user can declare out of the fishery, but that does not mean the VMS device stopped collecting tracking data. Additionally, VMS devices are capable of geofencing, and it is currently used in some cases to change the ping rate when a vessel enters or leaves specific areas.

But geofencing is not ever used to automatically turn off a VMS device in certain areas. Then lastly, the fastest ping rate for VMS devices is one ping every five minutes, and the national VMS regulations currently do not allow for a faster ping rate. Moving on to the Work Group suggestions for possible modifications in response to their task. There were two main strategies the Work Group discussed. The first is the use of geofencing, which involves defining an area or boundary that when crossed it would trigger an automatic change to the device ping rate. The second strategy would be what the Work Group call a snooze function, and this would be a process for setting a device to not collect spatial data for a pre-determined period of time.

With the geofencing strategy, the Board would need to define the areas where the ping rate would be different than the one per minute rate that is in Addendum XXIX. It would also need to define what that different ping rate would be, for example one per day, or something else. A big issue with this strategy is that the currently approved devices are not all capable of geofencing.

This wasn't something that was required in Addendum XXIX, or when our request for proposals was released. Specifically, the Viatrax devices, which make up the majority of devices in the non-Maine fleet cannot use geofencing right now. Another concern with this is that in order to use geofencing, you need cell phone service to register when a vessel crosses cell service, not cell phone service, to register when that vessel crosses its defined boundary and adjust the ping rate at that time.

But cell service is not available everywhere these vessels would be going, and so that would mean the devices would need to be satellite rather than cellular, to use this approach, and that would be a high cost with that one-minute ping rate. The other approach of implementing a snooze function would require establishing a process, where a web form would be submitted to request a temporary snooze of a particular device during a period of non-fishing activity that is specified.

Then if that request is approved, the device would stop collecting data for a period of time defined previously in the form, and after that period of time it would automatically wake back up and resume data collection. Of the currently approved devices, Viatrax and Particle are capable of doing something like this, but it would increase the cost to have this function, because of the development fees and increased subscription fees. Additionally, this type of process would require states and/or the vendors to process and approve snooze requests and disable the devices. One plus side that was discussed about this strategy is that it would create a record of every time a device is snoozed, and that could help mitigate abuse of the function by bad practice.

Both of these approaches come with some concerns about data loss, but geofencing more so than snoozing. With geofencing we would lose data on fishing effort in the areas where the ping rate would be slowed down. For example, if this approach were implemented and a boundary was set for the devices to start pinging at the one-minute ping rate, once they crossed the three-mile line, for example.

Then data for fishing activity inside the three-mile line would be lost. As discussed in Addendum XXIX, the ping rate of one per minute was selected because that is the rate that allows us to be able to identify fishing effort, whereas slower ping rates than that are incapable of doing that.

But because a significant number of slots or trips do occur in state waters, this would be a big loss of data. Additionally, it might create some challenges for trips in both state and federal waters if we only had a track for part of the trip. With the snooze function, if it's used correctly, so only when a vessel is not fishing, and there shouldn't be too much data loss, but there is a chance of fishing activity not being captured while a device is snoozed. As requested, the Working Group got input from the LEC, Law Enforcement Committee on these ideas.

One thing the LEC noted was that tracking has helped to reduce the misuse of trap tags. Not having tracking in state waters would create a loophole there. With regard to geofencing, the LEC was concerned that it would be easier to cheat inside the defined boundary, and that because they are able to get quicker access to spatial data where cell service is available, which is more of the inshore area, it could potentially slow down investigations of already suspected vessels.

In general, the LEC commented that the vessel operators should not be allowed or able to turn devices on or off themselves, and if that were the case it would be extremely difficult to enforce the requirements, because law enforcement wouldn't really be able to determine whether a device was purposely turned off or if it failed, and lastly there was a discussion about defining what are fishing versus non-fishing trips.

The LEC and the Work Group both agreed that with either of these strategies it would be really critical to implement clear rules around non-fishing trips, such as prohibiting any bait, gear or lobster being onboard during those non-fishing trips. The Work Group had a few additional things for the Board to consider as well.

One is that since tracking was implemented the states have seen improvement in trip reporting, with fewer errors in those reports. Second, they noted that if the Board pursues this further it could make it so permit holders could have a choice about whether to get a new device or upgrade to a device that is capable of one of these strategies, but not require everybody to get a new device if they don't want to. Then lastly, they noted that some of the currently approved companies would have to make some significant investments to modify their devices to be able to use satellite service. Because the devices have already been purchased, there might not be a huge financial incentive to pursue those modifications, and that could potentially limit the availability of devices that would be able to

accomplish these strategies. That's all I have, so I'm happy to take any questions.

CHAIR KELIHER: Any questions for Caitlin? Steve Train.

MR. TRAIN: Thank you, Caitlin. Geofencing thing looks a little more complicated, but the snooze option. Say somebody like me that lives on an island and I'm not fishing on Sunday. You have to call in Sunday morning and say, I don't want my tracker, I want it to be snoozed on Sundays, because we're going boating? Can I do that once a year and say Sundays I'm not fishing, or is that every time you go?

MS. STARKS: The way the Work Group discussed it, it would be a one-time request every time you want to snooze the device. It would be web form, it wouldn't be like calling in and saying, I want my device to be snoozed.

MR. TRAIN: You have to call and tell them you want this snoozed? It still is, for something that is used like an SUV for about half the fishermen in the state of Maine. It's like a plumber's van or electrician's van. You use it for everything, not just when you're working. It seems onerous.

MS. STARKS: Those are the two things the Work Group came up with that would be viable things that our devices could do.

CHAIR KELIHER: Any other questions? I'm going to phone a friend, Kurt Blanchard, could you come to the table? Kurt, to my question that I keep rumbling around here in my head is just kind of prima facia evidence, as far as being on and off, or literally being on or off the boat, the tracker being on or off the boat. Is that something that could simplify an enforcement approach here, if it's not on the boat or if it's not on, it's prima facia evidence of a violation?

MR. KURT BLANCHARD: I'm not clear what you're asking. Are you asking if the device is on the boat or the device is turned on while on the boat?

CHAIR KELIHER: It could be either.

MR. BLANCHARD: Currently the way it's worded now, that would be prima facia evidence for violation.

CHAIR KELIHER: Thinking about Steve's example, where on a Sunday, non-fishing day in the state of Maine, he is using his boat to go into town to get groceries or whatever, he just removes it. I mean we would obviously have to have language change within the plan. We would have to have regulatory language associated with it. But I think what I'm concerned about is if we were going to go in this direction, having something so onerous from a regulatory standpoint for an agency, to have to have somebody that takes that call every time the boat isn't going to be used for fishing. I'm looking for something simpler from an enforcement standpoint. If somebody is going to be on their boat, and they are seen in the act of fishing, and that tracker is either not turned on or not on, depending on the approach that was taken. That would be prima facia evidence of a violation.

MR. BLANCHARD: That goes to defining what the fishing activity would be, or what you would consider the activity to be when it would have to be on, and that's great. From a law enforcement perspective, as long as we can clearly define when the activity takes place and when that should be on, we could support that.

Again, also the reality of it is, and we had this discussion on the Working Group is, the tracking by law enforcement of fishermen moving around harbors and using the boat for personal use. The reality of that happening is pretty minor. I can't see where or how that would be beneficial to be supporting the cause of why we have this for this industry or for the fishing activity.

CHAIR KELIHER: Thank you, Kurt. I didn't mean to put you on the spot, but what you're getting at is, kind of with the idea of, if you define fishing, what

that fishing activity is. We do that with menhaden with Power Block and Net, and those things have to be on board a vessel if you're going to be in possession of fish.

You've got bait, you've got gear, you're in the process of hauling gear, right, how would you define that? Just trying to think of a simpler approach than having to make a phone call. I won't put you on the spot any more, but I just wanted to get your input on that on the record. I think from a Board perspective we've got a Working Group that has done a lot of work here, that's given us some very valuable advice on geofencing and potentially other approaches.

What I would recommend is that we kind of absorb this information and add this to the next Board meeting in the fall at the annual meeting, for kind of further discussion and refinement. Maybe the Law Enforcement Committee could talk about the defining of the fishery, so it would be a potential, simple approach if the Board wanted to go in that direction. Dan McKiernan.

MR. McKIERNAN: Pat if you also could define the burden. It's not clear to me who the fisherman is calling. Is the fisherman calling the company that sold them the device, or is it calling someone at DMR or a third party? That is not clear to me, based on this discussion. If more could come later on that it would be helpful.

CHAIR KELIHER: That is valid, Dan. I always look at as, it's our regulation so we would have to give that authority, to be able to move away from that regulation for a period of time. Bob Beal.

EXECUTIVE DIRECTOR BEAL: I thought we were going to give them Caitlin's cell phone number, but apparently not. Still follow the phone calls. One of the issues that is tricky here is there are four or five manufacturers, and they all have different capabilities. Some of the devices don't even have a physical on/off switch, and if you remove them from the hardwired power on the vessel, they've got a battery backup, so they keep recording things. I think these are unique issues with each different device they've got. We kind of have to work through one by one. But probably to your point, Work Group did a lot of good work, let's think about it a little bit, and if there are additional questions and some of these unique features of the different devices, we have to kind of work through some of these questions as well. You're on.

CHAIR KELIHER: This is a complicated issue. We have a standing case in front of a federal judge in Maine. We don't know the direction that that judge is going to go. This could be something that is going to have to be, depending on the action of that judge, decision of that judge, could change the trajectory and the speed on which we have to act, or it may be the opposite.

We may be found completely compliant. But at the end of the day, I think we passed a motion to look at these issues. We've got good information on the table. I think there is some defining that could potentially be done that helps us get around the fact that we've got four or five devices that we have to deal with.

I think the other question becomes, as we have implemented our rule in Maine, we have had staff call fishermen to say, hey, your device isn't on. If you look at that device, it's not that they were being malicious, it's just that a fuse has blown, something happened, and it's on battery and it's pinging every six hours.

All you get is a spot on a chart every six hours. How much of an invasion of privacy is that? I mean those are the kind of things that I start to think about as I start thinking about how we would deal with this and how we want to look at it going forward. If there is no objection, what I would like to do is, let's take this information, think about it a little bit, and then add it to the next agenda, the agenda in the fall. Toni hopefully won't disagree with that.

MS. KERNS: No, I don't disagree. When you are thinking about it, let's try to keep in mind how we can stay accountable and not create loopholes within the fishery, because we talked about that with the Work Group as well as Enforcement, and that is really important. If we do create loopholes that could be actually more administrative burden on your staff than not, than these call-ins, potentially, who knows. I think it depends on how many people actually want to utilize this newest function.

But the other part is, is that I hope we keep an open mind, in the sense that, is it possible that we could just allow for a device that meets these needs, that still lets these individuals who are fine with having the 24/7 tracker continue on. Because as Caitlin said, some of these devices, we're not even sure have the capability of getting to this point at all. We have many thousands of dollars invested in this already, and for those individuals that are fine with these devices, why would we make them change, spend more dollars on new devices, when they are okay with what they have.

CHAIR KELIHER: Thanks for that, Toni, I think those are really good points. Renee Zobel.

MS. ZOBEL: Toni essentially just took the words out of my mouth. A lot of money is spent on these devices that were approved devices by the Addendum. They were the intent of the Addendum to be low-cost cellular devices to get the job. I just would caution moving forward in a way that doesn't allow that big investment, in some cases by the federal government, an application to this industry to be able to meet that mandate.

CHAIR KELIHER: Thanks, Renee, I appreciate that comment. Does anybody want a last word on this issue? Caitlin, we are going to give your phone number out.

MS. STARKS: Staff would just like to clarify if there is any work that we need to do on our end between now and October, or are the Board members just going to think about this and come back in October and have a discussion?

CHAIR KELIHER: Unless the Bord has some additional tasking for staff, my intent was that we just think about it, with the exception of maybe Law Enforcement thinking about potential definitions of fishing, if we were going to have kind of that prima facia approach to whether it's on or off. But other than that, I didn't have any additional tasking. If we're all set on that.

ADJOURNMENT

CHAIR KELIHER: Moving right on, is there any other business to be brought before this Board, because I am the only thing standing in the way of dinner, or as we say in Maine, "suppah." Seeing none, motion to adjourn, I hear it all around. Thank you very much.

(Whereupon the meeting adjourned at 5:07 p.m. on Tuesday, August 6, 2024)

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **American Lobster Management Board**

FROM: **American Lobster Technical Committee**

DATE: **October 7, 2024**

SUBJECT: **2024 American Lobster Data Update**

Data Update

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

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

This is the fourth Data Update and provides an update of last year's review with the addition of 2023 data. Indicator status (negative, neutral, or positive – see table below) was determined relative to the percentiles of the stock assessment time series (i.e., data set start year through 2018).

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

An updated status based on the mean value over the most recent five years (2019-2023) is provided for each time series, for comparison to the five-year means provided during the stock assessment (2014-2018). This treatment of data is consistent with model-free indicators provided during stock assessments (see Section 5 in the 2020 stock assessment report for more detail). VTS abundance indices have been added to the indicators used in the stock assessment for this Data Update process. Note that updated five-year means (2019-2023) for several trawl survey-based indicators remain impacted by COVID-19 survey disruptions and a new (unrelated to COVID-19) survey disruption to the NEFSC trawl survey in Spring 2023. Additionally, the NEFSC Fall time series has not been updated with 2023 data. The TC and SAS are reviewing potential changes to handling of the NEFSC survey data as part of the ongoing benchmark assessment, including how the Albatross / Bigelow vessel calibration is handled, implementation of gap-filling procedures for missed strata, and removal of one stratum from the

Georges Bank survey index because it is no longer sampled. Thus, these changes need to be evaluated through peer review of the assessment before further updates of indicators are provided. In the interest of time and anticipated impacts from the changes described, the TC decided not to calculate Fall 2023 indices using the old calibrations and data methods. Indices affected by this issue will be identified with an asterisk (*). Please see the appendix for details on other data changes. Below are the results of the data updates by sub-stock.

Gulf of Maine (GOM)

Overall, Gulf of Maine indicators for recruits and adults continue to show declines from time series highs observed during the stock assessment, while YOY indicators show some improvement.

- YOY conditions showed improvements since the stock assessment (Table 1 and Figure 1).
    - Updated status for five-year means were all neutral, indicating improvement since the stock assessment when two of five means were negative (both southwest areas).
    - All ME indices have shown consistent increasing trends since a recent low in 2021. 2023 values for two indices improved from negative or neutral to positive status while the other three indices remained neutral.
    - It's important to note that changes in YOY indicators are not expected to be detected in the recruit indicators for several years.
- Trawl survey recruit abundance indicators showed signs of decline since the stock assessment (Table 2 and Figure 2).
    - Three of the updated five-year means changed status from positive to neutral since the stock assessment. The other three remained positive, though two (NEFSC) did not include additional data since 2022* when they were also positive. All three indicators that have declined to neutral status since the assessment are for inshore GOM waters.
    - 2023 values for all inshore GOM surveys were neutral status, a decline for one additional indicator from positive to neutral since 2022.
    - Five of six indicator values were not available for 2020 due to COVID-19 sampling restrictions.
- Trawl survey encounter rates show declines inshore since the stock assessment (Table 3 and Figure 3).
    - All four of the updated five-year means for inshore indicators were neutral, whereas only one was neutral during the stock assessment. Five-year means for the two offshore indicators remain positive, though they do not include additional data since 2022* when they were also positive.
    - Note that the ME/NH survey encounter rates (spring and fall) are still high relative to other surveys.
    - Five of six indicator values were not available for 2020 due to COVID-19 sampling restrictions.
- Ventless trap survey indices show abundance declining since the stock assessment (Table 4 and Figure 4).
    - Status determinations for four of eight updated five-year means were negative and four were neutral, compared to four positive means and no negative means during the stock assessment.

- The indicator for Area 513 has been more stable over recent years than the indicators for the other three areas.
- While the status of most 2023 indicators remained the same (neutral or negative), the values were similar or improved over the 2022 values in all areas except 511 (both sexes) which continued to decline and changed from neutral to negative status between 2022 and 2023.

Georges Bank (GBK)

Overall, Georges Bank indicators show slight improvement since the stock assessment, though updates include no additional data since 2022*. Note that there are no YOY or VTS indicators for this sub-stock area.

- Trawl survey recruit abundance indicators showed slight improvements (Table 5 and Figure 5).
  - One updated five-year mean changed from neutral to positive since the stock assessment, while the other remained neutral.
  - 2022 values were both positive and relatively high, as were 2021 values.
  - No values were available for 2020 due to COVID-19 sampling restrictions.
  - These indicators tend to be noisier than some of the other abundance indicators, with high interannual variability and lack of discernible trends.
- Trawl survey encounter rates showed similar conditions since the stock assessment (Table 6 and Figure 6).
  - The updated means both remained positive.
  - No values were available for 2020 due to COVID-19 sampling restrictions.

Southern New England (SNE)

Overall, Southern New England indicators show continued unfavorable conditions with some further signs of decline since the stock assessment. Most updated indicators are at or near time series lows.

- YOY conditions were negative across the stock with some decline since the stock assessment (Table 7 and Figure 7).
  - Updated status for the five-year means were all negative, whereas one of three was neutral during the stock assessment.
  - No YOY have been caught during the MA survey for the last nine years.
  - It is very important to note that the CT/ELIS YOY values for 2022 and 2023 are calculated from only one and two observed larvae, respectively (marked with asterisks in Figure 7). Survey sampling methods changed in these years due to reduced encounters of lobsters, making interpretation of these two years problematic relative to the rest of the time series. The Stock Assessment Subcommittee will evaluate this dataset during the ongoing benchmark assessment to determine its use in future assessments and Data Updates.
- Trawl survey recruit abundance indicators showed declines since the stock assessment (Table 8 and Figure 8).
  - Updated status for the five-year means were all negative, with three of eight moving to negative conditions since the stock assessment. Two of these indicators (NEFSC) did not include additional data since 2022* when they were also negative.
  - No recruit lobsters were observed in 2023 for three of six available indicators.

    - Six of eight indicator values were not available for 2020 due to COVID-19 sampling restrictions.
- Trawl survey encounter rates showed deteriorating conditions since the stock assessment (Table 9 and Figure 9).
    - Updated status for the five-year means were all negative, with two changing from neutral to negative since the stock assessment. Two of these indicators (NEFSC) did not include additional data since 2022* when they were also negative.
    - No lobsters of any size were observed in 2023 for two of six available indicators.
    - Six of eight indicator values were not available for 2020 due to COVID-19 sampling restrictions.
- Ventless trap survey indices show continued declines since the stock assessment (Table 10 and Figure 10).
    - The status for three updated five-year means changed from neutral to negative since the stock assessment. The other updated five-year mean remained neutral.
    - All 2023 annual values had negative status; this is the second year in a row that annual status has been negative across all indicators.
    - It is important to note that the ventless trap survey has only taken place during depleted stock conditions coinciding with an adverse environmental regime, so interannual variability can be misleading without the context of a longer time series encompassing varying stock conditions.

Tables and Figures

Table 1. GOM abundance indicators: YOY indices.

YOUNG-OF-YEAR INDICES					
Survey	*ME*				*MA*
	511	*512*	*513 East*	*513 West*	*514*
1981					
1982					
1983					
1984					
1985					
1986					
1987					
1988					
1989			1.64		
1990			0.77		
1991			1.54		
1992			1.30		
1993			0.45		
1994			1.61		
1995		0.02	0.66		0.91
1996		0.05	0.47		
1997		0.05	0.46		0.10
1998		0.00	0.14		0.03
1999		0.04	0.65		0.43
2000	0.00	0.10	0.13	0.17	0.07
2001	0.24	0.43	2.08	1.17	0.39
2002	0.13	0.29	1.38	0.85	1.00
2003	0.22	0.27	1.75	1.22	0.75
2004	0.18	0.36	1.75	0.67	1.02
2005	1.42	1.25	2.40	1.12	1.06
2006	0.49	1.06	1.57	1.08	0.45
2007	0.59	1.11	2.23	1.30	1.27
2008	0.32	0.59	1.27	1.10	0.33
2009	0.66	0.33	1.51	0.48	0.17
2010	0.16	0.64	1.25	0.63	0.44
2011	0.41	0.98	2.33	0.90	0.58
2012	0.44	0.62	1.27	0.30	0.08
2013	0.09	0.22	0.34	0.12	0.00
2014	0.16	0.47	1.04	0.42	0.11
2015	0.15	0.22	0.42	0.03	0.00
2016	0.13	0.21	0.42	0.14	0.08
2017	0.21	0.36	0.65	0.23	0.08
2018	0.27	0.34	0.62	0.22	0.03
2014-2018 mean	0.18	0.32	0.63	0.21	0.06
2019	0.43	0.64	0.94	0.45	0.06
2020	0.29	0.51	1.06	0.33	0.19
2021	0.06	0.12	0.38	0.28	0.28
2022	0.13	0.59	0.71	0.42	0.11
2023	0.44	0.95	1.43	0.57	0.22
2019-2023 mean	0.27	0.56	0.90	0.41	0.17

25th	0.16	0.18	0.51	0.23	0.08
median	0.22	0.34	1.26	0.63	0.33
75th	0.43	0.60	1.60	1.09	0.67

Figure 1. GOM abundance indicators: YOY indices.

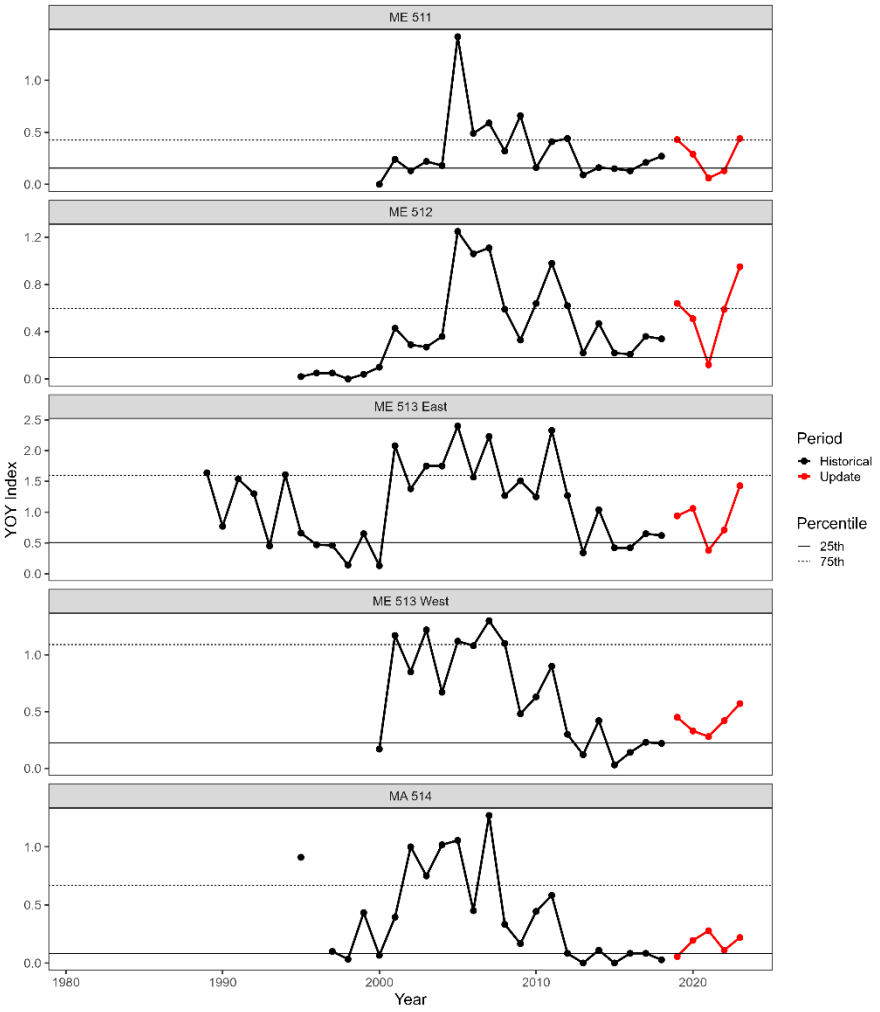


Table 2. GOM abundance indicators: trawl survey recruit abundance.

RECRUIT ABUNDANCE (SURVEY)						
Abundance of lobsters 71 - 80 mm CL (sexes combined)						
Survey	*NEFSC*		*ME/NH*		*MA 514*	
	Spring	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*
1981	0.13	0.06			6.38	4.84
1982	0.29	0.42			2.74	3.85
1983	0.28	0.90			1.76	9.76
1984	0.20	0.31			2.15	6.13
1985	0.14	1.41			4.48	9.60
1986	0.27	1.29			3.01	3.80
1987	0.67	0.57			2.47	1.16
1988	0.67	1.21			2.52	4.12
1989	0.00	1.61			4.48	7.51
1990	0.27	1.76			6.11	15.36
1991	0.55	1.41			2.73	7.55
1992	0.50	1.37			4.31	8.95
1993	0.25	0.86			5.12	3.19
1994	0.15	2.75			7.59	13.77
1995	1.45	1.44			4.54	12.12
1996	0.76	4.59			3.09	12.10
1997	2.02	2.12			4.59	6.46
1998	1.59	2.16			4.50	7.47
1999	1.51	3.01			4.29	8.73
2000	4.64	3.01		24.09	4.24	8.87
2001	1.05	1.51	9.28	17.81	4.32	1.58
2002	1.08	1.91	22.00	22.41	3.43	5.00
2003	1.41	0.36	10.65	18.32	1.96	0.66
2004	0.84	2.26	7.55	12.29	2.46	1.30
2005	0.34	0.87	18.51	25.90	4.35	2.11
2006	2.17	1.27	18.07	18.30	6.09	5.30
2007	1.62	0.64	15.91	16.82	0.77	1.61
2008	0.99	2.41	17.88	31.61	2.54	6.12
2009	4.88	4.90	24.72	32.67	3.19	8.88
2010	2.98	4.53	17.66	37.35	2.22	9.39
2011	10.27	11.83	39.25	46.09	5.24	15.04
2012	11.25	6.74	36.55	37.12	3.03	11.30
2013	10.93	18.12	34.50	37.86	4.83	12.20
2014	11.66	21.54	50.79	41.95	3.35	7.06
2015	14.44	17.89	38.51	67.99	7.05	17.91
2016	13.25	22.54	50.83	60.07	13.61	17.44
2017	15.74		48.42	48.13	7.85	13.58
2018	14.15	15.87	42.77	55.84	5.25	25.69
2014-2018 mean	13.84	19.46	46.26	54.80	7.42	16.34
2019	16.69	7.62	46.37	50.85	10.69	14.59
2020				34.65		
2021	10.05	8.04	32.86	32.19	6.39	10.16
2022	11.82	8.29	22.78	24.86	8.61	6.27
2023			25.08	32.09	4.51	8.78
2019-2023 mean	12.85	7.98	31.77	34.93	7.55	9.95
25th	0.30	1.21	17.72	20.37	2.73	4.30
median	1.07	1.76	23.36	32.67	4.30	7.53
75th	4.23	4.53	39.07	44.02	5.05	11.90

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

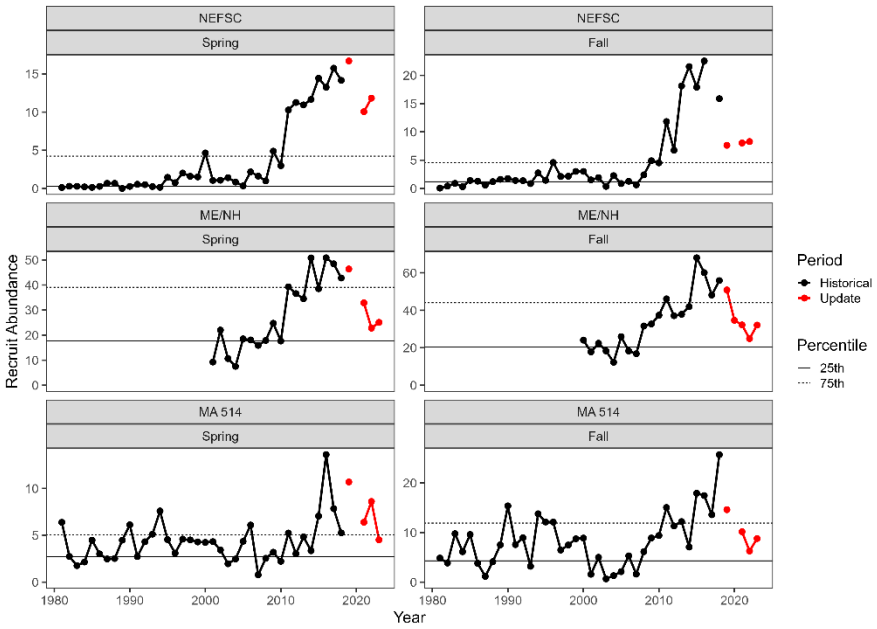


Table 3. GOM abundance indicators: trawl survey encounter rate.

SURVEY LOBSTER ENCOUNTER RATE Proportion of postive tows						
Survey	*NEFSC*		*ME/NH*		*MA 514*	
	Spring	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*
1981	0.44	0.25			0.86	0.72
1982	0.34	0.18			0.50	0.70
1983	0.26	0.33			0.76	0.76
1984	0.28	0.36			0.76	0.76
1985	0.38	0.49			0.71	0.67
1986	0.33	0.47			0.68	0.83
1987	0.43	0.24			0.85	0.54
1988	0.31	0.30			0.76	0.58
1989	0.19	0.35			0.78	0.95
1990	0.41	0.32			0.86	0.95
1991	0.42	0.32			0.87	0.94
1992	0.40	0.24			0.93	0.77
1993	0.41	0.39			0.97	0.82
1994	0.45	0.40			1.00	0.93
1995	0.41	0.37			0.93	0.93
1996	0.54	0.54			0.91	0.95
1997	0.64	0.35			0.93	0.86
1998	0.52	0.40			0.76	0.69
1999	0.51	0.42			0.73	0.91
2000	0.63	0.42		0.94	0.93	0.98
2001	0.57	0.40	0.88	0.86	0.93	0.72
2002	0.75	0.53	0.94	0.95	0.91	0.73
2003	0.69	0.44	0.92	0.85	0.82	0.55
2004	0.87	0.31	0.89	0.86	0.84	0.56
2005	0.77	0.36	0.95	0.91	0.95	0.67
2006	0.72	0.60	0.93	0.93	0.91	0.88
2007	0.72	0.43	0.97	0.85	0.51	0.54
2008	0.84	0.49	0.92	0.86	0.83	0.75
2009	0.82	0.63	0.98	0.92	0.89	0.87
2010	0.85	0.75	0.98	0.96	0.87	0.98
2011	0.83	0.74	0.99	0.96	0.89	0.85
2012	0.86	0.78	0.98	0.98	0.91	0.95
2013	0.87	0.73	1.00	0.93	0.96	0.95
2014	0.90	0.71	1.00	0.99	0.79	0.96
2015	0.93	0.69	1.00	0.96	0.98	0.95
2016	0.94	0.75	1.00	0.96	0.96	0.97
2017	0.86		0.99	0.94	0.84	0.98
2018	0.86	0.71	0.98	0.96	0.84	0.90
2014-2018 mean	0.90	0.72	0.99	0.96	0.88	0.95
2019	0.83	0.71	0.99	0.95	0.85	0.92
2020				0.96		
2021	0.90	0.75	1.00	0.91	0.86	0.90
2022	0.79	0.76	0.98	0.90	0.78	0.85
2023			0.96	0.91	0.85	0.83
2019-2023 mean	0.84	0.74	0.98	0.93	0.84	0.88

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

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

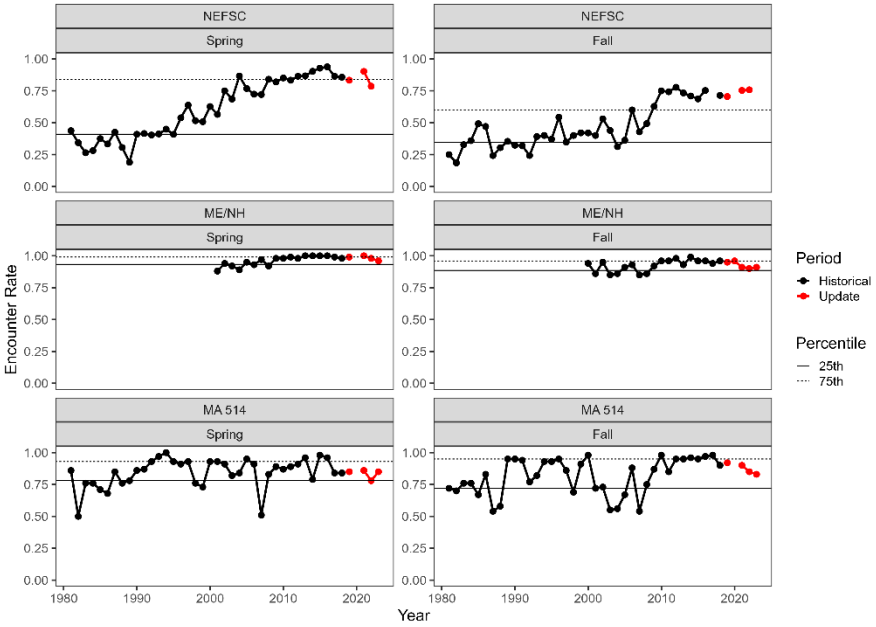


Table 4. GOM abundance indicators: ventless trap survey abundance.

VENTLESS TRAP ABUNDANCE Abundance of lobsters ≥ 53 mm CL								
Survey	*511*		*512*		*513*		*514*	
	Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*
1981								
1982								
1983								
1984								
1985								
1986								
1987								
1988								
1989								
1990								
1991								
1992								
1993								
1994								
1995								
1996								
1997								
1998								
1999								
2000								
2001								
2002								
2003								
2004								
2005								
2006	7.65	5.34	6.87	5.38	5.73	4.37	3.10	3.40
2007	5.06	3.91	3.95	3.83	5.82	4.35	1.85	1.84
2008	4.94	3.87	5.78	4.95	5.78	4.97	2.77	2.51
2009	3.60	2.65	6.31	5.35	6.89	5.53	2.72	2.66
2010	5.66	3.90	6.95	5.69	6.61	5.27	2.49	2.22
2011	8.70	6.52	11.10	8.48	7.32	5.60	3.47	2.60
2012	10.95	7.64	12.06	9.47	11.40	7.72	5.21	4.52
2013	11.14	7.95	11.87	8.64	9.36	6.49		
2014	10.38	6.63	11.92	8.04	7.74	4.96	3.15	2.35
2015	8.47	4.63	10.39	7.70	8.54	5.48	4.01	3.16
2016	14.59	9.15	14.34	10.75	10.78	7.56	4.79	3.56
2017	11.69	7.07	11.61	8.52	8.46	5.56	3.38	2.45
2018	15.10	9.43	11.26	8.23	9.57	6.37	3.47	2.43
2014-2018 mean	12.05	7.38	11.90	8.65	9.02	5.99	3.76	2.79
2019	12.93	8.27	8.22	5.94	8.68	5.25	2.85	1.93
2020	7.66	5.47	7.91	5.96	9.29	6.61	2.50	1.69
2021	7.34	5.44	5.94	5.23	8.24	5.93	1.77	1.37
2022	6.69	4.95	4.83	4.18	7.88	6.21	1.63	0.96
2023	4.94	3.86	5.20	4.61	8.33	6.33	1.81	1.51
2019-2023 mean	7.91	5.60	6.42	5.18	8.48	6.06	2.11	1.49

25th	5.66	3.91	6.87	5.38	6.61	4.97	2.76	2.41
median	8.70	6.52	11.10	8.04	7.74	5.53	3.27	2.56
75th	11.14	7.64	11.87	8.52	9.36	6.37	3.61	3.22

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

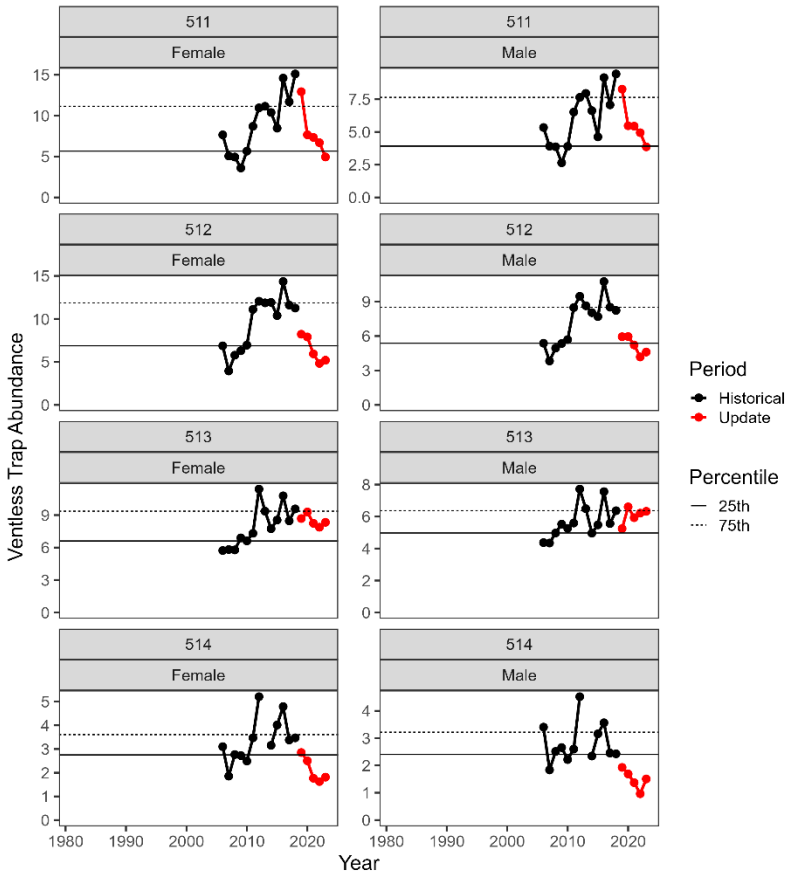


Table 5. GBK abundance indicators: trawl survey recruit abundance.

RECRUIT ABUNDANCE (SURVEY)		
Abundance of lobsters 71 - 80 mm CL (sexes combined)		
Survey	*NEFSC*	
	Spring	*Fall*
1981	0.08	0.28
1982	0.18	0.41
1983	0.16	0.33
1984	0.09	0.40
1985	0.19	0.26
1986	0.57	0.64
1987	0.43	0.54
1988	0.09	0.36
1989	0.04	0.23
1990	0.44	0.47
1991	0.08	0.34
1992	0.13	0.62
1993	0.50	0.22
1994	0.01	0.13
1995	0.03	0.14
1996	0.00	0.35
1997	0.06	0.90
1998	0.01	0.33
1999	0.07	0.29
2000	0.27	0.33
2001	0.47	0.45
2002	0.06	0.56
2003	0.29	0.16
2004	0.04	0.18
2005	0.09	0.13
2006	0.16	0.12
2007	0.03	0.23
2008	0.05	0.17
2009	0.30	0.33
2010	0.30	0.15
2011	0.09	0.35
2012	0.15	0.17
2013	0.14	0.24
2014	0.16	0.21
2015	0.06	0.44
2016	0.15	0.13
2017	0.35	
2018	0.04	0.22
2014-2018 mean	0.15	0.25
2019	0.16	0.13
2020		
2021	0.41	0.43
2022	0.42	0.62
2023		
2019-2023 mean	0.33	0.39

25th	0.06	0.18
median	0.11	0.29
75th	0.25	0.40

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

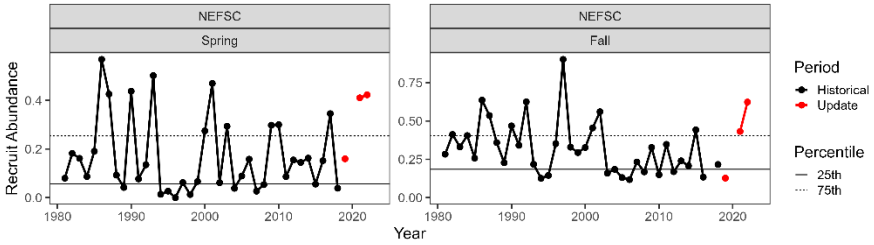


Table 6. GBK abundance indicators: trawl survey encounter rate.

SURVEY LOBSTER ENCOUNTER RATE		
Proportion of postive tows		
Survey	***NEFSC***	
	Spring	***Fall***
1981	0.23	0.52
1982	0.23	0.43
1983	0.18	0.38
1984	0.12	0.34
1985	0.19	0.35
1986	0.27	0.36
1987	0.18	0.35
1988	0.34	0.40
1989	0.14	0.38
1990	0.18	0.44
1991	0.19	0.45
1992	0.26	0.49
1993	0.22	0.36
1994	0.11	0.38
1995	0.14	0.42
1996	0.16	0.40
1997	0.10	0.48
1998	0.10	0.40
1999	0.16	0.58
2000	0.23	0.41
2001	0.23	0.49
2002	0.29	0.55
2003	0.27	0.44
2004	0.18	0.53
2005	0.16	0.58
2006	0.24	0.54
2007	0.26	0.46
2008	0.29	0.55
2009	0.34	0.54
2010	0.38	0.62
2011	0.30	0.69
2012	0.35	0.57
2013	0.33	0.65
2014	0.37	0.61
2015	0.27	0.59
2016	0.45	0.55
2017	0.40	
2018	0.29	0.59
2014-2018 mean	0.36	0.58
2019	0.36	0.57
2020		
2021	0.41	0.48
2022	0.34	0.64
2023		
2019-2023 mean	0.37	0.56

25th	0.18	0.40
median	0.23	0.48
75th	0.29	0.55

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

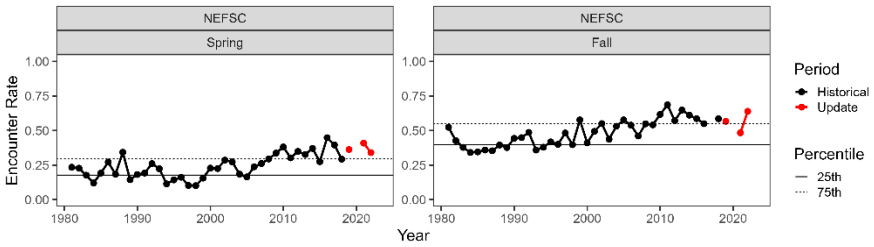


Table 7. SNE abundance indicators: YOY indices.

YOUNG-OF-YEAR INDICES			
Survey	***MA***	***RI***	***CT / ELIS Larvae***
1981			
1982			
1983			
1984			0.43
1985			0.53
1986			0.90
1987			0.78
1988			0.74
1989			0.74
1990		1.18	0.81
1991		1.51	0.55
1992		0.63	1.44
1993		0.51	1.19
1994		1.27	0.98
1995	0.17	0.34	1.46
1996	0.00	0.15	0.31
1997	0.08	0.98	0.21
1998	0.28	0.57	0.55
1999	0.06	1.03	2.83
2000	0.33	0.33	0.78
2001	0.11	0.75	0.32
2002	0.11	0.25	0.64
2003	0.00	0.73	0.25
2004	0.06	0.42	0.45
2005	0.17	0.54	0.49
2006	0.22	0.44	0.71
2007	0.17	0.36	0.37
2008	0.00	0.14	0.37
2009	0.06	0.06	0.19
2010	0.00	0.11	0.35
2011	0.00	0.00	0.26
2012	0.00	0.09	0.12
2013	0.17	0.19	0.16
2014	0.11	0.22	0.06
2015	0.00	0.17	0.19
2016	0.00	0.06	0.45
2017	0.00	0.03	0.10
2018	0.00	0.03	0.17
2014-2018 mean	0.02	0.10	0.19
2019	0.00	0.03	0.21
2020	0.00	0.14	0.10
2021	0.00	0.08	0.19
2022	0.00	0.03	0.25
2023	0.00	0.03	0.48
2019-2023 mean	0.00	0.06	0.24

25th	0.00	0.14	0.26
median	0.06	0.34	0.45
75th	0.17	0.63	0.76

Figure 7. SNE abundance indicators: YOY indices.
Asterisks indicate years with survey changes.

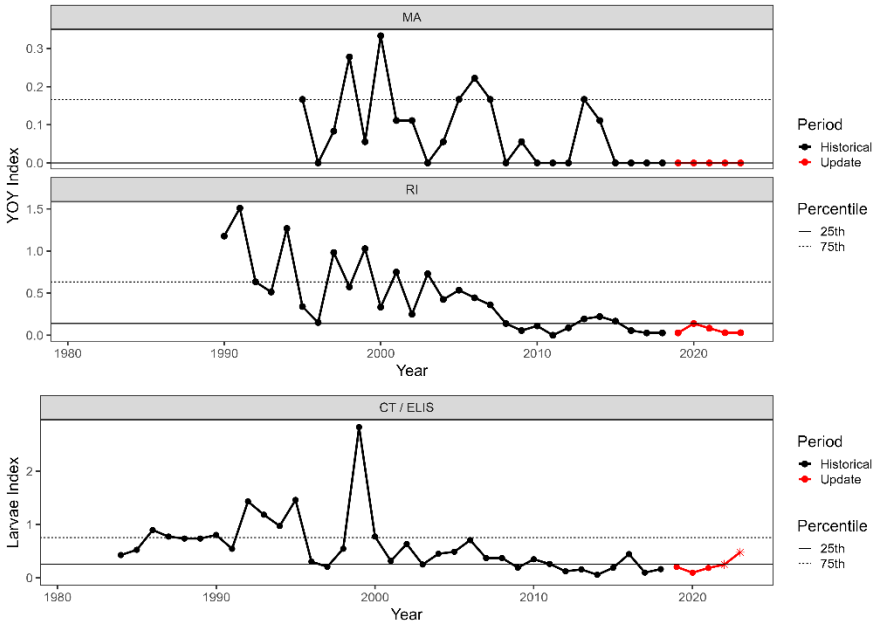


Table 8. SNE abundance indicators: trawl survey recruit abundance.

RECRUIT ABUNDANCE (SURVEY)								
Abundance of lobsters 71 - 80 mm CL (sexes combined)								
Survey	*NEFSC*		*MA*		*RI*		*CT*	
	Spring	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*
1981	0.10	0.89	0.65	0.07	0.89	1.31		
1982	0.74	0.74	0.10	0.04	0.26	0.64		
1983	0.45	0.62	0.09	0.04	0.94	0.43		
1984	0.10	0.81	0.42	0.01	1.03	1.35	10.09	6.80
1985	1.99	1.01	0.34	0.09	0.28	0.97	3.08	3.93
1986	0.18	0.59	0.17	0.20	0.91	1.28	2.77	5.76
1987	1.04	0.45	0.26	0.17	0.79	3.14	2.93	6.86
1988	0.55	0.60	0.24	0.16	0.47	4.05	1.85	4.88
1989	0.09	1.65	0.14	0.43	0.90	3.26	4.86	5.28
1990	0.71	0.83	2.29	0.31	2.17	2.69	6.89	7.74
1991	0.31	0.51	1.18	0.87	4.77	3.10	10.83	10.32
1992	0.19	0.94	0.10	0.57	0.62	1.97	10.31	10.65
1993	0.59	0.42	0.25	0.52	7.81	8.29	7.78	15.18
1994	0.15	0.38	0.95	0.42	1.00	3.88	5.07	11.51
1995	0.01	0.61	1.14	0.03	1.33	4.50	12.13	11.20
1996	0.40	2.39	0.40	0.32	1.60	6.55	11.37	11.08
1997	1.64	1.60	1.45	0.12	2.58	6.10	15.42	24.99
1998	0.78	1.06	1.09	0.11	1.63	3.24	24.06	12.72
1999	2.43	0.66	0.75	0.19	1.71	2.07	24.57	12.96
2000	0.67	1.27	0.56	0.13	1.54	1.83	13.37	8.27
2001	0.39	0.45	0.18	0.03	2.97	2.17	10.77	7.41
2002	1.63	0.39	0.34	0.00	2.68	0.73	8.07	2.75
2003	0.34	0.33	0.07	0.00	0.29	0.93	3.52	4.08
2004	0.27	0.28	0.05	0.00	1.86	1.48	2.38	3.37
2005	0.11	0.24	0.08	0.00	1.07	2.53	2.26	1.54
2006	0.19	0.32	0.08	0.03	3.63	2.24	2.02	1.38
2007	0.19	0.35	0.08	0.00	0.68	2.68	2.65	1.12
2008	0.21	0.29	0.16	0.01	0.64	2.95	2.20	1.27
2009	0.15	0.35	0.16	0.05	1.14	1.36	1.20	1.33
2010	0.21	0.73	0.06	0.18	0.44	1.21	1.26	
2011	0.10	0.64	0.18	0.00	0.42	1.02	0.43	0.18
2012	0.11	0.99	0.07	0.21	0.30	0.18	0.44	0.08
2013	0.23	0.44	0.11	0.04	0.16	0.02	0.23	0.06
2014		0.67	0.04	0.00	0.02	0.14	0.15	0.05
2015	0.03	0.28	0.07	0.30	0.05	0.37	0.15	0.06
2016	0.83	0.69	0.05	0.14	0.57	0.25	0.16	0.00
2017	0.10		0.13	0.16	0.14	0.41	0.03	0.00
2018	0.08	0.38	0.02	0.01	0.18	0.68	0.00	0.01
2014-2018 mean	0.26	0.51	0.06	0.12	0.19	0.37	0.10	0.03
2019	0.06	0.32	0.01	0.02	0.52	0.50	0.03	0.00
2020					0.23	0.32		
2021	0.01	0.59	0.01	0.00	0.27	0.07	0.03	0.00
2022	0.09	0.19	0.00	0.00	0.09	0.16	0.00	0.01
2023			0.00	0.01	0.07	0.05	0.00	0.00
2019-2023 mean	0.05	0.37	0.01	0.01	0.24	0.22	0.01	0.00
25th	0.11	0.38	0.08	0.02	0.42	0.78	1.23	1.16
median	0.23	0.61	0.17	0.10	0.91	1.65	2.93	4.48
75th	0.67	0.83	0.42	0.20	1.62	3.07	10.20	9.81

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

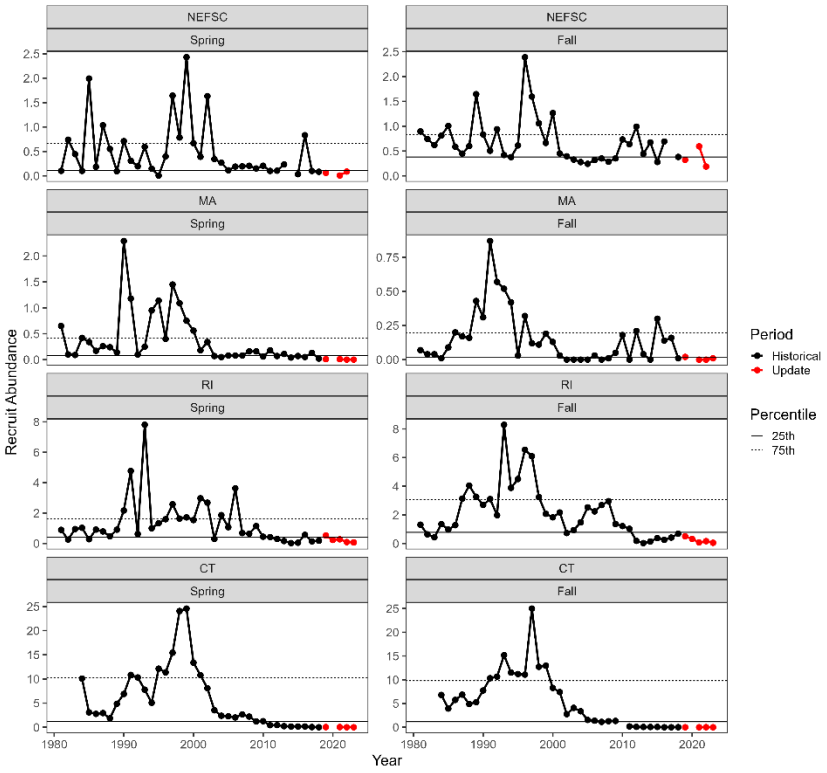


Table 9. SNE abundance indicators: trawl survey encounter rate.

SURVEY LOBSTER ENCOUNTER RATE								
Proportion of postive tows								
Survey	*NEFSC*		*MA*		*RI*		*CT*	
	Spring	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*
1981	0.18	0.47	0.38	0.15	0.49	0.41		
1982	0.26	0.35	0.28	0.21	0.30	0.43		
1983	0.14	0.26	0.21	0.16	0.46	0.37		
1984	0.08	0.32	0.40	0.18	0.59	0.44	0.63	0.76
1985	0.21	0.34	0.51	0.22	0.31	0.50	0.57	0.69
1986	0.17	0.25	0.39	0.38	0.64	0.46	0.67	0.61
1987	0.13	0.23	0.28	0.18	0.35	0.47	0.63	0.76
1988	0.09	0.28	0.39	0.21	0.49	0.55	0.65	0.66
1989	0.13	0.40	0.50	0.33	0.52	0.57	0.75	0.63
1990	0.14	0.44	0.66	0.44	0.64	0.53	0.73	0.76
1991	0.14	0.33	0.41	0.39	0.77	0.69	0.81	0.77
1992	0.22	0.34	0.51	0.23	0.40	0.57	0.77	0.68
1993	0.12	0.27	0.54	0.26	0.50	0.71	0.73	0.75
1994	0.09	0.25	0.51	0.20	0.58	0.57	0.73	0.74
1995	0.05	0.35	0.44	0.12	0.55	0.67	0.77	0.68
1996	0.10	0.39	0.30	0.16	0.79	0.76	0.66	0.78
1997	0.25	0.28	0.45	0.21	0.75	0.71	0.71	0.81
1998	0.12	0.34	0.54	0.13	0.59	0.55	0.83	0.71
1999	0.22	0.28	0.41	0.21	0.76	0.59	0.78	0.79
2000	0.13	0.31	0.45	0.15	0.68	0.63	0.81	0.73
2001	0.21	0.25	0.28	0.18	0.65	0.60	0.77	0.58
2002	0.19	0.24	0.28	0.03	0.61	0.45	0.73	0.59
2003	0.11	0.26	0.14	0.03	0.51	0.40	0.71	0.64
2004	0.10	0.19	0.28	0.03	0.54	0.50	0.61	0.66
2005	0.08	0.19	0.34	0.15	0.49	0.45	0.63	0.54
2006	0.14	0.23	0.42	0.03	0.79	0.62	0.61	0.51
2007	0.13	0.21	0.34	0.10	0.44	0.54	0.70	0.53
2008	0.10	0.22	0.32	0.10	0.55	0.52	0.63	0.65
2009	0.17	0.32	0.50	0.05	0.57	0.40	0.49	0.55
2010	0.12	0.33	0.22	0.24	0.47	0.45	0.54	
2011	0.13	0.35	0.17	0.05	0.30	0.23	0.46	0.28
2012	0.13	0.34	0.17	0.15	0.27	0.16	0.43	0.20
2013	0.10	0.28	0.18	0.08	0.20	0.09	0.28	0.15
2014		0.26	0.13	0.08	0.07	0.23	0.26	0.10
2015	0.06	0.27	0.10	0.05	0.12	0.16	0.27	0.10
2016	0.15	0.25	0.08	0.11	0.30	0.14	0.25	0.03
2017	0.08		0.07	0.16	0.16	0.23	0.08	0.03
2018	0.08	0.29	0.11	0.06	0.09	0.18	0.09	0.01
2014-2018 mean	0.09	0.27	0.10	0.09	0.15	0.19	0.19	0.05
2019	0.05	0.26	0.05	0.11	0.16	0.11	0.09	0.00
2020					0.16	0.16		
2021	0.04	0.18	0.07	0.00	0.20	0.12	0.06	0.03
2022	0.08	0.17	0.00	0.00	0.14	0.09	0.01	0.04
2023			0.00	0.03	0.18	0.05	0.00	0.01
2019-2023 mean	0.06	0.21	0.03	0.04	0.17	0.10	0.04	0.02

25th	0.10	0.25	0.21	0.09	0.32	0.40	0.52	0.52
median	0.13	0.28	0.34	0.16	0.51	0.49	0.65	0.64
75th	0.17	0.34	0.45	0.21	0.60	0.57	0.73	0.74

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

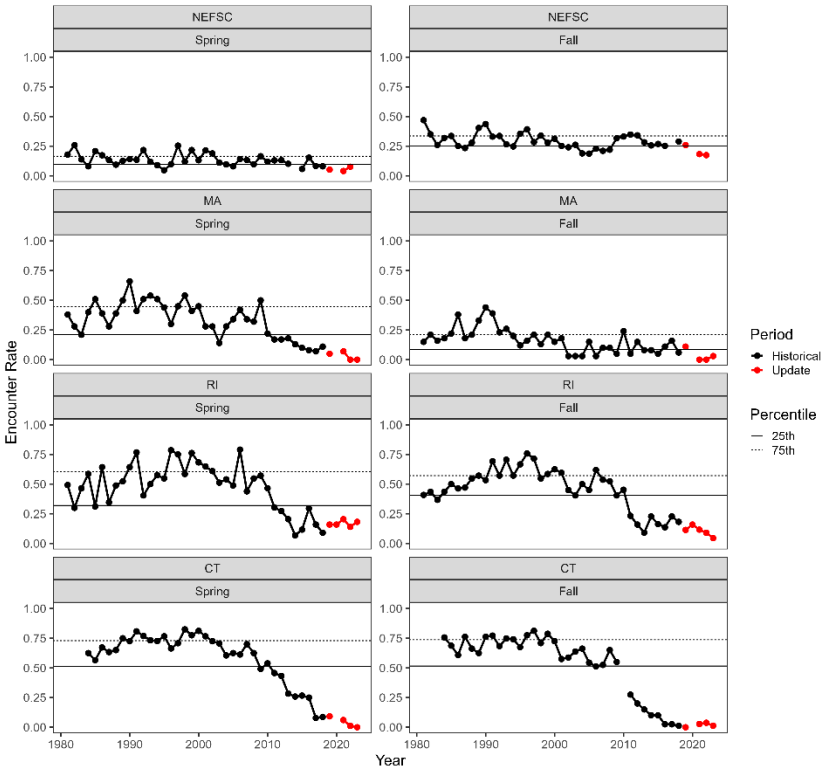
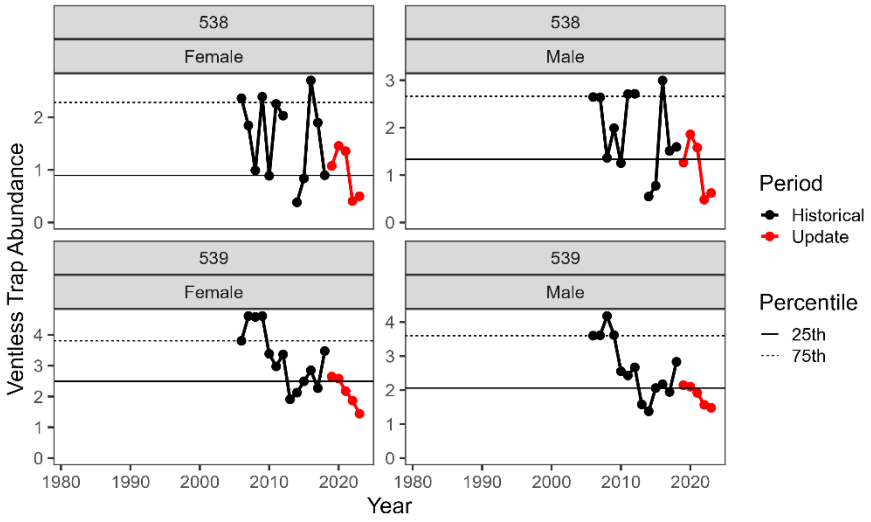


Table 10. SNE abundance indicators: ventless trap survey abundance.

VENTLESS TRAP ABUNDANCE				
Abundance of lobsters ≥ 53 mm CL				
Survey	*538*		*539*	
	Female	*Male*	*Female*	*Male*
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005				
2006	2.36	2.64	3.81	3.60
2007	1.84	2.64	4.61	3.61
2008	0.99	1.36	4.58	4.18
2009	2.39	1.99	4.61	3.62
2010	0.89	1.25	3.38	2.55
2011	2.25	2.71	2.98	2.43
2012	2.03	2.71	3.37	2.67
2013			1.91	1.58
2014	0.38	0.55	2.12	1.38
2015	0.84	0.77	2.49	2.06
2016	2.70	3.00	2.85	2.17
2017	1.90	1.51	2.27	1.94
2018	0.90	1.59	3.48	2.83
2014-2018 mean	1.34	1.48	2.64	2.08
2019	1.08	1.26	2.65	2.14
2020	1.46	1.86	2.58	2.10
2021	1.36	1.58	2.18	1.92
2022	0.41	0.48	1.87	1.57
2023	0.50	0.62	1.44	1.48
2019-2023 mean	0.96	1.16	2.14	1.84

25th	0.90	1.33	2.49	2.06
median	1.87	1.79	3.37	2.55
75th	2.28	2.66	3.81	3.60

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



Appendix: Data Update Data Changes

Rhode Island (2024 Update)

A slightly more conservative method for identifying traps to exclude from the VTS data set was adopted during the 2024 Data Update (terminal data year of 2023). For example, some traps with a hole in the funnel or side head were excluded whereas they were not in previous years. The table below compares the number of traps retained for index calculation between the 2024 Data Update and 2023 Data Update.

Year	2023 Data Update	2024 Data Update
2006	852	851
2007	848	848
2008	864	864
2009	804	804
2010	858	857
2011	858	858
2012	834	830
2013	839	836
2014	832	825
2015	854	846
2016	831	817
2017	833	831
2018	846	839
2019	858	850
2020	836	826
2021	864	851
2022	861	815

The only change in conditions the data change causes is for 2019 and 2020 annual values for both sexes which change from negative conditions during the 2023 Data Update to neutral conditions during the 2024 Data Update. The terminal five-year means are negative for both sexes during both data updates.

Maine (2023 Update)

During the 2023 Data Update (terminal data year of 2022), a few errors were found in the upload process where data was not uploaded correctly and treated in a consistent manner as the assessment. For the Fall 2021 ME/NH Trawl Survey, the sex of sampled lobsters did not upload correctly, leading to 7 tows being excluded in error. These data have now been corrected and included. During the 2020 assessment, the stock assessment team, in consultation with survey staff, determined that a very large outlier tow in the Spring 2014 ME/NH Trawl Survey should be excluded from the assessment. However, this outlier tow was not excluded in the 2022 Data Update. It was excluded for the 2023 Data Update, consistent with the stock assessment. For the Maine settlement survey, data for 2013 was not uploaded completely and this has now been corrected.

Massachusetts (2023 Update)

Following the 2022 Data Update (terminal year of 2021), an error was discovered in the data pull for the SNE VTS index that did not filter the frequency of trawl hauls per month in historical data to match the

reduced sampling frequency in data since the footprint reduction (see below; reduced to 1 haul/month). This error was corrected in the data pull for the 2023 Data Update.

Massachusetts (2022 Update)

Following the 2021 Data Update (terminal data year of 2020), there was a reduction in the spatial coverage of the SNE VTS (Statistical Area 538) due to reduced participation. This change necessitates dropping out data collected during earlier years from areas no longer sampled to calculate an index from a consistent survey footprint, resulting in changes to the indices. Note that the updated index increased slightly in scale (the reduced footprint excludes most of the interior of Buzzards Bay), but the pattern over time is generally consistent with the previous index.

Rhode Island (2022 Update)

Some changes to the SNE VTS Statistical Area 539 (RI) data occurred between the 2021 Data Update (terminal data year of 2020) and 2022 Data Update (terminal data year of 2021). Upon further QA/QC in site or sample location, strata classification for select stations over time were rectified. Data as such were updated to reflect these changes during the 2022 Data Update.

Draft Document for Public Comment

Atlantic States Marine Fisheries Commission

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

Postponing Implementation of Addendum XXVII Measures

September 2024

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Public Comment Process and Proposed Timeline

In August 2024, the American Lobster Management Board (Board) initiated Draft Addendum XXXI to consider postponing implementation of certain measures of Addendum XXVII. Addendum XXVII established a trigger mechanism to automatically implement management measures to provide additional protection of the Gulf of Maine/Georges Bank (GOM/GBK) spawning stock biomass. Under Addendum XXVII, changes to gauge and escape vent sizes in Lobster Conservation Management Areas (LCMAs) 1 (Gulf of Maine), 3 (offshore federal waters) and Outer Cape Cod (OCC) were triggered in October 2023 based on an observed decline in recruit abundance indices of >35% from the reference level (equal to the three-year average from 2016-2018), which triggered management changes to be implemented by June 1, 2024. The Board extended the implementation date of the series of changes to gauge and vent size to begin January 1, 2025 to allow the Gulf of Maine states the opportunity to coordinate with Canada regarding possible trade implications, and give the industry and gauge makers additional time to prepare for these changes.

Draft Addendum XXXI considers further delaying the biological measures (size limits and v-notch definitions) an additional six months to July 1, 2025. The purpose of postponing the changes in minimum gauge size for LCMA 1 and the measures under Section 3.1 of Addendum XXVII to create a common size limit for state-only and federal permit holders fishing in OCC is to reduce negative impacts to the US and Canadian lobster industries in 2025 and allow Canada more time to consider implementing complementary management measures.

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 **October 6, 2024 at 11:59 p.m**. **EST.** Comments may be submitted by mail or email. If you have any questions or would like to submit comments, please use the contact information below.

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

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

Date	Action
August 2024	Draft Addendum for Public Comment Developed
August 2024	Board Approved Draft Addendum for Public Comment
September-October 2024	Public Comment Period Including Public Hearings
October 2024	Board Reviews Public Comment, Selects Management Measures, Final Approval of Addendum XXXI
TBD	Implementation of certain Addendum XXVII Measures

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-XXX to the Fishery Management Plan (FMP). Management authority in the exclusive economic zone (EEZ) from 3-200 miles from shore lies with NOAA Fisheries. The management unit includes all coastal migratory stocks between Maine and Virginia. Within the management unit there are two lobster stocks and seven management areas. The Gulf of Maine/Georges Bank (GOM/GBK) stock (subject of this draft addendum) is primarily comprised of three Lobster Conservation Management Areas (LCMAs), including LCMAs 1 (GOM), 3 (offshore federal waters), and Outer Cape Cod (OCC) (Figure 1). There are three states (Maine, New Hampshire, and Massachusetts) which regulate American lobster in states waters of the GOM/GBK stock; however, landings from the GOM/GBK stock occur from Rhode Island through New York and these states regulate lobsters landed in state ports.

Addendum XXVII was approved on May 2023, establishing a trigger mechanism to automatically implement management measures to provide additional protection of the GOM/GBK spawning stock biomass. Under Addendum XXVII, changes to gauge and escape vent sizes in LCMAs 1, 3 and OCC would be initiated based on an observed decline in recruit abundance indices of 35% from the reference level (equal to the three-year average from 2016-2018). In October 2023, the Technical Committee reported that with the inclusion of 2022 data in the index time series, the trigger index had declined by 39%, surpassing the trigger point of a 35% decline. This decline required the impacted states to change the minimum gauge for LCMA 1 by June 1, 2024.

In October 2023, the American Lobster Management Board (Board) modified the implementation date for the measures in Addendum XXVII to January 1, 2025. The extension of the implementation date was to provide the GOM states the opportunity to coordinate with Canada regarding possible trade implications, and give the industry and gauge makers additional time to prepare for the changes.

In August 2024, the Board passed the following motion:

> *Move to initiate an addendum to delay the biological measures implementation date of Addendum XXVII until July 1, 2025. Specifically, biological measures under Section 3.1 that created common size limits for state-only and federal permit holders fishing in Outer Cape Cod would be implemented effective July 1, 2025. Similarly, management measures triggered under Section 3.2 would be implemented by July 1, 2025 starting with the Year 1 measures, and subsequent management measures (additional minimum size increase in Area 1 in year 3; vent size increase in Area 1 in year 4; maximum size reduction in Area 3 and Outer Cape Cod) would be implemented by July 1 of the calendar year for which they are required. Trap tag issuance regulations regarding the routine issuance of 10% additional trap tags in Areas 3 and 1 above the trap limit or allocation would remain unchanged.*

The action proposed in this document would be to postpone the gauge and escape vent size changes in sections 3.1 and 3.2 of Addendum XXVII for an additional six months to July 1, 2025. The Draft Addendum does not consider postponing regulations prohibiting the issuance of 10% additional trap tags in Areas 1 and 3 above the trap limit or allocation.

2.0 Overview

2.1 Background and Statement of Problem

In June 2024, a meeting was held between US and Canadian lobster fishery managers and industry members to discuss lobster management structures and stock assessments of the two countries. There was some interest on the part of Canadian fishing representatives to match the US minimum size increase in the GOM to minimize commerce issues and to address resource changes seen in some of the maritime lobster fishing areas (LFA), but any changes to management would be proposed by industry under the current status of the Canadian stocks. The timing of a possible Canadian action could not be completed by January 1, 2025, when the US rules are scheduled for implementation. To allow the Canadian industry time to have the necessary discussions to consider complementary conservation measures of an increased minimum size in their GOM LFAs, the group discussed the possibility of postponing the biological measures of Addendum XXVII. A postponement to July 1, 2025 would allow the Canadian LFA fisheries in the GOM, which take place predominantly in the first half of the year, time to discuss a potential gauge change after their fisheries close. In addition, the Massachusetts inshore fishery does not open until after North Atlantic right whales migrate out of Massachusetts state waters (usually in early to mid-May), and most inshore catches occur after the shed in July; therefore, the proposed delay would match up with the start of the majority of the US inshore Gulf of Maine fishery.

Based on this meeting with Canada, the Board determined that postponing implementation of Addendum XXVII's biological measures to July 1, 2025 would reduce negative impacts to the US and Canadian lobster industries in 2025 and allow Canada more time to consider implementing complementary management measures. The US lobster processing operations rely heavily on smaller 3 ¼" lobster from Canada during May and June, when there are not yet enough landings from the US fishery to maintain operations. Additionally, if Canada Department of Fisheries and Oceans and industry did choose to implement a complementary size limit, a January 1, 2025 timeline would not be achievable. The six-month delay would likely not have a significant biological impact on the GOM portion of the stock because the majority of the fishery does not ramp up until June and July.

3.0 Proposed Management Options

The following management options consider postponing the implementation of Section 3.1 and 3.2 of Addendum XXVII with the exception of the regulations prohibiting the issuance of 10% additional trap tags in Areas 1 and 3 above the trap limit or allocation.

When the Board takes final action on the addendum, there is the opportunity to select any measure within the range of options that went out for public comment, including combining options across issues.

Option A: Status Quo
This option would maintain the current implementation schedule for all Addendum XXVII management measures, including the January 1, 2025 minimum gauge size increase to 3 $^{5}/_{16}$".

Option B: Postpone Implementation of Addendum XXVII Measures Until July 1, 2025
Under this option, the implementation deadline for the biological measures (gauge and vent sizes, and v-notch definition) under Addendum XXVII would be postponed an additional six months.

The following management measures established in Section 3.1 of Addendum XXVII would be postponed to July 1, 2025:

- Standardize measures within GOM/GBK stock LCMAs to the most conservative measure where there are inconsistencies between state and federal regulations. This results in a maximum gauge size of 6-3/4" for state and federal permit holders, and a v-notch possession definition of $^{1}/_{8}$" with or without setal hairs for all permit holders in Outer Cape Cod (OCC).

The implementation deadline of January 1, 2025 would be maintained for the following measure established under Section 3.1 of Addendum XXVII:

- Implement regulations for LCMAs 1 and 3 to limit the issuance of trap tags to equal the harvester trap tag allocation. This means no surplus trap tags will be automatically issued to permit holders for these areas until trap losses occur and are documented.

This option would also postpone implementation of the biological management measures triggered under Section 3.2 of Addendum XXVII. The minimum size of 3 $^{5}/_{16}$" for lobsters in LCMA 1 would become effective July 1, 2025. The additional gauge and escape vent size changes for LCMA 1, 3 and OCC triggered under Addendum XXVII would be implemented by July 1 of the year for which they are scheduled.

Table 1 specifies the proposed schedule for implementation of each gauge and escape vent size measure if Option B is selected. Changes to measures are shown in bold text.

Table 1. Option B Proposed Implementation Schedule for Management Measures

Implementation of Management Measures Triggered Under Addendum XXVII, Section 3.2			
Area	**LCMA 1**	**LCMA 3**	**OCC**
Current Measures	Minimum gauge: 3 ¼" Maximum gauge: 5" Vent size: status quo	Minimum gauge: $3^{17}/_{32}$" Maximum gauge: 6 ¾" Vent size: status quo	Minimum gauge: $3\ ^{3}/_{8}$" Maximum gauge: 6 ¾" Vent size: status quo
July 1, 2025	**Minimum gauge size: $3\ ^{5}/_{16}$" (84 mm)**	*Status quo*	*Status quo*
July 1, 2027	**Minimum gauge size: $3\ ^{3}/_{8}$" (86 mm)**	*Status quo*	*Status quo*
July 1, 2028	**Vent size: 2 x $5\ ^{3}/_{4}$" rectangular; $2\ ^{5}/_{8}$" circular**	*Status quo*	*Status quo*
July 1, 2029	*Status quo*	**Maximum gauge size: 6 ½"**	**Maximum gauge size: 6 ½"**

4.0 Compliance

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

5.0 Recommendations for Actions in Federal Waters

The management of American lobster in the EEZ is the responsibility of the Secretary of Commerce through the National Marine Fisheries Service. If this Draft Addendum is approved, the Atlantic States Marine Fisheries Commission would recommend the federal government promulgate all necessary regulations to implement complementary measures to those approved in this addendum.

6.0 References

Atlantic States Marine Fisheries Commission (ASMFC). 1997. Amendment 3 to the Interstate Fishery Management Plan for American Lobster.

ASMFC. 2023. Addendum XXVII to Amendment 3 to the Interstate Fishery Management Plan for American Lobster.

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: **Caitlin Starks, Senior FMP Coordinator**

DATE: **October 8, 2024**

SUBJECT: **Public Comment on Draft Addendum XXXI to Amendment 3 to the American Lobster Fishery Management Plan**

The following pages represent a draft summary of all public comments received by ASMFC on American Lobster Draft Addendum XXXI as of 11:59 PM (EST) on October 6, 2024 (closing deadline).

Comment totals for the Draft Addendum are provided in the table below, followed by a summary of the webinar public hearing, and written comments sent by organizations and individuals. A total of 81 written comments were received. These included five letters from organizations, and the remainder from individual stakeholders.

One virtual public hearing was held. There were 26 members of the public in attendance at the hearing. Five public comments were provided during the public hearing. Attendees were polled about which option they support, given "Option A", "Option B", and "No Opinion" as options; the majority of responses (15/19) supported Option B.

The following tables are provided to give the Board an overview of the support for or opposition to the proposed action in Draft Addendum XXXI. Comments that did not specify a position on the Draft Addendum options are included in the written comments; many of these comments expressed opposition to any change to the minimum gauge size. Comments unrelated to this action are counted in a separate "other" category. Prevailing themes from the comments are highlighted below.

Table 1. Total Written Comments Submitted to ASMFC

Total Comments Received	
Organization Letters	5
Individual Comments	76
Total Written Comments	**81**

Table 2. Comments on Draft Addendum XXXI

Management Options	Public Hearing	Letters	Individual Comments	Total
Option A. Status Quo	2		2	**4**
Option B. Postpone Implementation	15	5	28	**48**
Oppose Gauge Change			42	**42**
Other			4	**4**

Rationales for Support of Option A. Status Quo

- Increasing the measure is a good conservation idea.
- The previous increase to the gauge size did not hurt the industry.
- Science not emotion should dictate the actions necessary to protect a healthy lobster population.
- Gulf of Maine warming and low recruitment rate rates indicate action should be taken.

Rationales for Support of Option B. Postpone implementation to July 1, 2025

- The minimum gauge size should change for Canada and the US at the same time, otherwise the gauge increase is useless.
- More time is needed to figure out the marketing side, the enforcement side, and to give fisherman a chance to plan for how this will affect their businesses.
- A delay will allow more data to be collected.

Other Comments

- The large majority of other comments expressed opposition to increasing the LCMA 1 minimum gauge size. A number of reasons for this view were given.
    - Harvesters are seeing more lobsters this year than ever, especially undersize lobsters ranging in size, and egg-bearing females.
    - It is not needed because the population is robust and harvest is sustainable.
    - Increasing the gauge will have significant negative economic impacts for harvesters.
    - Economic studies should be conducted to better understand impacts to the fishery.
- Lobster surveys are not capturing the trends the fishermen are seeing.
- There are better management options for maintaining a healthy stock than a gauge increase.
- There should be a zero-tolerance policy across all lobster zones for keeping v-notched lobsters.
- A bigger minimum vent size would filter most small lobsters out of traps. A mandatory ¾" mesh panel should be required in the bottom parlor sections of the traps to reduce claw damage.
- The Board should consider separate gauge sizes for males and females. The female gauge size could increase but the size for males could stay the same.
- Canada is still allowed to harvest large breeding lobsters.
- Lobsters are egging out at smaller sizes.
- The Addendum XXVII measures should be delayed indefinitely.
- Vent sizes do not need to change.
- Dealers will lose market shares to Canada.
- Gauge size changes should be made in smaller increments.
- The fleet gotten much smaller over the last three years, and pressure on the fishery has dropped considerably.
- Concern about fish predation on lobsters.
- The maximum gauge decrease for the Outer Cape Cod LCMA will cut the Cape Cod Lobster Management Area catch out of the market for large lobster.

American Lobster Draft Addendum XXXI Public Hearing

Webinar Hearing
September 23, 2024
26 Public Participants
19 Commissioners and State Staff

Commissioners & Proxies: Cheri Patterson (NH), Doug Grout (NH), Ray Kane (MA), Dan McKiernan (MA), Patrick Keliher (ME), Jason McNamee (RI), Marty Gary (NY), Allison Murphy (NOAA)

ASMFC Staff: Caitlin Starks

Hearing Overview

- Attendees were polled about which option they prefer
    - 19 of 26 public attendees responded to the poll
    - 15 (79%) supported Option B, postpone Addendum XXVII measures
    - 2 (11%) supported Option A, status quo
    - 2 (11%) voted "No Opinion"
- Five comments were provided with rationales for supporting Option B

Summary of Comments

Michael Polisson

- Supports Option B, but thinks Addendum XXVII should be indefinitely postponed because it is wrong.
- Does not believe Canada will cooperate to match the US gauge size. Last time the gauge increased in the US, Canada also increased but later lowered the size limit again.
- We do not understand why recruitment is declining.
- The Commission needs to consider the economic information not just stock information, and consider the economic disaster the gauge increase will cause.

Dustin Delano

- Supports Option B and will send in written comments later on behalf of the New England Fishery Stewardship Association.

Patrice McCarron, Maine Lobstermen's Association

- Supports Option B to allow Canada more time to consider complementary measures, and also to give the Commission time to review updated survey data and stock assessment.

Sam Pickard

- Supports Option B
- Does not understand why we are doing all of these addenda to fix previous one.
- The gauge increase will kill Maine and Massachusetts industries

Beth Casoni, Massachusetts Lobstermen's Association

- Supports Option B.
- Hopes the new stock assessment will come out and allow for reevaluating the gauge size.

American Lobster Addendum XXXI Public Hearing Attendance (Online)			
First Name	**Last Name**	**Email Address**	**State**
Dennis	Abbott	swamper199@GMAIL.COM	
Jeffrey	Bartlett	Jbartlettmlafish@gmail.com	Massachusetts
Matt	Bass	matthew.bass@mass.gov	Massachusetts
Samuel	Blatchley	sblatchley@ecklandblando.com	Massachusetts
Colleen	Bouffard	colleen.bouffard@ct.gov	Connecticut
Tessa	Browne	tessa@capeannlobstermen.com	Massachusetts
Scott	Bush	bushmans3a@hotmail.com	Connecticut
Chris	Cash	Christina.cash@maine.edu	Maine
Beth	Casoni (MLA)	beth.casoni@lobstermen.com	Massachusetts
Shawn	Costa	shawncosta@comcast.net	Massachusetts
David	Coyne	dbcoyno12@gmail.com	Massachusetts
Dustin	Delano	coo@fishermenstewardship.org	Maine
Paul	DiMare	pdimare@bstseafood.com	Massachusetts
Glen	Fernandes	graciejfishing@gmail.com	
Damon	Frampton	dtframpton@gmail.com	New Hampshire
Doug	GROUT	groutnhfish@gmail.com	New Hampshire
Marty	Gary	martin.gary@dec.ny.gov	
Raymond	Kane	ray@capecodfishermen.org	Massachusetts
Patrick	Keliher	patrick.keliher@maine.gov	Maine
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Kiera	Lawlor	kiera.lawlor@mass.gov	Massachusetts
Jason	Lemos	jasonjlemos@gmail.com	New Hampshire
John	Maniscalco	john.maniscalco@dec.ny.gov	New York
Patrice	McCarron	patrice@mainelobstermen.org	Maine
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Anthony	Mielcarz	Mielcarz11@gmail.com	Massachusetts
Lorraine	Morris	lorraine.morris@maine.gov	Maine
Kellen	OMaley	u0750285@gmail.com	Massachusetts
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Samuel	Pickard	lobsterer.sp@gmail.com	
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Kathleen	Reardon	kathleen.reardon@maine.gov	Maine
Chris	Scott	christopher.scott@dec.ny.gov	New York
Stephen	Smith	stephens_7@comcast.net	Massachusetts
Hank	Soule	hank@offshorelobster.org	New Hampshire
Renee	St. Amand	renee.st.amand@ct.gov	Connecticut
Kenneth	Stanvick	Kennethstanvick@comcast.net	
Justin	Susarchick	jsusarchick@maritimeaquarium.org	Connecticut
Corinne	Truesdale	corinne.truesdale@gmail.com	Rhode Island
Allison	murphy	allison.murphy@noaa.gov	
Erik	Anderson	andy42152@aol.com	New Hampshire

MAINE
Lobstermen's Association, Inc.
2 Storer St, Ste 203 * Kennebunk, ME 04043
207-967-4555 * 866-407-3770 * www.mainelobstermen.org

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

Transmitted Via email

October 4, 2024

Dear Ms. Starks:

The Maine Lobstermen's Association (MLA) strongly supports the Atlantic States Marine Fisheries Commission's (ASMFC) draft Addendum XXXI to postpone implementation of the scheduled gauge increase for Lobster Management Area 1 (LMA 1).

The MLA remains opposed to increasing the LMA 1 gauge because the unintended consequences of the measure have yet to be adequately addressed. The MLA has outlined these concerns in detail through previous comments, letters, and testimony at Lobster Board meetings. The MLA supports delaying the gauge increase until July 2025 to provide more time to address these concerns.

Specifically, delaying the gauge increase will provide additional time for Canada to consider implementing complimentary measures. This would address many of the industry's concerns by minimizing impacts on the supply chain and market, addressing the issue of fairness between U.S. and Canadian lobstermen who share the waters of the Gray Zone, and enhancing the efficacy of this conservation measure.

Importantly, a delay would also provide time for both the Commission and the lobster industry to review the latest survey data used to assess the health of the lobster stock and the preliminary results on the Benchmark lobster stock assessment.

MLA urges you to adopt Addendum XXXI to postpone implementation of the LMA 1 gauge increase until July 2025.

Thank you for your consideration.

Patrice McCarron

Patrice McCarron
Acting Chief Operating Officer

Maine Lobstering Union

Local 207

150 Bar Harbor Rd, Trenton, ME 04506

October 3, 2024

Please accept these comments from the Maine Lobstering Union for Addendum XXXI to the Interstate Fishery Management Plan for American Lobster. We support the postponement to July 1, 2025. We still question if this gauge change and subsequent vent changes are necessary. At the August meeting in Virginia, we requested the TC review MDMR licensing data. Maine has 250 less lobstermen in 2024, and with mandatory reporting, we can identify latent license holders and calculate a conservation equivalency. Maine has made substantial investments in our sampling protocols to reflect both climate change and changes in the migratory patterns we are experiencing in the Gulf of Maine. We request both licensing and new data collected to be reviewed prior to implementing any gauge increase.

The Mitchell Provision is needed to stabilize the market between Canada and Maine.

"The Addendum recommends to NOAA Fisheries that the Mitchell Provision of the Magnuson-Stevens Act apply to foreign imports of whole live or processed lobster, meaning the smallest minimum size for foreign imports would match the smallest minimum size in effect for the US industry. The current smallest LCMA minimum gauge size in effect is 3¼ inches, and when the LCMA 1 gauge size increases, this will change to 3 5/16 inches. Foreign imports smaller than the new minimum gauge size would be prohibited. These size restrictions do not apply to lobsters traveling in-bond through the US."

We feel strongly that "or processed" must be added to the Mitchell Provision. The one pound lobster is a very popular size in the restaurant industry, removing that size product will drive sales to Canada instead of the USA. We have already given our export market to Canada, with the USA tariffs, foreign markets get filled with Maine lobster out of Canada. We as fishermen need to know the gauge increase is needed, and more importantly that the harm it would do the industry does not out weight the benefits.

Sincerely,

Maine Lobstering Union Executive Board

If you have any questions please call, text or email: 207-240-0556, volsen@district4.net

Massachusetts Lobstermen's Association

8 Otis Place ~ Scituate, MA 02066
781.545.6984

September 27, 2024

Caitlin Starks
Atlantic States Marine Fisheries Commission
Suite 200 A-N
Arlington, VA 22201

Email: comments@asmfc.org

RE: Lobster Draft Addendum XXXI

Dear Ms. Starks,

The Massachusetts Lobstermen's Association (MLA) submits this letter of SUPPORT on behalf of its' ~1800 members to the Atlantic States Marine Fisheries Commission (ASMFC) on the Draft Addendum XXXI (Draft Add. XXXI) to delay the implementation of the biological measure in Addendum XXVII (Add. XXVII) to the Amendment 3 to the American Lobster Fishery Management Plan until July 1, 2025.

The further delay of these biological changes in Draft Add. XXXI to the size limits and V-notch definitions in Lobster Conservation Management Areas (LCMAs) 1 (Gulf of Maine), 3 (offshore federal waters) and Outer Cape Cod (OCC) will afford the efforts of the Canadian government to consider and implement complimentary biological measures to be in-line with the U.S.

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. The membership is comprised of fishermen from New Jersey to Canada and encompasses a wide variety of gear types from fixed gear and mobile gear alike. The MLA continues to work conscientiously through the management process with the Massachusetts Division of Marine Fisheries, Atlantic States Marine Fisheries, Atlantic Large Whale Take Reduction Team, and the New England Fisheries Management Council to ensure the continued sustainability and profitability of the resources in which our commercial fishermen are engaged in.

The MLA strongly encourages the ASMFC to permanently delay the implementation of these biological measures, even if Canada does not come in-line with the U.S. measures and wait until after the new Stock Assessment has been completed. If there are concessions for the Canadians, then there MUST be concessions for the U.S. fishers. The lobster industry continues to do everything asked of them to protect the resource and now more than ever, should be afforded management based on the most current data sets.

Thank you for your thoughtful deliberation and consideration of our comments.

Sincerely,

Beth Casoni

MLA, Executive Director

From: Curt Brown
To: Comments
Subject: [External] Lobster Draft Addendum XXXI
Date: Sunday, October 6, 2024 2:46:10 PM

Ready Seafood, a Maine based lobster company, supports Addendum XXXI, or the extension of a pause on a gauge increase until July 1, 2025.

While we support Addendum XXXI, this pause is much shorter than what we supported in our comments at the ASMFC meeting in April, 2024. Given the proactive nature of Addendum XXVII, the overall health of the resource in Maine, the recent positive settlement numbers in Maine, and the drastic negative economic consequences a gauge increase will have on Maine's lobster industry, a six-month delay is simply too short to sort all this out.

Unfortunately, the lack of flexibility around a longer pause was driven by two states, New Hampshire and Massachusetts, whose combined landings pale in comparison to Maine. These two states expressed concern around protecting the lobster resource as the reason for shortening the delay. We find this concern does not pass the straight face test. For generations, both New Hampshire and Massachusetts kept oversized and v-notched lobsters that were thrown back in Maine. *It will still be legal to land v-notched lobsters in these two states under Addendum XXVII.*

Their current concern about protecting the lobster resource is laughable given the fact that it will still be legal for lobsters v-notched in Maine to be harvested as soon as they crawl south of Maine waters. These v-notched lobsters are proven breeders, regardless of the size of the notch in their tail. The only purpose of a gauge increase is to increase egg production. For these two states to push a gauge increase, with all it's catastrophic economic consequences, while continuing to allow proven breeders to be harvested is a masterclass in hypocrisy. Maine's coastal communities will suffer as a result.

To summarize, we grudgingly support Addendum XXXI, but we are disappointed that the pause decided on was only six months. There are very sound biological reasons to extend this pause longer to collect additional data and avert dire economic consequences for the State of Maine.

Ready Seafood
1016 Portland Rd.
Saco, Me. 04072

Curt Brown / *Marine Biologist*
Ready Seafood Co.
1016 Portland Rd. Saco, ME 04072
Office: (207) 352-5565
Cell: (207) 653-7354

New England Fishermen's Stewardship Association
500 Southborough Dr. Suite 204
South Portland, ME 04106

October 4, 2024

Atlantic States Marine Fisheries Commission
Caitlin Starks, Senior FMP Coordinator
1050 N Highland St, Suite 200 A-N
Arlington, VA 22201

Dear Commissioner,

On behalf of the New England Fishermen's Stewardship Association (NEFSA), I am writing in support of Addendum XXXI to Amendment 3 to the Interstate Fishery Management Plan for American Lobster. The NEFSA Board of Directors voted unanimously to support Addendum XXXI which would postpone the implementation of Addendum XXVII gauge and escape vent size changes to July 1, 2025.

Representing thousands of New England fishermen, dealers, businesses, and consumers, the New England Fishermen's Stewardship Association is the fastest growing fishing advocacy platform in New England. Established in May 2023 and guided by fishermen at the helm, NEFSA is rooted in Maine and has a board of directors comprising of fishermen from all over New England. Our mission statement reads:

> "NEFSA is an alliance of the wild harvesters of the waters off of New England, dedicated to educating the public about how best to manage our seafood resources through sound science and best practices at conservation used by fishermen, with a view toward economic well-being, ecosystem sustainability and US food security."

As you're aware, reaching the trigger within Addendum XXVII caught everyone by surprise, including regulators. NEFSA supports the further postponement of implementing a gauge change to July 1, 2025 but still opposes any such change in general. NEFSA is extremely concerned that a gauge change will have severe market implications across the supply chain and will ultimately lead to the elimination of many target customers across the world.

With the extra time, NEFSA hopes more conversation around the market situation will help prepare for the possible devastating consequences to a more limited supply of lobster and to the loss of access to the "chicken" market. The extra time will also allow harvesters to brace themselves for a decline in catch and severe loss of income which will result from a gauge increase of such magnitude. In previous comments, NEFSA suggested increases of 1/32, like the previous gauge change of 1989, rather than a major increase of 1/16—if there MUST be any increase at all. The lobster fishery is a very volatile industry and expenses are at an all time high. If the projected 10%(+/-) decrease in catch is greater than expected, it will result in harvesters and dealers going out of business.

NEFSA also hopes that with the extra time, more data will become available, especially as we approach the 2025 stock assessment. While a decline in the stock assessment is forecasted, we believe it will not be as steep as the indices used in the trigger index of Addendum XXVII. Fishermen are still reporting a high amount of juvenile lobsters in their traps, despite a much cooler 2024 bottom temperature.

Fishermen and dealers alike would have preferred to have a conversation around other resiliency options. Surely there are multiple ways to achieve an increase in egg production without effecting the market so severely by eliminating the “chicken” size lobster.

NEFSA also finds it important to note that Addendum XXVII was created to be a proactive measure with the goal of stabilizing the high lobster population experienced over the last several years. Fishermen have been riding the wave of high landings for over a decade and are now experiencing more normal catch rates. No one anticipated the fishery would land over 100 million pounds year after year throughout the future. The question posed by both harvesters and dealers still remains, is increasing egg production by increasing the minimum gauge size worth the major market implications and short term financial hardships that could lead to folks going out of business?

While we remain opposed to the gauge increase, NEFSA appreciates and fully supports the commissions willingness to create Addendum XXXI with the intent of postponing the minimum gauge increase until July 1, 2025. Despite our occasional policy disagreements, harvesters and regulators do have one thing in common. We all strive to maintain a robust lobster stock and healthy fishery to be passed on to future generations.

Sincerely,

Dustin W. Delano
Chief Operating Officer
New England Fishermen Stewardship Association

Washington Office
1222 Longworth House Office Building
Washington, D.C. 20515
Phone: (202) 225-6306
Fax: (202) 225-2943

www.golden.house.gov

Committee on Armed Services

Committee on Small Business

Jared Golden
Congress of the United States
2nd District of Maine

October 8, 2024

Robert Beal
Executive Director
Atlantic States Marine Fisheries Commission
1050 North Highland St, Suite 200 A-N
Arlington, VA 22201

Dear Director Beal and Commissioners,

I am writing to you again requesting that the Atlantic States Marine Fisheries Commission (ASMFC) and the American Lobster Board delay the implementation of the Lobster Management Area 1 gauge increase, Addendum XXVII, currently scheduled to begin in January 2025. While I believe that the proposal as written in Addendum XXXI to delay a gauge increase until July 1, 2025, is the better of the two options presented by the ASMFC, I encourage the Commission to proceed solely based on the full consideration of all data sources and a commitment from Canadian regulators to enhance their conservation measures.

As you know, the intent of Addendum XXVII is to mitigate declining stocks of American lobster proactively, a goal shared by harvesters, dealers, and the ASFMC. In my conversations with lobstermen and dealers, it has always been clear that their top concerns are the sustainability of the stock and the ability for it to be harvested by future generations. That is why, as I previously stated in my letter to you on April 29, 2024, I am concerned that the data used to arrive at the trigger index for a gauge increase is overly precautionary and has limitations that do not entirely reflect the current status of the stock.

It is my hope that the ASFMC will ultimately support a long-term pause of the amendment to allow additional time for the technical committee to consider the stock's health more carefully while considering other resiliency measures and incorporating thorough scientific data and objective analysis acceptable to regulators and members of the commercial lobster fishery. Other data that has not been considered or will become available include mandatory harvester reporting, the conservation equivalent from a reduction of overall lobster licenses, and the 2025 lobster stock assessment. These efforts should coincide with robust engagement with your Canadian counterparts to address the regulatory disparity between American and Canadian lobstermen and create a level playing field for all harvesters in the Gulf of Maine.

6 State Street, Suite 101
Bangor, ME 04101
Phone: (207) 249-7400

7 Hatch Drive, Suite 230
Caribou, ME 04736
Phone: (207) 492-6009

179 Lisbon Street
Lewiston, ME 04240
Phone: (207) 241-6767

Without a longer-term pause, devastating economic consequences are on the horizon for Maine's lobster industry. For the latest year data is available, it is estimated that if Addendum XXVII goes into effect, it would decrease the value of lobster landings, resulting in a loss of over 680 jobs and $59.6 million to Maine's economy. I am deeply concerned about how this economic impact would impact the industry and the hundreds of communities in Maine that depend on a viable lobster fishery. Few involved in the fishery or these communities are adequately prepared for the economic disruption that would likely occur.

These decisions must always include those with significant experience, the harvesters themselves. I trust that you, as the regulators, will also consider and incorporate their invaluable input in matters before you.

Sincerely,

Jared F. Golden
Member of Congress

From: alyssa lapointe
To: Comments
Subject: [External] No increase
Date: Saturday, October 5, 2024 6:49:23 AM

Sent from my iPhone
As a Maine lobstermen I really feel this would destroy our industry. Please stop trying to change a great fishery

From: Austin Houghton
To: Comments
Subject: [External]
Date: Saturday, October 5, 2024 10:17:57 AM

There is no reason to change the measure i have seen countless small lobsters everyday Eggers an so many v-knotchs. It's frustrating seeing all these lobsters you can't take throwing them back an there's tons of them now you want to change the measure just don't make any sense you don't have a clue

From: Bill Furtado
To: Comments
Subject: [External] Lobster increase gauge
Date: Saturday, October 5, 2024 6:24:16 PM

Sent from my iPhone there are so many small lobsters we are seeing and so many oversized females I don't think that you need to raise the gauge. We catch a big lobster now bigger than the gauge. It doesn't make sense. If you have any questions you can call me 617-688-7026 thank you.

From: Billy Bob Faulkingham
To: Comments
Subject: [External] Lobster Draft Addendum 31
Date: Thursday, September 26, 2024 9:41:08 PM

Please delay implementation of addendum 27. This came on way too quickly. There are serious problems with implementing this so soon. We need to make agreements with Canada as well as see further scientific evidence before we move forward with this plan. Thank you.
Best Regards,
Representative Billy Bob Faulkingham

From: Brian Billings
To: Comments
Subject: [External] Proposed gauge change
Date: Friday, October 4, 2024 1:29:37 PM

ASMFC board,

I believe extending the lobster gauge change to July would allow another year of data to be collected, and also minimize gauge impact to lobstermen by coinciding with the yearly shed.

Also, I would strongly recommend (if possible) to first change the vent size rather than the gauge. From my experience as a fisherman, the increase in vent size would allow for better flow of lobsters out of our traps. This would reduce handling of smaller lobsters and lobster vs. lobster conflicts inside the traps while on bottom. All of that would, in theory, reduce damage and death rates to lobsters over all and allow for higher breading rates.

By reducing efficiency of our traps with a larger vent, more legal and sub-legal lobsters would escape without being hauled to the surface and culled. I feel this would have a far better impact for our lobster population.

Thank you for your time and consideration,

BrianBillings
Zone C lobsterman, MLA board member
Sent from my iPhone

From: Brian Moody
To: Comments
Subject: [External] Measure increase
Date: Saturday, October 5, 2024 5:57:54 PM

Sent from my iPhone
First thing thank you for your time I hope you give it great consideration into rethinking the measure increase there is absolutely no reason for this change yes your “trigger” was met but did you ever consider maybe with our older population in the industry that maybe they just are not working as hard to catch the lobsters there is plenty of juvenile lobsters on the bottom you just are not looking for them in the right places

From: Bruce Fernald
To: Comments
Subject: [External] Gauge increase
Date: Friday, October 4, 2024 2:22:34 PM

I am a lobster fisherman of 50 years fishing out of Little Cranberry Island,Me. For years we have seen over 25 years of low catches.The last fifteen or so years have been more than anyone could have imagined compared to the past.The lobsters I see in my traps these days are showing nothing but a healthy industry.The 2 to 3# female lobs egged out and never been caught before are everywhere that I fish.The small ones with an1 1/2" to 2" carapace are everywhere some so small they can get through the 11/4" wire meshes.Lobsters under the minimum size are egging out more every year.Why that is is unknown but it's adding to the egg production.The one thing that I worry about is food for the lobster larvae when there on the surface.If that is proven to be fine the industry will be fine.

If the market can adjust and people can still afford to have a lobster then fine.But from what I hear and read that can be a major issue.I think we as fisherman can deal with the increase as long as the market doesn't get messed up.I don't have a good feeling about that!

Bruce Fernald

Little Cranberry Island,Me.

Sent from my iPhone

From: Buddy Simmons
To: Comments
Subject: [External]
Date: Sunday, October 6, 2024 7:45:35 PM

I'm a harvester in favor of delaying the gauge increase. We don't need to increase the gauge period.

Sent from Yahoo Mail for iPhone

From: Caleb Soohey
To: Comments
Subject: [External] Lobster measure
Date: Saturday, October 5, 2024 7:49:15 PM

I do not believe that we need an increase in the measure I haul 150 a day and I throw at least 400 pounds of shorts over a day

From: Cassie Pinkham
To: Comments
Subject: [External] Lobster draft addendum XXXI
Date: Friday, October 4, 2024 6:48:30 PM

I am a lobster fisherman from Friendship Maine. I do not think there is a need for a measure increase. The amount of small lobsters that have shown up in the last 2 years is more than I have ever seen in my entire fishing career. The data you have accumulated showing no juvenile lobsters is completely false. Going forward with the measure increase is only going to hurt the lobster industry if not put us all under financially. More data needs to be collected and gone over before jumping to something that will crimple the entire industry.

From: Chris Chadwick
To: Comments
Subject: [External] Lobster measure increase
Date: Saturday, October 5, 2024 8:13:06 AM

I’m 43 and currently fish 800 traps ,have been in the lobster industry since I was 10 when I got my first license, I do not see any reason to adjust the measure it is a thriving, sustainable, resource

From: Colin Piper
To: Comments
Subject: [External] Lobster draft Addendum XXXI
Date: Saturday, October 5, 2024 4:50:08 PM

Dear Atlantic States Marine Fisheries Commission,

My name is Colin Piper I am a first generation lobsterman out of Hancock, ME. I started fishing when was 8 years and have earned respect on the water. It has gone from a summer job to my full time job that I take much pride in. I have worked hard to get to where I am today and still have a lot to learn. I have been fishing for 12 years now and have only seen an increase of undersized lobsters every year. The undersized stock is very strong and health. We see more every year and in more places. We already show great efforts in our management for lobsters. Between the our minimum and maximum gauge increase now and the v-notch. It allows us to harvest only the best product that we catch. I believe that the measure increase would not help us in anyway at all. I believe that it would hurt the income of all the fisherman up and down the coast with no benefit for the future. When there are other places that such as Canada that can harvest some of the best breeders. That is what I believe can hurt the population. When the best breeders with the best quality's are not being protected in surrounding areas it could show signs of decreased catch of legal size lobsters. However I don't see a decline in lobsters around my area. There are more and more every year of short and v-notch lobsters that we protected for years to come. I believe that this Addendum should be further postponed/ canceled until more research is collected. This has moved at a very high pace for any good research to be collected in most areas. I also believe basing the trigger point off the record high year is hard to understand. The landings found new record highs every year. And to now base a trigger point off a record that wasn't even expected doesn't seem right. I hope the commission can consider my thoughts on this topic and the effects that it will have on the lobster industry in a whole.

Thank you,
Colin Piper

From: Shawn Costa <shawncosta@comcast.net>
Sent: Monday, September 23, 2024 5:44 PM
To: G2W2 <G2W2@asmfc.org>
Cc: fvsusanlynn@comcast.net
Subject: [External] Public Hearing on Lobster Draft Addendum -Comment

Good day,
With the current catch and market conditions, I propose a delay in any changes to the current lobsters regulations for at least 3 years.
Kind Regards,

F/V Rhumbline
Shawn Costa
1-561-213-6950 cell

From: stephanie ames
To: Comments
Subject: [External] Lobster draft addendum 31
Date: Saturday, October 5, 2024 10:31:02 AM

Dear ASMFC,
I am a 4th generation lobster fisherman from matinicus island Maine. I do not support the measure increase, because there is no need for one. We have been compliant with all the changes over the last 20 years. It is time for us to stand up. The amount of short lobsters is plentiful. Our fishery is very sustainable.

Thank you
David Ames II

Sent from Yahoo Mail for iPhone

From: David Merchant
To: Comments
Subject: [External] Lobster draft addendum
Date: Saturday, October 5, 2024 6:50:15 PM

In regards to the lobster measure increases and vent size change it is not necessary at this time. There are more small lobsters than I have ever seen. Lobster catch fluctuates from year to year so to base a decision that detrimental to the industry off a single years stalk assessment is insanity. Beyond that our vent size already is larger than the proposed measure size so it should be irrelevant to start with. The whole proposal should be thrown out especially without proper longevity to support further data collected.
David Merchant, F/V Roll With It
Sent from my iPhone

From: David Rich
To: Comments
Subject: [External] Measure size
Date: Saturday, October 5, 2024 9:09:21 PM

This measure size increase is crazy, I have never seen as many short undersized lobsters as i have the last few years. Young and count on 7 or 8 a trap some with twice that. The ratio to keepers is way off.

From: Doug.Laura McLennan
To: Comments
Subject: [External] Lobster measure increase delay
Date: Friday, October 4, 2024 3:09:28 PM

I would like to speak out in support of the delay in the American Lobster gauge for Maine. There are many reasons for this delay. The main reason is getting time to put the entire proposition to rest. This law change will totally upend the industry. Unintended problems have arisen with the relation with the Canadien market that were not thought out before the Maine Commissioner of Marine Resources presented this idea to ASMFC. There was never an economic study done to the impact on the industry harvesters, and other participants in the industry. Maine has had it current measure of 3 1/4 since 1989. This measure size has proven to work well. Trying to produce more egg bearing lobsters on the small side of the measure is not a scientific solution. The larger lobsters are what need to be protected. We have area 3 boats with different size restrictions on the larger measure, and also they take lobsters than Maine fishermen v notch for protection of egg bearers , to market, fishing outside the area 1 line. There needs to be an industry standard on the protection of the large female egg bearers, not the small juvenile lobsters, that are not proven breeders.This was not well thought out, and the actual intention should be questioned, as it looks as if it is to put un necessary burdens on a already heavy regulated industry. The increase was 100% voted down at all Maine Lobster Zone Councils last fall. Passing a law that is so rejected by industry would be a travesty in fishery regulation. Thank You for listening

Respectively Douglas McLennan
Zone D district 7 zone Council

From: Dustin Leighton
To: Comments
Subject: [External] Lobster measure
Date: Saturday, October 5, 2024 9:26:02 AM

In my opinion increasing our minimum size and decreasing the maximum size on our measure is absolutely insane. I throw back several hundred pounds of under sized lobster a day. Not to mention the amount of nice healthy oversized male and females daily this time of year. Our lobster population is strong and does not need to be messed with…. I'm willing to photograph what I see everyday.
Sent from my iPhone

From: Elijah Brice
To: Comments
Subject: [External] Support for Postponing XXVII
Date: Saturday, October 5, 2024 9:46:53 PM

Addendum 27 is unnecessary and will have detrimental effects to our fishing industry. We see large numbers of juvenile lobsters and release many NEW, freshly notched, egg bearing female lobsters every day. A gauge change will not increase the lobster population, but simply reduce the amount we can legally keep in our catch. Would you like a 10-20% reduction in your income?

We need third party verification for proof of low juvenile lobster stock, more research on any potential benefits from this change, and a thorough analysis of how useless this would be on the international border with Canada if they don't adopt the same gauge size as us.

Our release of oversized lobsters is already a futile effort with Canadians being able to keep them just over the border. It will be the same with undersized lobsters. We will not see an average lobster size increase like other areas of New England. We will release our new undersize lobsters, they'll migrate over to Canada in the winter, then get caught and never return. The effort would be useless.

- Elijah Brice

Zone A Maine Lobsterman License #7248
Eastport, ME

From: Eric Smith
To: Comments
Subject: [External] Lobster Draft Addendum XXXI
Date: Saturday, October 5, 2024 4:33:11 PM

To whom it may concern,

The proposed measure increase for the lobster fishery is a reaction to a perceived problem that doesn't exist.
The inshore and offshore Maine lobster population has a healthy stock of juveniles, plentiful eggers/v-notched, and oversized lobsters. I believe these stocks have moved/shifted over time due to warming waters. I still see more juveniles and egged lobster in a day now than I ever have.

I believe that research through sea sampling programs should be expanded and maybe modified, before putting additional pressure on hardworking business owners and families.

The proposed measure increase is unnecessary, and the increase in vent size planned for 2028 is more unecessary than the former. Our vents are already oversized enough, allowing lobsters that are easily 3/8 of an inch above minimum legal carapace length to escape. Vents currently in use would still be adequate with a larger measure.

I hope that you will take input from all stakeholders in the fishery seriously. Often times we feel we're just swept under the rug, as if our thoughts don't matter. We are your best and largest data source. Thousands of sets of eyes on the resource and taking part in catch reporting programs. Each and every one of us has a very serious interest in the lobster stocks continued abundance.

Thank you for your time,

Eric Smith
F/V Nuclear Fishin'

From: Eric & Kate-Lyn Knight
To: Comments
Subject: [External] Lobster Draft Addendum 31
Date: Saturday, October 5, 2024 6:59:24 PM

Good Morning,

> Today is the last day to make public comments and have the fisherman's voice heard. I've participated in many of these responses; from whales, to offshore wind and any other threat our industry has faced. I never thought I would have to stand up to the ASMFC and beg to not have a measure increase. This would be catastrophic to our coastline from the top to bottom. We've had a self regulating business long before any government was crushing us with regulations.
>
> Most lobstermen are commercial fishermen - they have diversified over the years to supplement income when lobstering is slow. Unfortunately it has become increasingly harder to diversify due to cost and access to other fisheries. A measure increase is a sure way to handicap the lobstermen once again. Lobsters have tails, they move and migrate and certainly do not crawl all at once. These animals are cyclical, some years are just stronger than others. If we lose the current year class of lobsters due to a measure increase we are going to have a 30% reduction in catch. That is just not feasible, we will not recover. A lot of us younger fishermen have 100s of thousands invested. I have 3 young children at home under the age of six to feed and provide for. They depend on me catching Lobsters, I don't have a state scallop license I can make up 30% loss of income.
>
> I am 36 years old this year, I started lobstering at the age of 12. I fish year round offshore, I've seen an increase in catch for the past 10 years. A lot more guys are staying offshore year round, we are feeding and farming the lobsters in 30-50fa. In my opinion the inshore lobster sediment is different than the offshore sediment 3-15miles from shoreline. Before we ruin a fishery, we need more research done where guys are fishing, I've never seen a ventless trawl survey remotely close to where I fish. Last fall in November and December we saw a huge increase in juvenile lobsters 2-3 yrs out from being a counter lobster.
>
> In closing I would like you to consider the impact this increase in measure will have on our State economy. Maine is full of, "mom and pop" small businesses that rely on our lobster fishery. The increase in measure will have a negative impact for our State. As a Mainer, a fisherman, a husband, a father I ask you NOT to move forward with addendum 31!
>
> Thank You,
> Eric Knight
> F/V Ivy Jean
> Cape Elizabeth, ME

From: Gary Libby
To: Comments
Subject: [External] Lobster gauge increase
Date: Friday, September 20, 2024 4:21:25 PM

I'm a lobster fisherman from Maine. I am writing in opposition to the lobster gauge increase. I don't think it's necessary from what I have seen for small lobster in my traps this year. There's a big problem with the different sizes of lobster between Canada and the United States, it will cause hardship for fishermen and dealers. The fisherman will have a loss of income. Dealers will lose market shares to Canada that be more hardship for them and fisherman. If ASMFC continues with this fisherman and dealers can and will lose their businesses. I ask you reconsider the corse of action for the sake of the hole lobster industry.

Thank you for your consideration
Fisherman Gary Libby of Port Clyde Maine.

From: Erik HANSEN <erikhansen1214@gmail.com>
Sent: Thursday, October 3, 2024 11:10 AM
To: Comments
Subject: [External]

I would really like to explain that this measure increase will not help Maine lobstermen what so ever. Our lobsters will be coaght in Canada instead. We are under alot of preasure with expenses and regulations. The lobster industry is doing just fine as far as I can see. Been lobstering my entire life and the amount of under size lobster is the most I've seen in my lifetime. I'm going on 40 years of it. This really needs more thinking about what's right for our fisheries. A measure increase is not what is needed. Thank you Erik Hansen

From: Herman Coombs
To: Comments
Subject: [External] Measure increase delay
Date: Saturday, October 5, 2024 6:26:46 AM

It's just doesn't seem right to only use one years worth of data to increase the measure. Three or fours years would be more accurate because things go in cycles. Lobster settlement has gone up the very next year but the process has already been started and there was no contingency plan for this. Once taken away it will never go back. Too bad government can't keeps their hands off a very productive fishery.
Herman Coombs
F/V Jocelyne K
Orrs Island Me

From: Isaac Gates
To: Comments
Subject: [External] Lobster Draft Addendum 31
Date: Saturday, October 5, 2024 8:33:19 PM

Hello, I'm a Maine commercial lobsterman. I hold an area 1 American lobster permit as well. I have 10 years full time on the water, summers and any non school day before that since I can remember. I have the experience and knowledge about this subject. There is no need for a measure increase. I'm out there year round and see an abundance of short lobsters male and female. I fish depths from 15 fathom to 100 fathom. There is an abundance of seeders, of all sizes. There is not a shortage of lobsters. None what so ever. It's about finding the keepers in the amount of shorts, eggers, or v notches and oversize. And furthermore if we get measure increase we should be given that amount on the other side of the measure as well. Other states allow it. I fish all the way to the area 1 and area 3 border on the 600 line those same lobsters I throw back that are a 16th of an inch to big can be kept by area 3 boats. Measure increase will do nothing but make our living harder then it needs to be due to reporting and whale regulations give the fishermen a break. If it's about what people want to see on the lobster market then give us the amount on the other end of the measure as well. If you want to see more lobsters let there be a commercial striper fishery and increase the slot size. They are one of lobsters biggest predators. Don't shrink what we can keep along with everything else that has been put into place. This industry is has proven itself sustainable for many years. Leave it alone. It's worked. Please consider my comment.

From: James Sturks
To: Comments
Subject: [External] Measure increase
Date: Saturday, October 5, 2024 6:33:53 PM

I think it's crazy that you feel the need to change something that has worked for many years. What's a measure change going to do except put hard working fisherman out of business! Please consider the lives that you're going to put in hardship over something that doesn't need to be changed! I have a family I support and I can tell you that this measure increase is going to affect us a lot! Please don't do it!

Sent from Yahoo Mail for iPhone

From: Jason Joyce
To: Comments
Subject: [External] Support for Addendum 31
Date: Friday, October 4, 2024 5:42:04 PM

Dear Commissioners,

As a town Selectman on Swan's Island Maine I implore you to support Addendum 31 and thank you for the initial delay from implementation. The short term pain caused by this increase in measure would have hurt our coastal fishing community so much.
Thinking ahead I also ask you to consider the negative effects of the increase in vent and guage size in July of 2025 and reconsider implementing the small guage increase from Addendum 27.

Thank you,

Capt. Jason Joyce
Swan's Island Selectman
20 Grindle Road
Swan's Island, ME. 04685
207-479-6490

From: Jim Kimbrell
To: Comments
Subject: [External] Lobster measure
Date: Tuesday, September 24, 2024 4:31:02 PM

Hello
To get right to the point, I am in favor of increasing the lobster measure.
I was lobstering many years ago when they increased the measure. At that time there were people against the increase. The change in the measure didn't hurt anyone.
This change will not hurt anyone either. There is a lot of effort being made to catch as much as possible. It might be a record amount of effort to catch as much as you can. Increasing the measure is a good conservation idea.
Change the measure.
Jim Kimbrell
Lamoine, Maine
04605

..

Sent from my iPad

From: jimtitone@aol.com
To: Comments
Subject: [External] Lobster Amendment XXXI
Date: Sunday, October 6, 2024 9:33:53 PM

Ladies and Gentlemen. The lobster gauge increase as proposed under Amendment 27, must be postponed indefinitely. Instead of collecting a second year of data regarding juvenile lobster settlement to corroborate the single year decrease trigger, the American Lobster Board executed a knee jerk reaction in implementing the gauge increase. According to the latest settlement index data published in the August 2024 edition of the Commercial Fisheries News, "All Maine sites saw an increase in settlement - most notably for the northeastern regions, reaching numbers similar to levels last seen in the mid 2000's. Most notable has been the reversal in settlement patterns in Casco Bay. Based on these latest improvements in juvenile lobster settlement, the proposed lobster gauge increase must be postponed indefinitely.

Sincerely,
Jim Titone
F/V Fly Girls
Seabrook, NH

From: John Berglund
To: Comments
Subject: [External] Lobster Draft Addendum 31
Date: Saturday, October 5, 2024 9:16:38 PM

To Whom it May Concern,

My name is Quincy Berglund and I am a commercial lobsterman. I'd like to voice my strong support for postponing Addendum XXXI. I have been lobstering for 25 years and I believe we have done an excellent job of being responsible stewards of our aquaculture and have gone above and beyond in implementing conservation measures. This Addendum would be harmful to our careers, our industry, and our economy. I ask that you take this comment into consideration and postpone Addendum XXXI.

Thank you,

J. Quincy Berglund

Sent from my iPhone

From: John Drouin
To: Comments
Subject: [External] Lobster draft Addendum XXXI
Date: Saturday, October 5, 2024 5:33:05 PM

To ASMFC Lobster Board:

My name is John Drouin, a Cutler Maine lobsterman for 45 years.
I urge you to pass addendum 31 for a delay in the lobster gauge increase.

There are a number of reasons we need the delay. Such as to give Canada time to see what the ramifications are and how that will affect imports to the US.

We also need more time to re-examine the science for the reason of a gauge increase. Perhaps we will find that an increase isn't needed, or we examine the economic impact of a gauge increase....perhaps we do an increase with smaller increments instead of the planned 1/16" each time.
I think the board didn't have proper information when it originally considered the gauge increase based on the current science and monitoring programs that we have.

I can go into further details, but the bottom line is that the board needs to pass this addendum.
Thank you,
John Drouin.

From: John McCarthy
To: Comments
Subject: [External] Lobster Draft Addendum XXXI
Date: Friday, October 4, 2024 9:22:17 PM

I am writing to voice my support for a delay in the LMA 1 gauge increase until July 2025.

Thank you-John McCarthy

From: John Tripp
To: Comments
Subject: [External] Lobster Draft addendum XXXI
Date: Saturday, October 5, 2024 12:00:06 PM

I write to express the support in the delay of the gauge increase until later in the season. The longer we can wait to address issues and concerns over the market impacts with Canada the better. Also I am deeply concerned that implementing this in January would have drastic impacts on catch rates for spring fishermen. I think that if the gauge is going to increase it should coincide with the molt as best as possible.

I would also like to state I am against increasing the gauge as a conservation measure. I believe there are better alternatives to maintain a healthy stock. For one there should be a zero tolerance policy across all lobster zones for keeping V notched lobsters, as well as stronger enforcement for people to v notch egg bearing lobsters. Simple things like making it mandatory to carry an approved punching tool, not the one on the measure. A clean v notch from a good tool is a healthy way to ensure that the lobster can heal quickly.

I believe that simple measure should be taken to improve the handling of lobsters. A minimum vent size of 1 7/8 would filter most small lobsters out. Stop allowing fishermen to bring up loads of shorts just to have to fight them out of the traps or risk mortality from other lobster in the trap, or getting claws broken off from hanging out of traps wounding and potentially causing stress to the stock.

I believe a mandatory 3/4 mesh panel should be required in the bottom parlor sections of the traps. This “claw saver” panel does just that, protects lobsters from being wounded by claws hanging out of the bottoms of the traps and potentially dying.

Lastly I am concerned about the use of hide bait for lobstering. I am concerned that not enough research has been done on long term affects of consumption of hide bait in lobsters. I worry that the hairs left in the follicle could damage the digestive tract of the lobster. I don’t believe we should be putting land based products into the ocean to harvest lobster.

Thanks, John Tripp
F/V SkyAnnIra
Spruce Head, ME

From: Comments
To: Caitlin Starks
Subject: FW: [External] Lobster Draft Addendum XXXI
Date: Monday, September 23, 2024 9:47:45 AM

-----Original Message-----
From: Joseph McDonald <lobsterlovah@gmail.com>
Sent: Saturday, September 21, 2024 7:45 PM
To: Comments <comments@asmfc.org>
Subject: [External] Lobster Draft Addendum XXXI

To whom it may concern,
As a second generation lobster fisherman from Jonesport I'm calling for a pause on the measure increase. In the past several years I have seen more juvenile lobsters inside the 3 mile line than ever before. The economic impact that increasing the measure is going to cause will bankrupt half the industry. The state of Maine cannot afford to lose the revenue in taxes they won't receive anymore. The measure increase will affect all businesses across the state. The science is majorly flawed in data. We cannot increase the measure if there is no true problem.
Sincerely, Joseph McDonald

From: millertime3862@aol.com
To: Comments
Subject: [External] Lobster draft addendum 31
Date: Saturday, October 5, 2024 10:40:20 AM

Please reconsider the implementation of the measure increase. Your science and what the fishermen are seeing are entirely different. I believe you need more time to study what's happening and get a better understanding of it all. The economic impact of it will be devastating to many communities with immeasurable consequences. Take more time to find better solutions to what's happening. Thank you for your time.

Josh Miller
lobstermen, Vinalhaven ME.

From: Joshua Eaton
To: Comments
Subject: [External] Measure increase
Date: Saturday, October 5, 2024 6:36:29 AM

This is not the time for a measure increase. It will absolute cripple the lobster industry! Speaking for myself I won't be able to pay my crew or support my family. That's about 20 percent of the catch!!

From: justin sprague
To: Comments
Subject: [External]
Date: Saturday, October 5, 2024 6:59:39 AM

If this measure increase goes thru it will put me and the rest of the coast of Maine out of business were already barely making ends meet with taxes, cost of living and expenses more then doubling.

From: kandj2005 (null)
To: Comments
Subject: [External] What I see in my traps
Date: Saturday, October 5, 2024 6:17:43 AM

We have seen far more juvenile lobster in our traps in recent years than in the past. I feel what we are seeing checking traps 130-140 days throughout the year provides the most accurate representation of the lobster stock. I feel we have been told the stock is depleting for over 30 years now and we just keep seeing more and more lobsters of all classes each year. How can what surveys show and what we are seeing be so much different. More surveys and consideration needs to be put into such impactful decisions.
Thank you
Kevin Griffin
Maine zone F
Sent from my iPhone

From: Kyle Kennedy
To: Comments
Subject: [External] Measure increase
Date: Saturday, October 5, 2024 8:15:29 AM

ASMFC,

I am writing today to discuss the measure increase for the lobster industry. I am on the water every day and I personally believe the science has failed us once again. Lobsters are never in the same spot every year.

If you talked to fisherman they have to figure out what's going on in the present to catch them. If you went to the same spot and tried the same things year after year we would have gone out of business a long time ago. The lobsters are most definitely settling in to different areas. Ten years ago you would never see juvenile lobsters in 70-80 fathoms of water. Now it is very common to see lobsters extremely small come up in traps in deep water. They are so small it's hard to imagine how they didn't fall out of the trap when it was coming up.

Increasing the gauge size seems like another way to attack the fisherman. The catch for lobsters has dipped in the last couple years because of the slowdown in the economy. Fisherman couldn't afford to haul their traps as much as they'd like because of the low prices they were receiving. Increasing the measure is only going to intensify this and force many out of business. The United States used to be the land of the free and it seems like now it's a constant fight to just be able to go to work. That doesn't seem right when we know there's not a lack of juvenile lobsters. During Covid some of the surveys were not completed correctly and it looks like that's the data you are basing our decisions from.

The measure changes will be catastrophic to the lobster industry. We can't survive with less product. The prices we receive never change and I'm sure most have said the fisherman will receive more money for the ones they do catch in 2025. That will never be the case. The large dealers have already explained to us that we are going to lose the "chick" market once this goes through. That's the smallest legal lobster we catch and a very valuable market. Canada is going to monopolize on this decision.

Please remember if you follow through with this, you are the ones directly responsible for crippling the lobster industry and forcing many families into poverty. All of this is based on erroneous data.

Kyle Kennedy
F/V Katlyn Joan
207-598-7410

From: LWATKINSON@roadrunner.com
To: Comments
Subject: [External] Lobster Draft Addendum XXXI)
Date: Saturday, October 5, 2024 4:56:40 PM

To whom it concerns:

I do not support a guage increase for the state of Maine. I fish zone C9 which is just inside the 3 mile line. I have taken multiple sea samplers and on completion of the day, they agree that our area has a very healthy resource. I have discussed with them that I believe the ventless trap survey is being sampled in the wrong area and depth which is giving incorrect data. My recommendation would be to increase sea sample data and new and deeper ventless trap surveys. The juvenile lobsters have shifted from their traditional grounds 20 years ago.
Thank you
Lee Watkinson
4556 Lic #

From: Mack Kelley
To: Comments
Subject: [External] Don’t change the measure
Date: Saturday, October 5, 2024 3:32:23 PM

I’m just here to put in my opinion that the measure needs to be left alone. If there is anyone in doubt that there are plenty of juvenile lobster I gladly invite them to come on my boat and I’ll show them. Or they can even look at my tik tok series about my wooden and wire trap comparison. The amount of short lobster i catch in those 9 traps alone should speak volumes. Thank your for your consideration.
Sent from my iPhone

From: matt gilley
To: Comments
Subject: [External] Lobster draft addendum 31
Date: Sunday, October 6, 2024 9:52:17 PM

Good evening,
I am writing in support of delaying the gauge and v notch standards. The whole idea needs to be cancelled all together until there is complete data collected from off and onshore fisheries. The economic effect this will have on the Maine coast will be crippling at a time when many are already struggling. Please pass addendum 31 and delay the gauge increase indefinitely.
Thank you,
Matt Gilley
Harpswell Maine
F/V Catherine G

From: Comments
Sent: Tuesday, October 8, 2024 10:16 AM
To: Caitlin Starks
Subject: FW: [External]

From: Matthew Knowlton <knowlton.matt3@gmail.com>
Sent: Saturday, October 5, 2024 10:23 AM
To: Comments <comments@asmfc.org>
Subject: [External]

The lobster industry does not need a measure increase, baby lobsters are more plentiful than I have ever seen them. The fleet has shrunk a considerable amount over the last 3 years. That being said pressure on the fishery has dropped considerably. It is very apparent when working the water how very little gear there is compared to just 3 years ago. The lobster industry has always self regulated when needed, usually through our own regulation or fishermen dropping out of the industry. Please do not increase the measure, the few of us that are left are working on slimmer margins.
Please also consider the problem we are seeing with "squirts" taking over the bottom. These are the real problem the lobster industry is currently facing.

From: Merritt Wotton
To: Comments
Subject: [External] Lobster Draft Addendum 31
Date: Saturday, October 5, 2024 7:40:11 AM

Support of postponing Addendum 27 measures

My name is Merritt Wotton and I am a commercial lobsterman from New Harbor, Maine. I do not believe a measure increase is necessary at this time. This year I have by far seen more undersized lobsters than any other time in my life. The science is not matching up to what we see as harvesters.

I'd like to comment on the inaccurate data of the ventless trap study. My traps inshore fill up with short lobsters in the months of April and May every year before the ventless traps are deployed. The undersized lobsters then tend to burrow in to molt by June when that survey is started. Once that ventless survey is completed in August the first bulk of the summer shed has generally been harvested . Once these legal sized lobsters are harvested the undersized begin to trap again. September we see an abundance of undersized lobster filling traps again. I have routinely measured 20/30 undersized lobsters per trap this September. They are as abundant as ever.

This survey needs to be done during the time undersized lobsters are crawling in April, May, and September. I believe the science needs to reflect what harvesters are seeing or end of the day it is bad science. If we as harvesters saw a decline in undersized lobsters that would be one thing but the whole coast seems to be in agreement the stock looks extremely healthy.

Many of us are on the ocean 2,000-3,000 hours per year. It is our occupation and livelihood on the line to understand how our resource of lobsters are traveling and changing. We discuss what we are seeing and analyze it throughout the day. We know this resource better than any study ever will.

From: Michael Dawson
To: Comments
Subject: [External]
Date: Saturday, October 5, 2024 1:31:43 PM

At this time I feel there is no need for a measure increase .my Name is Michael Dawson I've lobstered for over 40 years, zone D council Chair, LAC member an also have done the Ventless trap survey in the midcoast of Maine for many years. This past year I saw more small lobsters in the traps then I've seen in past years. Some of the biggest numbers I've ever seen in August. Also they don't do the trap survey in the deeper water offshore we're lobsters stay. Ow year round which is a change from years ago! It's just not needed at this time in Maine ! I haven't heard any fisherman in my area that supports this increase at this time or feel that it is needed! Thank you Michael Dawson FV Lisabeth Ann New Harbor Me

From: Michael Thompson
To: Comments
Subject: [External] Lobster draft addendum XXXI
Date: Saturday, October 5, 2024 4:41:41 PM

I have been a commercial fisherman my entire life. Lobster fishing has always been the most conservation minded fishery of all Maines fisheries. In saying that all of these absurd changes as of late have all made no sense and now a measure increase definitely feels like the fatal blow. My catch of keepers may be down this year but the amount of shorts has been through the roof. There definitely does not seem to be a shortage of baby lobsters on the ocean floor. Furthermore if keeping more egg bearing.lobsters around to produce more babies is the goal than fisheries like shafmaster should definitely be dealt with. They fish the Gulf of Maine yet scurt around maines measure and zero tolerance for v notches all the while keeping all the large female brood stock we need to keep the population up. I think it's a joke ur looking to us little guys to fix a problem that the big boats in the gulf that play by different rules and keep big egg bearing females either with a what we call a mutilated tail or just blow the eggs off with an air hose are causing. All of the U.S.A waters should all abide by the same measure and laws as maine. Than I guarantee the population of lobster would thrive for generations to come. Increasing the measure is only gona push us small captian owned operations out of business allowing guys that have no skin in the game to run shafty boats and the problem will continue untill there's nothing left of the fishery. I have made a trip on a shafmaster boat and have witnessed first hand what they legally and illegally keep for lobsters and untill they are dealt with no regulation you impose on us is going to make a difference. I truly hope u reconsider increasing our measure and find a way to make our laws apply to anyone fishing the gulf of Maine as I truly believe that is the only thing that will sustain our fishery for generations to come. Thank you

From: Michelle Plummer
To: Comments
Subject: [External] Lobster draft addendum 31
Date: Sunday, October 6, 2024 12:02:26 AM

To whom it may concern,
I've worked on the back of a boat for approximately 40 years and in my opinion there plenty of small lobsters. So many in fact that that if our measure were 1/8" or even 1/16" smaller our catch this year would have at least quadrupled. But that aside, this is a migratory species. Increasing our measure will do nothing but insure that those states to our south and the country to our north will put our lobster fishery out of business. Unless this is a law that will be implement across the board in all states and Canada there is really no point to increasing our measure. The fact is that there is an abundance of juvenile lobsters that are too small for us to keep. And just in case I haven't made myself clear I do not support increasing our lobster measure size.

Thank You,
Michelle Plummer
Sternman F/V Michelle Lee
Sorrento, Maine

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Get Outlook for iOS

From: Nat Hussey
To: Comments
Subject: [External] Lobster Draft Addendum XXXI
Date: Saturday, October 5, 2024 9:01:03 AM

I support postponing or terminating this gauge size increase measure. Thank you

Nat Hussey
207 485 2706
ME DMR license #9066, Landings #149931

From: neil kirby
To: Comments
Subject: [External] Comemt about the addendum
Date: Saturday, October 5, 2024 9:33:28 PM

The measure increase is unnecessary and i know my fellow fishermen will agree that this season especially, but also the last few seasons we have caught measured and released an incredibly large amount of short juvenile lobsters, so your trawl survey should be re assessed or else you should listen to the fishermen that are on the water every day collecting real data that will show you the total opposite of your survey. Im 100% against the measure increase, it doesn't need to happen and it shouldn’t happen!
Sent from my iPhone

From: Nicholas Parlatore
To: Comments
Subject: [External] Measure increase
Date: Saturday, October 5, 2024 6:20:05 AM

The proposed measure increase is the worst possible thing this fishery needs, we already throw over 85-90% of what we catch. This year along we've seen a MASSIVE spike in juvenile and egg bearing lobsters. There is no shortage, our measure is already doing its job and with us already keeping so few, this measure increase is only going to drive more people out of the fishery. Please listen to the people who do this for a living, we see alot more than anyone behind a desk or what you find from a small survey.

From: Nick Faulkingham
To: Comments
Subject: [External]
Date: Saturday, October 5, 2024 7:34:13 AM

I am against any changes, regarding vent and measure increases!

I feel more research for juvenile recruitment level lobsters needs to be performed in tidal mud flats during the early summer months. I also think studies should be performed in deeper water throughout the year with better designed equipment. I have witnessed some of the contraptions used for the study and I do not see how an accurate assessment can be performed, especially in deep water.

One of my major concerns with the lobsters industry, is the increasing amount of predatory fish. I have seen an explosion of cunners, cod, and stripped bass in the last 7 years. Cunners, will east lobster eggs along with juvenile lobsters. Cod and stripped bass are targeting larger lobsters and this will be devastating to the lobster industry.

I feel an increase in cod and stripper limits , would be beneficial for the lobster industry I also feel implementing a lobster hatchery program along the newengland seaboard would be beneficial too. Maybe add the program to coastal communitie schools.

From: Galen Plummer <junglerooster1@hotmail.com>
Sent: Wednesday, September 25, 2024 4:59 AM
To: Comments
Subject: [External] Maine measure increase

Some one needs to look further into settlement studies. As a fisherman my observations like many other fishermen shows a huge variety of lobster sizes. A measure increase in size will cost fishermen a lot of money and put us at a disadvantage in the lobster market. It's just not needed.
Sent from my iPhone

From: prentiss harmon
To: Comments
Subject: [External] Lobster Draft Addendum 31
Date: Saturday, October 5, 2024 5:59:42 PM

I do not support the measure increase it will crush what we have worked so hard for. There is nothing but an abundance of egg bearing females and juvenile lobsters in Maine waters right now

From: r.a. morales
To: Comments
Subject: [External] Lobster Draft Addendum 31
Date: Wednesday, September 25, 2024 4:16:06 AM

I support of postponing addendum 27 measures.

Sent from my iPhone

From: RIchard Carlsen
To: Comments
Subject: [External] Measure increase.
Date: Saturday, October 5, 2024 12:27:36 PM

I would like to express my opinion in the measure increase. I've been fishing since I was 11, I am now 60. I have seen good years and bad years. In years past, you would never see undersized lobsters with eggs. There are certain times of the fishing season where there are an abundance of egg lobsters. The past few years, I have seen hundreds of undersized female lobsters .....around a half an inch or so from making the measure. I have never seen a season of limited egg lobsters. The ventless trap surveys are not accurate for a couple of reasons. First, the survey traps are not in a high yield area and second, the bait in a trap lasts about a day before the crabs completely wipe it out so unfortunately the traps stop fishing and no lobsters will go into the trap. This increase in the measure will definitely affect all the lobstermen in a negative way. I will be taking someone from the State out to show the abundance of small lobsters that I have been catching.

If for some reason you still feel the need to pass this law, would you consider a double sided measure ? One side for female increased measure and the other side male with no increase in the measure? It would be really nice to see the people doing the surveys be a little more accurate in their reportings. Maybe go with the people that actually lobster for a living to get a more accurate report.

Thank you,
Richard Carlsen.

From: richard howland
To: Comments
Subject: [External] Public comments for delay in Measure change
Date: Friday, October 4, 2024 5:53:59 PM

I would like to voice my support for delaying the Measure change from January 1, 2025 until July 1, 2025. We need more time to figure out the marketing side, the enforcement side, as well as giving fisherman a chance to make a plan for how this will affect their businesses. Unfortunately the effects of this will be financially devastating too many fisherman who fish in Area 1, and cause rippling side effects in markets from the east coast of Canada down to Massachusetts.
Thank you for your time
Richard Howland
Captain FV Victoria
Islesford Maine

From:	Richard Smith
To:	Comments
Subject:	[External] Lobster Draft Addendum XXXI
Date:	Saturday, October 5, 2024 8:26:26 AM

To whom it may concern,

The proposed measure increase for the lobster fishery is a reaction to a perceived problem, a problem that doesn't exist.
The inshore and offshore Maine lobster population has a healthy stock of juveniles, eggers/notched, and oversized lobsters, but these stocks have moved/shifted over time. I see more juveniles and eggers in the run of a day now than I ever have.
I would suggest that research through sea sampling programs be modified and expanded, before putting additional hardships on business owners and families.
The proposed measure increase is unnecessary, and the increase in vent size planned for 2028 is unabashed stupidity. Our vents are already oversized enough to let lobsters escape that are easily 3/8" above minimum legal carapace length, so current vents would still be adequate with the larger measure.
Now is the time to show you're not as inept at your work as NOAA, and realize you have the capability of taking input from stakeholders in the fishery. We are your best, largest data source. Thousands of sets of eyes on the resource, with a true interest in its' continued abundance.
Thank you for your time.

Richard Smith
F/V Bad Behavior

From: Robert Ingalls
To: Comments
Subject: [External]
Date: Friday, October 4, 2024 11:59:49 AM

Please delay the gauge increase until july 21st 2025.
Give us time to get on the same page with our Canadian counter parts.
I've held a Maine license since 1960.
That's right I'm old.

Robert Ingalls.
16 Pettegrow Point Road
Bucks Harbor, Maine 04655

From: Ryan Sprague
To: Comments
Subject: [External] Oppose Lobster Measure Increase
Date: Saturday, October 5, 2024 5:54:25 AM

The lobsters in our state are as always flourishing. Some areas may not fish as well as others on any given year but with all things involving Mother Nature things cycle. The measure increase would do nothing but cripple our industry and give Canada even more of an upper hand in trade when it concerns our shared marine aquaculture. The science is flawed from bogus testing done by people who probably couldn't tell a female lobster from a male yet we are suppose to believe what these "experts" say is laughable. This is nothing more than a regulation that appears to do nothing but cripple the Maine fishing industry that we have sustained through FISHERMAN EFFORTS and not those of over educated pencil pushers with no real world experience in the fields they claim to be experts in. Have a wonderful day
Sent from my iPhone

From: Sam Flavin
To: Comments
Subject: [External] Lobster Draft Addendum XXXI
Date: Friday, October 4, 2024 5:49:26 PM

To Whom It May Concern,

I am writing in opposition to the proposed measure change. Any increase in our minimum measure will have a profound effect on our catch, particularly during the late winter and early spring. I fish on a year-round boat and from the months of February through June we rely heavily on lobsters that just make our current measure. Without these lobsters I cannot see a viable spring fishery.

Apart from avoiding a measure change entirely, I urge the ASMFC to delay the change to give fishermen time to prepare for this hit.

Sincerely,

Sam Flavin
Crew FV Victoria
Little Cranberry Coop
Islesford, ME

From: Samantha Thompson
To: Comments
Subject: [External] Lobster draft addendum 31
Date: Saturday, October 5, 2024 7:49:00 AM

I implore you to please consider option B, to postpone the Implementation of Addendum XXVII Measures until July 1, 2025.

:-) Samantha Thompson

From: Scott Place
To: Comments
Subject: [External] Lobster draft addendum 31
Date: Saturday, October 5, 2024 10:56:02 PM

To whom it may concern,
The proposal for a gauge increase is nonsense. 30 years ago there wasn't an oversized gauge in Massachusetts, no v notch rules, a quarter pound a pot was the norm much of the fishing season. Now we have a minimum and a maximum size and a zero tolerance v notch and it works. I'm consistently catching well over a pound a trap, throwing back thousands of v notches and seeing hundreds of thousands of shorts. The stock is robust. The reality of ups and downs is plausible to those of us that have been involved and invested in this fishery for decades. It gets better every year. If the 3 1/4" minimum, the 5" maximum and the zero tolerance v notch aren't adequate to sustain this fishery there's way bigger problems going on and a gauge increase won't save it.

Maintain the status quo!

Scott Place
F/V Lee Faith
MA 000427
Rockport Massachusetts

Sent from my iPhone

From: sfogarty72@gmail.com
To: Comments
Subject: [External] Measure increase
Date: Saturday, October 5, 2024 9:03:46 PM

I strongly oppose this increase.

The surveys are flawed.

Sean Fogarty
Zone D
Sent from my iPhone

From: Shane Hatch
To: Comments
Subject: [External] Lobster Draft Addendum 31
Date: Saturday, October 5, 2024 6:41:24 AM

Goodmorning,

My name is Shane Hatch, and have been lobstering/commercial fishing for 31 years. We need to further delay the gauge increase until we have the correct science to back it. I have been a part of the Maine DMR lobster sampling group for close to 20 years. While they do great work and I applaud them, some of the information does not make it to the table. Lobsters have changed many times and in many ways from shallow to deep, hard to soft bottom over the years. I know the biomass is still there but the science saying so has not been used correctly. I have spoken personally to Kathleen (head of Maines lobster sampling) a few times about how we can change this practice. Eventually I hope that we can resolve this issue. It will only show that there are just as many short lobsters as before and possibly more then ever! Thank you for your time.

Shane Hatch
Sent from my iPhone

From: Shaun McLennan
To: Comments
Subject: [External]
Date: Thursday, October 3, 2024 6:54:35 PM

I support the postponement. I do not support any changes to our fishery that has been proven to work well for several decades.

Thank you,
SHAUN MCLENNAN

From: KENNETH STANVICK <kennethstanvick@comcast.net>
Sent: Friday, September 27, 2024 8:12 AM
To: G2W2 <G2W2@asmfc.org>
Cc: Zobel, Renee <Renee.m.Zobel@wildlife.nh.gov>
Subject: [External] meeting Comments

I am recreational lobstermen and have been doing this for the past 10 years in New Hampshire. Let me say that I am not in favor of the proposed amendment. It seems to be yet another attempt to "kick the can" down the road. Science not emotion should dictate the actions necessary to protect a healthy lobster population. We have many examples where the commercial fishermen have denied science to ensure that they can continue to overfish the oceans to support their demand to continue an activity to benefit themselves.
I would suggest that Gulf of Maine (GOM) warming, low recruitment rate rates, should force fisheries managers to conclude that action must be taken, not be driven by the desires of commercial fishermen who have clearly demonstrated they put their needs above science-based decisions.

I need not tell you the many examples of where delaying actions have had a significant impact upon recovering of the target species. I cannot account overfishing as the only factor, but one of many factors which combine to force protective measures to be implemented.

I might speculate that I was the only attendee to vote that the amendment to extend the deadline be denied.
Interested in seeing how the vote turned out? I am sure that 99% of those who attended represented the commercial fishing industry.

Very best regard.

Ken Stanvick

From: Stephen Hutchinson
To: Comments
Subject: [External] Measure/vent increase
Date: Saturday, October 5, 2024 9:59:08 AM

I know what you people are up too it's not to help the fishermen this increase is a tool you are using to put more fishermen out of business you are using the science against us you know we have an abundance of juveniles that will be another boom in the next few years these increases will retard the boom 2 more years you know fishermen are selling out now because of the daily reporting state and federal. The higher cost of doing business and a decline in catch and a price that hasn't reflected an increase to keep up with our other rising prices.

Shame on you all!
sell outs putting us out of business for offshore wind energy farms.
P.S. DEAD AGAINST THIS!!!

From: Xfinity Email
To: Comments
Subject: [External] Addendum XXXI
Date: Monday, September 16, 2024 8:14:47 AM

To the ASMFC:

I am opposed to ASMFC going to Canada to get a minimum size agreement and allowing the Canadians to take the large lobster market from the American taxpaying lobster industry. For decades Cape Cod lobstermen and fish markets sold large lobsters at the Boston fish pier to be then sold nationally and internationally. Offloading occurred alongside the Canadian delivery trucks when seasons overlapped. I myself sold in Boston for forty years. The Boston fish pier wholesalers are familiar with all of us. Addendum XXXI would cut Cape Cod Lobster Management Area catch out of this market.

ASMFC and Massachusetts Division of Marine Fisheries (MA DMF) stated at public hearings that the impact would only be 2% but OCLMA attendees strongly disagreed. I have sought and never received the calculations for this number. Furthermore, MA DMF stated at public hearings that the minimum size increase will result in no financial loss while being silent on v-notch and maximum size financial expectations. The reason is that these two measures are a complete loss and impact the OCLMA significantly.

The OCLMA is a healthy and sustainable lobster fishery because 20 years ago it raised the minimum size and reduced traps by 25%. It is now being thrown into the current problem because MA DMF did not apply these measures throughout the state's waters. Its approach failed. This small region of Massachusetts should not take an economic hit due to MA DMF's mismanagement.

Finally, I believe the Economic Impact Statement (EIS) submitted in Addendum XXVII is flawed. There was not any section about the Cape Cod region which catches large lobsters. Massachusetts requires annual detailed catch reports from all lobster licenseholders and fish markets but those reports are for total pounds only. Since this region has a spectrum of sizes (unlike the MA-NH-MAINE area) the percentages are very important. Not only that but there is no record of the state even attempting to attain such information thus leading to the conclusion that the EIS is a fabrication.

Addendun XXXI significantly impacts the OCLMA and its markets and therefore I oppose it.

Stephen Smith

From: Sydnie Norris
To: Comments
Subject: [External] Measure change
Date: Saturday, October 5, 2024 10:20:30 AM

I work on F/V Amazing Grace out of Swans Island under captain Travis May Sr. We are in agreement to postpone the decision 6 months. If the measure change is going to work in theory, Canada needs to be a part of this change.

From: Thomas McLennan
To: Comments
Subject: [External] lobster draft addendum 31
Date: Saturday, October 5, 2024 5:47:00 AM

This is Thomas McLennan from Spruce Head, Maine. I'm writing to say I DO NOT SUPPORT ANY CHANGE TO THE LOBSTER MEASURE.

LEAVE IT BE!

thank you.

Sent from my U.S.Cellular© Smartphone

From:	Tiffany Strout
To:	Comments
Subject:	[External] Lobster Draft Addendum XXXI
Date:	Saturday, October 5, 2024 1:00:21 PM
Attachments:	Letter to ASMFC addendum XXXI.pdf FINAL-SEAMaine-Economic-Impact-Analysis-Report-2.pdf Addendum XXXI testimony 10-5-2024.pdf

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Dear Atlantic States Marine Fisheries Commission,

My name is Tiffany Strout and I am writing to you today to express my support for Addendum XXXI as put forward by the American Lobster Management Board, to further pause the implementation of the increase in the undersized measure.

Attached please find my testimony as related to acceptance of Addendum XXXI along with my reasonings.

Please include my testimony from both a Legislator and as a parent and concerned citizen along with the Sea Maine report all as apart of my record.

I also submitted testimony signed by all members of the Legislator on the Marine Resource Committee unanimously encouraging a pause on Addendum 29 which is now Addendum 31.

Thank you for watching out for the fishing industries along the coast of the United States. I am hopeful once you read my testimony you will see how your decisions directly affect my community and why I hope you really consider accepting Addendum XXXI allowing more time for science and will connect more with the fishermen who have spent years on the water.

Have a great day!
Tiff

Tiffany Strout
Concerned Parent and Community Member
Representative of District 11
(Milbridge, Harrington, Columbia, Columbia Falls, Centerville, Addison, Jonesport, Beals Island, Jonesboro, Roques Bluff, Whitneyville and Machias)
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Dear Atlantic States Marine Fisheries Commission,

My name is Tiffany Strout and I am writing to you today to express my support for Addendum XXXI as put forward by the American Lobster Management Board, to further pause the implementation of the increase in the undersized measure until July 25, 2025.

Attached please find my concerns as the current Representative of District 11 and below, please find my concerns as a resident of the DownEast Maine region and most importantly as a mother as a first-generation lobster fisherman.

In learning more about the Atlantic States Marine Fisheries Commission (ASMFC) I read your mission statement "To promote the better utilization of the fisheries, marine, shell and anadromous, of the Atlantic seaboard by the development of a joint program for the promotion and protection of such fisheries, and by the prevention of physical waste of the fisheries from any cause". I am hopeful as you read this request, you will understand my mission is to help ensure my community is a safe and prosperous community that enables future generations to learn about their heritage and have an opportunity to work and thrive in the fisheries now and in the future. My mission is driven by my sons love of the ocean and the desire to be a part of the fishing community, but also, to help ensure current and future individuals are also able to have the opportunity following in their families' footsteps or like my son, be a first-generation fisherman. Protecting the fishing industry will help to make sure our community does continue to be safe and prosperous for all who live there.

When thinking about prosperity, the value can vary person to person depending on their personal goals. Here is Washington County, our prosperity my be quite different than other areas where you also oversee. In Washington County, we are a community of people with a deep work ethic that has over the years adapted to season jobs such as blueberry harvesting, wreath making and the fisheries. We have no big industry in the coastal parts so working hard and adapting are part of our core values.

Knowing the Commission relies on data and facts to help them make their decisions, I thought I would provide some about Washington County as most may not be familiar with the area.

Washington County Maine, known as the Sunrise County, has a total population of just over 31,437 (2022 census), includes two cities, forty towns, three plantations, and two Native American areas and is located in the far eastern part of the State of Maine. The county is 5th largest in size with a total area of 2,562.7 square miles and boarders Canada both at land and at sea.

As compared to other counties in the United States, Washington County, Maine is considered one of the poorest counties in the United States, consistently ranking among the highest poverty rates in the state of Maine, with a significantly higher poverty rate compared to the national average, meaning, it is considered much poorer than most other US towns when looking at poverty statistics alone. In 2022 the employment rate was 49%.

In reading this you may wonder why this information would be important to the ASMFC when making decisions that effect the regulation around the fishing industry. The simple answer is the fishing industry is the main driver of Washington Counties employment and the main contributor to the economy. Without the fishing industry, Washington County would not exist.

Sea Maine did a report highlighting the impacts of the industry which I have attached to this email and wish to be included in the record for my testimony. If you read the report, you may gain a better understanding of the direct impacts across the state, but I will high light the most important one specific to Washington County and Hancock County, DownEast Region:
"Regionally, the seafood sector in the DownEast region accounted for 45 percent of all direct jobs (and 47.4% of total impact jobs) and supported $390 million in labor income (16 percent) in 2019. The seafood sector in DownEast supports slightly more jobs than Southern Maine despite having less than one-fifth of the population. DownEast seafood jobs were concentrated in the harvesting subsector — the region accounted for 65 percent of all harvesting jobs in seafood sector statewide in 2019. These estimates are likely conservative as a result of a significant amount of harvesting activity that did not have geographic identifying information attached — accounting for nearly 3,700 jobs."

Knowing this information, now ties into why what seems like a small proposal in a measure should not play a big part, but the one you are proposing definitely will but not in the way you are hoping.

As mentioned above, Washington County directly boarders Canada and fisherman from both Washington County and Canada fish in what is called the "Grey Zone" Washington County fisherman are already at a disadvantage when fishing for lobsters on the oversized measure. As you know, lobsters over 5 inches must be thrown back because we know lobsters become more fertile as they age, and the intent is to make sure there are breeders to sustain the future of the industry. Canada however does not have the same regulations on measure and lobsters that are thrown back by Maine lobstermen can then be harvested by Canadian lobstermen defeating the entire reasoning and hurting the industry.

The same thing will happen with an increase in the small measure. It is estimated the small increase in the smaller measure will have a direct 20% decrease in catch for DownEast lobstermen. This is due to the same reasoning as the over sized lobsters. The fishermen fishing in the "Grey Zone" will throw back the current size lobsters they are allowed to keep, and they will go directly into the Canadian traps to be hauled and sold. There will be no time for them to grow and help with the sustainability of the stock as the intent of the change.
Removing 20% of the catch from the fishermen in Washington County will most definitely have both an impact on the fisherman, but also every business in the community including, banks, stores, bait dealers, truck drivers, carpenters, trap makers and the tourist industry. Also, there are several members of the Motahkomikuk and Sipayik reservations who take part in the fishing industry in Washington County and some may also fish in the "Grey Zone", but even if they are shore fishermen, the effect is still the same with Canada.

While I can respect the intent of ASMFC is to protect the fishing species, I can assure you, there are no better stewards of the sea including the ecosystem and species than those who have relied and need to rely on the industry for their livelihood and more importantly take great pride in their heritage.

Allowing the fishermen to be more of the voice of the science based on years of time on the water learning the migration of the species and working to make sure the industry can continue will be the most beneficial to everyone including the species that live in the ocean.
This model has proven true over the years with things like removing all thousands of miles of floating rope from their gear, using breakaways on their balloons and buoys and probably one of the

most important implementations of V-notching the egg bearing female lobsters and returning them to the sea.

A request I have for the commission is to also look at other areas like industrialization of the Atlantic Ocean and how that is impacting the ocean species and ecosystems both now and in the future. There are companies' sonar blasting the bottom for mapping and then there will be 100s of miles of dredging to try to bury all the cables coming to shore.

The intent of Addendum 29 is to help maintaining the lobster stock, but there is not conversation about what the effects of dredging through breeding grounds of all species or even the protected coral areas. There has been no remarks offered by the commission, at least that I could find, related to the danger of the EMF that is emitted from the electrical cables that European studies have shown to deform the lobster larva not allowing the tail to properly develop causing them to be unable to swim or the mesmerizing effect it has on the crab species to cause them to freeze and not move. One of the most concerning futures is the floating offshore wind terminals that require dragging 3 to 4 ginormous anchors across the bottom of the ocean on 3 to 4 sides of the platform to get them to hitch in the ground for anchors. Knowing anything about the ocean tells you that you will need to have slack in the chains going to the platform because well, the ocean is always moving which will be dragging continually across the bottom as it moves side to side. In addition, you will not be able to bury any of the cables connecting to each other or to the shore because again, the ocean is always moving which will create a spiderweb of floating cables through the array. There are many more concerns including the wake and smother effects also both damaging to the ecosystem.

If the commission really wanted to make a difference in the sustainability of the ocean and the species that call it home, they should listen to those who want to protect it for their heritage and livelihood rather than those who want to profit by industrializing the ocean not caring about the species that call it home.

Thank you for taking the time to read my concerns and I hope you have a better understanding about the direct impact accepting Addendum XXXI will have on my community and the people that want to continue to call DownEast Maine home. With new data being collected to show recovery of the stock, further moving the measure adjustment out will allow for more time to gather additional date and if the data shows recovery with the measure currently in place, would changing the measure make any difference to the recoverability of the lobster stock, maybe a better chance in southern Maine, but not in DownEast when fishing with Canadians who are maintaining the current measure but I guarantee the biggest threat to everything in the ocean is industrialization.

Please let me know if you have any questions and I am hopeful the commission will take time to learn more about the effects their decisions have on people.

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Dear Atlantic States Marine Fisheries Commission,

I am writing to you today to request through review and approval of Addendum XXXI to further pause the implementation of a change in the undersized measure of a lobster harvested extending the pause until July of 2025. With the understanding the lobster industry needs to have sustainability policies in place to help ensure the continuation of the heritage industry, concern has been brought forward by the industry of this change in the under measure hoping to have an effect on sustainability but is certain to have a huge effect on the commercial fishermen.

As the industry has both grown and become more profitable, those in the industry have worked tirelessly to monitor the industry and put forward policies such as v-notching egg bearing females so they will not be able to be caught in the future and would continue as proven breeders producing lobsters for the future.

A couple of major concerns with a change in the undersize measure are, the decrease in the landings estimated to be 20% in zone A and the unfairness of the competition with the fishermen in Canada. When zone A lobstermen return under sized lobsters, those moving lobsters are going to crawl in the Canadian traps and be caught and kept for sale. The unintended consequences of changing the undersized measure are a decrease of landings for Maine lobstermen and an increase in landings for the Canadian lobstermen still resulting in the same number of lobsters harvested.

I appreciate the passing of Addendum XXX to not allow live lobsters to be imported into the United States that did not meet the measurement requirements imposed on Maine fishermen. My concern is, if this amendment only relates to live lobsters, but not processed meat, there would be no way to measure the shell of the lobster that was harvested and would there for not deter the catch of the new undersized measured lobsters in Canada as they could be caught, processed, and shipped into the United States.

In addition, the lobstermen have been under extreme stress and financial hardships implementing gear for all the whale regulations, increased cost in bait, increased cost in fuel and recently extreme storms that have destroyed both boats and wharfs. At this time, implementing a change in the undersize measure, when the science is showing leveling off or a slight increase in juvenile lobsters being recorded seems like yet another unnecessary regulation.

Allowing the lobstermen to work continue to work while there is a pause in the whale regulations will provide more data for better scientific review. The lobstermen are the biggest stewards of the ocean and the fishing industry, not just lobstering. As a representative of the industry, the information you can provide to ASMFC could be a deciding factor.

Thank you for your time and consideration of this recommendation. I am looking forward to hearing your thoughts and working with you towards continuing to pause the new undersized measure regulation.

Sincerely,

Tiffany Strout
State Representative

District 11 Addison, Beals, Columbia, Columbia Falls, Harrington, Jonesboro, Jonesport, Machias, Milbridge, Roque Bluffs, Whitneyville, Centerville Township, and North Washington (Part)

The Economic Impacts of the Maine Seafood Sector

Prepared for

Seafood Economic Accelerator for Maine

Prepared by

Middlebury Institute *of* International Studies at Monterey

Center for the Blue Economy

MAINE CENTER FOR BUSINESS AND ECONOMIC RESEARCH

UNIVERSITY OF SOUTHERN MAINE

January 2023

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1 Executive Summary

This analysis utilizes the best available data from the Maine Departments of Marine Resources and Labor together with the IMPLAN economic model to estimate the total (direct, indirect, and induced) economic impacts of the commercial seafood sector and core value chain components on the state of Maine and substate regions. The analysis is intended to serve as a baseline indicator from which to compare impacts in future years, as well as to evaluate the impact of specific investments or initiatives on the growth of the sector over time. The major findings of the analysis are summarized below.

- The seafood sector contributed **over $3.2 billion dollars in total economic output** to the Maine economy in 2019. Retail seafood ($692 million), lobster harvesting ($511 million), and seafood processing ($343 million) were the largest contributing industries to total economic output.

- The sector supported **over 33,300 jobs statewide** in 2019, 23,846 of which were employed directly in sector industries and another 7,300 additional jobs supported from other indirect and induced multiplier effects. **Harvesting including lobster, non-lobster species and aquaculture is the largest employing part of the seafood sector supporting over 12,700 jobs**, followed by retail seafood outlets, including restaurants (8,550).

- Total direct and multiplier effects jobs in seafood estimated here makes the seafood sector the **largest natural resource-based sector in the Maine economy**.

- Employment supported **$1.3 billion in total labor income**, $967 million of which were from direct employment in the value chain industries and another $336 million resulting from other indirect and induced multiplier effects. Contributions to labor income were led **by lobster harvesting ($393 million)**, retail ($285 million), and all other non-lobster species harvesting ($155 million).

- The seafood sector supported an estimated **$449 million in tax revenues** in 2019, including local, state, and federal. The sector supported nearly $91 million in local and $110 million in state tax revenues. A total of $248 million in federal tax revenues were also supported.

- Regionally, the seafood sector in the **Downeast region accounted for 45 percent of all direct jobs** (and 47.4% of total impact jobs) and supported $390 million in labor income (16 percent) in 2019. The seafood sector in Downeast supports slightly more jobs than Southern Maine despite having less than one-fifth of the population. Downeast seafood jobs were concentrated in the harvesting subsector — the region accounted for 65 percent of all harvesting jobs in seafood sector statewide in 2019. These estimates are likely conservative as a result of a significant amount of harvesting activity that did not have geographic identifying information attached — accounting for nearly 3,700 jobs.

- The seafood sector supported over 10,000 jobs and over $260 million in labor income in 2019 in the Midcoast region. The sources of economic impacts from the seafood sector are concentrated in lobster harvesting and retail for the region, with aquaculture comprising a smaller but growing sources of jobs and income in the region.

- In Southern Maine, the seafood sector supported over 7,600 jobs and $370 million in labor income — slightly less than Downeast. The bulk of direct jobs were supported by the retail industry sector (over 4,000), while harvesting (all species wild caught) supported roughly 1,240 jobs.
- The seafood sector's total economic impact is a much larger share of the Downeast region, accounting for almost 20% of employment than the sector comprises of Midcoast or Southern economies.

This study focused on 2019, prior to the Covid pandemic. The continuing updating and improvement of economic data for the seafood sector and the individual industries should be a high priority for the industry and policy makers.

2 Introduction

2.1 Background

Maine seafood is central to the state's economic identity both in Maine and beyond. The seafood sector value chain collectively supports thousands of jobs and billions of dollars in incomes and output each year in the state and supports the prosperity of numerous communities along Maine's coast.

The Seafood Economic Accelerator for Maine (SEAMaine) commissioned the Middlebury Institute for International Studies Center for the Blue Economy (CBE) and the University of Southern Maine Center for Business and Economic Research (CBER) to quantify the economic contribution of the seafood sector to the Maine economy. This analysis is intended to support a larger effort aimed at improving the marketing of Maine seafood and is complementary to the work of other SEAMaine subcommittee reports. The analysis focuses on the domestic commercial seafood sector in Maine and should serve as a baseline case from which to compare impacts in future years, as well as to evaluate the impact of specific investments or initiatives on the growth of the sector.

2.2 The Maine Seafood Sector

The seafood sector is a composition of several economic activities, or industries, and can be characterized as a value chain as suggested in Figure 1. This figure describes the wild capture fisheries including lobsters, finfish, and other shellfish. The economic process begins with the purchase of certain inputs to the catching and cultivation process and proceeds through landing the catch, transporting it to processors and/or on to wholesale distribution or retail markets, such as seafood markets, grocery stores, or restaurants. At each stage of the process value is added to the fish caught, generating economic impacts through each step.

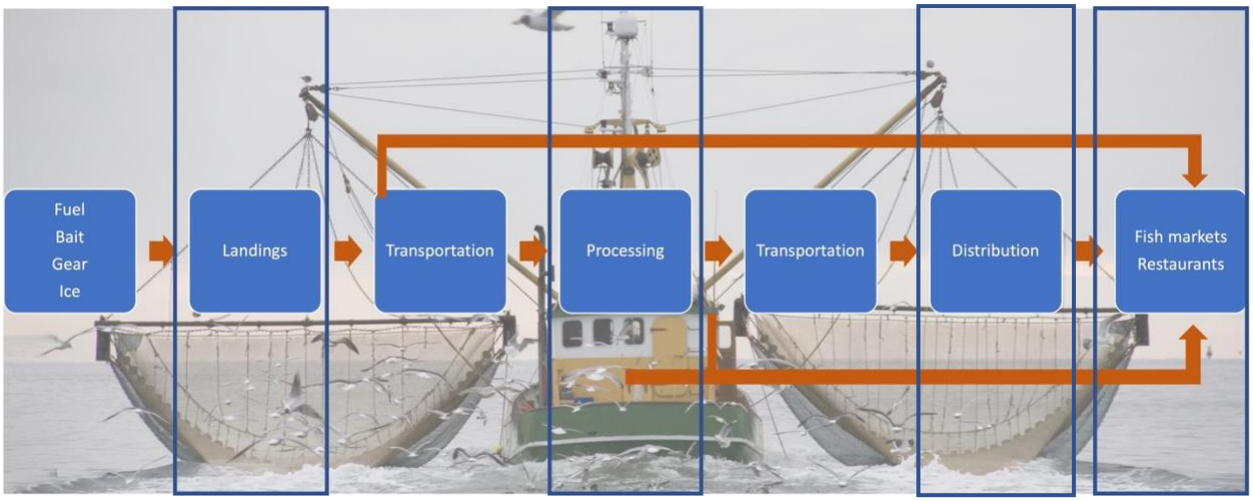

Figure 1: Wild Caught Fisheries Value Chain

The boxes in Figure 1 show the major points at which the economic contributions of the fisheries are measured: at the point of first sale (landings), at the point where the fish is processed into higher value products, at the points where the fish is distributed through wholesale markets, and at the final point of

sale through retail outlets. The value chain for aquaculture is very similar except that the inputs include food and in-water structures rather than bait, ice, and boats.

The economic characterization of the seafood sector tracks value creation through the four major industries — harvesting and production, processing, distribution, and retail since these are defined industries in standard economic data. The interrelationships among industries related to fishing are measured through economic impact (multiplier) analysis as described below. The total economic activity in Maine related to fishing is also affected by the purchases of goods and services within Maine not only by the fish harvesting stage. Data on inputs to harvesting and aquaculture such as bait, fuel, ice, dockage and mooring are not monitored and so are not included in this analysis directly. Approximations of the role of these inputs are provided in the IMPLAN model.

2.3 Methods Summary

This analysis is focused on quantifying the economic contribution (impacts) of the seafood sector on the Maine economy, inclusive of the direct economic impacts of the sector and its value chain components, as well as the other indirect or induced effects that result from recurring rounds of business to business and employee wages in the economy. For this purpose, a number of standard economic data sets and tools are used.

But it must be acknowledged at the outset that there are several significant weaknesses in the available data when it comes to fisheries. These include the fact that the vast majority of those employed in the harvesting sector are not counted in the most important regional economic data series because harvesters are not covered by unemployment insurance and are usually paid in shares of the catch value rather than wages. A similar problem exists with aquaculture producers, though to a somewhat lesser extent because some firms in the aquaculture industry do have significant portions of their employment in the Department of Labor data used for the study. The fishing industry's contribution shares to such industries as wholesale, retail, and transportation is also not measured in Maine and so national relationships must be used. This analysis, therefore, requires careful construction of data from multiple sources.

Employment is estimated as the number of jobs, both full-time and part-time, and includes wage and salaried employees, sole proprietors, and active partners. Employment is reported as inclusive of both the number of full-and part-time jobs. See the Appendix for a detailed description of job estimates in the harvesting industries.

Labor Income includes wages and salaries and any other compensation to labor such as benefits.

Value Added is the difference between gross output (sales) and the costs of inputs such as supplies, inventory, and capital goods. It primarily consists of payments to labor and to ownership (adjusted for taxes). Value added can be compared between industries without double counting.

Gross Output is equivalent to gross revenues or sales. Gross output cannot be easily compared between industries because the sales of one industry

The initial measures of the various sector industries are based upon data from the Maine Department of Labor, Maine Department of Marine Resources, and other supporting sources covering employment, wages, or ex-vessel landed value. Estimation of the direct and economic impacts are generated using the IMPLAN economic model and other available data. Employment in the harvesting and aquaculture industries are estimated using Department of Marine Resources licensing data. The Appendix provides a detailed explanation of how the licensing data was used to estimate employment. Economic impacts are reported across four core indicators—employment, labor income, value added, and gross output. For each

indicator the direct, indirect, and induced effects are reported. Details of data sources and limitations and estimation methods can be found in the Section 7.

The analysis focuses on the sector's economic impact in 2019. Some data is available for 2020 and 2021, however, the data series are not yet in place to accurately measure the many disruptions stemming from the COVID-19 pandemic. To be sure, the pandemic likely caused longer term implications within the sector, whether related to markets, inter-industry relationships, or firm/establishment-level operations, that will take time to emerge from several years of post-pandemic data. Despite 2019 being a more appropriate year for complete measurement, the analysis is not able to capture significant year-to-year changes that may not be related to the pandemic, such as the growth in aquaculture employment and wages.

3 Economic Impacts by Major Industry

3.1 Statewide Economic Impact Summary for 2019

The seafood sector contributed over $**3.2 billion dollars in total economic output** to the Maine economy in 2019 (Table 1). The sector supported over **33,000 jobs statewide**, 23,846 of which were employed directly in sector industries and another 9,400 additional jobs supported from other indirect and induced multiplier effects. **Harvesting (all species) accounts for over 12,700 direct jobs. Seafood retail and restaurant employment accounts for over 8,500 jobs.**

Employment supported **$1.3 billion in total labor income**, $967 million of which were from direct employment in the value chain industries and another $336 million resulting from other indirect and induced multiplier effects. Contributions to labor income were led by lobster harvesting ($393 million), retail ($285 million), and all other non-lobster species harvesting ($155 million), while retail ($692 million), lobster harvesting ($511 million), and processing ($343 million) were the largest contributing industries to total economic output.

In total, the seafood sector contributed over $3.2 billion in total economic output to the Maine economy in 2019, two-thirds ($2.15 billion) resulting from direct sales in sector industries. Of total economic output, roughly $1.97 billion is accounted for as value added.

Table 1: Maine Seafood Sector Economic Impact Summary

Industry	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Aquaculture	540	$28.9	$190.1	$198.4
Harvesting (Non-Lobster)	7,663	$154.7	$174.8	$196.2
Harvesting (Lobster)	5,037	$393.0	$446.9	$511.6
Processing	735	$36.5	$48.6	$343.1
Retail	8,558	$285.3	$425.9	$692.4
Wholesale & Logistics	1,313	$68.6	$91.0	$212.6
Total Direct	23,846	$966.9	$1,377.3	$2,154.3
Indirect (all other)	3,154	$106.4	$169.7	$353.8
Induced	6,319	$229.9	$419.4	$732.6
Total	33,319	$1,303.22	$1,966.35	$3,240.72

3.2 Industry Sector Economic Impacts

This section provides the economic impacts of each individual value chain component (industry), including indirect and induced impacts occurring in other subsector value chain components. As a result, the total of the estimates reported for each value chain component that follows will not sum to the statewide summary presented in Section 3.1., which adjusts the indirect and induced impacts to account for value chain overlaps in the individual value chain component subsectors. For example, indirect jobs estimated for the processing industry will include jobs in the harvesting industry. While those jobs are included in the estimates for the processing industry in this section, those jobs are adjusted in the statewide summary to eliminate double counting.

The industry-level impacts reported here are summarized by both statewide total and by region. The seafood sector in concentrated along coastal communities, however, its impact extends to all corners of the state. To provide a greater level of geographic detail of where sector impacts are concentrated, impacts are reported for 4 regions in the state based on county level aggregates (Figure 2).

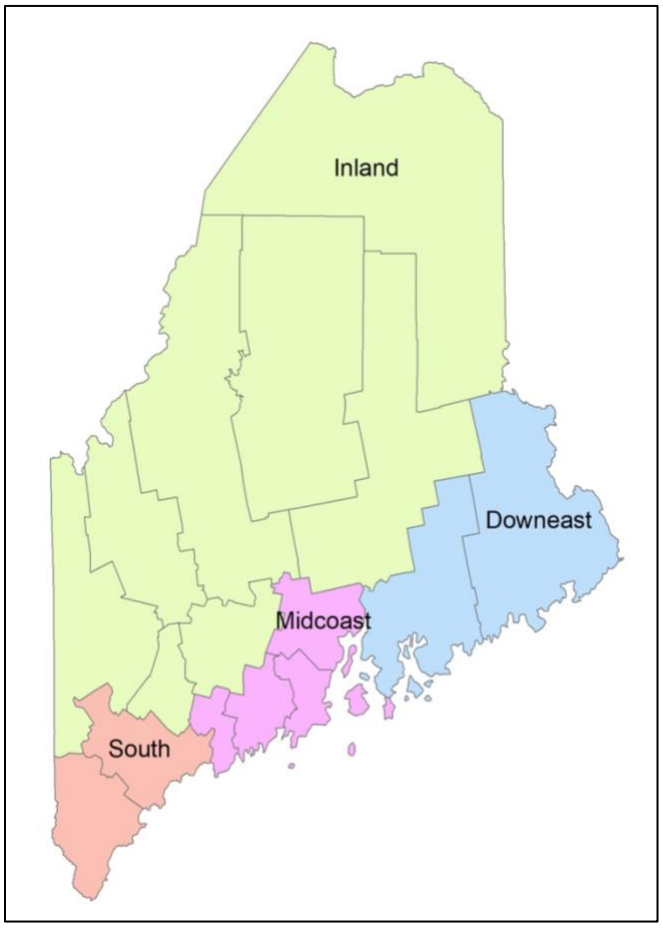

Figure 2: Regions Used in Seafood Economic Analysis

These regions are reported in place of county level estimates to protect confidentiality of industry participants and data management requirements for various data series. In some cases, data for certain industries lacked geographic identifying information and could not be assigned to a region within the state. These impacts are included in the state level reporting but are reported as an "unidentified" region. As a result, the regional specific impacts reported here for harvesting and to a lesser extent wholesale and logistics, can be considered conservative.

3.2.1 Aquaculture

Aquaculture involves the cultivation of fish, shellfish, and marine plants which may utilize ocean sites or be produced in land-based facilities using sea water[1]. Although considerably smaller than wild-caught harvesting, aquaculture is growing rapidly in operations in development or under consideration that would support hundreds of additional jobs and income in the coming years.

Measuring the economic scale of the industry is difficult, due in part to the infancy of the industry in Maine and the length of the business cycle from inception to realized revenues from production, which can take up to five years. Maine DMR data indicate approximately 156 aquaculture lease sites spanning over 1,400 acres as of 2019. However, not all lease sites actively realize revenue from production. Furthermore, the majority of these lease sites, if in operation, do not report employment data to the state but are overseen by owner-operators who are counted as self-employment. The Department of Labor data indicate there were approximately 36 aquaculture operations supporting 340 jobs in 2019 with labor income totaling roughly $29 million — direct effects of the industry. We estimate that 200 additional jobs are located in organizations operating

[1] In Maine, aquaculture is primarily of marine species. Freshwater hatcheries in Maine for trout and landlocked salmon are run by the U.S. Fish & Wildlife Service and Maine Department of Inland Fisheries & Wildlife but these are not included here because the relevant economic data for these facilities is reported as part of state government employment in general.

Limited Purpose Aquaculture sites of 400 square feet for commercial purposes (See Appendix for more details.)

In total, at least 540 jobs were supported in 2019 and over $36 million in labor income (Table 2). The industry supported total output of $223 million, accounting for approximately 7 percent of the entire seafood sectors impact in 2019. The bulk of impacts from aquaculture were located in Downeast followed by the Midcoast region accounting for nearly 90 percent of the industry's output and 75 percent of the industry's employment statewide (Table 3).

Table 2: Economic Impacts of Aquaculture

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Direct	540	$28.9	$190.1	$198.4
Indirect	78	$1.2	$2.8	$4.6
Induced	218	$6.3	$11.5	$19.9
Total	837	$36.4	$204.4	$222.9

Table 3: Total Economic Impacts of Aquaculture by Region

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Downeast	308	$16.3	$105.4	$114.7
Inland Maine	52	$6.7	$11.8	$14.2
Midcoast	219	$9.1	$74.2	$79.5
Southern Maine	162	$4.4	$13.0	$14.5
Total	740	$36.4	$204.4	$222.9

3.2.2 Harvesting - Lobsters

Lobster harvesting is perhaps the most emblematic part of the Maine seafood sector and is an icon of the Maine brand. Like other harvesting industries, employment in lobstering is difficult to quantify due to the seasonality of the industry and business structure and to the nature of the statistical systems. There was a total of 8,923 lobster licenses of all types in 2019 reported by DMR. These were converted to 8,200 individuals by counting unique name-date of birth identifiers and removing multiple licenses. From this total, noncommercial license holders were removed along with under 18, demonstration licenses, and non-resident licenses. The result is approximately 5,000 unique individuals holding commercial lobster licenses. Actual employment in lobster harvesting cannot be directly measured since some of these license holders may not engage in harvesting.

In 2019, the landed value of lobster totaled $485 million. Although the amount of landed weight was lower compared to previous years, the price of lobster remained high throughout the season. Of the total landed value, 41 percent was in Downeast, with another 32 percent in the Midcoast region and roughly 13

percent in Southern Maine. Approximately 13 percent of the landed value was not associated with a specific geography and is therefore attributed to the state as a whole (Table 5).

An estimated 5,000 jobs were supported directly from lobster harvesting, with $393 million in labor income in 2019 (Table 4). These jobs, which include full- and part-time jobs, are the typical level of employment associated with the total landed value (output), as calculated by the IMPLAN model. An additional 1,500 jobs and $106 million in labor income were supported from indirect and induced effects. A total of $852 million in economic output were supported statewide accounting for over one-quarter of the entire seafood sector output statewide in 2019.

Table 4: Economic Impacts of Lobster Harvesting Statewide

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Direct	5,037	$393.0	$446.9	$511.6
Indirect	127	$11.3	$20.8	$42.6
Induced	1,376	$95.0	$171.5	$298.3
Total	6,540	$499.3	$639.2	$852.5

Table 5: Total Economic Impacts of Lobster Harvesting by Region

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Downeast	2,951	$214.5	$273.2	$382.3
Inland Maine	243	$139.0	$184.3	$233.7
Midcoast	2,189	$73.6	$88.2	$111.2
Southern Maine	1,157	$72.2	$93.5	$125.3
Total	6,540	$499.3	$639.2	$852.5

Special Note: Boat building and Repair. Boatbuilding and repair is a significant supplier industry to the harvesting industries. The Maine boat building industry supplies the recreational, commercial, and fishing industries, but no data series provides separate estimates for these markets. Indirect jobs supported in boatbuilding and repair for fisheries are estimated separately. Existing data allowed estimates only for new boats purchased in 2019. These estimates were derived from boat registrations reported in various datasets (Maine Inland Fisheries and Wildlife, Department of Marine Resources, and US Coast Guard) and average cost by retail value of these vessels. In total, $8.1 million in new vessel sales for the harvesting industry were assumed which supported an estimated 30 jobs in boatbuilding and an addition 22 from multiplier effects. These jobs collectively supported a total of $2.7 million labor income across the Midcoast and Downeast regions, where most of the boat building industry is located.

3.2.3 Harvesting – Non-lobster

Although lobster accounts for the largest share of wild caught species, $183 million in landed value of other species were realized in 2019. The non-lobster species can be grouped as follows (with the number of individuals holding licenses):

Finfish	2,731
Eel/Elver	1,193
Shellfish	2,541
Echinoderms	260
Marine Worms	775
Seaweed	163
TOTAL	7,663

Like other harvesting industries such as lobster harvesting, counting employment in the industry is challenging because there are no official data on the number of people employed in the various fisheries. Based on data for the various species, just over 7,600 licenses were identified in 2019.

Harvesting of wild caught species excluding lobster supported over 10,300 jobs in 2019, of which 7,600 were directly involved with harvesting operations (Table 6).[2] A total of $201 million in labor income was supported by the industry, including $158 million from direct effects and another $46 million from indirect and induced effects. A total of $345 million in total economic output was supported by wild caught harvesting excluding lobster in 2019. This accounted for approximately 11 percent of the seafood sector's total output. Like lobster harvesting, impacts were largest in the Downeast region (Table 7). However, some caution should be taken in this interpretation given the significant number of impacts that were not able to be geographically identified.

[2] It should be noted that 7,663 direct jobs based on license data is an indication of people that work or derive some level of income from fishing. We have no basis to determine how many of these individuals derive substantial income from fishing or what the fishing income distribution of licenses holders is. The IMPlan model estimates 2,737 direct jobs based on the 2019 landed value (output), which is the number of jobs typically associated with the corresponding level of output for a national fishery that includes much larger fisheries and fishing enterprises than found in Maine.

Table 6: Economic Impacts of Harvesting (Non-lobster) Statewide

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Direct	7,663	$154.7	$174.8	$196.2
Indirect	194	$4.1	$7.6	$15.8
Induced	2,535	$42.4	$76.1	$133.1
Total	10,392	$201.2	$258.5	$345.0

Table 7: Total Economic Impacts of Non-Lobster Harvesting

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Downeast	5,401	$29.8	$37.9	$53.0
Inland Maine	705	$19.2	$25.4	$32.2
Midcoast	2,836	$20.5	$24.6	$31.0
Southern Maine	1,450	$131.8	$170.6	$228.7
Total	10,392	$201.2	$258.5	$345.0

3.2.4 Processing

Seafood processing includes the value-added production of harvested fisheries and aquaculture that turn raw living resources into seafood products, including frozen seafood and other specialty seafood products. Most processors in the state are larger operations and are included in the standard data series. Based on DOL data, a total of 735 jobs were supported in the seafood processing industry in 2019, which in turn supported another 1,142 indirect jobs and 395 induced jobs (Table 8). A total of $108 million in labor income was supported by the processing industry in 2019, or which $37 million were from direct payrolls of seafood processors. The industry supported $515 million in economic output which accounted for 16 percent of the seafood sector's total output.

The impacts of the processing industry are highest in Southern Maine which supported over 930 jobs (Table 9), followed by Downeast (725 jobs), and the Midcoast region (611 jobs). The concentration in Southern Maine is partly a legacy of a time when Portland was a major center of the fishing industry and where there was easy access to a labor force. The shift of landings eastward over the past two decades has supported growth in processing, which may continue in the future.

Table 8: Economic Impacts of Processing Statewide

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Direct	735	$36.5	$48.6	$343.1
Indirect	1,142	$54.1	$75.6	$117.2
Induced	395	$17.2	$31.7	$55.5
Total	2,271	$107.8	$156.0	$515.8

Table 9: Total Economic Impacts of Processing by Region

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Downeast	735	$34.1	$49.5	$145.6
Midcoast	611	$29.0	$43.5	$153.4
Southern Maine	936	$44.7	$63.0	$216.7
Total	2,282	$107.8	$156.0	$515.8

3.2.5 Wholesale and Logistics

Wholesale and logistics are focused on the distribution of raw and processed seafood products to domestic and international markets. The industry includes the storage, transportation, and logistics of moving seafood products to retail and consumer markets. Businesses engaged in the shipment and handling of seafood products are required to be licensed by DMR. Those records are matched with DOL data to then aggregate wholesale operations handling seafood. Over 1,300 jobs were supported by wholesale and logistics operations in 2019 across the state, which in turn supported another 990 jobs through indirect and induced effects (Table 10). Over $115 million in labor income was supported, of which $69 million was from direct payrolls of seafood wholesalers. In total wholesale and logistics supported over $350 million in output, accounting for 11 percent of the seafood sector's total output.

The economic impacts of the seafood wholesale and logistics industry was concentrated in Southern Maine (1,060 jobs), followed by 880 jobs in the Downeast region and 320 jobs in the Midcoast region (Table 11).

Table 10: Economic Impacts of Wholesale and Logistics Statewide

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Direct	1,313	$68.6	$91.0	$212.6
Indirect	572	$27.8	$40.4	$80.3
Induced	421	$18.8	$34.4	$59.9
Total	2,306	$115.2	$165.8	$352.8

Table 11: Total Economic Impacts of Wholesale/Logistics by Region

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Downeast	881	$44.6	$64.2	$121.7
Midcoast	319	$14.8	$21.3	$48.9
Southern Maine	1,068	$54.1	$78.0	$177.6
Unidentified	37	$1.6	$2.3	$4.6
Total	2,306	$115.2	$165.8	$352.8

3.2.6 Retail: Markets and Restaurants

The retail seafood industry includes seafood specialty food stores, supermarkets, and seafood restaurants. Fish and seafood specialty markets are identified in DOL economic data totaling 370 jobs across 37 establishments in the state. In addition, approximately 5 percent of supermarket employment is included to account for seafood department employment. Seafood is sold in many restaurants in Maine, but much of that seafood will have come from outside Maine. To focus on those restaurants that use Maine seafood as an input, DMR data is combined with DOL data. Restaurants engaged in the handling of raw seafood products are required to be licensed by DMR. Those records were matched with DOL records to then aggregate restaurant operations handling seafood and are assumed to be 7,830. In total, over 8,550 jobs were supported by retail operations in 2019 across the state (Table 12). An additional 2,400 jobs were supported though indirect and induced effects. A total of $389 million in labor income was supported by the retail seafood industry, of which $285 million was from direct payrolls of seafood retailers. In total, retail seafood supported over $1 billion in output, accounting for 32 percent of the seafood sector's total output.

Nearly half of the total impacts of retail seafood were located in the Southern Maine region totaling over 5,100 jobs (Table 13). Retail seafood is the key conduit between the coastal regions of Maine and the inland counties of the rest of the state. Retail seafood supported 2,175 jobs in the Inland Region of the state, extending from Aroostook County to Oxford County.

Table 12: Economic Impacts of Retail /Restaurant Statewide

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Direct	8,558	$285.3	$425.9	$692.4
Indirect	1,041	$46.0	$76.1	$164.4
Induced	1,374	$58.1	$108.5	$191.0
Total	10,974	$389.4	$610.5	$1,047.9

Table 13: Total Impacts of Retail/Restaurant by Region

	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Downeast	1,579	$62.0	$96.9	$163.6
Inland Maine	2,175	$64.9	$104.9	$189.3
Midcoast	2,082	$67.2	$107.2	$187.3
Southern Maine	5,138	$195.3	$301.4	$507.7
Total	10,974	$389.4	$610.5	$1,047.9

4 Regional Economic Impacts

4.1 Downeast Maine

The seafood industry plays an outsized role in the Downeast region contributing over $960 million in total economic output in 2019, which accounted for nearly 14 percent of the region's total output (Table 14). The sector supported over 10,900 jobs, of which approximately 8,200 jobs were directly employed in the sector with another 2,300 jobs supported from other indirect and induced multiplier effects. The seafood sector supported $390 million in labor income, or 12 percent of the Downeast regional total. Similar to employment, roughly two-thirds of total labor income was supported directly by sector industries.

Although well-known as the center of lobster harvesting in Maine (with about 3,000 jobs), the Downeast region is also the major center for non-lobster harvesting (about 5,400 jobs). Retail contributed another 1,400 jobs, while other non-lobster species harvesting and wholesale supported roughly 500 jobs in each of those industries. Processing played a much smaller role relative to the size of the harvesting industry in the region in 2019. The seafood sector in Downeast supports considerably more jobs than Southern Maine despite having less than one-fifth of the population. Downeast sector is much more comprised of the harvesting and production of seafood products, whereas in Southern Maine the sector is much more concentrated in the retail consumption of seafood products.

Table 14: Economic Impact Summary for the Downeast Region

Industry	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Aquaculture	308	$12.2	$97.9	$102.1
Harvest Non-lobster	5,401	$21.9	$24.1	$29.1
Harvest Lobster	2,951	$158.1	$173.8	$209.7
Processing	275	$11.1	$14.7	$88.5
Retail	1,144	$38.5	$57.7	$93.2
Wholesale Distribution & Logistics	881	$22.5	$29.7	$61.3
Total Direct	10,961	264	398	584
Indirect (all other)	1,639	$41.0	$64.0	$124.1
Induced	3,284	$86.3	$150.6	$255.6
Total	15,884	$391.70	$612.47	$963.68

4.2 Midcoast

Harvesting in the Midcoast region accounts for about 5,000 jobs, somewhat smaller than Downeast (Table 15). But at 2,000 jobs, the retail/restaurant industry has almost twice as many jobs as the Downeast region. Direct employment in the Midcoast seafood sector accounted for 8,200 jobs with a total economic impact from 10,800 jobs. These jobs generate over $260 million in labor income in the region. The sources of economic impacts from the seafood sector are concentrated in lobster harvesting and retail for the region, with aquaculture comprising a smaller but growing sources of jobs and income in the region.

Despite the smaller footprint of the seafood sector in the Midcoast region, over $710 million in total economic output is still supported in the region accounting for almost 6% of total regional economic output.

Table 15: Economic Impact Summary for the Midcoast Region

Industry	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Aquaculture	219	$7.6	$71.1	$74.1
Harvest Non-lobster	2,836	$16.4	$20.0	$22.3
Harvest Lobster	2,189	$118.6	$145.3	$161.7
Processing	611	$10.7	$14.3	$107.5
Retail	2,082	$50.9	$77.9	$128.1
Wholesale Distribution & Logistics	319	$9.1	$12.2	$30.8
Total Direct	8,255	$213.2	$340.8	$524.5
Indirect (all other)	860	$20.2	$31.5	$71.0
Induced	1,724	$34.0	$65.6	$118.3
Total	10,840	$267.4	$438.0	$713.9

4.3 Southern Maine

The Southern Maine seafood sector supported over $1 billion of Southern Maine's total economic output in 2019 (roughly 2% of total regional output) (Table 16). Over 7,600 jobs were supported by the sector and $370 million in labor income. Unlike the other two regions, the bulk of direct jobs were supported by the retail industry sector (over 4,000), while harvesting (all species wild caught) supported roughly 1,270 jobs in 2019. In total, just under 6,300 jobs were directly supported by the seafood sector in Southern Maine, while another 1,300 jobs were supported through other indirect and induced multiplier effects.

Table 16: Economic Impact Summary for the Southern Region

Industry	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Aquaculture	137	$3.7	$11.7	$12.2
Harvest Non-lobster	270	$17.3	$18.5	$20.0
Harvest Lobster	947	$62.1	$66.3	$71.9
Processing``	275	$14.7	$19.6	$147.2
Retail	4,041	$152.7	$223.1	$354.6
Wholesale Distribution & Logistics	611	$36.1	$48.1	$118.2
Total Direct	6,281	$286.5	$387.3	$724.2
Indirect (all other)	440	$31.7	$50.8	$113.9
Induced	882	$51.6	$98.8	$175.5
Total	7,603	$369.8	$536.9	$1,013.6

Inland Maine

The presence of the seafood sector in the Inland regions of Maine is primarily in the retail consumption supporting 1,700 jobs, while another 20 jobs are supported by inland fish hatcheries (Table 17). These jobs provided $49 million in labor income. In total, over $200 million in economic output was supported by the seafood sector in noncoastal counties in the state that make up the Inland region.

Table 17: Economic Impact Summary for the Inland Region

Industry	Employment	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Aquaculture	21	$5.4	$9.4	$9.8
Retail	1,704	$43.2	$67.2	$116.5
Total Direct	1,725	$48.6	$76.6	$126.4
Indirect (all other)	214	$10.6	$17.3	$36.9
Induced	429	$12.4	$22.8	$40.2
Total	2,368	$71.6	$116.8	$203.4

4.4 Unspecified Location Values

Approximately $120 million of landed value in non-lobster harvesting and $65 million in lobster harvesting landed value had an unidentified geographic location in the DMR data (Table 18). We have no basis for allocating these impacts to a specific region, and so we report the value of these outputs in a separate category. We do not report employment for these unidentified location values on the assumption that the harvesting employment is captured elsewhere in the data.

Table 18: Economic Impact Summary of Unidentified Regional Activity

Industry	Labor Income ($M)	Value Added ($M)	Gross Output ($M)
Harvest Non-lobster	$99.1	$112.2	$124.7
Harvest Lobster	$54.3	$61.4	$68.3
Wholesale Distribution & Logistics	$0.8	$1.0	$2.3
Total Direct	154	175	195
Indirect (all other)	$4.6	$8.3	$17.3
Induced	$46.8	$83.4	$146.0
Total	$205.5	$266.4	$358.6

4.5 The Seafood Sector in Regional Economic Context

The analysis of the seafood sector's size also raises a question of the role of the sector in each of the regions. As noted, the economic impacts are largest in the Downeast region, followed by the Midcoast and then the Southern region. It is also important to show the importance of the sector in the overall economy of each of these regions. For that purpose, the seafood sector was compared with total employment, value added, and output for each of the regions. The results are shown in Figure 3, which shows that almost 20% of employment in the Downeast region is directly or indirectly related to seafood. This compares to about 9% in the Midcoast and 2% in the Southern Region. Seafood accounts for almost 12% of labor income in Downeast and 7% of value added. This concentration of the seafood industry in the rural economies of Hancock and Washington counties is one of the key findings of this analysis.

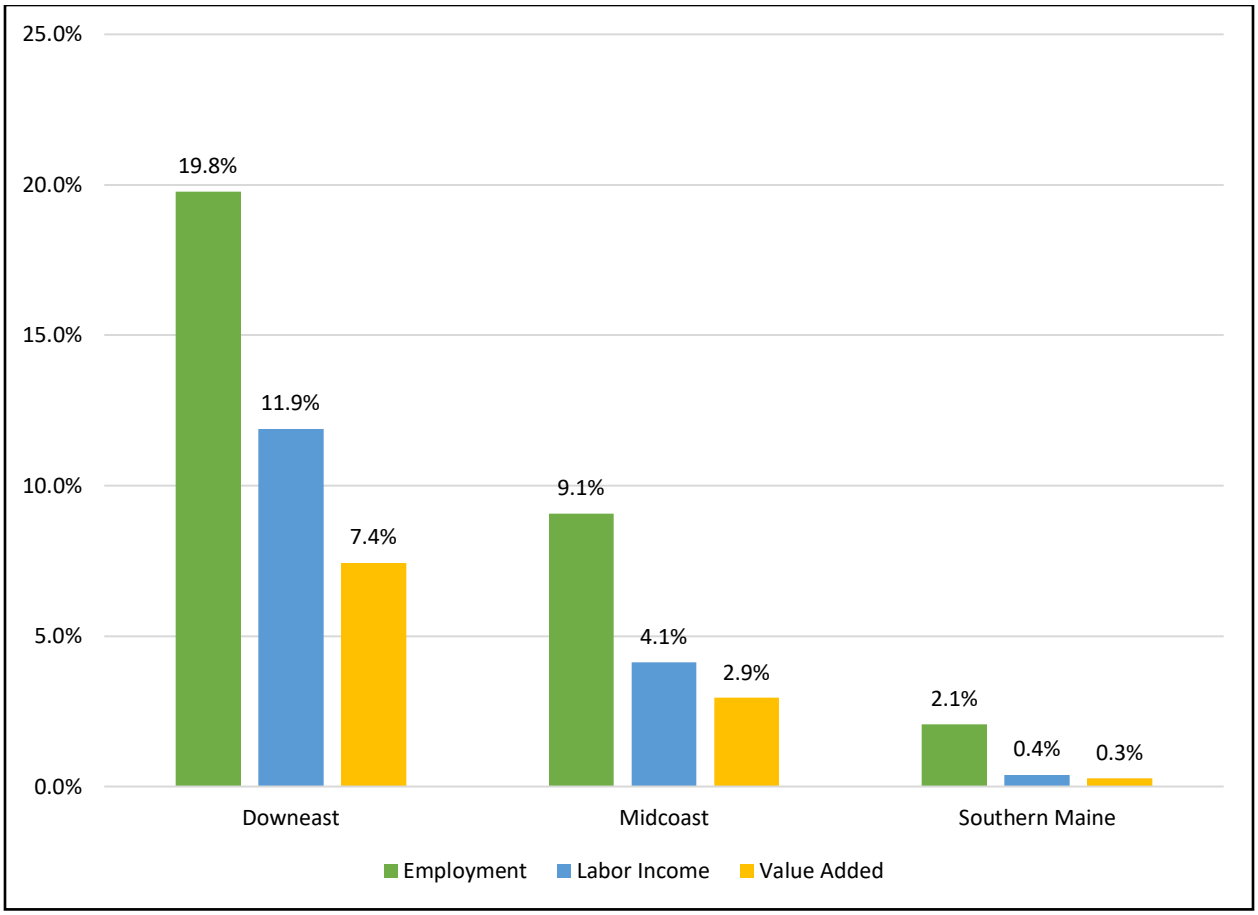

Figure 3: Relative Size of Seafood Sector in Maine Regions

5 Fiscal Impacts

The seafood sector supported an estimated $449 million in tax revenues in 2019, including local, state, and federal. The sector supported nearly $91 million in local (county aggregate) tax revenues and $110 million in state tax revenues. A total of $248 million in federal tax revenues were also supported.

Table 13 shows the break down across value chain industries. Of the total, $127 million in state and local tax revenues were supported from direct effects of the seafood sector value chain industries, with another $74 million in state and local tax revenues supported from indirect and induced effects. Retail had the largest contribution to state and local taxes totaling $66 million, followed by $43 million from harvesting (all species).

Table 19: Tax Revenue Impacts of the Seafood Sector in Maine

SeaMaine Industry Impact	Local	State	Federal	Total
Aquaculture	$3.22	$5.12	$9.52	$17.87
Harvesting (Non-lobster)	$4.00	$7.75	$22.36	$34.11
Harvesting (Lobster)	$11.26	$19.79	$56.34	$87.39
Processing	$1.38	$1.92	$7.53	$10.83
Retail	$33.08	$32.74	$58.73	$124.55
Wholesale & Logistics	$2.70	$3.72	$14.17	$20.59
Total Direct	$55.6	$71.1	$168.7	$295.3
Indirect (all other)	$10.43	$12.19	$28.34	$50.97
Induced	$24.89	$26.71	$51.29	$102.89
Total	**$90.96**	**$109.96**	**$248.29**	**$449.20**

6 Discussion and Conclusions

This study has estimated the economic dimensions of the seafood sector in Maine, including harvesting, processing, distribution, and retailing for capture fisheries and aquaculture. The best available data shows that in 2019:

- The sector directly employed 23,800 people, with a multiplier effect of an additional 9,400 jobs for a total impact of 33,300 jobs.
- These jobs accounted for $1.3 billion in labor income, of which $967 million was for direct jobs in the industries.
- On $2.2 billion in sales, the sector directly contributed $1.4 billion in valued added contribution to the Maine Gross State Product and contributed a total of $1.9 billion in value to multiplier effects.

Compared to other parts of the Maine economy, the seafood sector in 2019 was the largest natural resource-based industry:

- Total seafood direct employment would have been larger than forest products, as well as the combination of agriculture and other food products manufacturing.
- Total seafood value added is also larger than paper and wood manufacturing, and farming plus other food products.

It is also important to emphasize that the estimates in this report are likely to be *underestimates*. A large number of aquaculture operations are not incorporated in the data, only retail outlets (markets and restaurants) requiring a DMR license are included, and marine recreational fishing has been excluded entirely.

This study focused on a single year of data: 2019. This is because of the substantial amount of customized data construction that must be done to measure the economy of the food sector which had to be developed. The year 2019 was selected to avoid using data from a year affected by the Covid pandemic. But understanding the effects of the pandemic is still important. For that purpose, employment data from the Department of Labor for the major seafood industries as defined by the North American Industrial Classification System from 2018Q1 to 2022Q1 are shown in Figure 3. To smooth out the seasonal variations, a four-quarter moving average is used.

This analysis, which should be considered preliminary, shows that seafood markets have grown in employment since 2019, with little interruption from the pandemic. Processors and aquaculture in the Department of Labor data have declined slightly as measured by the Department of Labor data, but these trends were apparent before the pandemic. Seafood wholesalers and restaurants (on the right-hand vertical axis) did show significant drops from the pandemic, and neither industry has recovered to pre-pandemic levels. Note that these figures are for all restaurants; a future analysis needs to look at seafood restaurants in more detail.

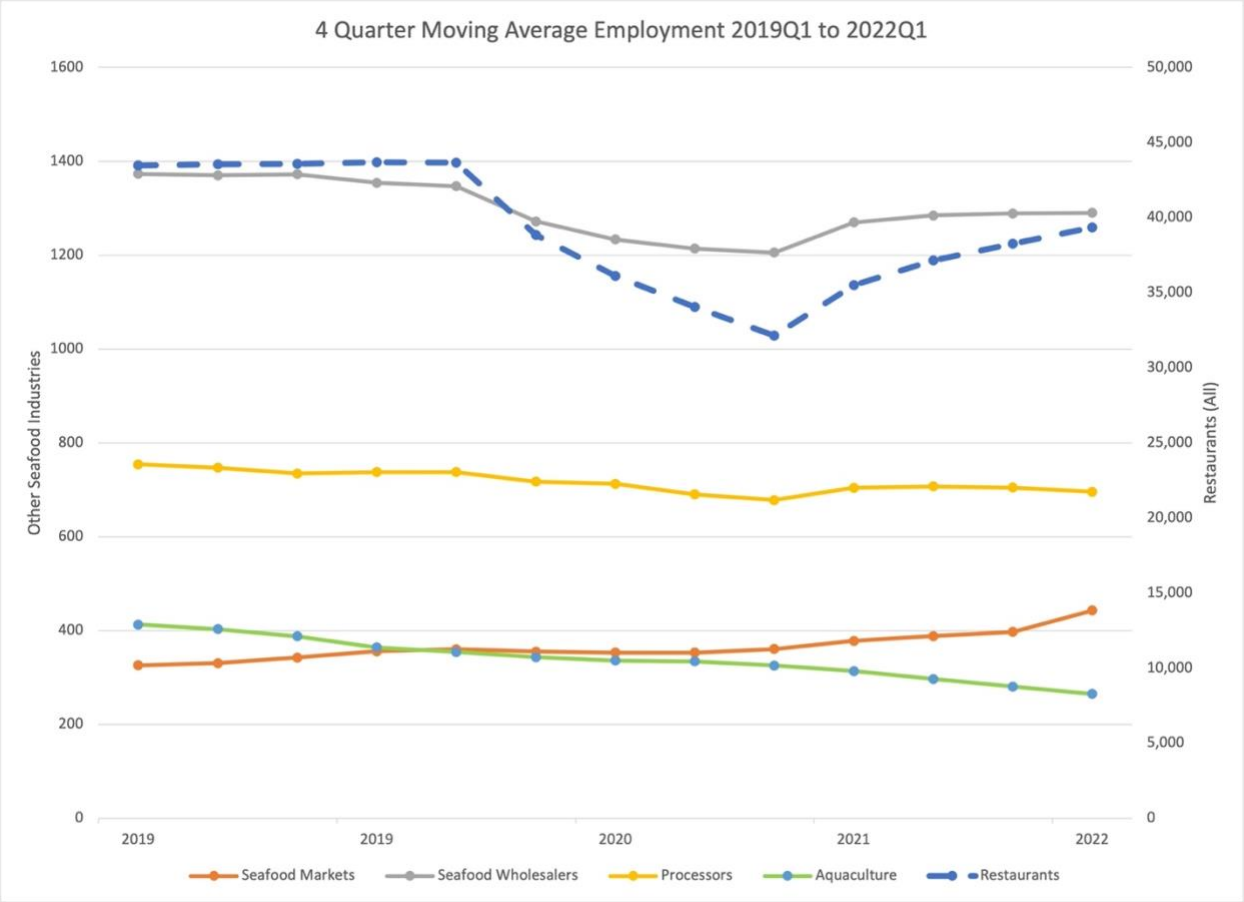

Figure 4: Trends in Employment in Major Seafood Industries

As this brief discussion of trends indicates, the snapshot of the industry presented in this study can only serve as a baseline against which to measure future changes. This report should be considered a supplement to the study conducted for SeaMaine by Gardner-Penfold. Key steps for continuing to understand the economic evolution of the seafood industries include:

1. Annual Updates
    - Employment data for the industries included in the Department of Labor industry data as in Figure 3.
    - Department of Marine Resources lobster and non-lobster licensing data to approximate employment in harvesting using the unique identifier method for non-lobster licenses.

- Landings and landed value data from the Department of Marine Resources

2. Improve measures

   As noted at several points in this study, the economic data for fisheries in the U.S. and in Maine is much weaker than for other industries, in large part because the economic structure of fisheries is different with a large proportion of proprietors, casual labor, seasonality and geographic flexibility. The inter-industry relationships are poorly measured in the Economic Census which is taken every five years and uses a national sample that often includes very few firms from a small state like Maine. Two projects could greatly improve the economic data for fisheries in Maine.

   The first would be to add a simple survey to the harvesting license renewal process asking for the number of days in the previous year that were actually spent fishing. The question could be set up as a single choice question from defined ranges to make answering quick. The answer to this question would convert license information into labor participation information providing a much more accurate measure of employment.

   The second would be to conduct a more detailed survey of fishing and aquaculture enterprises to measure total output (in the case of aquaculture) and in the case of inputs and costs for all harvesting enterprises. Such surveys are complex to administer because they are best done with online surveys or with survey diaries and with voluntary participation from a sample. A detailed study of the aquaculture industry is currently under development. The results of these studies would provide much more accurate measures of the economic impacts of the harvesting sector. For the processing, wholesale, transport, and retail sectors, standard impact models such as IMPLAN (used here) are adequate. These types of studies are complex and can be expensive and so should be done no more than every five years.

7 Data Sources

7.1 Quarterly Census of Employment and Wages

The primary data source for aquaculture, seafood processing, wholesale and logistics, and retail industries come from the Maine Department of Labor Center for Workforce Research and Information (CWRI) Quarterly Census of Employment and Wages (QCEW) establishment-level microdata. CBER was provided access to the establishment-level employment and wage data from which customized industry sectors and geographic regions were used to calculate direct employment and wage effects. Businesses are categorized in the QCEW by industry according to the North American Industry Classification System (NAICS) hierarchy. Included industries and concordance with the seafood sector are shown below.

Table 20: Seafood Sector Industry Data Map

Sector Industry	NAICS Industry	NAICS Code	Data Source	Model Inputs	IMPLAN Sector
Aquaculture	Finfish farming and fish hatcheries	112511	QCEW, DMR	Emp, wages	14
	Shellfish farming	112512	QCEW, DMR	Emp, wages	14
	Other aquaculture	112519	QCEW, DMR	Emp, wages	14
Harvesting - Lobster	Commercial Fishing	114111	DMR	Landed value (output)	17
Harvesting - All other species	Commercial Fishing	114111	DMR	Landed value (output)	17
Seafood Processing	Frozen specialty food manufacturing	311412	QCEW, DMR	Emp, wages	92
	Seafood product preparation and packaging	311710	QCEW, DMR	Emp, wages	92
Boatbuilding	Boat Building and Repairing	336612	DMR	Output	361
Wholesale & Logistics	Fish and Seafood Merchant Wholesalers	424460	QCEW, DMR	Emp, wages	398
	Specialized Trucking (Local)	484220	QCEW, DMR	Emp, wages	398
Retail	Supermarkets	445110	QCEW, DMR	10% of Emp, wages	406
	Fish and Seafood Markets	445220	QCEW, DMR	Emp, wages	406
	Full service restaurants	722511	QCEW, DMR	Emp, wages	509
	Limited service restaurants	722513	QCEW, DMR	Emp, wages	510

7.2 The IMPLAN Economic Model

The estimation of economic impacts utilizes IMPLAN — a commonly used proprietary input-output economic model that represents the sales and purchases of goods and services in the economy from raw inputs to end consumer. IMPLAN uses a variety of federal data sources to map the relationships between industries and consumers which allows a user to analyze the spending flows of an economic activity, whether individual firm, set of businesses, event, or policy, across a defined regional economy. The IMPLAN model used in for this analysis is based on county and state level data for Maine. Counties are further aggregated into regions to abide by confidentiality requirements for using QCEW data. More information on IMPLAN can be found at support.implan.com.

Definitions

Measuring Economic Impacts

Economic impact analysis attempts to quantify the net change to an economy that is a result of a business(es), policy, event, or in this case of an industry sector. From another perspective, economic impact analysis attempts to capture the hole left in the state and regional economies if the seafood sector did not exist. Economic impacts are generally characterized as the primary economic effects stemming from the object being analyzed and the secondary or multiplier effects from recurring rounds of spending in the defined economy.

Direct effects include the primary effects from employment and operations of seafood sector businesses across the value chain.

Indirect effects are secondary effects that result from the operational spending of seafood sector businesses on suppliers and vendors and the recurring rounds of spending that accrues. Indirect effects are also referred to as intermediate effects.

Induced effects are secondary effects from spending of employee wages from both seafood sector businesses as well as from wages of employees of suppliers and vendors spent in the local economy. Induced effects are also referred to as local consumption effects.

Economic Impact Indicators

Economic impacts are reported across several common indicators that include employment (jobs), labor income, value added, and output.

Employment is estimated as the number of jobs, both full-time and part-time, and includes wage and salaried employees, sole proprietors, and active partners. Employment is reported as inclusive of both the number of full-time (FT) and part-time (PT) jobs. Both FT and PT jobs are counted with equal weight and are not distinguished by the model, which is commonly reported in government-reported employment data as well as other economic models.

Labor Income measures the value of all employment derived income in the region. It is inclusive of wages and benefits of employees (employee compensation) or total payroll cost to an employer, as well as proprietor income, or income derived from self-employed workers, sole proprietors, partnerships, and tax-exempt cooperatives.

Value Added is a measure of economic value and is equivalent to the industry's contribution to gross domestic product (GDP). Value added includes all labor income, as well as taxes on production and imports and other property income. Conversely, it is total output less intermediate inputs to production.

Economic Output is a measure of the total value of all goods and services produced. Output includes all labor income, value added, as well as intermediate inputs to production. Total output can also be interpreted as total industry sales.

7.3 Online Data Sources

Department of Marine Resources

Data Access Portal with Mapping

https://dmr-maine.opendata.arcgis.com/

Data Sets in Open Data Portal

https://maine.maps.arcgis.com/home/group.html?id=b451a68027b542958df0d6634f73af4f#overview

Aquaculture Leasing Data

https://maine.maps.arcgis.com/apps/webappviewer/index.html?id=b846cf37b1d64c988f89eafa085c8b7a

Department of Labor

https://www.maine.gov/labor/cwri/qcew.html

8 Appendix: Using License Data for Estimated Harvesting and Aquaculture Employment

A major challenge facing all studies of the seafood sector, particularly the industries involving harvesting seafood through fishing as well as the more recent activities of aquaculture is that the standard government data series do not cover most people employed in the fishing industry in Maine. This industry is generally exempt from the unemployment insurance laws, which are the basis for the most detailed employment data available. Other methods must be used, the most important of which is the licensing data from the Department of Marine Resources.

This data is available from DMR for each individual license. The challenge is to convert licenses to individuals, assign the individuals to the relevant fishery and determine the location of activity. Adjustments must be made for people holding multiple licenses. It is also necessary to exclude licenses held by those who do not reside in Maine or who have licenses for non-commercial uses such as recreation or education. In 2019 there were 17,766 licenses for fishing, of which 8,923 were for lobstering; 2,791 for groundfish, pelagics, and anadromous; and 6,048 all other species. The employment total reported here of 12,700 was the difference between the total number of licenses and the total number of individuals.

Individuals were identified by dividing harvesting into three major groups: lobstering; commercial fishing for groundfish, pelagic, and anadromous species; and all other species. In each of these groups a unique identifier was calculated. The first name, last name, and date of birth (in Julian format, or the day number since 1/1/1900) was created. For example, John Doe, born on July 4, 1980, would have an identifier of doejohn29406. These unique identifiers were then examined for duplicate licenses held within each group and duplicate licenses counted as 1. The result of unique identifier and a single license then comprised the employment count.

This analysis has two potential limitations. One is the possibility of an individual holding licenses in more than one group. However, the groups are organized by major gear type so multiple licenses are not expected to be large. The other problem is that having a license does not guarantee actual participation in fishing activity. It is likely, in fact, that part time employment is more common than full time employment. All this indicates that any serious investigation of employment in Maine fisheries should be grounded in a more thorough investigation of multiple job holding as well as part- and full-time participation.

A somewhat similar problem exists with aquaculture. Some aquaculture firms, particularly the larger ones, are covered by unemployment insurance and their employees are counted in the aquaculture industry data reported by the Department of Labor. But many other aquaculture operations are quite small or are operated by larger organizations and included in their overall employment data. To estimate the employment in aquaculture not covered by DOL, we used data from the limited purpose aquaculture (LPA) licenses. These are licenses for small scale (up to 400 square feet) operations which may be for research, education, or commercial purposes. For this analysis, licenses for research and education were excluded[3] and the remaining licenses were reorganized to estimate the number of individuals rather than the number of licenses. Because of the size of these sites, it is possible for one person or organization to hold more than one LPA license. The resulting count of individuals with commercial LMA licenses was

[3] Aquaculture conducted for research or education should be reported as part of those industries, not aquaculture.

200 statewide. These were added to the DOL counted employment. However, we kept the wages at the same level because many of these LPA pay little compensation or pay it as contract or self-employment.

From: tomi plummer
To: Comments
Subject: [External] Measure
Date: Wednesday, September 25, 2024 12:04:43 PM

As a maine fishermen this measure increase is non sense. I've caught more illegal lobsters in my traps this year than ever before. The research team needs to expand their search for lobsters. The smaller lobsters are alot closer to shore and in shallow waters. Further research needs to be completed before you go and completely decimate our way of life.

From: travis faulkingham
To: Comments
Subject: [External] Lobster draft addendum 31
Date: Saturday, October 5, 2024 7:58:41 AM

Hello there
Please don’t pass this measure change, there are so many small lobsters that we are seeing, more than we typically see this year. Lots of fishermen are selling out and retiring, 2 currently in our town that caught lots and 1 that passed away, maybe others plan to sell out also. Close the licenses first, and even if we are somehow over fishing which I don’t feel we are, but if we are, just let us keep going, the windmills and other rules will cause more people to sell out and choose other work, if we are catching less then hopefully we will get a higher price. Changing the measure size isn’t going to help it’s going to cause my catch to be less and less income for my family of 6. Open more lobster hatcheries if there are really actually less lobsters growing up—- there must be money for it somewhere as the DMR marine patrol seems to keep getting very expensive new boats and upgrades for what? They should be spending more time at the docks and zipping around in small fast boats rather than getting massive boats in my opinion.
Thanks for your time, I hope someone reads this. For any questions please reach out.
FV Farrah Marie
Offshore lobsterman
Travis Faulkingham
207-266-8551
Sent from my iPhone

From: Waylon Merchant
To: Comments
Subject: [External] Lobster Draft Addendum 31
Date: Saturday, October 5, 2024 12:49:51 PM

I support the postponing of the Addendum 27

From: Wayne Delano
To: Comments
Subject: [External] Addendum xxx1
Date: Sunday, October 6, 2024 8:14:45 PM

Im a Lobster fishermen from Friendship maine Please consider this addendum to delay the guage increase.
Im opposed to This increase it will be devastating to myself and the Lobster industry.
DEFINITELY IF ANY INCREASE WAS TO HAPPEN IT SHOULD BE SMALLER IMCREMNTS!
That would definitely make this easier for us to work with, but indefinitely postponing any increase would be best for all of us in the industry.
Thank you
Wayne Delano

From: Will Mitchell
To: Comments
Subject: [External] Lobster draft addendum 31
Date: Saturday, October 5, 2024 3:53:33 PM

I support the proposed postponement of the implementation date for the biological measures outlined in Addendum XXVII until July 1, 2025. This extension is a prudent decision that allows for better coordination with Canadian lobster fishery management, helping to mitigate potential negative impacts on both U.S. and Canadian industries.

By aligning our timelines, we can ensure that both fisheries can adapt effectively to changes in regulations, particularly regarding the minimum gauge size and escape vent sizes. This approach recognizes the complexities of cross-border fishing dynamics and prioritizes the sustainability of the GOM/GBK stock without compromising our conservation goals.

Moreover, this delay provides essential time to collect additional data, allowing us to assess the health of the lobster population more accurately. Having more robust data will help clarify whether there truly is a significant decline and support informed decision-making.

Delaying these measures until July will also provide the industry and gauge makers ample time to prepare, minimizing disruptions during critical fishing periods. Overall, this thoughtful consideration demonstrates a commitment to collaborative and effective management practices, benefiting all stakeholders involved.

From: wilsonhboone@gmail.com
To: Comments
Subject: [External] Opposition to gauge change
Date: Sunday, October 6, 2024 7:23:22 AM

Hello,
I am a commercial fisherman and have been harvesting lobster as crew out of Vinalhaven Maine for the past 21 years. I do not support the gauge increase and hope that a delay until July of 2025 will be enacted. I believe this delay will enable more data to be utilized in the final decision on this issue and I also believe that ultimately a gauge change will not necessarily affect settlement. A gauge change will however negatively impact an industry already beset on multiple sides by regulation, decline in catch, high expenses and a struggle to find workers.
Thank you.
Wilson Boone
MLA Member
Vinalhaven Fishermen's CO/OP Board Member

Sent from my iPhone

Atlantic States Marine Fisheries Commission

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703.842.0740 • 703.842.0741 (fax) • www.asmfc.org

MEMORANDUM

TO: **American Lobster Management Board**

FROM: **American Lobster Advisory Panel**

DATE: **October 1, 2024**

SUBJECT: **Advisory Panel Report**

The American Lobster Advisory Panel (AP) met via webinar on Monday, September 23rd, 2024. The purpose of the meeting was 1) to present the annual data update for lobster abundance indicators to the AP, and 2) to review Draft Addendum XXXI to Amendment 3 to the American Lobster Fishery Management Plan and gather input from the lobster advisors on the proposed management options. The addendum considers postponing measures for Lobster Conservation and Management Area (LCMA) 1, 3 and the Outer Cape Cod (OCC) area that were triggered under Addendum XXVII.

Lobster AP Attendance
Grant Moore (Chair, MA)
Jon Carter (ME)
Jeff Putnam (ME)
Eben Wilson (ME)
Robert Nudd (NH)
John Whittaker (CT)
Arthur (Sooky) Sawyer (MA)
Todd Alger (MA)
John Fullmer (NJ)

The following is a summary of the AP discussions on each topic. **The AP members in attendance made a consensus recommendation to adopt Draft Addendum XXXI, Option B.**

Annual Data Update
The Technical Committee (TC) Chair, Tracy Pugh, presented the annual data update to the AP, followed by questions and discussion. Some advisors commented that there are areas the surveys do not cover that have a lot of lobsters, and they should be sampled. One advisor commented that there is too much focus inshore when there should be more sampling offshore.

The advisors also asked about the current status of the trigger index from Addendum XXVII. The TC Chair presented it, showing the 2023 value has declined further. It was clarified that there is no longer any management action associated with this index since Addendum XXVII has already passed and the trigger level was already reached last year.

Draft Addendum XXXI
AP members provided input on which of the proposed options in Draft Addendum XXXI they support and why. There was consensus among the advisors on the preferred management

options. All advisors in attendance supported Option B, postpone implementation of the Addendum XXVII measures. Reasons given for this preference included significant concerns about the negative impacts of the gauge increase in LCMA 1 to the industry if smaller lobster can come in from Canada, a desire to see an economic analysis of the measures' impacts, and also that they have been observing much higher abundances of sublegal lobsters ranging across age classes and females with eggs, both inshore and offshore. Two advisors said the proposed delay is better than no delay, but they do not think the gauge needs to change at all.

Bobby Nudd described what he has been seeing where he fishes. He said he has seen a drastic increase in the number of sublegals and eggers, with the increase being larger in 2023. The lobsters represent a large range of sizes, not just one or two year classes. If all of these lobsters are showing up now, it means they had to have settled somewhere over the last few years, but the signal was not picked up in the settlement surveys. Grant Moore also said that offshore they have small lobsters spilling out of traps in quantities they have never seen before. They used to only catch very large lobster offshore, but now there are a range of ages out there, both on top of Georges Bank and in deeper water.

The advisors also discussed engagement with the Lobster Conservation Management Teams (LCMTs). They took issue with the fact that the LCMTs were not involved in developing management measures for the Gulf of Maine LCMAs. The FMP established the LCMTs to get industry acceptance of lobster management by developing measures from the bottom up, but Addendum XXVII was developed top-down.

ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

FOR AMERICAN LOBSTER
(*Homarus americanus*)

2023 FISHING YEAR

Prepared by the Plan Review Team

October 2024

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Table of Contents

1.0 Status of the Fishery Management Plan

Year of ASMFC Plan's Adoption:	Amendment 3 (1997)
Plan Addenda:	
Addendum II (2001)	Addendum XVI (2010)
Addendum III (2002)	Addendum XVII (2012)
Addendum IV (2003)	Addendum XVIII (2012)
Addendum V (2004)	Addendum XIX (2013)
Addendum VI (2005)	Addendum XX (2013)
Addendum VII (2005)	Addendum XXI (2013)
Addendum VIII (2006)	Addendum XXII (2013)
Addendum IX (2006)	Addendum XXIII (2014)
Addendum X (2007)	Addendum XXIV (2015)
Addendum XI (2007)	Addendum XXVI (2018)
Addendum XII (2008)	Addendum XXIX (2022)
Addendum XIII (2008)	Addendum XXVII (2023)
Addendum XIV (2009)	Addendum XXX (2024)
Addendum XV (2009)	
Management Unit:	Maine through North Carolina
States with a Declared Interest:	Maine through Virginia (Excluding Pennsylvania and DC)
Active Committees:	American Lobster Management Board, Technical Committee, Lobster Conservation Management Teams, Plan Development Team, Plan Review Team, Advisory Panel, Stock Assessment Subcommittee

2.0 Status of the Fishery

2.1 Commercial Fishery

The lobster fishery has seen incredible expansion in landings over the last 40 years. Between 1950 and 1975, landings were fairly stable around 30 million pounds; however, from 1976 to 2008 the average coastwide landings tripled, exceeding 98 million pounds in 2006. Landings continued to increase until reaching a high of 159 million pounds in 2016, but have been trending downward since then (Table 1). In 2023, coastwide commercial landings were approximately 120 million pounds, a 1% decrease from 2022 landings of 121 million pounds. The largest contributors to the 2022 fishery were Maine and Massachusetts with 80% and 13% of landings, respectively. The ex-vessel value for all lobster landings in 2023 was approximately $517.6 million, which is a 21% increase from 2022.

Historically, Lobster Conservation Management Area (LCMA) 1 has had the highest landings, and accounted for 80% of total harvest between 1981 and 2012. This is followed by LCMA 3 which accounted for 9% of total landings during the same time period. In general, landings have

increased in LCMA 1 and have decreased in LCMAs 2, 4, and 6. According to state compliance reports, in 2023, approximately 93% of the total landings came from LCMA 1, while the remaining 7% were contributed by the other LCMAs[1]. A map of the LCMAs is found in Figure 1.

Landings trends between the two biological stocks have also changed, as a greater percentage of lobster are harvested from the Gulf of Maine/Georges Bank (GOM/GBK) stock. In 1997, 26.3% of coastwide landings came from the Southern New England (SNE) stock. However, as the southern stock declined and abundance in the Gulf of Maine increased, proportional harvest has significantly changed. In 2000, only 15.6% of landings came from the SNE stock and by 2006, this declined to 7%. In 2023, only about 1.3% of coastwide landings came from the SNE stock[1].

2.2 Recreational Fishery

Lobster is also taken recreationally with pots, and in some states, by hand while SCUBA diving. While not all states collect recreational harvest data, some do report the number of pounds landed recreationally and/or the number of recreational permits issued. In 2023, New Hampshire reported 5,446 pounds of lobster harvested recreationally and New York reported 866 pounds. Maine, Rhode Island, and Connecticut do not collect information on the number of pounds recreationally harvested. For 2023, Rhode Island issued 506 lobster licenses, and 216 lobster licenses were sold in Connecticut in 2022. In general, recreational activity appears to be declining in recent years.

3.0 Status of the Stock

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

The assessment found that abundance estimates for the GOM/GBK stock show an increasing trend beginning in the late 1980s. After 2008, the rate of increase accelerated to a record high abundance level in 2018, the terminal year of the assessment. The GOM/GBK stock shifted from a low abundance regime during the early 1980s through 1995 to a moderate abundance regime during 1996-2008, and shifted once again to a high abundance regime during 2009-2018 (Figure 2). Current spawning stock abundance and recruitment and are near record highs. Exploitation (commercial landings relative to stock abundance) declined in the late 1980s and has remained relatively stable since.

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

[1] These value does not include data from Massachusetts, which were not provided.

exploitation from 2016-2018 was 0.459, below the exploitation target of 0.461. Therefore, the GOM/GBK lobster stock is not depleted and overfishing is not occurring.

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

Based on the new abundance threshold reference point, the SNE stock is significantly depleted. The average abundance from 2016-2018 was 7 million lobster, well below the threshold of 20 million lobster (Table 2, Figure 3). However, according to the exploitation reference points the SNE stock is not experiencing overfishing. The average exploitation from 2016-2018 was 0.274, falling between the exploitation threshold of 0.290 and the exploitation target of 0.257. The assessment and peer review panel recommended significant management action be taken to provide the best chance of stabilizing or improving abundance and reproductive capacity of the SNE stock.

A benchmark assessment is ongoing and expected for completion in 2025.

4.0 Status of Management Measures

4.1 Implemented Regulations

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

Coastwide Requirements and Prohibited Actions

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

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

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

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

Addendum I (August 1999)

Establishes trap limits in the seven LCMAs.

Addendum II (February 2001)

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

Addendum III (February 2002)

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

Technical Addendum 1 (August 2002)

Eradicates the vessel upgrade provision for LCMA 5.

Addendum IV (January 2004)

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

Addendum V (March 2004)

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

Addendum VI (February 2005)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Addendum XXVII (2023)
Establishes a trigger mechanism to implement management measures (gauge and escape vent sizes) to provide additional protection of the GOM/GBK spawning stock biomass (SSB). It also implements changes to management measures for LCMAs 1, 3, and Outer Cape Cod to improve the consistency of measures across the GOM/GBK stock.

Addendum XXX (2024)
Clarifies the Commission's recommendation to NOAA Fisheries that the increased minimum gauge size in LCMA 1 triggered under Addendum XXVII would also apply to foreign imports of American lobster.

5.0 Fishery Dependent Monitoring
The following provisions of Addendum XXVI went into effect January 1, 2019:

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

The Addendum XXVI requirement for commercial harvesters to report their fishing location by 10 minute longitudinal/latitudinal square was implemented in 2021. Table 4 describes the level of reporting and monitoring programs by each state. *De minimis* states are not required to conduct biological sampling of their lobster fishery.

In recent years it has been a challenge for the states whose lobster fisheries primarily occur in SNE to complete the required ten required sea and/or port sampling trips for fishery dependent monitoring. In 2023, Rhode Island, Connecticut, and New Jersey were unable to meet the requirement. Rhode Island completed nine out of ten trips. New Jersey completed zero trips

and continues to have difficulty with vessel Captains accommodating an observer aboard. No fishery dependent sampling has been conducted by Connecticut since 2014 due to reductions in funding and staffing levels. Table 5 provides data on the amount of sampling performed by state.

6.0 Status of Fishery Independent Monitoring

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

7.1 Trawl Surveys

Maine and New Hampshire: The Maine-New Hampshire Inshore Trawl survey conducted by Maine Department of Marine Resources began in 2000 and covers approximately two-thirds of the inshore portion of Gulf of Maine. The spring survey began on May 2, 2023, a day later than intended due to storms. Region 1 was still completed by beginning in Portland, ME, then moving south to cover the stations off NH, before going back north. The spring survey finished June 1, 2023, off Lubec, Maine. Due to weather and gear conflicts, 97 out of the 120 scheduled tows were completed leading to an 81% completion rate for the survey. A total of 10,826 lobsters were caught and sampled, with 5,080 females, 5,739 males, 6 unsexed, and 1 gynandromorph caught and measured (Figure 4). The fall survey began on September 25, 2023 in Portsmouth, New Hampshire and finished on October 27, 2023 off of Lubec, Maine. Due to the adverse weather and gear conflicts, 78 out of the 120 scheduled tows were completed leading to a 65% completion rate for the survey. A total of 11,516 lobsters were caught and sampled, with 5,620 females, 5,894 males, and 2 unknown sexes caught and measured (Figure 5).

Massachusetts: Since 1978, the Division of Marine Fisheries has conducted spring and autumn bottom trawl surveys in the territorial waters of Massachusetts. This survey has run continuously since 1978, with the sole exception of 2020, when neither the spring nor fall survey took place due to Covid-19 restrictions. After low levels observed in the GOM during the early to mid-2000s, relative abundance indices have increased over the last decade but have declined in recent years, with declines evident in the sublegal sizes a couple years prior to declines in the legal sizes. Sublegal-sized abundance has been at or below the median for the past four years with data (no data in 2020). Legal abundance has remained above the time series median since 2015, although the 2022 and 2023 values were much closer to the median than the previous six years. In SNE, relative abundance from the spring and fall surveys remains low. There were no lobsters observed in the SNE spring surveys, and no legal-sized lobsters observed in the fall survey in 2023 (Figure 6).

Rhode Island: The Rhode Island DFW Trawl Survey program conducted seasonal surveys in the spring and fall, as well as a monthly survey. In 2023, 44 trawls were conducted in the Spring and 44 in the Fall. Monthly Survey includes monthly trawls throughout Narragansett Bay. There were 143 trawls performed as part of the Monthly program in 2023. Spring 2023 mean CPUEs were 0.02 and 0.23 for legal and sub legal lobsters, respectively, and Fall 2023 CPUE was 0.00

for legal lobsters and 0.16 for sublegal lobsters. The 2023 mean monthly trawl CPUEs were 0.05 and 0.27 per-tow for legal and sublegal lobsters, respectively (Figure 7).

Connecticut and New York: Juvenile and adult abundance are monitored through the Long Island Sound Trawl Survey during the spring (April, May, June) and the fall (September, October) cruises all within NMFS statistical area 611. Due to the COVID-19 pandemic, the spring and fall 2020 Long Island Sound Trawl Surveys were not conducted; an estimated index is shown as the average of 2019 and 2021. The spring 2023 lobster abundance index (geometric mean = 0 lobsters/tow) was the lowest in the time series. Spring abundance in the last 12 years (2011-2023) remains less than 1.0. All indices from 2004-2022 are below the time series median (2.76). The fall 2022 lobster abundance index (geometric mean = 0.0128 lobsters/tow) is derived from the collection of one, sublegal male and was a slight improvement from 2019 when no lobsters were caught in September and October. The fall time series median (3.03) has not been exceeded since 2004. Both legal and sublegal-size lobster abundance have declined with similar trajectory (Figure 8).

New York: New York initiated a stratified random trawl survey in the near shore ocean waters off the south shore of Long Island in 2018 from the Rockaways to Montauk Point and the New York waters of Block Island Sound. Three sampling cruises were conducted in 2023. These cruises took place during the spring (May, June) and fall (October, November). Twenty-eight stations were sampled during the cruise in May, and twenty-nine stations were sampled during the June cruise. During the fall, twenty-five stations were sampled in October and four stations were sampled in November. Eleven lobsters were caught during the 2023 surveys.

New Jersey: An independent Ocean Trawl Survey is conducted from Sandy Hook, NJ to Cape May, NJ each year. The survey stratifies sampling in three depth gradients, inshore (18'-30'), mid-shore (30'-60'), offshore (60'-90'). The mean CPUE is calculated as the sum of the mean number of lobsters per size class collected in each sampling area weighted by the stratum area. The 2023 CPUE is a decrease from the 2022 value (Figure 9).

Delaware, Maryland, and Virginia conduct bottom trawl surveys but lobster catch is very rare.

7.2 Young of Year Index

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

Maine: There are currently 40 fixed stations along the Maine coast. Of these 40 stations 38 have been sampled consistently since 2001 with two additional sites added to Zone D, off midcoast Maine, in 2005. In recent years, these sites are sampled October to December. Only 35 sites were sampled in 2023 due to staffing and weather limitations. Sites were selected based on orientation to surface winds, position in bays, water temperature during settlement period (for eastern Maine sites) and presence of suitable habitat. A new R script was developed

in 2022 to pull the data directly from Maine's MARVIN archive database to create a replicable and transparent data query, but these numbers differ slightly from past data pulled. Cut-off values for YOY vary by year. In 2022, it was identified that 2013 data had not been uploaded correctly previously so the numbers are different from previous reports (Figure 10).

New Hampshire: New Hampshire Fish and Game conducted a portion of the coastwide American Lobster Settlement Index (ALSI). In 2023, a total of 40 juvenile lobsters were sampled from three sites; 33 older juveniles, 4 young-of-year (YOY) lobster, and 3 one-year-old (Y+). Figure 11 depicts the CPUE (#/m2) of all sampled lobsters, YOY and Y+, for all New Hampshire sites combined from 2008 through 2023. For each of these indices, CPUE shows a general upward trend to a time series high in 2011 with sustained moderate to low levels from 2012 through 2023 (Figure 11).

Massachusetts: Annual sampling for early benthic phase/juvenile (EBP) lobsters was conducted during August and September, 2023. As of 2023, suction sampling is conducted in the GOM stock unit at 10 sites from Cape Ann to the South Shore area, and in the SNE stock unit at 4 sites in Buzzards Bay. In 2023 densities of YOY lobsters remained below time series means in all sampling regions within the GOM. However, densities in Salem Sound, one of the longest sampled regions in GOM, have been improving since time series lows in the 2010s, trending upwards over the last few years. In SNE there were no YOY lobsters found in the Buzzards Bay sampling locations in 2023 (Figure 12).

Rhode Island: In 2023, the RI DEM DMF YOY Settlement Survey (Suction Sampling) was conducted at six fixed stations with twelve randomly selected 0.5 m^2 quadrats sampled at each survey station. The survey stations are located outside of Narragansett Bay along the southern Rhode Island coast, from Sachuest Point (east) to Point Judith (west). The index represents the average annual densities for YOY (≤ 13mm) and total lobsters caught (Figure 13). The 2023 YOY Settlement Survey index was 0.03 lobsters/m2, and with all lobsters was 0.09 lobsters/m2.

Connecticut: The CT DEEP Larval Lobster Survey in western Long Island Sound was discontinued after 2012. Alternative monitoring data are available for the eastern Sound from the Millstone Power Station entrainment estimates of all stages of lobster larvae. Abundance indices in both programs are delta mean density of larvae per 1000 cubic meters of water, entrained into the power plant in the case of the Millstone program and stage 4 only captured in surface plankton samples in the CT DEEP program. Both programs show a protracted decline in recruitment following the 1999 die-off. Note, the 2022 value (0.251 Δ-mean density) for the eastern Sound represents one observed stage IV larvae in all samples obtained. The 2023 value (0.480 Δ-mean density), although the highest since 2006, only represents two observed stage III lobster larvae in all samples obtained (Figure 14).

7.3 Ventless Trap Survey

To address a need for a reliable index of lobster recruitment, a cooperative random stratified ventless trap survey was designed to generate accurate estimates of the spatial distribution of

lobster length frequency and relative abundance while attempting to limit the biases identified in conventional fishery dependent surveys.

Maine: The Maine Ventless Trap Survey changed strategies in 2015 to cover more area by eliminating the vented traps at each site. This change allowed the survey to double the number of sites with ventless traps and increase the sampling coverage spatially to 276 sites. Traps were set during the months of June, July, and August. The stratified mean was calculated for each area using depth and statistical area for ventless traps only. Compared to the previous years, in 2023 the number of sublegal (<83 mm CL) lobsters caught increased slightly in the NH-Friendship area (513), stayed the same in the Schoodic Point to Friendship area (512), and decreased in the Schoodic Pt-Cutler area (511). The number of legal sized (≥ 83 mm CL) lobsters caught remained the same in areas 513 and 512, and decreased in 511 (Figure 15).

New Hampshire: Since 2009, NHF&G has been conducting the coastwide Random Stratified Ventless Trap Survey in state waters (statistical area 513). A total of six sites were surveyed twice a month from June through September in 2023. Catch per unit effort (stratified mean catch per trap haul) from 2009 through 2023 is presented in Figure 16. Annual stratified mean catch per trap haul values varied without significant positive or negative trend throughout the fourteen year time series.

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

The time series of relative abundance for sublegal (< 83 mm CL) and legal-sized (≥ 83 mm CL) lobsters for Area 514 (part of LMA 1) is shown in Figure 17 as the stratified mean CPUE (± S.E.). Note that the MA index includes data from both vented and non-vented traps, and includes all four survey months (June – Sept). The average catch of sublegal lobsters is much higher than the catch of legal-sized lobsters, and generally increased from 2006 through 2016 but has been declining since, with values from the last five years (2019-2023) falling below the time series average of 4.38 sublegal lobsters/trap. The stratified mean catch per trap of legal-sized lobsters in 2023 was 0.52 (± 0.01), and was below the time series average of 0.56.

The time series of relative abundance (stratified mean CPUE ± S.E.) for sublegal (<86 mm CL) and legal-sized (≥ 86 mm CL) lobsters in the Area 538 (MA SNE survey area) is shown in Figure 18. Note that due to survey changes for the MA SNE survey region in 2021, the entire MA SNE time series now represents June – August only, first haul of the month, and only those stations that occurred in the reduced survey footprint. The mean sublegal CPUE in 2023 was 0.56 (± 0.06), well below the time series average of 1.79 sublegal lobsters/trap haul. The CPUE of legal-sized lobsters in 2023 was 0.32 (±0.08), very close to the time series average of 0.33 legal lobsters/trap haul.

Rhode Island: Rhode Island conducted the 2023 ventless trap survey in June, July, and August at a total of 27 stations divided between Block Island Sound, Rhode Island Sound, and Narragansett Bay Over the 18 trips and 848 pots (ventless and vented) hauled, 2,108 lobsters were sampled. The depth-stratified abundance index of sublegal lobsters in the 2023 survey, 2.99 lobsters per ventless trap, remains below the time series mean of 5.71 lobsters per ventless trap. The abundance index for legal-sized lobsters, at 0.47 lobsters per ventless trap, is above the time series mean of 0.38 lobsters per ventless trap (Figure 19).

Delaware: A pilot study was initiated in 2018 to assess the population structure of structure-oriented fish in the lower Delaware Bay and nearshore Atlantic Ocean. Sampling was conducted in the lower Delaware Bay and the nearshore Atlantic Ocean using commercial-sized ventless fish pots during April through December 2023. Eight American Lobsters were caught in lower Delaware Bay and 486 American Lobsters in the nearshore Atlantic Ocean with a ratio of 60% males, 36% female and 4% egg laden. The sampled American Lobsters ranged in length from 52 mm to 140 mm.

8.0 State Compliance

States are currently in compliance with all required biological management measures under Amendment 3 and Addendum I-XXIV. However, the Plan Review Team (PRT) notes that Connecticut and New Jersey and did not conduct sea/port sampling in 2023, as required by Addendum XXVI. Rhode Island did conduct sampling, but was unable to complete the ten required trips.

9.0 De Minimis Requests

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

10.0 Regulatory Changes

Maine

- As of January 1st, 2023, 100% electronic harvester reporting is mandatory for all commercial lobster license holders.
- In the 2023 fishing year, Maine DMR adopted rules to incorporate the requirements in Addendum XXIX (American Lobster) and Addendum IV (Jonah crab) that were approved by the Atlantic States Marine Fisheries Commission (ASMFC) in March 2022. Specifically, for compliance with the Interstate Fisheries Management Plans, this regulation requires all federally-permitted lobster and Jonah crab vessels with commercial trap gear area permits to have electronic tracking devices.

Connecticut

- Regulations of Connecticut State Agencies (Title 26. Sec 26-157c-1 through 26-157c-4) were amended in 2022 to include both the LMA6 seasonal closure, lobster trap vent size requirement and minimum size carapace length.
- Connecticut is in the regulatory process to implement electronic tracking device requirements for federally-permitted lobster and Jonah crab vessels with commercial trap gear area permits.

11.0 Enforcement Concerns

Maine

- In 2023, Maine Marine Patrol Officers documented 299 lobster-related violations, with 66 being summonses. Marine Patrol's highest profile cases in 2023 were four individuals being charged with molesting lobster gear, 1 harvester found in possession of 23 short lobsters, and 1 individual determined to be fishing lobster traps beyond the Area 1 limit of 800. 33 individuals were issued violations for fishing untagged lobster traps with the most egregious violation being 56 untagged traps. Officers continue to prioritize lobster enforcement at sea illustrated by the documentation of more than 20,000 inspected lobster traps, between traps hauled and lobster boat boardings. The majority of other violations were associated with the possession of illegal lobsters, lobster license violations, and protected resource related gear violations.

New Jersey

- One summons was issued for each other the following: deploying lobster traps within a closed artificial reef area, failure to properly mark traps set on an artificial reef, and failure to notify enforcement prior to deploying lobster traps on an artificial reef.

New York

- In 2023, New York had three infractions. This included lobster traps with improper vents, landing improper size lobsters from LMA 4, and landing lobsters without a state permit on a trawler.

12.0 Research Recommendations

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

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

federal waters, particularly those fished by the LCMA 3 fleet, via a NMFS-implemented lobster-targeted sea sampling program.

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

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

NEAMAP Trawl Survey Protocols - The SAS recommends that the NEAMAP Trawl Survey sampling protocol be modified for all lobsters caught to be sorted by sex. If a subsample is necessary, subsamples be taken by sex for additional biological data (size, egg presence and stage, vnotch, etc.) This modification would align the biological sampling methodology with other trawl surveys used in the assessment, and perhaps allow the survey to not be collapsed by sex into survey slots.

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

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

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

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

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

SNE Recruitment Failure - The direct cause of the precipitous declines in recruitment under less variable spawning stock biomass is largely unknown. Research designed to understand the causes driving recruitment failure is vital for any efforts toward rebuilding the SNE stock. In addition, being able to predict similar conditions in GOMGBK could allow management the opportunity to respond differently.

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

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

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

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

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

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

13.0 Plan Review Team Recommendations

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

- Massachusetts was unable to provide a compliance report including all required data by the August 1 deadline[2].
- In 2023, Rhode Island, Connecticut, and New Jersey, did not meet the Addendum XXVI minimum requirement of ten sea/port sampling trips. Given persistent issues with states being unable to meet the sampling requirement, the Board should consider how to address this issue moving forward.

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

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

- The PRT recommends the Board consider reviewing the monitoring requirements in SNE given the status of the stock and the difficulty obtaining sea sampling trips in a fishery with reduced effort. The TC has discussed the need for additional sampling trips in federal waters as the fishery has shifted offshore. The Stock Assessment Subcommittee is considering this issue as part of the ongoing stock assessment.

[2] Data for Massachusetts that were not available for this report will be added at a later date.

14.0 Tables

Table 1. Landings (in pounds) of American Lobster by the states of Maine through Virginia. Source: ACCSP Data Warehouse for 1981-2022 landings; state compliance reports for 2023 landings. *C= confidential data.*

	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	Total
1981	22,631,614	793,400	11,420,638	1,871,067	807,911	890,218	593,801	55,700	63,108	2,173	39,129,630
1982	22,730,253	807,400	11,265,840	3,173,650	880,636	1,121,644	846,215	90,700	64,788	4,713	40,985,839
1983	21,976,555	1,310,560	12,867,378	5,114,486	1,654,163	1,207,442	769,913	56,700	76,192	20,619	45,054,008
1984	19,545,682	1,570,724	12,446,198	5,259,821	1,796,794	1,308,023	927,474	103,800	98,876	37,479	43,094,871
1985	20,125,177	1,193,881	13,702,702	5,140,131	1,381,029	1,240,928	1,079,723	118,500	82,295	42,881	44,107,247
1986	19,704,317	941,100	12,496,125	5,667,940	1,253,687	1,416,929	1,123,008	109,000	57,593	93,105	42,862,804
1987	19,747,766	1,256,170	12,856,301	5,317,302	1,571,811	1,146,613	1,397,138	84,100	49,820	60,241	43,487,262
1988	21,739,067	1,118,900	12,977,313	4,758,990	1,923,283	1,779,908	1,557,222	66,200	22,966	53,696	45,997,545
1989	23,368,719	1,430,347	15,645,964	5,786,810	2,076,851	2,344,932	2,059,800	76,500	17,502	45,107	52,852,532
1990	28,068,238	1,658,200	16,572,172	7,258,175	2,645,951	3,431,111	2,198,867	68,300	24,941	58,260	61,984,215
1991	30,788,646	1,802,035	15,998,463	7,445,172	2,673,674	3,128,246	1,673,031	54,700	26,445	7,914	63,598,326
1992	26,830,448	1,529,292	14,969,350	6,763,087	2,534,161	2,651,067	1,213,255	21,000	27,279	753	56,539,692
1993	29,926,464	1,693,347	14,350,595	6,228,470	2,177,022	2,667,107	906,498	24,000	46,650	2,940	58,023,093
1994	38,948,867	1,650,751	16,176,551	6,474,399	2,146,339	3,954,634	581,396	8,400	7,992	460	69,949,789
1995	37,208,324	1,834,794	15,903,241	5,362,084	2,541,140	6,653,780	606,011	25,100	26,955	5,210	70,166,639
1996	36,083,443	1,632,829	15,312,826	5,295,797	2,888,683	9,408,519	640,198	20,496	28,726	C	71,311,517
1997	47,023,271	1,414,133	15,010,532	5,798,529	3,468,051	8,878,395	858,426	C	34,208	2,240	82,487,785
1998	47,036,836	1,194,653	13,167,803	5,617,873	3,715,310	7,896,803	721,811	1,359	19,266	1,306	79,373,020
1999	53,494,418	1,380,360	15,875,031	8,155,947	2,595,764	6,452,472	931,064	C	41,954	6,916	88,933,926
2000	57,215,406	1,709,746	14,988,031	6,907,504	1,393,565	2,883,468	891,183	C	62,416	C	86,051,319
2001	48,617,693	2,027,725	11,976,487	4,452,358	1,329,707	2,052,741	579,753	C	31,114	C	71,067,578
2002	63,625,745	2,029,887	13,437,109	3,835,050	1,067,121	1,440,483	264,425	C	20,489	C	85,720,309
2003	54,970,948	1,958,817	11,321,324	3,561,391	C	946,449	209,956	C	22,778	C	72,991,663
2004	71,574,344	4,076,845	11,675,852	3,059,319	646,994	996,109	370,536	13,322	14,931	27,039	92,455,291
2005	68,729,813	C	11,291,145	3,174,852	713,901	1,154,470	369,003	C	39,173	21,988	85,494,345
2006	75,420,639	2,612,389	12,102,232	4,355,690	806,135	1,252,146	470,878	3,706	26,349	28,160	97,078,324
2007	63,987,476	2,468,811	10,046,445	2,299,744	568,696	911,761	334,097	C	26,804	C	80,643,834
2008	69,911,680	2,568,088	10,606,534	2,782,000	427,168	712,075	304,479	C	32,932	C	87,344,955
2009	81,124,149	2,986,981	11,789,758	2,842,088	412,468	731,811	C	6,064	30,618	21,472	99,945,409
2010	96,247,042	3,648,004	12,772,983	2,928,688	441,622	813,513	692,910	C	29,149	16,345	117,590,257
2011	104,957,939	3,919,195	13,385,902	2,754,067	198,928	344,232	698,205	8,879	41,057	12,879	126,321,283
2012	127,464,536	4,229,227	14,486,428	2,706,384	247,857	550,441	919,351	C	65,579	10,823	150,680,627
2013	128,015,530	3,817,707	15,259,573	2,155,762	127,420	496,535	660,367	C	62,601	9,061	150,604,556
2014	124,941,312	4,374,656	15,312,852	2,412,875	127,409	222,843	526,368	26,330	57,414	11,099	148,013,158
2015	122,685,783	4,721,826	16,450,853	2,316,458	205,099	147,414	445,060	22,894	29,284	9,474	147,034,145
2016	132,749,768	5,782,098	17,784,921	2,260,335	254,346	218,846	349,880	C	29,254	2,854	159,432,301
2017	112,153,095	5,645,434	16,493,125	2,031,143	130,015	150,317	409,062	32,364	29,136	1,630	137,075,319
2018	121,226,471	6,199,365	17,697,243	1,905,689	110,580	112,685	344,547	C	24,893	2,727	147,624,201
2019	102,227,148	6,093,615	17,029,462	1,795,212	111,573	112,107	291,072	C	11,831	1,840	127,673,859
2020	97,916,077	5,014,169	15,711,853	1,695,279	159,173	111,678	309,197	11,098	10,176	C	120,938,700
2021	110,697,747	5,712,222	16,826,952	1,351,415	148,758	109,117	290,981	6,193	12,827	3,099	135,159,312
2022	98,777,569	5,262,127	14,907,099	1,189,045	88,654	81,950	266,612	C	13,336	C	120,586,393
2023	96,536,642	6,088,954	15,890,702	1,116,390	124,250	105,542	264,495	C	8,518	C	120,135,493

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

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

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

Table 3. 2023 LCMA specific management measures

Management Measure	LCMA 1	LCMA 2	LCMA 3	LCMA 4	LCMA 5	LCMA 6	OCC
Min Gauge Size	3 1/4"	3 3/8"	3 17/32"	3 3/8"	3 3/8"	3 3/8"	3 3/8"
Vent Rect.	1 15/16 x 5 3/4"	2 x 5 3/4"	2 1/16 x 5 3/4"	2 x 5 3/4"	2 x 5 3/4"	2 x 5 3/4"	2 x 5 3/4"
Vent Cir.	2 7/16"	2 5/8"	2 11/16"	2 5/8"	2 5/8"	2 5/8"	2 5/8"
V-notch requirement	Mandatory for all eggers	Mandatory for all legal size eggers	Mandatory for all eggers above 42°30'	Mandatory for all eggers in federal waters. No v-notching in state waters.	Mandatory for all eggers	None	None
V-Notch Definition[1] (possession)	Zero Tolerance	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	State Permitted fisherman in state waters 1/4" without setal hairs Federal Permit holders 1/8" with or w/out setal hairs[1]
Max. Gauge (male & female)	5"	5 ¼"	6 3/4"	5 ¼"	5 ¼"	5 ¼"	State Waters none Federal Waters 6 3/4"
Season Closure				April 30-May 31[2]	February 1-March 31[3]	Sept 8-Nov 28[4]	February 1-April 30

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

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

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

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

Table 4. 2023 sampling requirements and state implementation. All states have 100% active harvester reporting. Sufficient sea sampling can replace port sampling. *De minimis* states (denoted by *) are not required to conduct biological sampling of their lobster fishery.

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

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

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

Table 5. 2023 sea and port sampling trips and samples by state. *De minimis* states (denoted by *) are not required to conduct biological sampling of their lobster fishery.

State	**Sea Sampling**			**Port Sampling**		**Totals**	
	Trips	Samples	Traps	Trips	Samples	Trips	Samples
ME	160	184,150	36,812	0	0	160	184,150
NH	14	7,601	NA	11	1,099	25	8,700
MA	67	27,957	12,025	0	0	67	27,957
RI	1	360	195	8	2,172	9	2,532
CT	0	0	0	0	0	0	0
NY	0	0	0	18	1,830	18	1,830
NJ	0	0	0	0	0	0	0
DE*	0	0	0	0	0	0	0
MD*	1	71	60	0	0	1	71
VA*	0	0	0	0	0	0	0
Total	243	220,139	49,092	37	5,101	280	225,240

15.0 Figures

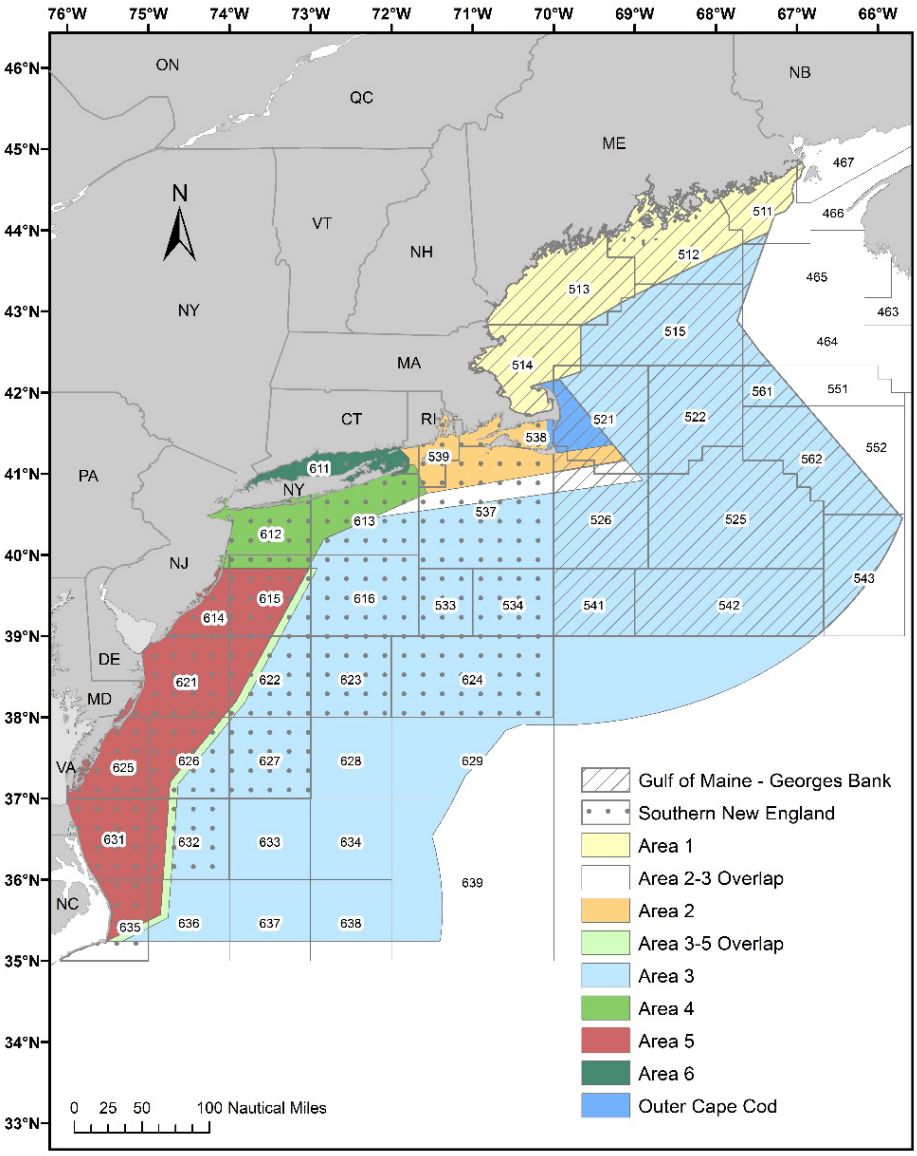

Figure 1. Lobster Conservation Management Areas (LCMAs) and stock boundaries for American lobster.

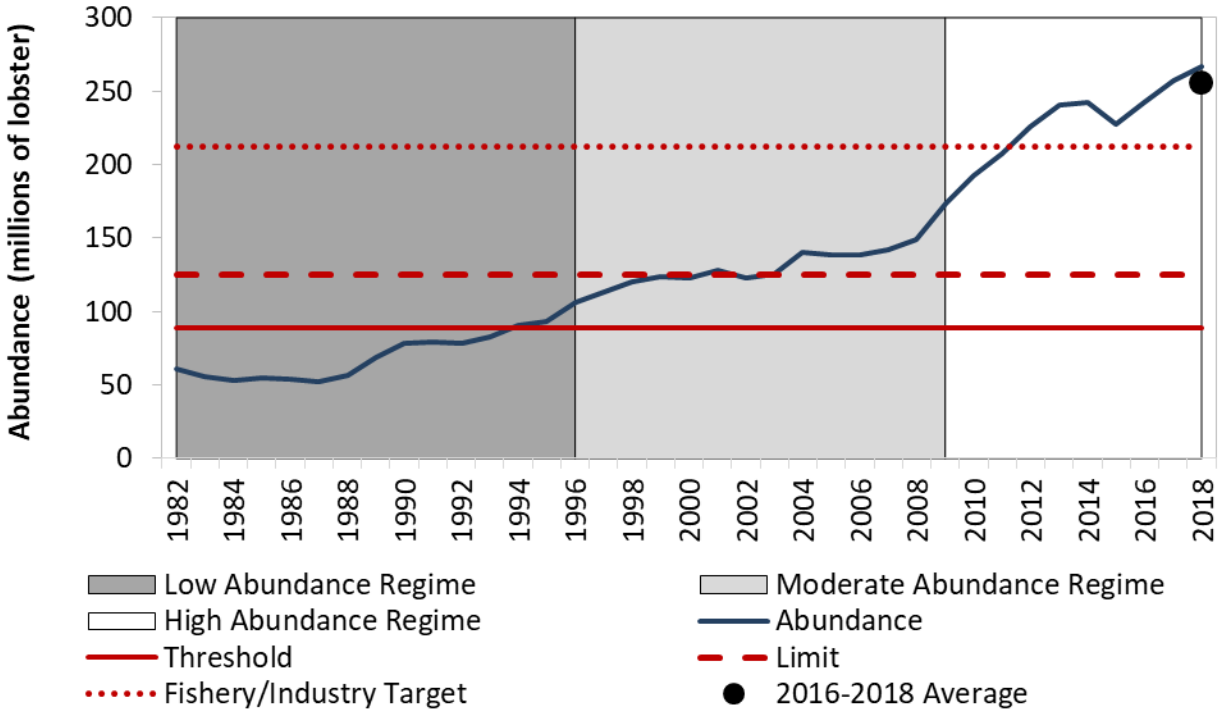

Figure 2. Abundance for GOM/GBK Relative to Reference Points. Source: 2020 Benchmark Stock Assessment for American Lobster.

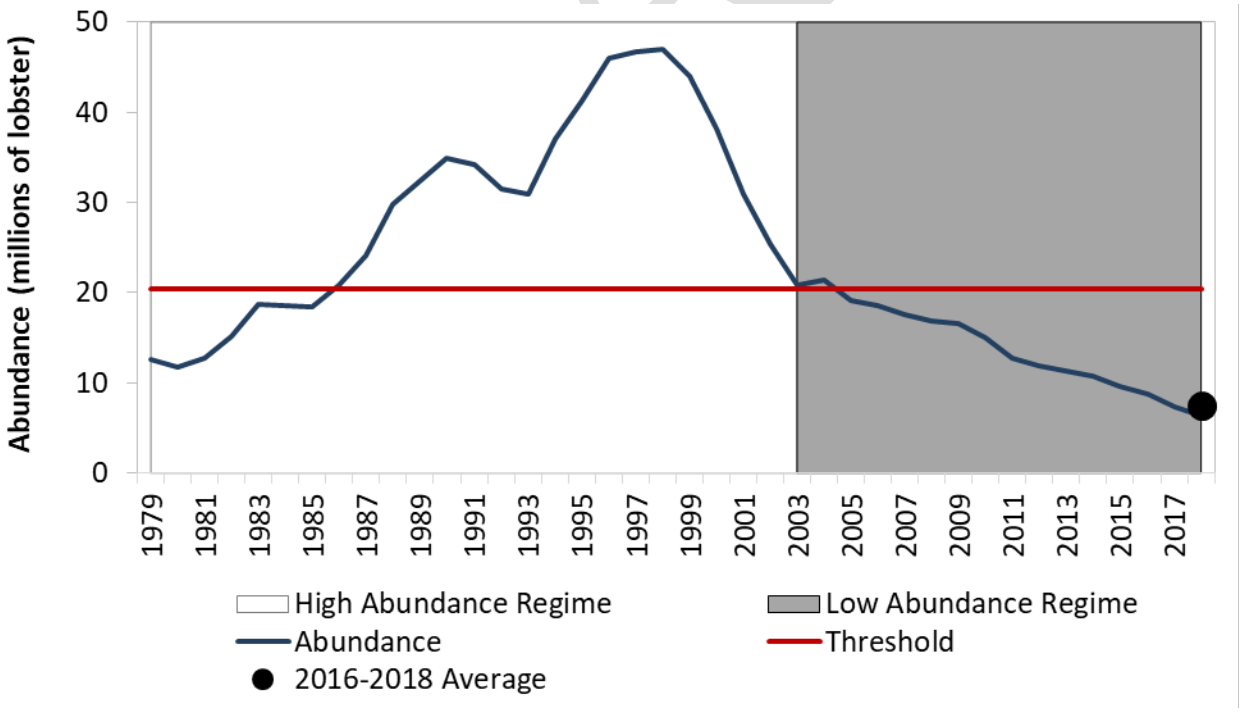

Figure 3. Abundance for SNE Relative to Reference Points. Source: 2020 Benchmark Stock Assessment for American Lobster.

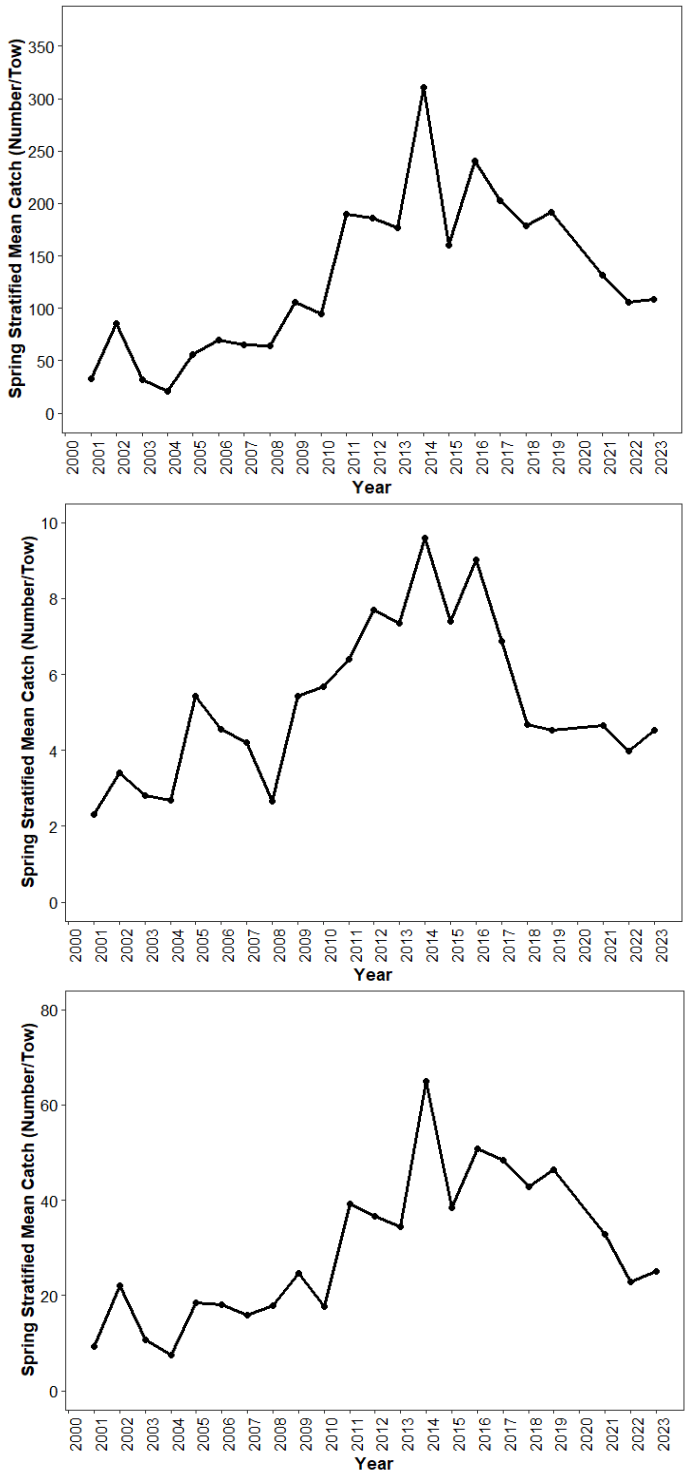

Figure 4. Stratified mean catch and recruit abundance for American lobster on the Spring ME/NH Inshore Trawl Survey (2000-2023). Top: Mean catch of sublegals (<83). Middle: Mean catch of legal sized lobsters (>82). Bottom: Recruit abundance (71-80 mm lobsters).

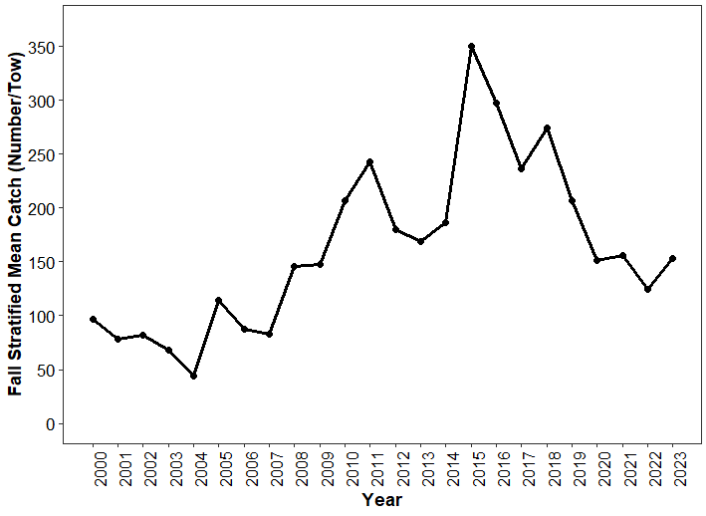

Figure 5. Stratified mean catch and recruit abundance for American lobster on the Fall ME/NH Inshore Trawl Survey (2000-2023). Top: Mean catch of sublegals (<83). Middle: Mean catch of legal sized lobsters (>82). Bottom: Recruit abundance (71-80 mm lobsters).

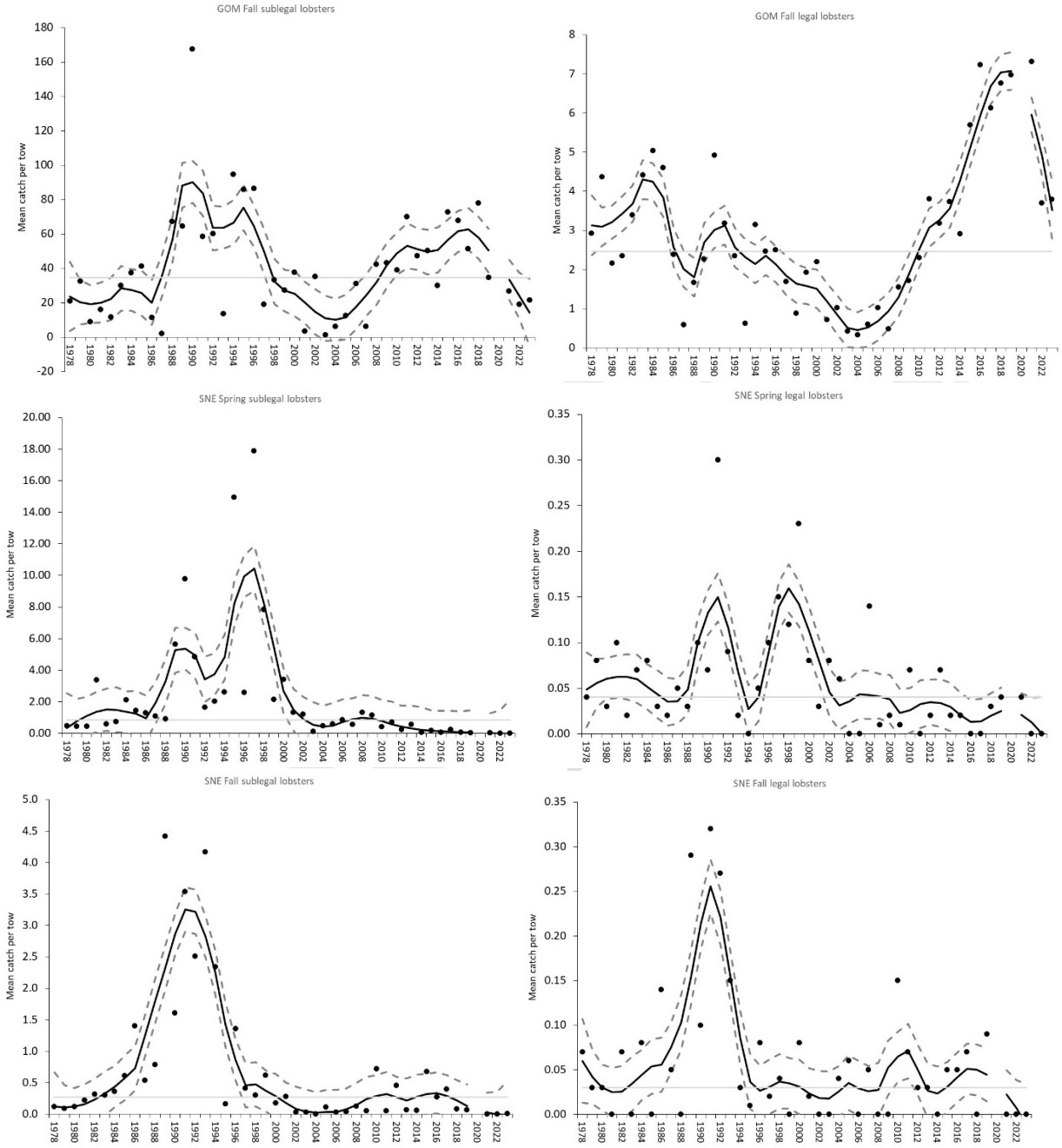

Figure 6. MADMF Fall Trawl Survey sublegal (left) and legal (right) indices from 1978-2023 sexes combined. Note there was no survey conducted in 2020 (spring or fall) due to the Covid-19 pandemic. The top two charts are from Gulf of Maine and the bottom four charts are from Southern New England. Black line represents a LOESS fit to the data (span = 0.25) and dashed grey lines are upper and lower standard errors of the model fit. The horizontal grey line is the time series median.

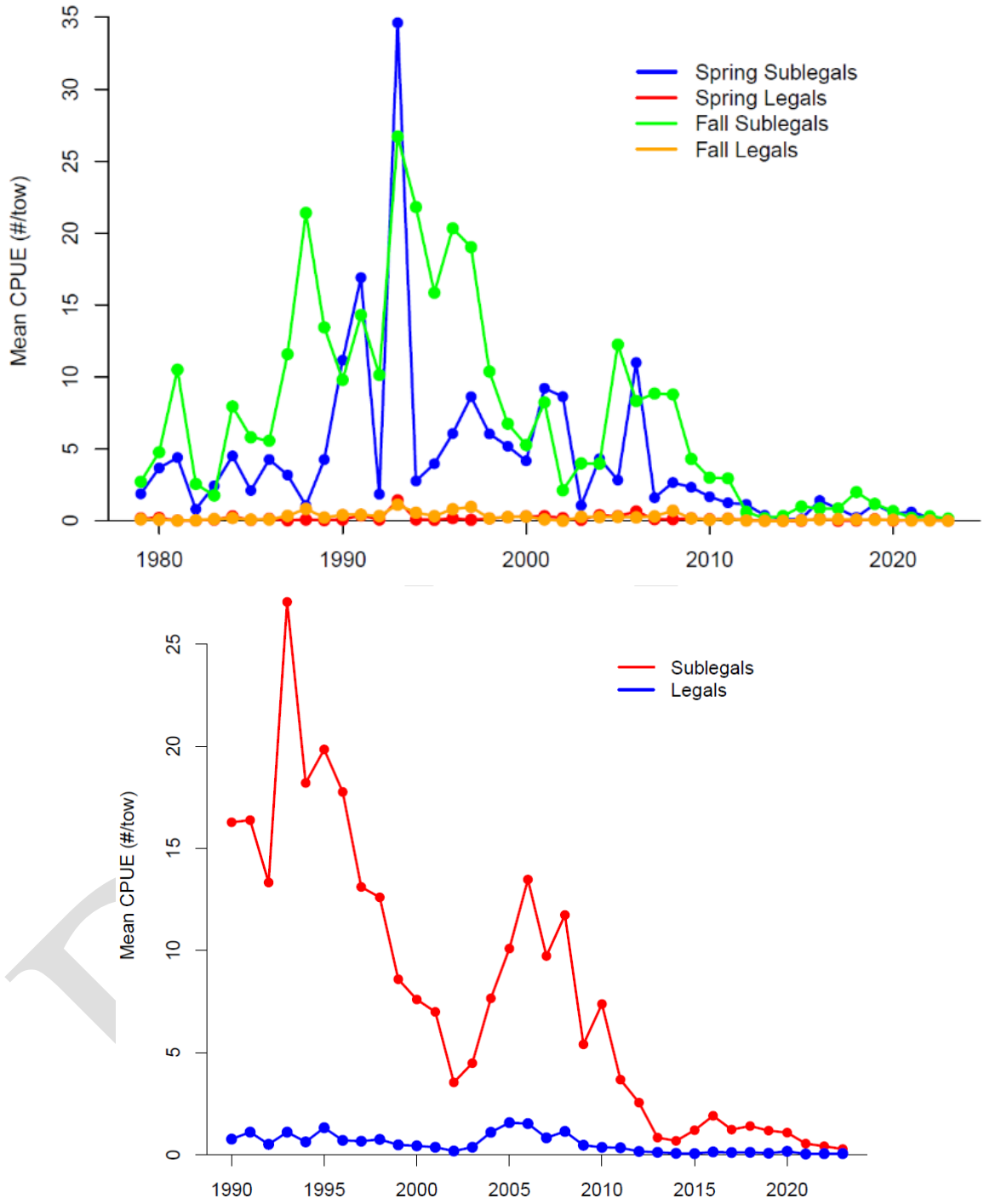

Figure 7. RIDFW Seasonal (spring and fall) Trawl lobster abundances (top) and Monthly Trawl lobster abundances (bottom). CPUE is expressed as the annual mean number per tow for sub-legal (<85.725mm CL) and legal sized (>=85.725mm CL) lobsters.

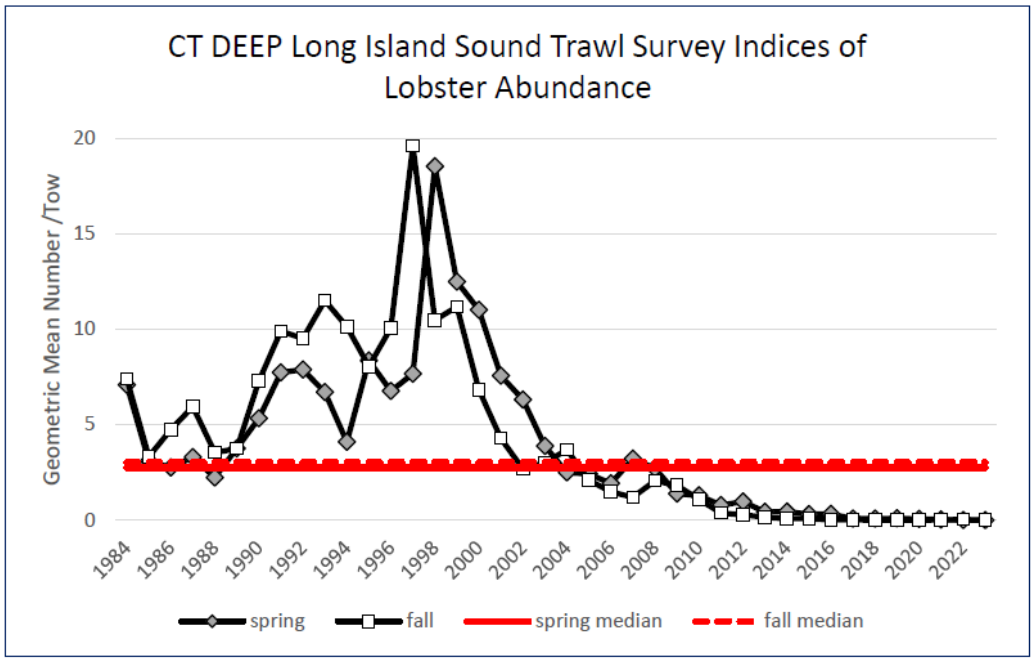

Figure 8. Results of the Long Island Sound Trawl Survey during spring (April-June) and fall (September-October) within NMFS statistical area 611.

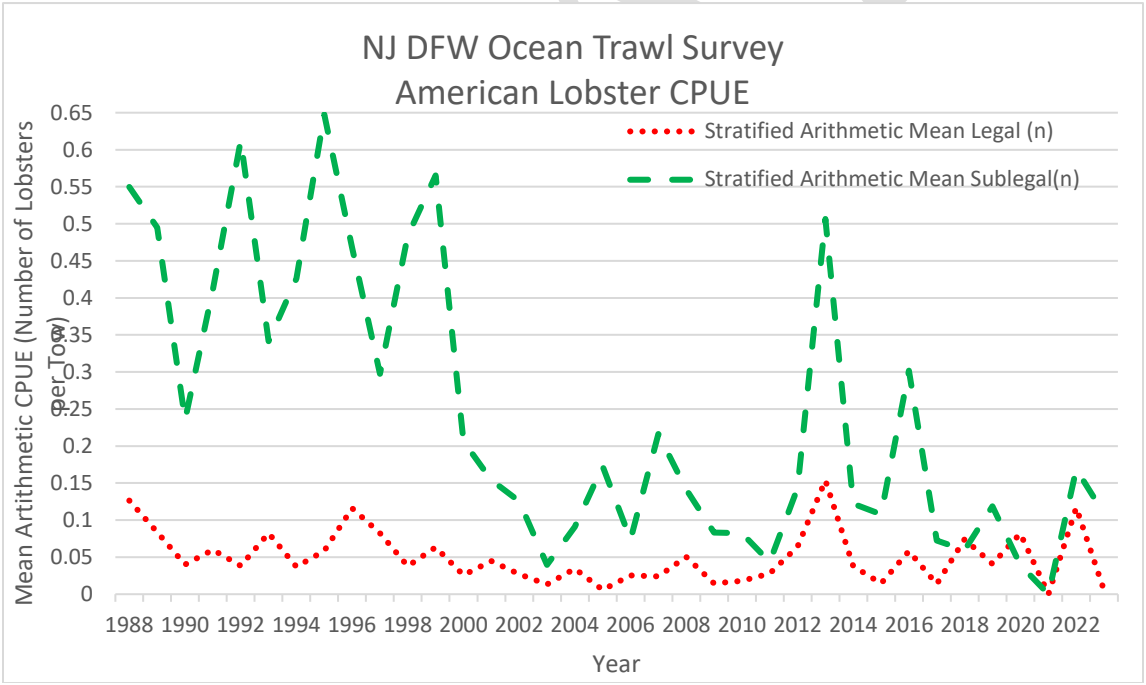

Figure 9. Stratified mean CPUE of all lobsters collected aboard the NJDFW Ocean Trawl Survey. *NOTE: No April 2019 Survey was conducted due to Research vessel mechanical issues. Due to the COVID-19 pandemic, Apr-Oct 2020 and 2021 CPUE and indices were not obtained.

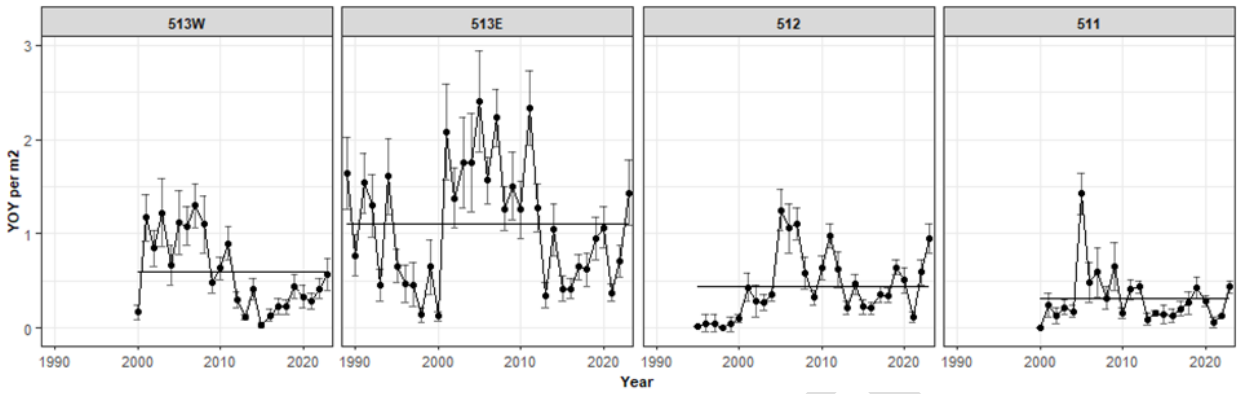

Figure 10. Maine Lobster Settlement Survey Index 1989-2023 for young of year for each statistical area with series average (solid horizonal line) for each region with standard error bars. The cut-off sizes for YOY vary by year.

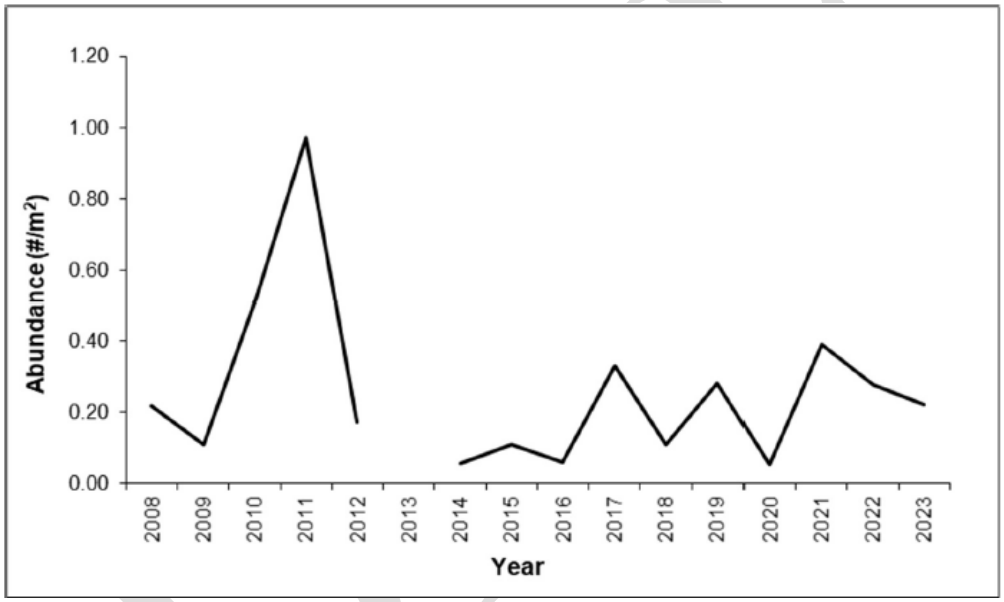

Figure 11. Catch per unit effort (#/m2) of young-of-year (YOY), one-year-olds (Y+), YOY and Y+ combined, and all lobsters during the American Lobster Settlement Index, by location, in New Hampshire, from 2008 through 2023.

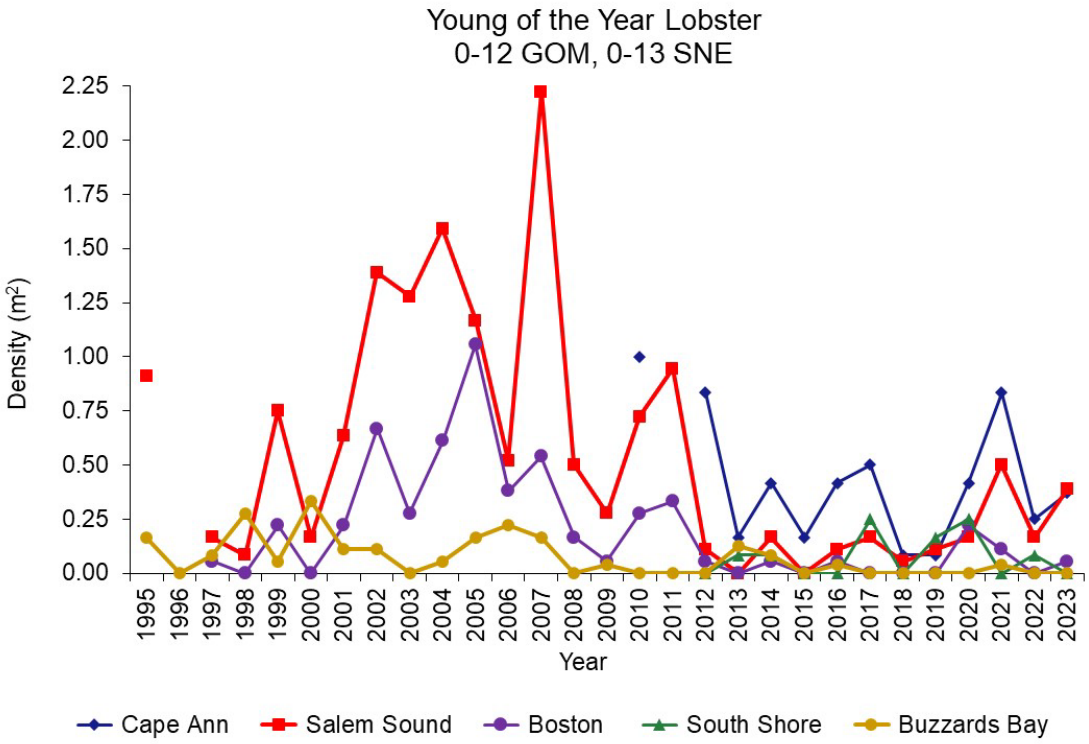

Figure 12. Young-of-year lobster density in four regions within the GOM stock unit – Cape Ann, Salem Sound, Boston, and South Shore, and one region in the SNE stock unit - Buzzards Bay. In GOM locations, lobsters ≤ 12 mm CL are considered YOY, while in SNE locations YOYs are ≤ 13 mm CL.

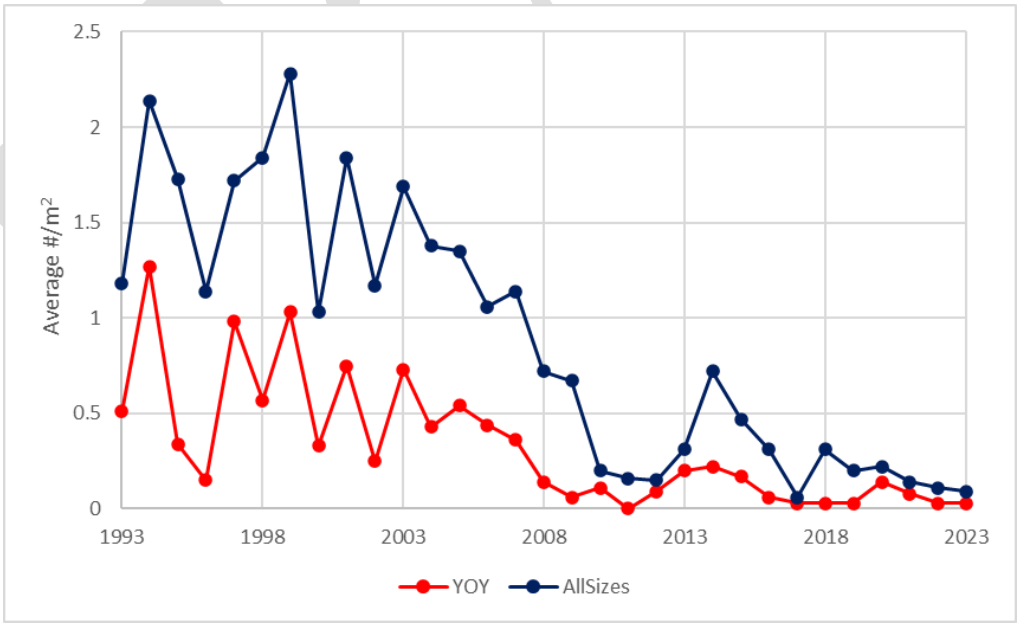

Figure 13. Average abundance of American lobster in Rhode Island suction sampling sites. Abundances are presented for YOY lobsters 13 mm or smaller (red line) and all sizes (blue line).

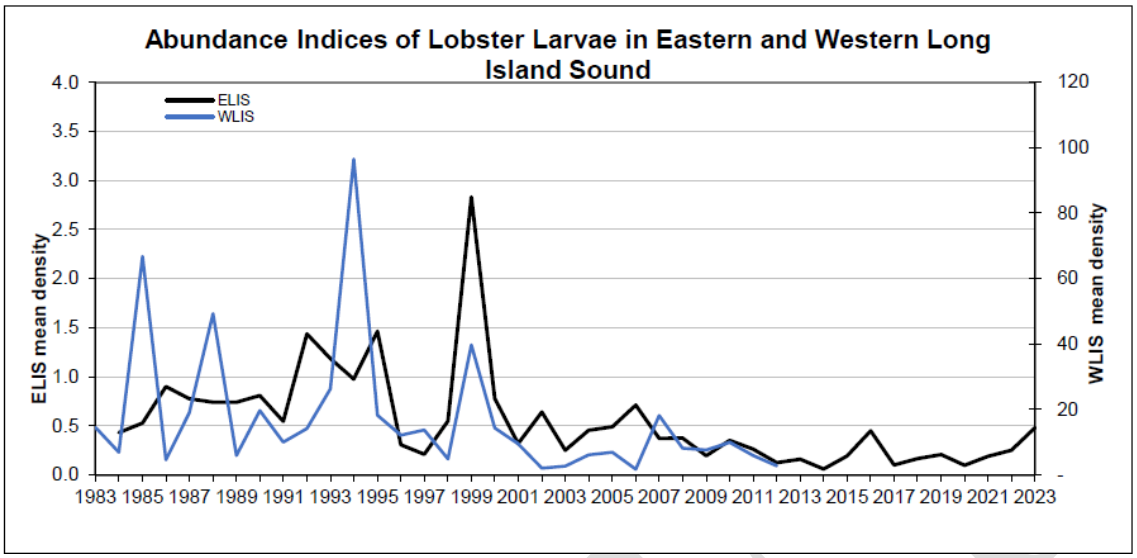

Figure 14. Abundance indices of lobster larvae from the Connecticut DEEP Larval Lobster Survey in western Long Island Sound and from the Millstone Power Station entrainment estimates in eastern Long Island Sound. The Connecticut DEEP survey was discontinued in 2013.

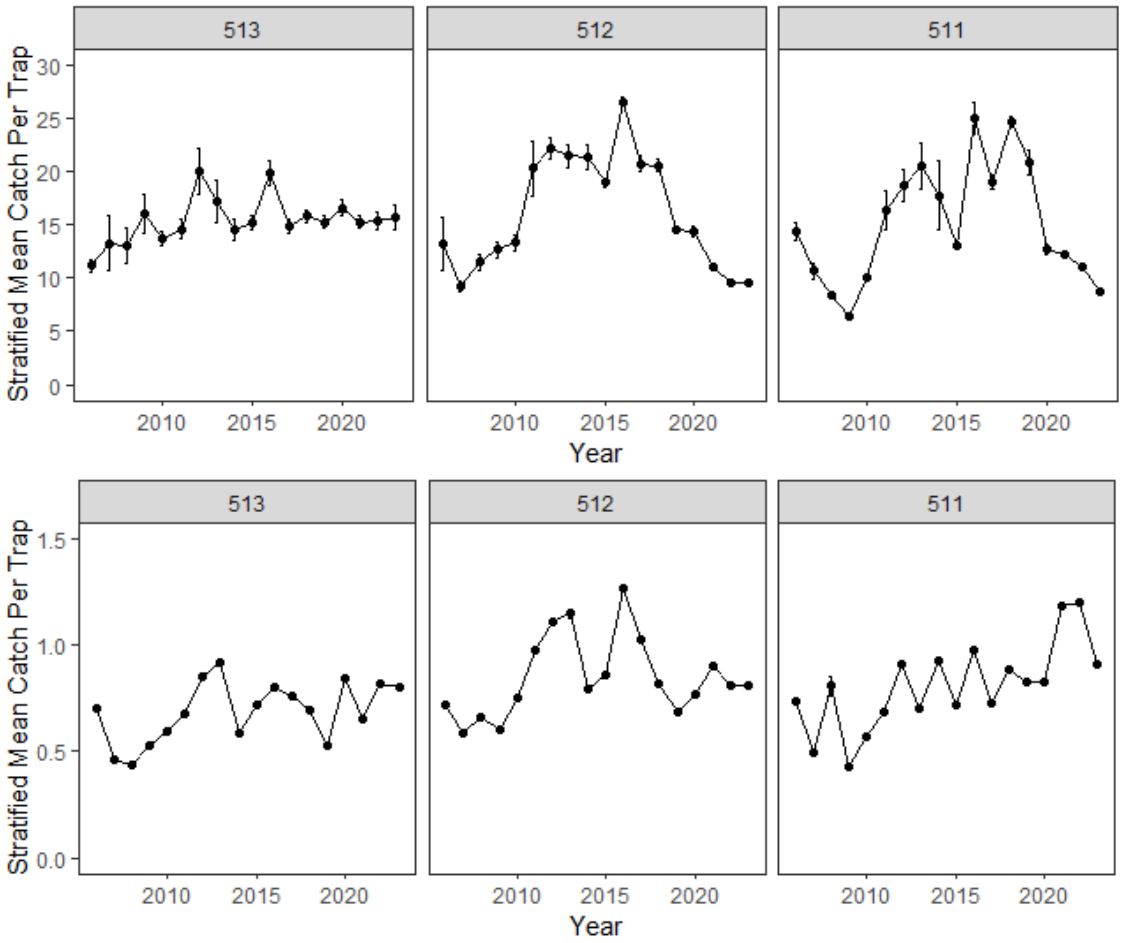

Figure 15. Stratified mean catch per trap for sublegal (top) and legal (bottom) sized lobsters from Maine's Ventless Trap Survey 2006-2023 by statistical area from ventless traps only. Standard error is shown.

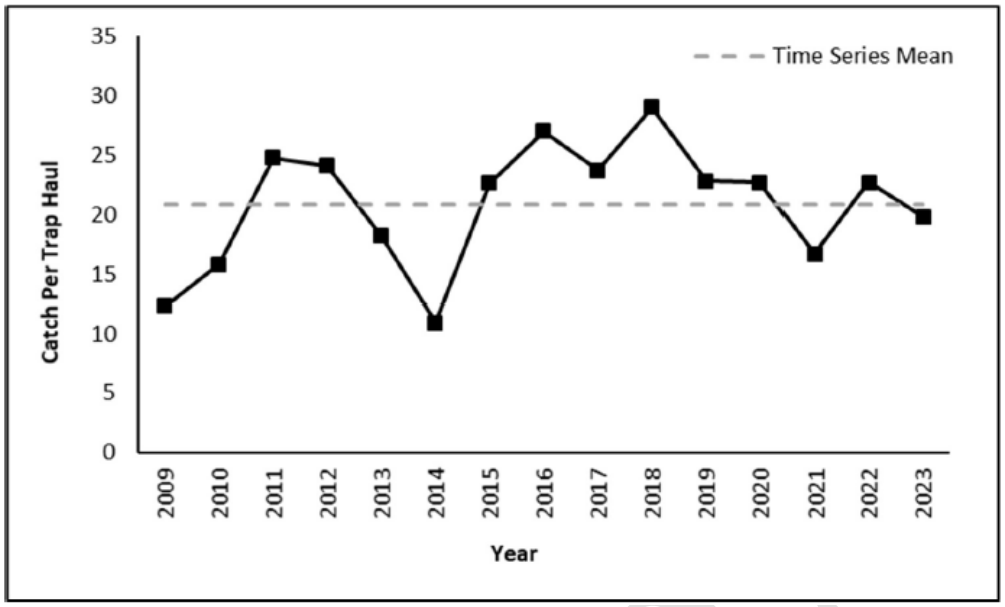

Figure 16. Stratified mean catch per trap haul (ventless traps only) for all lobsters captured during the coast-wide random stratified Ventless Trap Survey in New Hampshire state waters from 2009 through 2023.

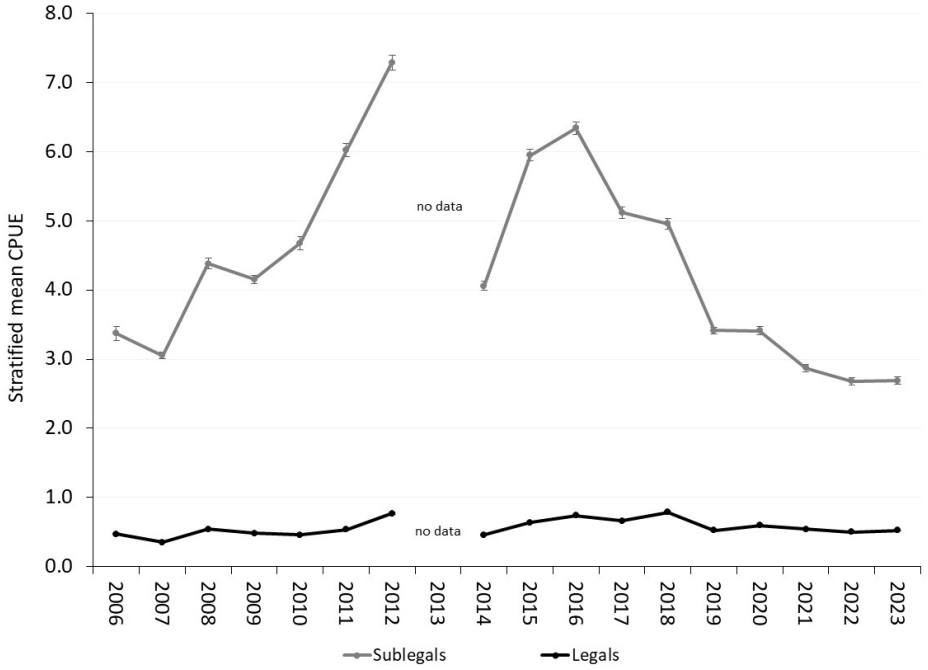

Figure 17. Stratified mean catch per trap haul (±S.E.) of sublegal (< 83 mm, grey line) and legal (≥ 83 mm, black line) lobsters in NMFS Area 514 from MADMF ventless trap survey from 2006-2023.

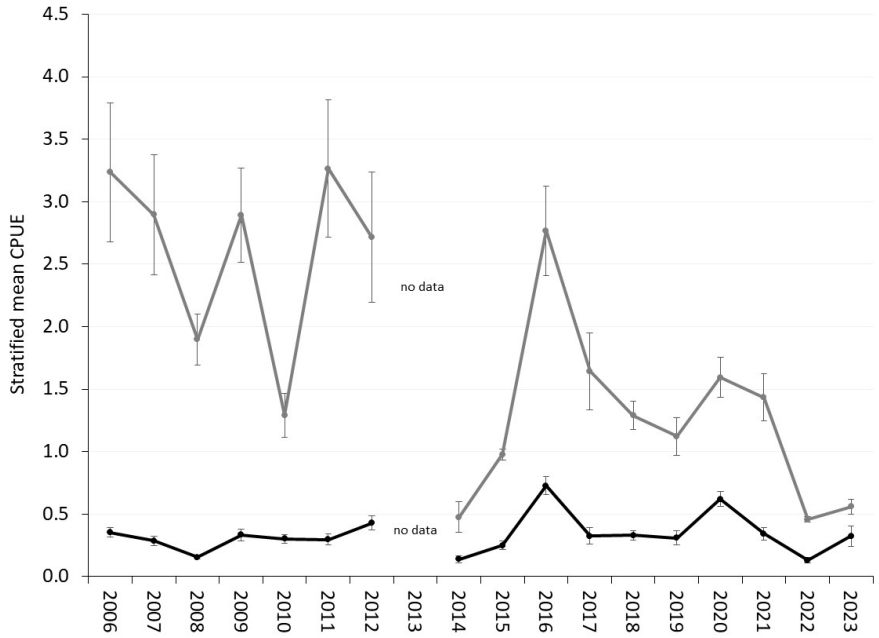

Figure 18. Stratified mean catch per trap haul (±S.E.) of sublegal (< 86 mm, grey line) and legal (≥ 86 mm, black line) lobsters in the reduced MA SNE survey area, Area 538.

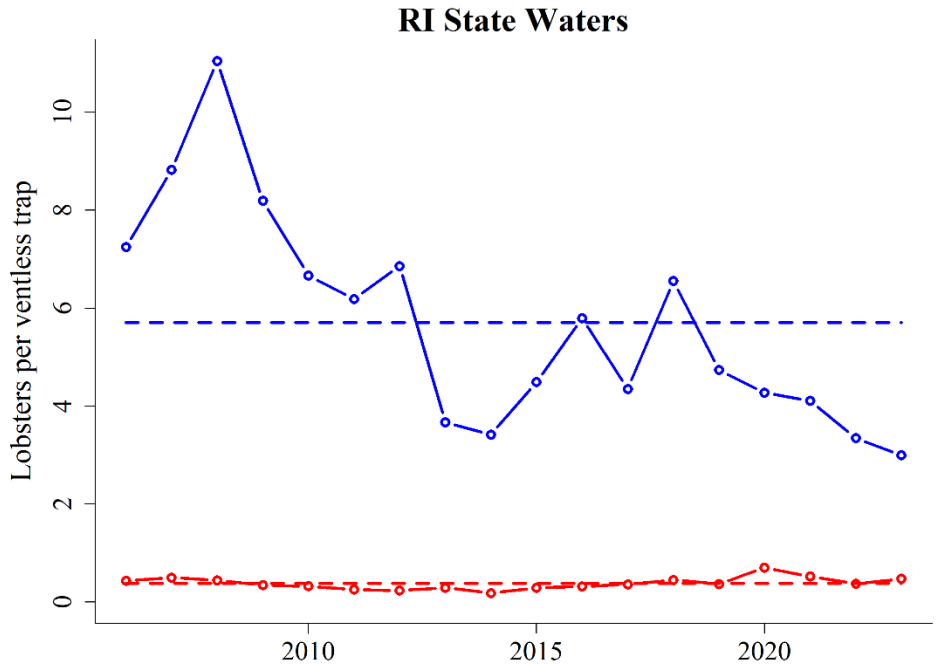

Figure 19. Depth-stratified mean catch of sublegal lobsters in the RIDEM DMF ventless trap survey, 2006-2023.

ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

For Jonah Crab
(*Cancer borealis*)

2023 FISHING YEAR

Prepared by the Plan Review Team

October 2024

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Table of Contents

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

2023 FISHING YEAR

1.0 Status of the Fishery Management Plan

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

2.0 Status of the Fishery

2.1 Commercial Fishery

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

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

harvested Jonah crab claws because they do not have seawater storage tanks on board to store whole crabs.

In 2023, landings along the Atlantic Coast totaled approximately 12.4 million pounds of Jonah crab, representing $14.1 million in ex-vessel value. Landings decreased 12% from 2022 landings of 14 million pounds, while ex-vessel value decreased 36% from the 2022 value ($22 mil). Anecdotal information from the industry suggests that Jonah crab landings and price are highly dependent on market conditions, which have affected recent fishery trends. Almost all coastwide landings came from trap gear. The states of Massachusetts (38%), Maine (25%), and Rhode Island (18%) were the largest contributors to landings. While landings from Southern New England still comprise the majority of the total, landings from the Gulf of Maine have been increasing in the last few years (Figure 1). Please note that Massachusetts data are based on dealer reports as harvester reports were not available for this report.

2.2 Recreational Fishery

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

3.0 Status of the Stock

The 2023 Jonah Crab Benchmark Stock Assessment and Peer Review Report, released in October 2023, indicates the range-wide population of Jonah crab remains above historic lows of the 1980s and 1990s. However, evidence of declining catch per unit effort (CPUE) in the fishery presents concern and uncertainty for the status of the stock.

Based on life history and fishery characteristics, the assessment divided the population into four stocks: offshore Gulf of Maine (OGOM), inshore GOM (IGOM); offshore Southern New England (OSNE) and inshore SNE (ISNE). According to the stock indicators, IGOM, OGOM, and OSNE recruit, exploitable, and spawning abundance conditions from 2019-2021 were neutral or positive relative to historical periods. Indicators generally agree across these stocks that abundance has not been depleted compared to the historic low abundance observed in the 1980s and 1990s. There are no reliable abundance indicators for the ISNE stock so no determination about the condition of this stock's abundance could be made. Young-of-the-year (YOY) settlement indicators generally show neutral conditions and do not indicate that recruitment in the GOM stocks will decline to historical lows in the near future. Settlement conditions are unknown for SNE stocks.

According to the Peer Review Panel, "Despite the limited availability of current data, there is considerable urgency for the assessment due to a very steep, three-year, decline in landings. Commercial landings have declined 51% in three years, after an unprecedented 30-fold rise in landings. Although the recent decline is not well-detected in fishery-independent stock indicators, there is some evidence of declining CPUE in the fishery, creating concern and uncertainty for the status of the stock. Given the mixed signals, the status of the Jonah crab stock is highly uncertain. The Panel strongly recommended close monitoring of annual stock indicators in the next few years.

In response to the assessment findings and peer review panel recommendations, the American Lobster Management Board accepted the Benchmark Stock Assessment and Peer Review Report for management use. The Board also tasked the Technical Committee (TC) with recommending possible measures or actions to address the concerns about stock status and recent fishery trends. The TC did not recommend any management action, but recommended that indicator data for the OSNE stock, where the majority of the fishery occurs, be updated annually, while data for the other three stock areas should be updated every five years.

4.0 Status of Management Measures

Interstate Fishery Management Plan for Jonah Crab (2015)

Jonah crab is managed under the Interstate Fishery Management Plan (FMP) which was approved by the American Lobster Management Board in August 2015. The goal of the FMP is to promote conservation, reduce the possibility of recruitment failure, and allow for the full utilization of the resource by the industry. The FMP lays out specific management measures in the commercial fishery. These include a 4.75" minimum size and a prohibition on the retention of egg-bearing females. To prevent the fishery from being open access, the FMP states that participation in the directed trap fishery is limited to lobster permit holders or those who can prove a history of crab-only pot fishing. All others must obtain an incidental permit. In the recreational fishery, the FMP sets a possession limit of 50 whole crabs per person per day and prohibits the retention of egg-bearing females. Due to the lack of data on the Jonah crab fishery, the FMP implements a fishery-dependent data collection program. The FMP also requires harvester and dealer reporting along with port and/or sea sampling.

Addendum I (2016)

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

Addendum II (2017)

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

Addendum III (2018)

Addendum III improves the collection of harvester and biological data in the Jonah crab fishery.

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

Addendum IV (2022)

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

5.0 Fishery Monitoring

The provisions of Addendum III went into effect January 1, 2019. Specifically, Addendum III requires reporting of additional data elements, the implementation of 100% harvester reporting within five years, and the completion of a minimum of ten sea and/or port sampling trips per year for biological sampling of the lobster/Jonah crab fishery. The Addendum III requirement for commercial harvesters to report their fishing location by 10 minute longitudinal/latitudinal square was implemented in 2021. Types of information collected vary by state, but can include shell width, sex, discards, egg bearing status, cull status, shell hardness, shell disease, and whether landings are whole crabs or parts. *De minimis* states are not required to conduct fishery-independent sampling or port/sea sampling. Data on the states' port and sea sampling in 2023 is summarized in Table 2.

6.0 Status of Fishery-Independent Surveys

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

Maine

A. Settlement Survey

The Maine settlement survey was primarily designed to quantify lobster young-of-year (YOY), but has also collected Jonah crab data from the sites throughout the survey. Jonah crab information collected includes carapace width, sex (when large enough), ovigerous condition, claw status, shell hardness, and location. The density of YOY Jonah crab increased over the past two decades with high values in 2012 and 2016, then declined slightly in recent years (Figure 2). In 2023, density of YOY Jonah crab decreased from 2022 in Statistical Areas 513 and 512, and increased in 511, but all areas remain at lower levels.

B. Ventless Trap Survey

Maine began its Juvenile Lobster Ventless Trap Survey in 2006. Since the beginning of the survey, Jonah crab counts were recorded by the contracted fishermen, but the confidence in early years of this data is low because of the confusion between the two *Cancer* crabs (Jonah crab vs. rock crab) and similar common names. In 2016, the survey began collecting biological data for Jonah crab including carapace width, sex, ovigerous condition, claw status, shell hardness, and location. Since 2016, the survey has sampled 276 sites coast wide using a stratified random design using depth and Statistical Area. In 2023, Jonah crab catch in the survey decreased in Statistical Areas 513 and 511 and increased in area 512, compared to 2022. Concentrations of Jonah crab were highest in Statistical Area 512 and lowest in 513 (Figure 3).

C. State Trawl Survey

The ME/NH Inshore Trawl Survey began in 2000 and is conducted biannually (spring and fall) through a random stratified sampling scheme. Jonah crab data has been collected since 2003. The 2023 spring survey ran from May to June and completed 97 out of 120 scheduled tows. A total of 227 Jonah crab were caught and sampled, with 117 females, 105 males, and 5 unsexed caught and measured. The 2023 fall survey ran from September through October and completed 78 out of 120 scheduled tows; A total of 139 Jonah crab were caught and sampled, with 61 females, 74 males, and 4 non-sexed Jonah crab measured and sampled. Abundance indices for Jonah crab have increased the past two years after declining from a peak in 2016 (Figure 4 and Figure 5).

New Hampshire

A. Settlement Survey

Since 2009, species information has been collected on Jonah crab in the New Hampshire Fish and Game portion of the American Lobster Settlement Index. The time series of CPUE (#/m^2) of Jonah crab for all NH sites combined, from 2009 through 2023 shows a general upward trend with a time series high in 2022 (Figure 6).

B. Ventless Trap Survey

Since 2009, New Hampshire Fish and Game has been conducting the coastwide Random Stratified Ventless Trap Survey in state waters (Statistical Area 513). A total of six sites were surveyed twice a month from June through September in 2023. Beginning in 2016, all Jonah crabs were evaluated for sex, carapace width (mm), cull condition, and molt stage. A total of 8 Jonah crab over 8 trips were measured during the 2023 sampling season.

Massachusetts

A. Settlement Survey

The Juvenile Lobster Suction Survey has consistently identified *Cancer* crabs to genus level since 1995, and Jonah crab have been consistently identified to species in the survey since 2011. The mean number of Jonah crab observed in the MA DMF Settlement Survey in the GOM region has been higher from 2016 through 2023 than it was from 2011 to 2015 (Figure 7).

B. Ventless Trap Survey

The Massachusetts Division of Marine Fisheries (MA DMF) Ventless Trap Survey is conducted in MA territorial waters of NMFS statistical areas 514 and 538. Stratified mean catch per trawl haul (CPUE) for the survey is standardized to a six-pot trawl with three vented and three ventless traps. The index produced from the MA DMF Ventless Trap Survey from area 514 has been increasing since 2012 and reached a time series high in 2023 (Figure 8). Jonah crab are infrequently captured in the area 538 portion of the survey, likely because water temperatures in this region frequently exceed the Jonah crab thermal preference.

C. Trawl Survey

While Jonah crab are common in the deeper, cooler, Federal waters portion of SNE, they are rare in Massachusetts state waters south of Cape Cod, and therefore are infrequently captured by the MA DMF Trawl Survey in this area. Since generally increasing in abundance since the mid-1990's, the last couple of years of the spring and fall surveys in the GOM have generally been near or below time series medians (Figure 9).

Rhode Island

A. Settlement Survey

The RI DEM lobster YOY Settlement Survey (Suction Sampling) intercepts Jonah crabs. Jonah crab catches in this survey are generally low. In 2023, the Jonah Crab Index was zero crabs per m^2, compared with the time series (1990-2023) mean of 0.17 crabs per m^2.

B. Ventless Trap Survey

Since its inception in 2006, the RI Ventless Trap Survey (VTS) has recorded counts of Jonah crab per pot. Carapace width, sex, ovigerous condition, and location data have been collected for all Jonah crabs encountered in the survey since 2015; prior to this, only counts of Jonah crab were recorded. In 2023, the stratified abundance index of Jonah crabs was 2.39 crabs per ventless trap, higher than the time series mean of 1.45 crabs per ventless trap (Figure 10).

B. Trawl Survey

RI DEM has conducted spring and fall trawl surveys since 1979, and a monthly trawl survey since 1990. However, the survey did not begin counting Jonah crab specifically until 2015. Jonah crabs are rarely encountered in this survey, and abundance indices are variable yet low, averaging 0.04 crabs per tow over the time series.

Connecticut

A. Trawl Survey

Jonah crab abundance is monitored through the Long Island Sound Trawl Survey (LISTS) during the spring (April, May, June) and fall (September and October) cruises, all within NMFS statistical area 611. The survey documents the number of individuals caught and total weight per haul by survey site in Long Island Sound. The LISTS caught one Jonah crab in the fall 2007 survey and two in the fall 2008 survey. Both observations occurred in October at the same trawl site in eastern Long Island Sound. No trawl survey sampling was conducted in 2020 due to

restrictions on field sampling caused by the global COVID-19 pandemic. No Jonah crabs were observed in the spring or fall surveys in 2021-2023.

New York

A. Trawl Survey

New York initiated a stratified random trawl survey in the near shore ocean waters off the south shore of Long Island in 2018 from the Rockaways to Montauk Point and the New York waters of Block Island Sound. Three sampling cruises were conducted in 2023 during the spring (May, June), and fall (October, November). Twenty-eight stations were sampled during the cruise in May, and twenty-nine stations were sampled during the June cruise. During the fall, twenty-five stations were sampled in October and four stations were sampled in November. A total of thirty-four Jonah crabs were caught. A total of six females were measured ranging from 20mm to 69mm with an average of 46mm. Twenty-seven males were measured ranging from 21mm to 136mm, with an average carapace of 49mm. One unknown Jonah crab was caught that measured 99mm.

New Jersey

A. Trawl Survey

A fishery-independent Ocean Trawl Survey is conducted from Sandy Hook, NJ to Cape May, NJ each year. The survey stratifies sampling in three depth gradients, inshore (18'-30'), mid-shore (30'-60'), and offshore (60'-90'). The mean CPUE, which is calculated as the sum of the mean weight of Jonah crab collected in each sampling area weighted by the stratum area, has remained low throughout the time series, but increased slightly in 2019. A cruise was not conducted in April 2019. Due to the COVID-19 pandemic, 2020 and 2021 CPUE and indices were not obtained. The 2022 and 2023 observations were higher than the previous three decades. (Figure 11).

7.0 Recent and On-Going Research Projects

A. Declawing Study

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

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

B. Growth and Fishery Dependent Data

In 2019, two collaborative studies between the University of Rhode Island and Rhode Island DEM were published. The first of these was a growth study, which described molt increments for adult females and males and molting seasonality and molt probabilities for adult males in Rhode Island Sound. The second was an interview study in which fifteen in-person interviews were conducted with Jonah crab fishermen to collect their knowledge concerning Jonah crab biology and fishery characteristics. The interviews provided insight into aspects of the species biology and life history that have not been characterized in the literature (e.g., seasonal distribution patterns); identified topics requiring further study (e.g., stock structure and spawning seasonality); and highlighted predominant concerns related to fishery management (e.g., inshore-offshore fleet dynamics).

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

C. CFRF Research Fleet

The Commercial Fisheries Research Foundation (CFRF) has expanded its lobster commercial research fleet to sample Jonah crab. Biological data collected include carapace width, sex, shell hardness, egg status, and disposition. To date 135,964 Jonah crabs have been sampled through the program[1].

8.0 State Compliance

All states have implemented the provisions of the Jonah Crab FMP and associated addenda. The implementation deadline for the Jonah Crab FMP was June 1, 2016; the implementation deadline for Addendum I was January 1, 2017; the implementation deadline for Addendum II was January 1, 2018; and the implementation deadline for Addendum III was January 1, 2019 (with the exception of the 10-minute square reporting requirement). Reporting at the 10-minute square level was implemented in 2021.

9.0 De Minimis Requests

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

10.0 Research Recommendations

Research recommendations made by the Stock Assessment Subcommittee and Peer Review Panel in the 2023 Jonah crab benchmark stock assessment are summarized below.

[1] https://www.cfrfoundation.org/jonah-crab-lobster-research-fleet

High Priority

- Surveys to track abundance in SNE during all life stages (e.g., settlement, recruitment, abundance) for future stock assessments and potential management advice.
- Research to provide a more comprehensive understanding of recruitment dynamics, including tracking of spatiotemporal settlement dynamics and the source of recruitment to offshore SNE, to inform development of Jonah crab settlement surveys.
- Appropriate survey methodologies need to be researched to track abundance of Jonah crab. Behavioral interactions with survey gear need to be better understood. Video surveys are recommended to examine these interactions. Video surveys could also be used for snapshot estimates of total stock size (i.e., swept-area biomass) that could be used to gain a better understanding on exploitation levels.
- Female migration pathways/seasonality and distribution needs to be researched to help understand movement and inform connectivity. Ventless trap surveys (state-run and windfarm impact) offer a potential data set to explore interannual variability in distribution.
- Information on larval duration in the field, mortality, and dispersal are needed to better understand possible connectivity. Spawning female distribution information would supplement efforts to model these processes. Evaluate larval data sets for species identification and to explore abundance, seasonality, and interannual variability.
- Inter-molt duration of adult crabs is currently unknown and growth increment data for mature crabs is limited. There are no growth data from offshore SNE where the bulk of the fishery occurs and differences in growth between regions are unknown.
- Research growth mechanisms for both sexes (e.g., potential for terminal molt, lack of growth associated with molting, high natural mortality for adults) to explain lack of exploitation signal (i.e., lack of size structure change) in available data sets.
- Increase and improve consistency of fisheries-dependent monitoring and biosampling. Sampling intensity by statistical area should be based on landings.
- Continue to improve accuracy of commercial reporting to improve quantification of effort in the directed and mixed-crustacean fisheries. Evaluate new spatial to better understand spatial dynamics of the fishery.
- Study the effect of temperature on Jonah crab behavior/activity.
- Studies should be done to identify and understand drivers of ecosystem/environmental drivers of Jonah crab population dynamics.
- Determine how to interpret fisheries-dependent data considering interactions between fishery response to abundance, economic drivers, and lobster fishery dynamics.

Moderate Priority

- Explore historical data sets from the scallop dredge survey and video surveys like HabCam to understand habitat use/suitability, abundance, distribution, and to inform potential covariates for catchability effects.
- Analyze food habits data, with an emphasis on offshore areas, to better understand predation of Jonah crab and as a potential measure of abundance and distribution.

- Evaluate evidence for a defined stock-recruit relationship or lack thereof. If lack of evidence, identify recruitment drivers and mechanisms of population abundance change.

Low Priority

- Information should be collected to help delineate stock boundaries and understand possible connectivity, with an emphasis on the GOM/SNE boundary.
- Reproductive studies pertaining to male-female spawning size ratios, the possibility of successful spawning by physiologically mature but morphometrically immature male crabs, and potential for sperm limitations should be conducted.
- If improved abundance data with higher encounter rates becomes available, cohort tracking analyses should be conducted across and within surveys to better understand if surveys are tracking true abundance signals and provide information on growth, mortality, and other demographic factors.
- The development of aging methods or determination of the mechanism responsible for the suspected annuli formation found in the gastric mill should be explored.

11.0 Plan Review Team Recommendations

The following are recommendations and comments from the Plan Review Team:

- The PRT recommends the Board approve the *de minimis* requests of DE, MD, and VA.
- The PRT notes that MA has been unable to meet the August 1 deadline for compliance reports for the last several years.
- Rhode Island, Connecticut, and New Jersey were not able to complete the sea and/or port sampling required by the FMP. Rhode Island completed four out of ten required trips, and Connecticut and New Jersey did not complete any sampling. These states have noted concerns with staff availability, funding, and lack of agreement by fishermen, which have contributed to the inability to complete the required sampling trips.
- The 2023 Benchmark Stock Assessment recommended that fisheries-dependent monitoring and biosampling be increased and improved, with sampling intensity by statistical area based on landings. The PRT recommends the TC provide recommendations on adequate sampling numbers by statistical area.

12.0 Tables

Table 1. Landings (in pounds) of Jonah crab by the states of Maine through Virginia. 2010-2022 landings were provided by ACCSP based on state data submissions. 2023 landings were submitted by the states as a part of the compliance reports and should be considered preliminary. *C= confidential data*

	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	Total
2010	1,154,564	C	5,689,431	3,899,239	C	995,059	84,645		23,909	C	11,846,847
2011	1,152,651	C	5,381,140	3,221,119	C	69,440	71,632		104,838	C	10,000,820
2012	586,449	C	7,540,545	3,865,978	2,349	468,364	86,736		C	C	12,550,421
2013	391,690	340,751	10,117,595	4,665,489	51,462	407,755	16,425		C	C	15,991,166
2014	361,500	404,703	11,904,649	4,568,400	49,998	95,855	48,008		154,764	C	17,587,878
2015	312,063	C	9,128,876	4,298,894	C	215,140	88,283	C	88,467	C	14,131,722
2016	625,240	150,971	10,661,416	4,232,785	C	177,425	279,249	C	64,552	C	16,201,295
2017	1,169,474	114,155	11,698,447	4,111,281	C	176,424	447,048	C	75,991	C	17,792,819
2018	1,061,799	22,434	13,250,803	4,665,701	C	231,705	880,192	C	60,932	C	20,173,884
2019	763,807	70,818	9,698,145	4,222,305	C	125,391	1,061,194	C	47,829	C	15,989,489
2020	696,309	31,658	8,605,007	3,331,552	C	105,841	975,522	C	35,606	C	13,781,495
2021	1,427,245	123,729	6,539,131	2,157,071	C	72,066	976,248	C	34,327	C	11,329,815
2022	2,090,924	295,529	7,803,736	2,504,895	C	41,816	493,179	C	C	C	13,230,080
2023	3,060,784	357,829	**5,336,973*	2,483,156	C	259,876	863,583	C	C	C	7,025,228

**The Massachusetts landings estimate is based on dealer reports because harvester reports were not available at the time of this report.*

Table 2. Fishery-dependent sampling (port/sea) by state in 2023. Delaware, Maryland, and Virginia are not required to complete fishery-dependent monitoring.

	Sea Sampling Trips	# of Samples	Port Sampling Trips	# of Samples
ME	19	3,489	0	0
NH	14	128	4	399
MA	0	0	10	6,689
RI	0	0	4	863
CT	0	0	0	0
NY	0	0	16	755
NJ	0	0	0	0
DE	None	None	None	None
MD				
VA				
Total	**33**	**3,617**	**34**	**8,706**

13.0 Figures

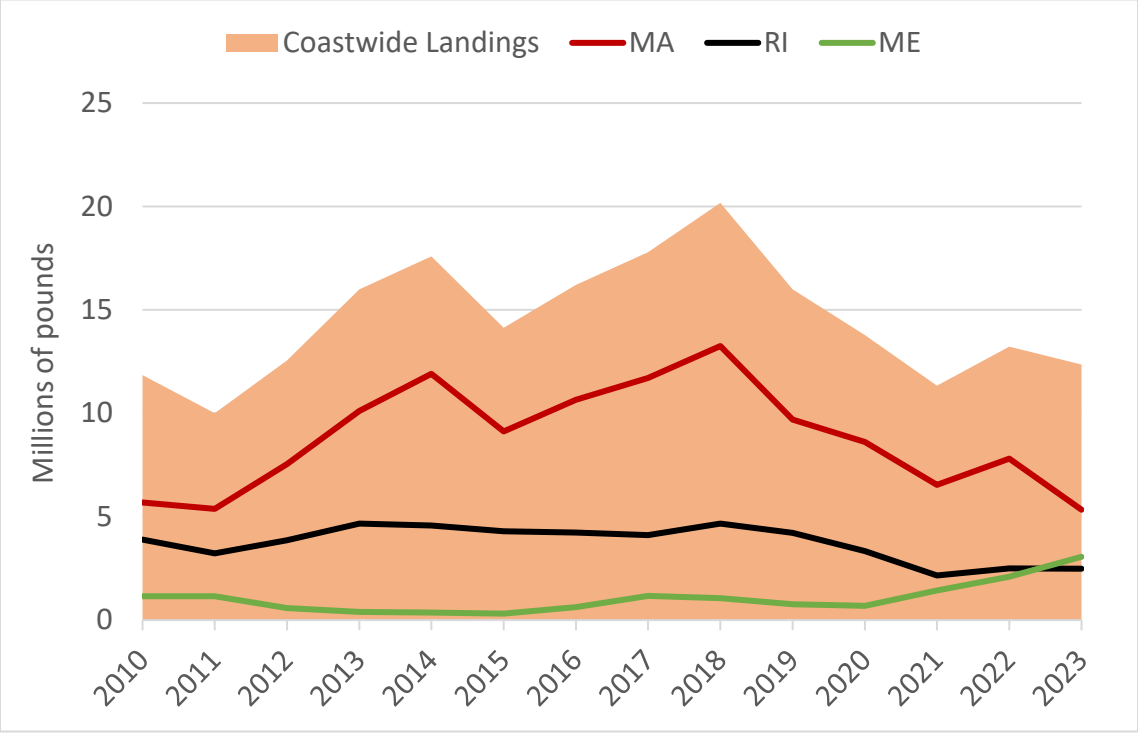

Figure 1. Coastwide commercial Jonah crab landings, 2010-2023. Data from 2010-2022 are from the ACCSP Data Warehouse, and 2023 landings are based on state compliance reports.

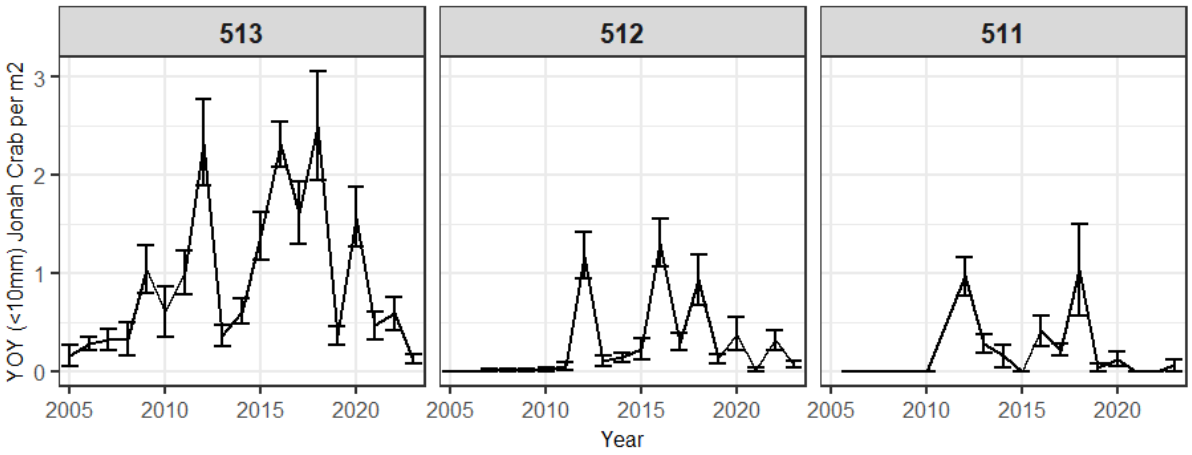

Figure 2. Density of YOY (<10mm carapace width) Jonah crab over time in the Maine Settlement Survey by statistical area.

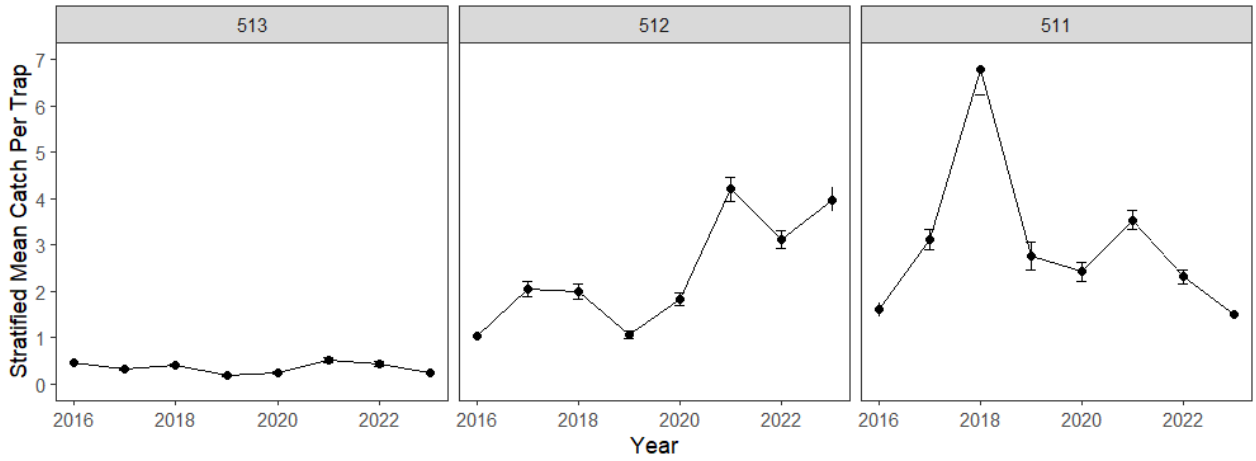

Figure 3. Stratified mean of Jonah crab from Maine Ventless Trap Survey 2016-2023. Standard error shown.

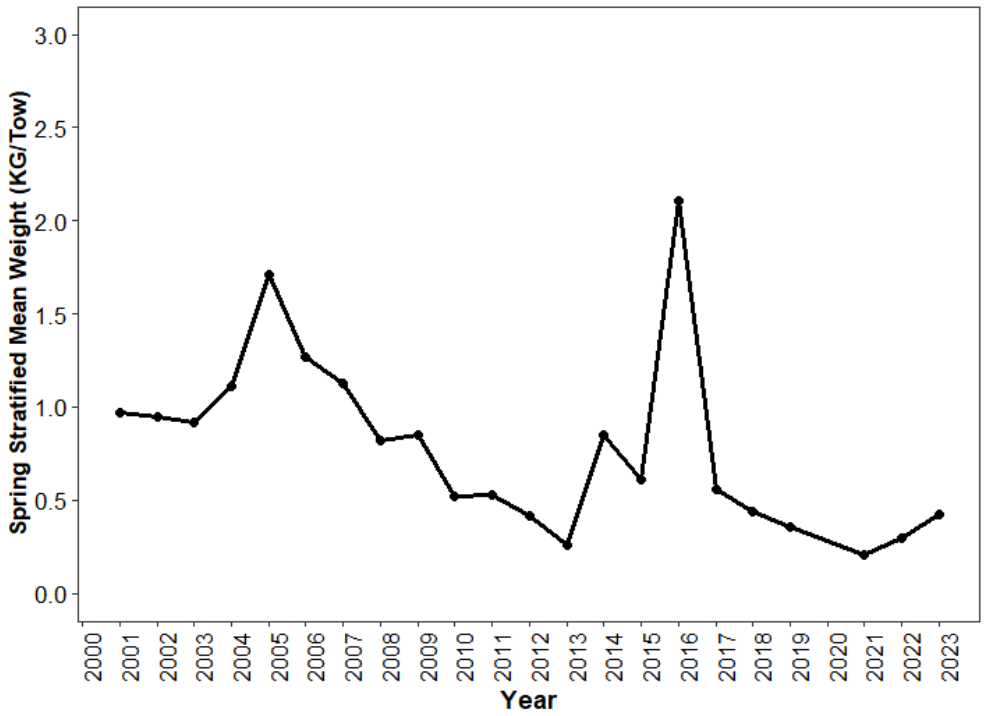

Figure 4. Stratified mean weight (kg/tow) of Jonah crab for Spring Maine-New Hampshire Inshore Trawl Survey 2001-2023.

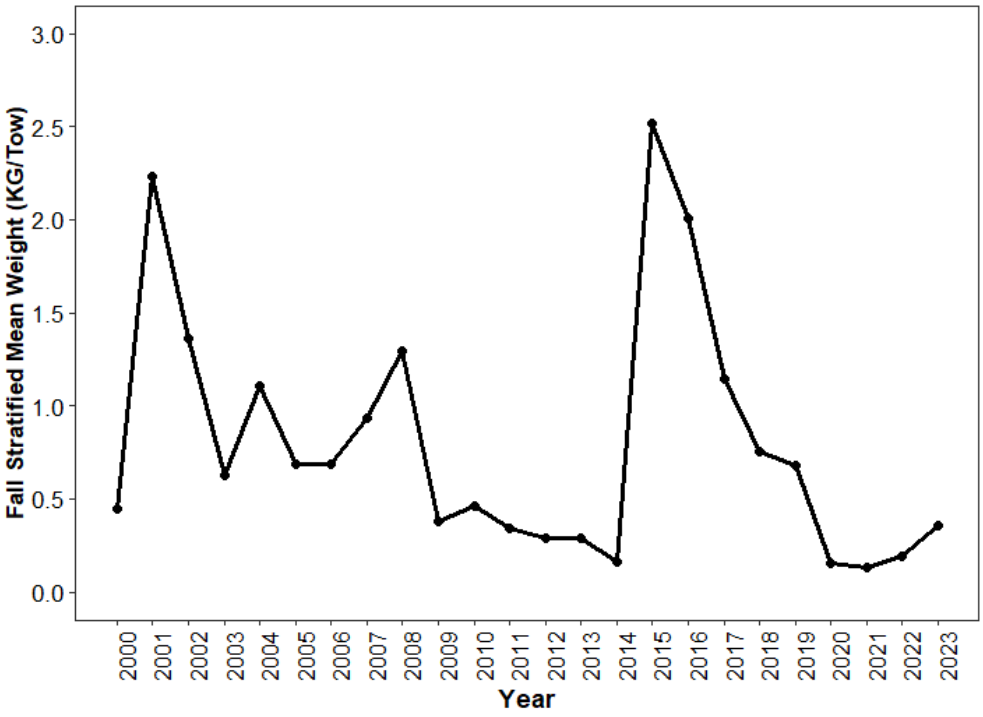

Figure 5. Stratified mean weight (kg/tow) of Jonah crab for Fall Maine-New Hampshire Inshore Trawl Survey 2000-2023.

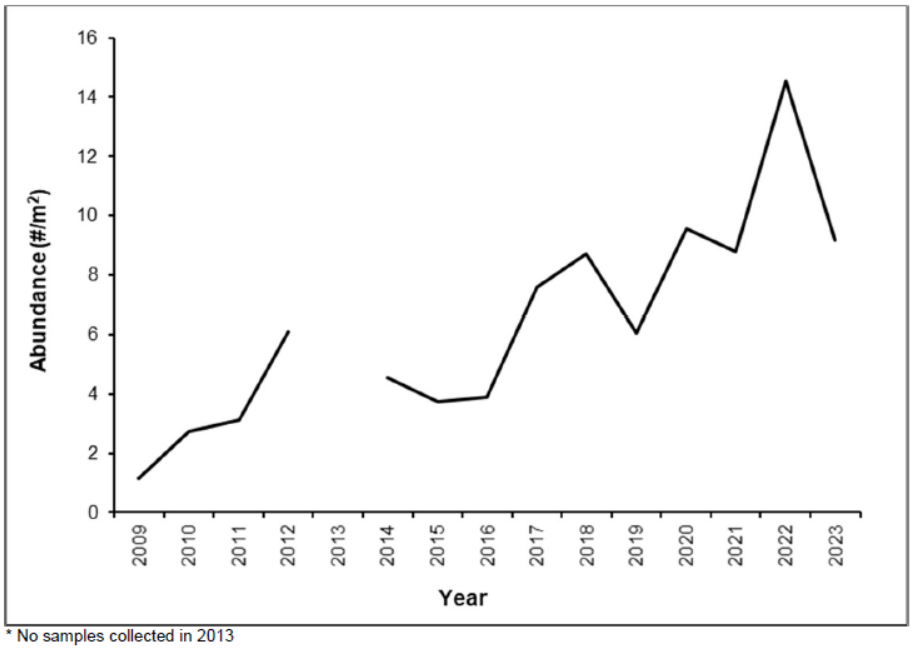

Figure 6. Catch per unit effort (#/m^2) of Jonah crab during the American Lobster Settlement Index Survey, in New Hampshire, from 2009 through 2023.

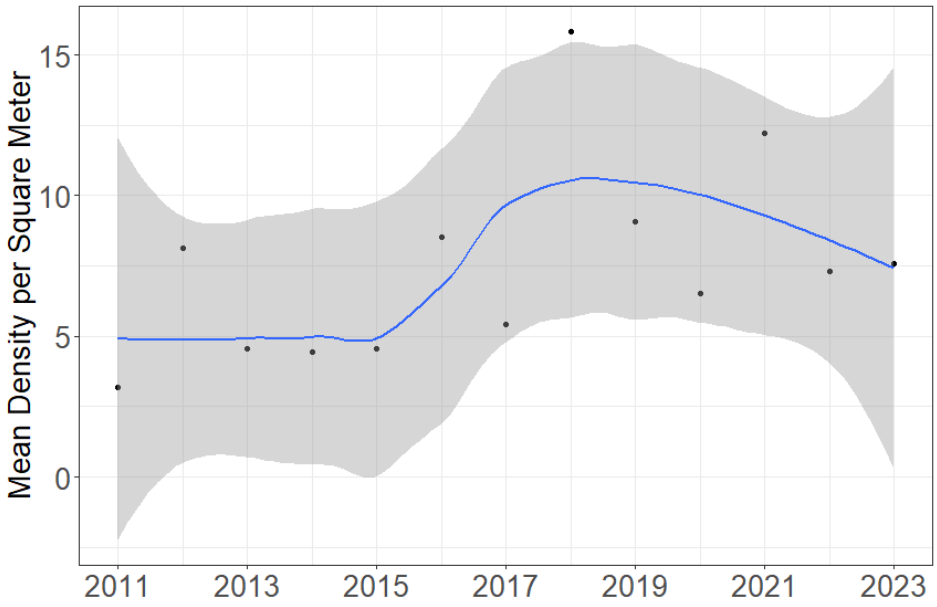

Figure 7. Mean number of Jonah crab per square meter from the MA DMF Settlement Survey from the Gulf of Maine (GOM) region. Black dots are annual means, blue line is a Loess soother, gray area is confidence interval around the Loess smoother.

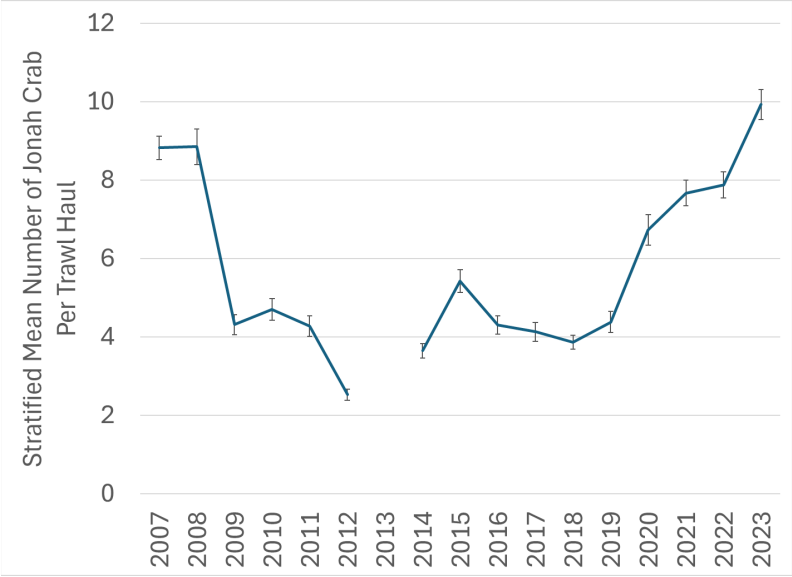

Figure 8. Mean number of Jonah crabs per trawl haul from ventless traps from GOM region of the MA DMF Ventless Trap Survey (standardized to a 6-pot trawl with three vented and three ventless traps). Error bars are two times the standard error. The survey was not conducted in 2013 due to a gap in funding.

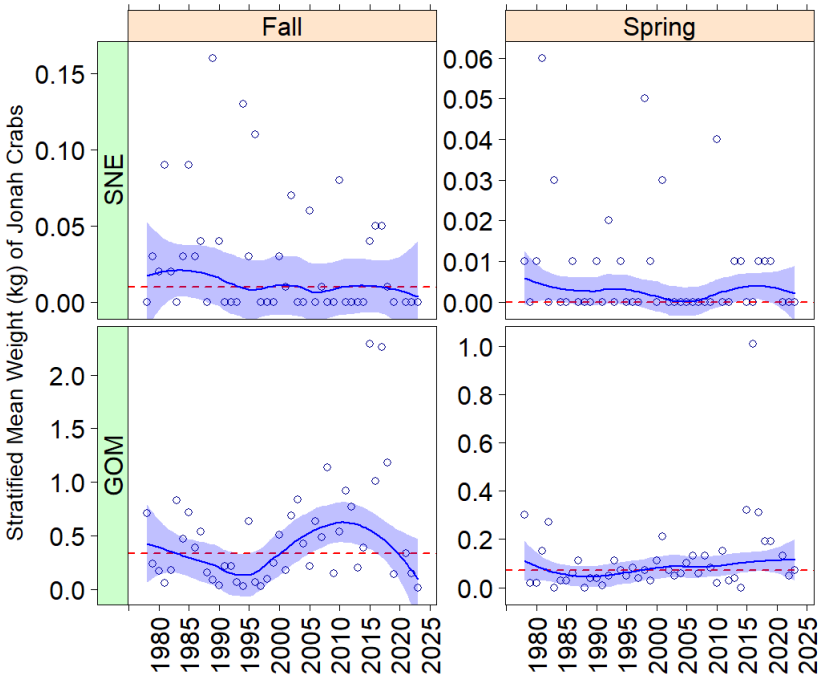

Figure 9. Stratified mean weight (kg) of Jonah crab from the MA DMF Trawl Survey. The left column shows the fall surveys, the right columns show the spring surveys. Southern New England (SNE) is on the top row, Gulf of Maine (GOM) is on the bottom. Red dashed line is the time series median. Blue line is a trend line (Loess smoother), and the blue shaded area is the confidence interval around the trend line. The survey was not conducted in 2020 due to the Covid-19 pandemic.

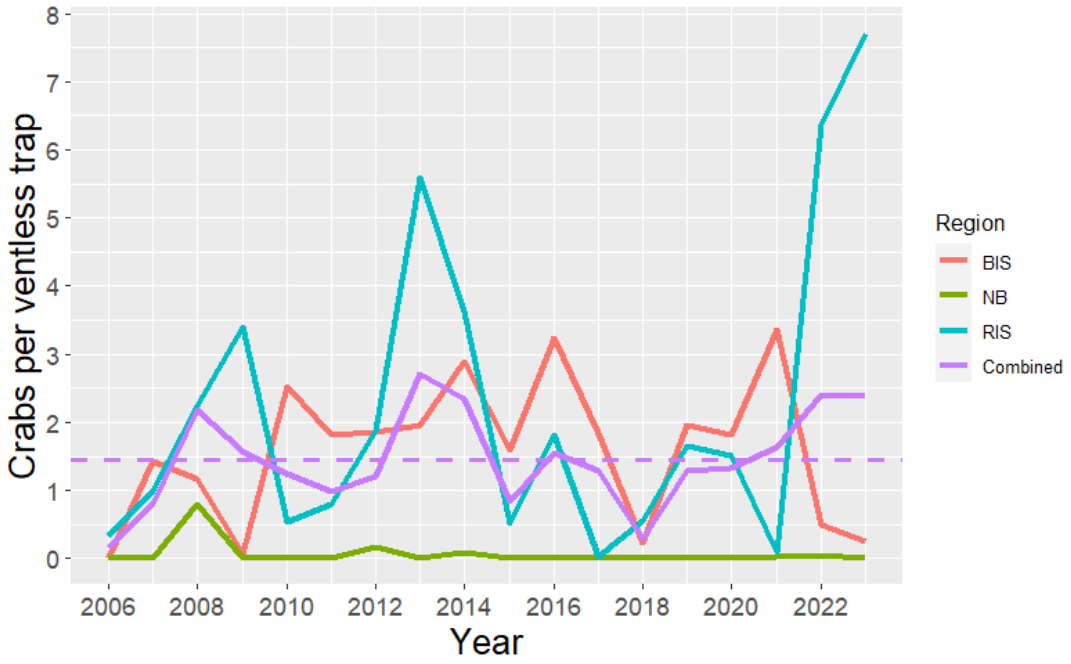

Figure 10. Rhode Island ventless trap survey index of Jonah crab abundance by region: Narragansett Bay (NB), Rhode Island Sound (RIS), and Block Island Sound (BIS). Time series mean for the combined region is presented as a dashed purple line.

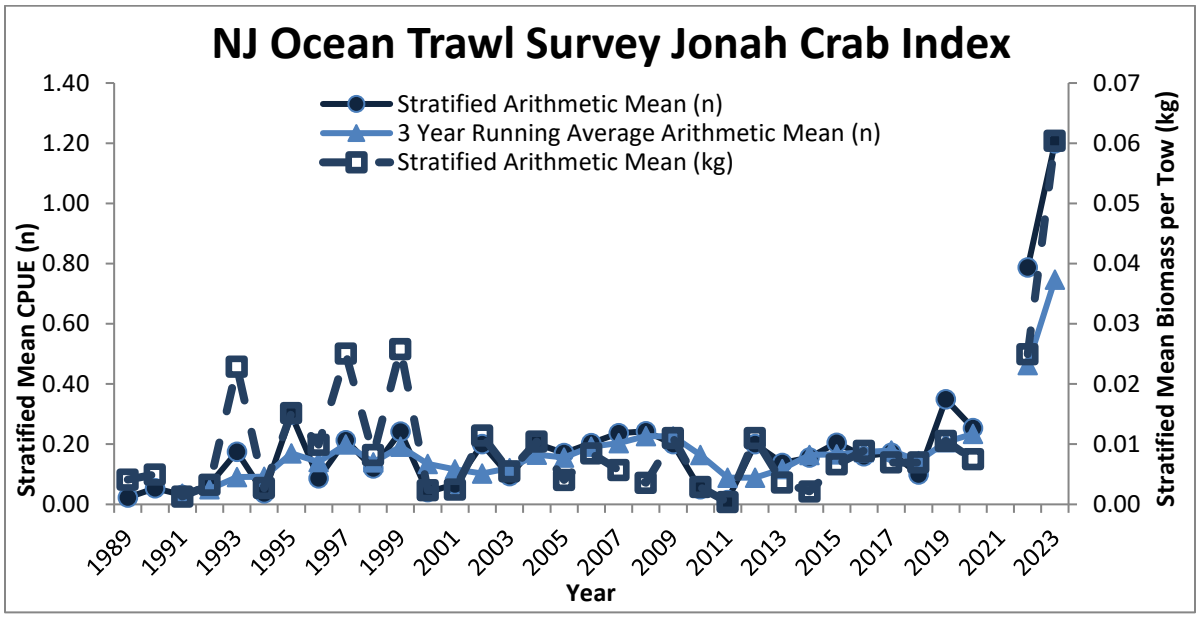

Figure 11. Stratified mean CPUE of all Jonah crab collected aboard the NJDFW Ocean Trawl Survey. The survey stratifies sampling in three depth gradients, inshore (18'-30'), mid-shore (30'-60'), offshore (60'-90'). The mean CPUE was calculated as the sum of the mean weight (in kg) of Jonah crab per size class collected in each sampling area weighted by the stratum area. *NOTE: No April 2019 Survey was conducted due to Research vessel mechanical issues. Due to the COVID-19 pandemic, Apr-Oct 2020 and 2021 CPUE and indices were not obtained.

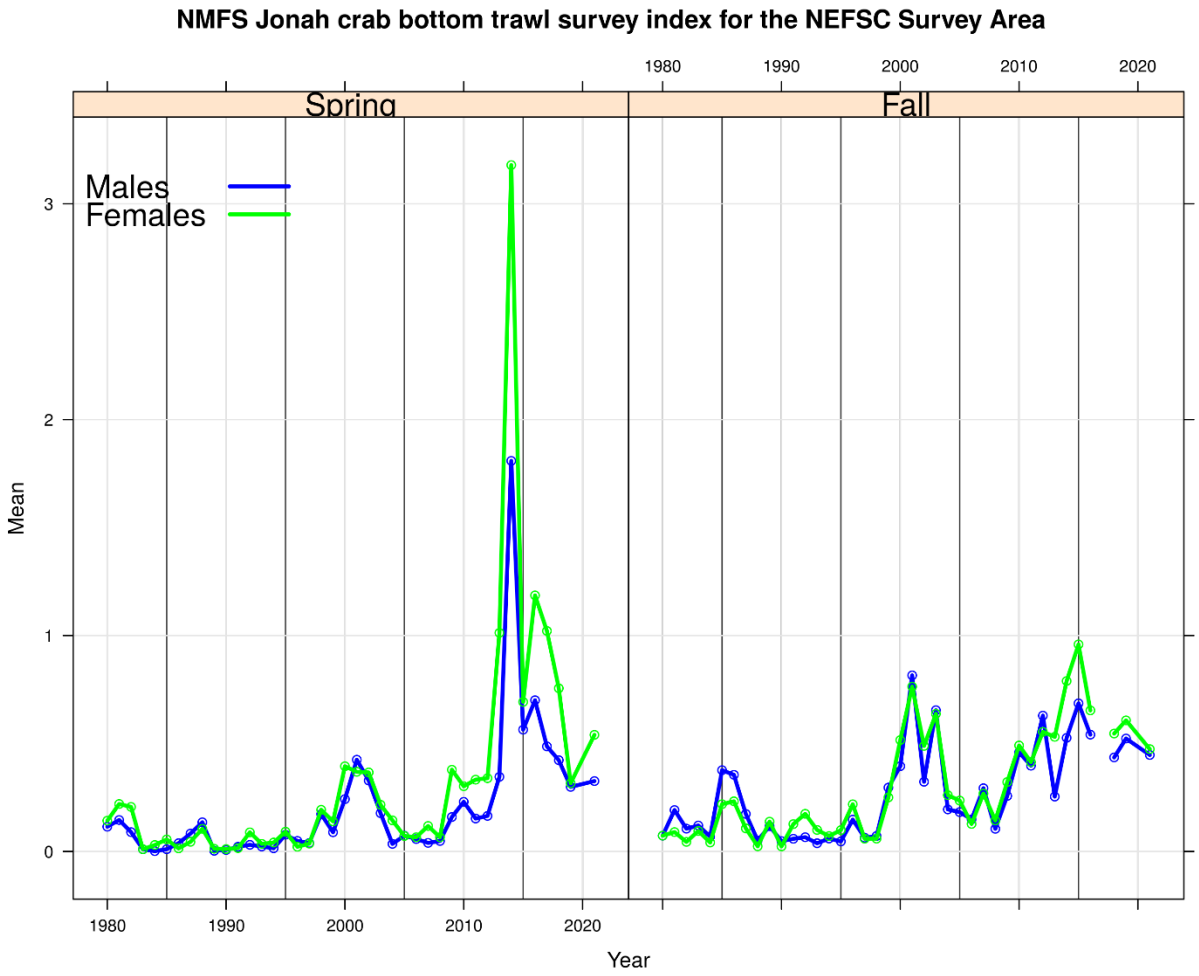

Figure 12. NMFS Jonah Crab index (mean number per tow) from the bottom trawl survey for the NEFSC Survey Area, through fall 2021. There was no survey conducted in 2020 due to the COVID-19 pandemic. 2022 and 2023 data are not yet available.

Atlantic States Marine Fisheries Commission

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Law Enforcement Committee
Meeting Summary

October 1, 2024

Committee Members: Scott Pearce, Chair, FL; Rob Beal, ME; Delayne Brown, NH; Keith Williams, CT; Sean Reilly / Thomas Gadomski, NY; Brian Scott, NJ; Nicholas Couch, DE; Matt Rogers, VA; Michael Paul Thomas, SC; Robert Hogan, NOAA GC; Katie Moore, USCG

ASMFC Staff: Toni Kerns, Caitlin Stark, Madeline Musante and Kurt Blanchard

Other Participants: Carl Lemire NOAA

The Law Enforcement Committee (LEC) conducted a virtual meeting on October 1, 2024, to discuss Electronic Vessel Tracking for Federal Permit Holders as required under Addendum XXIX to Amendment 3 to the American Lobster Fishery Management Plan and Addendum IV to the Jonah Crab Fishery Management Plan. **Specifically, the LEC was asked by the chair of the American Lobster Management Board (Board) to think about a definition of fishing as it relates to vessel tracking in the federal lobster fishery.**

Ms. Caitlin Starks, ASMFC FMP coordinator presented on the development of this addendum and the current state of the fishery management plan, including Board discussion on the 24/7 tracking requirement under Addendum XXIX and industry concerns over privacy. Caitlin Starks offered insight into the "Work Group" report on potential modifications to the vessel tracking program that would address privacy concerns while maintaining necessary data collection, as well as the LEC recommendations on development of vessel tracking in this fishery.

A general discussion ensued with members of the committee, ASMFC staff and a VMS specialist from NOAA. Topics such as the definition of fishing, geofencing, snoozing and privacy concerns were discussed in detail, with many opinions being offered. A breakdown of these topics are as follows:

Geofencing

Geofencing has a practical use in vessel monitoring for closed areas and crossing of lines of demarcation when used in concert with satellite monitoring. Geofencing is not practical in the application of tracking lobster vessels in the northeast, especially in Maine where due to the geography of the coastline there is poor cellular service. Many federally permitted vessels fish nearshore and without an adequate cellular or satellite service signal which would translate to a significant loss of data.

Snoozing or powering down the device.

The current specifications for the accepted devices in this program do not allow for a snooze or power down function. Trackers may only power down under specific circumstances and must have a letter of authorization from the program administrator to do so. The guidelines for this purpose are well defined and consistent between state and federal programs. The proposal of snoozing, or powering down, while in port and not fishing for short periods of time is not practical for the fisher and or the program administrator. Approval for each request would need to be granted, with consideration of the magnitude of requests. This would create an undue burden on both the fisher and the program administrator.

Privacy Concerns

Concerns over fisher privacy have been raised. With the 24/7 tracking of vessels and the multi-purpose use of these vessels outside of fishing, fishers are concerned that the scope of the program is reaching outside of the permitted activity. As the plan is written, and depending on how the state regulation is adopted, it may be considered prima facia evidence of a violation for just operating a federally permitted lobster / Jonah crab fishing vessel without the vessel tracker being powered on. Law enforcement would not typically prosecute a case of this nature without contacting the vessel operator and providing evidence of the vessel being used for the permitted activity.

Definition of Fishing

The Magnuson Stevens Fishery Conservation and Management Act clearly defines the activity of fishing:

- The term "fishing" means— (A) the catching, taking, or harvesting of fish; (B) the attempted catching, taking, or harvesting of fish; (C) any other activity which can reasonably be expected to result in the catching, taking, or harvesting of fish; or (D) any operations at sea in support of, or in preparation for, any activity described in subparagraphs (A) through (C). Such term does not include any scientific research activity which is conducted by a scientific research vessel.

States have adopted similar definitions for each of their respective fishery programs. These definitions may not be identical in wording, but the general context is the same. The committee discussed narrowing this definition to be more specific to lobster fishing and to clarify what elements would need to be met by law enforcement to show a fisher / vessel is engaged in the permitted activity. Topics such as bait being on board the vessel, targeted species being on board the vessel, working condition of the vessel, working condition of the captain and crew, were all discussed. The concept of declaring in and out of a fishery as used in the Federal VHS program was also discussed. With the plan as written, the committee could not come to a consensus of a definition for this purpose.

Additional Considerations

The committee discussed evidentiary elements needed or helpful for making a case for non-compliance relevant to this topic. Having a tracker that has a visual indicator on the device to show if a tracker is powered on or off would aid law enforcement in recognizing compliance. Additionally, having the ability to communicate via the device for a fisher to hail in or out of the fishery may alleviate privacy concerns among fishers.

There was additional discussion on who has the burden of proving a fisher is engage in the fishery if non- 24/7 tracking is pursued. Would the fisher need to show they are not engaged in the permitted activity or is it the responsibility of the regulator? This burden would typically fall on the regulator. The standard for burden of proof in a criminal or civil case would rest on the prosecution and or plaintiff, respectfully.

The following excerpt is from the Guidelines for Resource Managers on the Enforceability of Fishery Management Measures (May 2024).

VESSEL MONITORING SYSTEM (VMS)

Definition: A requirement to keep a positioning transmitter (transponder) onboard a fishing vessel. The transponder transmits position and movement information at specified time intervals to the management agency.

Average Overall Rating: 3.82

Recommendations:

- As VMS use is expanded, it should incorporate data transmission regarding gear onboard and the fish being targeted. It can increase the efficiency and effectiveness of enforcement patrols and inspections but does not replace on-the-water or dockside enforcement requirements.
- VMS should be considered for any large-scale fishery that is conducted in remote waters or offshore where at-sea and airborne enforcement is difficult or inefficient.

Atlantic States Marine Fisheries Commission

Atlantic Coastal Cooperative Statistics Program Coordinating Council

October 21, 2024
1:15 – 2:45 p.m.

Draft Agenda

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

1.	Welcome/Call to Order *(J. McNamee)*	1:15 p.m.
2.	Council Consent • Approval of Agenda • Approval of Proceedings from April 2024	1:20 p.m.
3.	Public Comment	1:30 p.m.
4.	Consider FY2025 Project and Administrative Proposals for Funding *(J. Simpson)* **Action**	1:35 p.m.
5.	Program and Committee Updates	2:10 p.m.
6.	Elect Chair and Vice Chair	2:30 p.m.
7.	Other Business/Adjourn	2:40 p.m.

The meeting will be held at The Westin Annapolis (100 Westgate Circle, Annapolis, Maryland; 88.627.8994) and via webinar; click here for details.

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ATLANTIC COASTAL COOPERATIVE STATISTICS PROGRAM

COORDINATING COUNCIL

The Westin Crystal City
Arlington, Virginia
Hybrid Meeting

April 29, 2024

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INDEX OF MOTIONS

ATTENDANCE

Council Members

Bob Beal, ASMFC
Megan Ware, ME, proxy for P. Keliher
Renee Zobel, NH, proxy for C. Patterson
Dan McKiernan, MA
Raymond Kane, MA
Jason McNamee, RI, Chair
Greg Wojcik, CT, proxy for J. Davis
Marty Gary, NY
Heather Corbett, NJ, proxy for J. Cimino
Loren Lustig, PA
John Clark, DE
Carrie Kennedy, MD
Stephanie Iverson-Carson, VMRC
Brandi Salmon, NC, proxy for K. Rawls
Ben Dyar, SC DNR
Chris McDonough, SC
Jeff Renchen, Fl, proxy for J. McCawley
Ingrid Braun-Ricks, PRFC
Brandon Muffley, MAFMC
John Carmichael, SAFMC
Max Appelman, NOAA
Richard Cody, NOAA

Staff

Toni Kerns
Tina Berger
Tracey Bauer
Alex DiJohnson
Katie Drew
Ed Martino
Daniel Mestawat
Joe Myers
Marisa Powell
Jamal Oudiden
Trevor Scheffel
Madeline Musante
Julie Defilippi Simpson
Anna-Mai Christmas-Svajdlenka
Caitlin Starks
Kristen Anstead
Pat Campfield
Jennifer Ni
Emilie Franke
Gabe Thompson
Geoff White

Guests

Pat Augustine
John Bello, Virginia Saltwater Sportfishing Assn.
Alan Bianchi, NC DMF
Nicole Caudell, MD DNR
Haley Clinton, NC DEQ
Caitlin Craig, NYS DEC
Scott Curatolo-Wagemann, Cornell Cooperative Extension of Suffolk County
Jessica Daher, NJ DEP
Conor Davis, NJ DEP
Anna Dorrance, ME DMR
Roman Dudus
Julie Evans, East Hampton Town Fisheries Advisory Committee
Lynn Fegley, MD DNR
James Fletcher, Unites National Fisherman's Association
Corrin Flora, ME DMR
Tom Fote, Jersey Coast Anglers Association
Alexa Galvan, VMRC
Keilin Gamboa-Salazar, SC DNR
Matthew Gates
Lewis Gillingham, VMRC
Angela Giuliano, MD DNR
Maryellen Gordon, NJ DEP
Melanie Griffin, MA DMF
Jesse Hornstein, NYS DEC
Cecil Jones
Amy Karlnoski, Office of NYS Assemblyman Fred Thiele, Jr.
Nicole Lengyel Costa, RI DEM
John Maniscalco, NYS DEC
David McCarron, NEFMC
Alexandre Meirhaeghe, NYS DEC
David Meservey
Thomas Newman, North Carolina Fisheries Assn.
Ronald Owens, PRFC
Cheri, Patterson
Andrew Petersen, Blue Fin Data
Story Reed, MA DMF
Sefatia Romeo Theken, MA DMF
James Rosato
Mike Ruccio, NOAA
David Sikorski
Somers Smott, VMRC
Kristen Thiebault, MA DMF
Anna Webb, MA DMF
Chris Wright, NOAA

The Atlantic Coastal Cooperative Statistics Program Coordinating Council of the Atlantic States Marine Fisheries Commission convened in the Jefferson Ballroom of the Westin Crystal City Hotel, Arlington, Virginia, via hybrid meeting, in-person and webinar; Monday, April 29, 2024 and was called to order at 1:30 p.m. by Chair Jason McNamee.

CALL TO ORDER

CHAIR JASON McNAMEE: Welcome, everybody to the April 29, 2024 meeting of the ACCSP Coordinating Council. My name is Jason McNamee; I'll be chairing the meeting this afternoon. Why don't we get to it, get this meeting going here. We'll call the meeting to order.

APPROVAL OF AGENDA

CHAIR McNAMEE: The first thing we will look at is the agenda. I believe we have at least one addition to the agenda, which we will put in Other Business. Geoff, do you want to describe that for the group?

MR. GEOFF WHITE: I wanted to briefly touch on the potential expansion of MRIP data collection in unsampled months, and states. We've added that as just a brief item under Other Business.

CHAIR McNAMEE: Excellent, thank you, Geoff. Are there any other additions, deletions, corrections to the agenda that anybody would like to see? Seeing none around the table. If anyone has a modification online, please raise your hand. Anything online? Okay, no one on line. With that, why don't we go ahead and approve the agenda as modified. Are there any objections to approving the agenda as modified? Anyone around the table, please raise your hand. Seeing none around the table, anyone online please raise your hand. No one on line, agenda is approved. Great, thanks everybody.

APPROVAL OF PROCEEDINGS

CHAIR McNAMEE: Next up is the approval of the Proceedings from our last meeting. Are there any edits, additions, deletions to the proceedings from the last meeting of the ACCSP Coordinating Council? Not seeing anybody around the table, anyone online with any corrections? None on line either. Are there any objections to approving the proceedings as submitted? Anyone around the table, please raise your hand if you have an objection. No hands at the table, anyone online? No hands online. All right, we will consider the proceedings approved by consensus as well.

PUBLIC COMMENT

CHAIR McNAMEE: Let's take a quick moment here to see if there is any Public Comment for things that are not on the agenda. I believe there is exactly one person in the room here, who I know, and I know is not going to have anything to say. Anyone online wishing to make a public comment? Oh, okay. James Fletcher, please go ahead whenever you're ready.

MR. JAMES FLETCHER: James Fletcher; United National Fishermen's Association. We have been trying to manage fish for years, and it comes up that nano-plastics and microplastics are floating at the surface, both in freshwater and saltwater, and that the eggs and the larvae of most of the species we manage are consuming those plastics and starving to death or about to.

The best eggs float closest to the surface, thereby getting the most plastics. Nano plastics microplastics, it is imperative that ASMFC and the Mid-Atlantic Fisheries Council and the Northeast Science Center throw a full-on press to discover the effects of nano and microplastics on the survival of larval fish, and see if we can't come up with a better management scheme.

I know it is out of the box, but for years the United National Fishermen's Association has brought forth the pharmaceuticals, pesticides and manmade chemicals. If you look at it, the plastics are a manmade chemical. ASMFC Council, National Marine Fisheries have been on notice for 15 or 20 years. Is there any chance that ASMFC would delegate a group to investigate this? Thank you very much for your time, James Fletcher, United National Fishermen's Association.

CHAIR McNAMEE: Thank you very much, Mr. Fletcher. Any other hands for public comment? I'm seeing no. I think we are set with public comment, so thanks for that. We can get into the heart of our agenda here.

CONSIDER FUNDING DECISION DOCUMENT AND FY2025 REQUEST FOR PROPOSALS

CHAIR McNAMEE: Let's start off with our Consideration of the Funding Decisions Document, and so for that Julie, I'm going to go to you.

MS. JULIE DEFILLIPI SIMPSON: The first thing we wanted to do today was just start with the FY24 funding status. This is the list of proposals that this group approved in October. The reason that we wanted to put this up there is that the economic impact of Rhode Island fishing industry, and the improving catch and effort data collection from recreational tilefish anglers, those were the two projects that the group had decided would split that money.

We just wanted to let you know that both of those projects got $65,134. Everyone else got the money that was approved in October. We just wanted to update you on the status of that. Also, to the best of our knowledge, most of the partners have not yet gotten their money. There are federal things that still need to be worked out for that distribution.

Okay, so the next item is the Reviewing and Approving of the FY25 RFP. The summary of changes on the general changes would be basically update of the dates. In the Funding Decision document, the RFP, and in the timeline for proposal review there were no changes to the biological priority matrix, the bycatch priority matrix, the Recreational Technical Committee priorities, the Socioeconomic priority, data elements for the Ranking Criteria Document.

I do want to note that Kathy Knowlton did point out that American lobster was listed twice in the bycatch prioritization matrix, and that is because there are two fleets. We did edit that to say Mid-Atlantic lobster, American lobster pots and also New England American lobster pots, but that is not actually a change, it was just a typo from last time. Then the only actual contextual change was in the Funding Decision Document in Appendix A. The Potomac River Fisheries Commission Electronic Reporting Project is now entering Year 5. They have a maximum value of $142,344. Those are all of the changes that I have, Mr. Chair.

CHAIR McNAMEE: Great, thank you, Julie. A couple of minor edits and changes to the dates is basically all that has changed in the Funding Decision Document. We're looking for a motion to approve that so we can move that forward. Is there anybody willing to make that motion? John Carmichael. Sorry, just to get that up on the board there. If you wouldn't mind reading that, John, I can't twist my head that far.

MR. JOHN CARMICHAEL: **Move to approve the 2025 ACCSP RFP and funding documents as presented to the Coordinating Council.**

CHAIR McNAMEE: Thank you, John, I see a couple of seconds. I saw Marty first, thank you, Marty. We've got a motion, it's been seconded. Any discussion on the motion from anybody on the Coordinating Council? Any hands online? No hands online. Why don't we see if we can do this easy. **Are there any objections to the motion that is up on the board, if so, please raise your hand. Anyone at the table? Anyone online with objections, please raise your hand. No hands online, so we will consider the motion approved by unanimous consent**. Thank you all very much. I think that is the big action item on our agenda.

UPDATE ON PROGRAM AND COMMITTEE ACTIVITIES

CHAIR McNAMEE: We're going to go now to go to our Updates on Program and Committee Activities. Just a quick note from me. We've got a couple of folks up here, so we have already heard from Julie, we have Geoff up here as well, and Ed over here on my left. They are going to switch it a little bit as they are going through the presentations, so you

can hear from a few more folks at ACCSP, switch it up a little bit. With that, Geoff, I believe you're up first, so I'm going to hand it off to you.

MR. WHITE: Actually, we have Julie up first.

MS. SIMPSON: We're going to start with the spring data load. ACCSP has completed the staging and review of the 2023 data, and some of the other updates to historical data. We have passed that over to the folks at NOAA Headquarters, and they are doing their review. They are going to be getting back to us this week, and so we are scheduling our public release of data on May 7. Look for that announcement. We will put that out on our website, and make sure that you all get an e-mail notifying you of that.

Some of the highlights for this year is that we do have a new contact in Florida for American eel data. American eel is one of those species that often has data contacts that are not within the standard fisheries offices. In the case of Florida, American eel data all comes from their freshwater division. We always have to reach out to the freshwater folks to get those data.

In addition, with the conversion factor changes in SAFIS was going to be reflected in historical eDR data in the Data Warehouse for this spring load. Then also, Maine did submit updates to 2022 data, as well as their 2023 data, so those will be reflected in this release as well. The next item we wanted to talk about was the Accountability Workshop that we held earlier this year, it was in February in Charleston. We had a great time in Charleston, as we always do. We brought state and federal partners, and so we wanted to thank everybody for making sure that somebody was there in person from your Agency. It was really helpful to have everyone there to discuss things and be in the breakout groups. We appreciate everybody being able to come. The facilitators we had were Jorge Fraga.

We consulted with him and had a contract with him, and then also Jennifer Cudney, who is in HMS, and in Miami she is part of a quality management group, and she came as well, and assisted. The scope of that workshop, the group determined was the most appropriate and optimal data and accountability toolkit, so that the ACCSP partners have standard and efficient methods of providing data that is complete, accurate, accessible, trusted and timely to the Data Warehouse, for use for science and management purposes.

Just as a reminder, this workshop is part of the charge that came from this group a number of years ago. There was an accountability report, where we did a number of surveys, and that small group recommended this workshop. This workshop is a follow up to the report that we did previously.

The workshop objectives were to identify when and how to appropriately use different accountability tools, identify the best tools to verify the data that were collected, with minimal effort and requirements. Also understand the return on investment for the tool, and to standardize the data accountability processes across partners.

The workshop came up with a data accountability tool prioritization. This will be part of a report from this workshop that should be completed and distributed in June of this year. Tier 1, we have data entry validation, both electronic and paper. We also have data audits, and then we have outreach, both proactive and reactive.

Tier 1, these were the tools that were determined to be the most easily accessible and the most return on investment for most of the partners. Tier 2 was in the second level, a little bit less accessibility and a little less ease of use, and they are not used by quite as many partners. Inspect the fisher trip to dealer report comparison, obviously that is only for two-ticket systems. Then interagency comparisons and in the for-hire sector dockside monitoring.

These are used by a number of folks, but they are not used quite as standard across the board, they are usually used in certain fisheries and not all fisheries. Tier 3, these are ones that are used much more rarely, and that is positional data such as VMS, onboard observing data, and then also

electronic monitoring data. Then Tier 4 was more of a validation.

This was also part of compliance, you know usually things that are less used to validate the data, and more used to make sure that people are actually reporting. They are a little bit more of a compliance tool. This included the pre-trip notifications, negative reports, dockside monitoring and again, that was not in the for-hire sector, because dockside monitoring for that sector was in Tier 2, and then also law enforcement. The other workshop that we held was last year in May of 2023. That was the SAFIS eTRIPS at-entry Validation Project. Again, we had excellent partner participation at that, so we thank all of you for making sure that folks came to that. We did develop a requirement document out of that workshop, and what we've done so far is we have hired a contractor at the end of last year, and that person is working on developing an interface in the SAFIS management system, so that partners could go in and create their own validations.

That will be for a few of the core fields, but also for all of the attributes that each partner can turn on or off in eTRIPS. We are going to be finishing that project also in June of 2024. We will probably be reaching out to your staff next week to get feedback on that SMS interface. The next item that we have is SciFish, which was launched in April 1 of 2024. We have been working on this project for about three years.

It originally started as a collaboration between the South Atlantic Fishery Management Council and North Carolina, who built similar projects, and realized that there was an opportunity for moving from a stovepipe approach to a more ACCSP one-place approach. They put in a proposal for making that happen, and this group funded that proposal for a number of years.

The approach for developing projects under the SciFish is to focus on data collection for marine or diadromous fisheries along the Atlantic coast. We especially wan to focus on projects that build data gaps or data efficiencies. We're asking folks to address what identified research needs they are going to be needing with their projects. It can't just be, hey, we think it would be really great to collect this data, okay, which stock assessment is asking for those data?

That is the kind of thing that we're looking for there. We also want folks to use intentional design and clearly articulate how the collected data is going to be used in either management or assessments. We are very much encouraging scientists and fishermen collaboration, because this is a citizen science project.

The Organizing Committee that has been working on this for a couple of years, includes the folks that are listed on this slide, again from the South Atlantic Council, North Carolina, ACCSP, Georgia DNR, Rhode Island DMF, NOAA, and also Harbor Light Software. A big thank you to all of these folks. They have been meeting every Tuesday morning at 8:30 for the last three years, so a lot of meetings.

I'm actually going to really miss not seeing these folks on 8:30 on a Tuesday morning this week, because this is our first week without that meeting. Brandi is smiling, so she is also going to miss this meeting. Lots and lots of work that was put into this. There were actually two babies born in the group during this time period. Lots of things happening.

The group that is called the SciFish Advisory Panel is part of the policies that this group approved in October. That is the group that is going to be taking over the administration of SciFish. There were a number of applications that the ACCSP leadership approved. That includes Julia Byrd from the South Atlantic Council, myself, Angela Giuliani from Maryland DNR, Fran Karp, who is an Advisor from Rhode Island.

Kathy Knowlton from Georgia DNR. Dee Lupton, who is the Advisor from North Carolina. George Maynard works at the Northeast Fisheries Science Center, Laura Oremland is at NOAA S&T, and works in their Citizen Science Group. Brandi Salmon from North Carolina and David Sikorski, who is an Advisor

from Maryland. The SciFish annual application timeline, as I said, we did launch this in April, and that was when we accepted our first round of pre-application. We did get two applications at that time.

We've also had a number of inquiries from folks who are interested in putting in a pre-application, but didn't do so in April. The next deadline for that is going to be on June 1st, and then we will start taking full applications in August. This timeline will repeat every year, so it will just keep cycling.

The next thing I wanted to move into was some of the cross-team projects that we've been working on. The first one is the VMS project for the VTA application. This is a vessel tracking application, and so this is related to the trackers that are on the lobster vessels in the northeast and somewhat in the Mid-Atlantic.

We have built an application, and worked very closely with the state partners who are using that application variable to view tracks and view the trips that have been matched to those vessel pings. We are also working now on putting together a proposal, so that we can enhance that software, now that it has been in use in Massachusetts for about a year.

Massachusetts, Rhode Island, Maine and other states are working together to put together that proposal. But so far it has been very successful, and it gets daily use through that application. The next item is the new eTRIPS map-based feature. This is an item that requires a lot of programming, but is pretty seamless for the user.

The users are asked for their latitude and longitude, they are also asked for the statistical area that they harvest in, and then in many cases they are asked for either a sub area or even a local area in certain states. In order to populate all that, they have to choose each one of those. What we're building now is a map feature, so they open the map, they click on the place that they fished, and it will populate the latitude, the longitude and the area fished for them.

We want to keep enhancing that, but the idea is to streamline their data entry by allowing them to answer multiple questions, just by clicking on the map, because they know where they are on the map, and that one click can help them to answer all of those. From a data quality perspective, they are still able to repopulate the field, but the field is still editable.

If they've clicked in an area and then they realize, oh that is not really what I wanted, obviously. That's not where I am. They can still edit that area if they need to at the same time. The next project is the Internal Commission Finance and Administrative Tools. This is a project that the software team has been working on crossing over with the F and A Department for our requirements and other needs that that group has for meeting managements and contracts and all kinds of things.

There has been a lot of great collaboration on that and a lot of good progress made on that application. Then the final item is the new recreational and other reports in the Data Warehouse. This is something that the Recreational Team, the Software Team, and the Data Team have all been working on. Where we used an agile approach for this project, and there are more details on what those new recreational reports entail in the Recreational updates, so I will let Geoff cover that later on. That brings us to the end of my section, so any questions?

CHAIR McNAMEE: Thank you, Julie. Opportunity to ask some questions on the items that Julie covered. I see a couple of hands, so I am going to start with Dan McKiernan first. Go ahead, Dan.

MR. DANIEL McKIERNAN: Julie, there was an early slide where you depicted the four levels of, I guess I would use the term auditing, and there was Level 2 talked about Agency collaboration. Could you shed some light on that?

MS. SIMPSON: Sure. When we talk about interagency comparison, what we're referring to is if there is a state that might be having, I'm looking at the state dealer report, but I might be looking at

a federal VTR, or I might collaborate with my neighboring state, so perhaps Massachusetts and New Hampshire had a lot of examples of a fishermen who maybe landed in one state, or was supposed to land in the other state.

The states really kind of have to work together on the reporting, because people tend to not always follow the rules the way they are supposed to. That was one of those things where again, it fell into Tier 2, because you do it sometimes, but you don't do it for literally every report.

CHAIR McNAMEE: Go ahead, Dan.

MR. McKIERNAN: Did anyone bring up the question, because when I saw interagency comparisons, I was thinking about like law enforcement. If a marine patrol officer were to witness a boat fishing, you know that could be cross-checked to the SAFIS system that there should be a report. Did that ever come up?

MS. SIMPSON: It did come up. That's in Tier 4, but with law enforcement, because again it is something that some people use, but it isn't used quite as often. It's more often used from a compliance standpoint more than from a, did this person report the right number of poundage's. We put it in Tier 4 for compliance.

CHAIR McNAMEE: Yes, go ahead, Dan.

MR. McKIERNAN: I have a third question. Under the cross-team projects you described an initiative for map-based data elements for area fished. Does this also require the request that we made for MRIP to be able to identify fishing locations? No.

MS. SIMPSON: No.

MR. McKIERNAN: Okay, thank you.

CHAIR McNAMEE: Great, Richard Cody, go ahead.
DR. RICHARD CODY: Julie, on the second round of SciFish proposals that are due on June 1st, is there a cutoff period for feedback to the applicants?

MS. SIMPSON: Our goal is to try to get back to folks within a month, so we'll try to get back to folks by July 1st, and then you can fill in and we would give you feedback on whether we felt a new pre-proposal was necessary, or more likely give you the go ahead for a full application.

CHAIR McNAMEE: Okay that's the hands in the room. Go ahead, John.

MR. CARMICHAEL: Yes, I appreciate that, Julie. I appreciate the SciFish thing, you know involved in this conversation when it started, and it's really nice to see it get to this point. Three years of weekly meetings, wow! Hats off to that crew, we know they are dedicated, but they really were for this, and it is great to see so many of them sticking around for the advisor role. Look forward to lots of great projects coming out of this.

CHAIR McNAMEE: Okay, any hands online? Okay, no hands online. One last call for folks in the room. Okay, thank you very much, Julie, and we will move on now to Ed Martino's part of the presentation, so Ed, whenever you're ready.

DR. ED MARTINO: I think I know a lot of folks in this room, but I don't think I've ever presented to you. I apologize, I tried to keep it high level. If it's too far in the technical weeds just tell me to stop, and we can talk about the details later. I think I did an okay job keeping the topic on point for this group.

I lead the Software Team at ACCSP, and I'm just kind of walking through some of the projects we've completed in the last 15 or 16 months or so, so since the March, 2023 Information System meeting. That is where I usually present updates like this. That first update there is kind of, it's a common theme. I'm going to talk a lot about APIs.

But just to keep it really simple, just for those that don't know, it's just mobile connection, any way that data comes in through a mobile device or a server process over the web, it's basically hitting an application program or interface or an API. That's all I mean, just mobile connection. SAFIS has seen a real uptick in that kind of submission with dealer

reports, trip reports, and now like the VMS location data that Julie just mentioned.

It's kind of important, it's behind the scenes a lot of this work, but it's important to kind of keep that thing tuned up and really working well. It's also important to make sure it addresses partner needs, so has to meet partner needs, work well, not have bugs or anything. We're constantly maintaining that, and those two examples there are basically one just feature where we've made it more flexible to update trip reports through this mobile-based submission process.

We call it the TRIPS upload API end point. But you can now update any field, with the exception of commercial fishing license and vessel, because that would essentially change the trip questions. But partners can update any field through the API now. That further down in the weeds item there, "rapid fire" duplicate submissions is just occasionally the mobile devices have these hiccups, and just blast us with the same trip, sometimes within milliseconds apart, so we kind of put some rate limiting code in place, to make sure that we don't see those as unique trips, we see them as duplicates. The next big item there is the partner footer, which is a bit more public facing. That is kind of like an additional screen and mobile or an additional page in eTRIPS online to ask questions that are triggered by what we call downstream responses, so you would select a certain species down at the catch level, or a certain gear at the effort level.

You can still ask a trip level question if those downstream responses trigger it, so it's kind of like you could ask start_port still. That whole feature was developed for HMS initially, but we knew it would have kind of like a broader application. We expected more partners to start using it, and that is kind of what is happening right now.

We expect it to be used for some of the new lobster fishery questions, based on the lobster fishery regulations that went into place earlier this month. The next release of eTRIPS will start using that for more than we're currently using it. That next item is the lookup list. It's kind of somewhat simple, but it is a critical part of mobile services that we put out.

It's basically a list of allowed or accepted values by ACCSP, or determined by partners for value like species, gears, fishing areas. It's all the allowed values that need to go out to the mobile devices, and we push it out through that lookup list endpoint. Then that same endpoint has had some more specific use cases, where we realized they were kind of a problem with the way certain features were working, like mobile devices.

If a captain is at sea and submits a trip while they are at sea, if the connection is disrupted, SAFIS might get the trip, we process it, but if the disconnection happens before we can send back the confirmation response, the mobile device is kind of left in limbo. We developed this trip process list to kind of resolve that issue, where the mobile device at any time can say, did you get that trip and data process? That helped resolve that one particular issue.

The next items here are kind of, you know that top right one on the list is kind of a general goal to get eTRIPS online and eTRIPS mobile more consistent, with respect to the interface and the user experience. There are some reasons these Aps or these platforms are different, but we've been constantly trying to kind of homogenize the appearance for users.

I am not really going to go into details, but one simple example is just we had these things called state port and state vessel, which were really just parent lists that force the users to select the state before they could pick a vessel or a port. We didn't collect that information, and so there was really no need to ask the user and take up screen real estate.

We didn't do it on mobile, we were doing it online, so we kind of cleaned up that interface and online. These things, they seem kind of trivial, but they are important to the users to kind of have a more homogenous experience. These map tools Julie just mentioned, I don't think I really have anything to

add there, other than the last eTRIPS release we pushed that feature out, so you click a map.

We always auto-populated the Lat and Long, that was the whole point of the map for several years in eTRIPS, but now we kind of auto-determine the statistical area, and we're kind of already thinking about ways to expand that use to things like sub-areas and 10-minute squares, based on that same click. The VMS Project, Julie really highlighted a lot of that work. The Software Team was mostly focused on the API/Mobile side of receiving that data and validating it. That is the trip locations endpoint there.

Then we worked with the Date Team or the Cross-Team Project to work on the VTA, the vessel tracking application. It's an Admin Portal to let partner Admin go in, review the data, plot the trips, and review the compliance of the vessel. The next item again, is a little bit down in the weeds, but it's sort of a modification to overall SAFIS error processing.

The real goal there was to kind of put what we're calling soft-fail errors or warning. It's like the trip will still be accepted, but we might say you're on an old AP version, or you submitted this trip reporting under one federal agency, but it should have been a dual permitted trip. We kind of have a couple one-off cases like that, but with that project that Julie mentioned about the attribute validations with THP Consulting, Taryn Pinnell being the Contractor.

We're going to bring in a whole suite of partner-managed new validation, and warnings of kind of one of the options partners will have. It could set a new validation of the hard-fail, or just a warning. Getting that into the core part of SAFIS internals was an important lift for us. This slide really just, this is something we present at the Information System Committee each year now. It's kind of a high-level view of the priorities for the Software Team.

At the very top, I guess the main item here was that we completed the species QC re-design. I should say the top three projects there are the species QC re-design, the registration tracking and the eDR re-design. They are kind of longer-term bigger software projects. But I think based on those first few slides you can see that there are a lot of other projects going on, a lot of work that comes up. Some of it is planned, we expected it to happen, other things we didn't expect to happen, but it's a high priority.

We're constantly trying to stay focused on the core projects here, but we're always trying to work and balance with other tasks and keep priorities balanced as new things come up. That is kind of what that big arrow is on the bottom there. The species QC re-design was all about giving partners control of species, we call them GUMPs grade/unit /market/ price, a species type field, giving partners control of the application and the trip-type level, kind of set what values we would accept and how we validate those.

That project was wrapped up, we wrapped that up in June, and we started focusing on these other two big projects, the registration tracking and the eDR re-design project. The registration tracking project is kind of a project that is really about adding this concept of relationships to SAFIS, so giving partners the ability to connect, we call entities or participants together.

Actually, that could be individuals or businesses, and it gives partners a way to kind of define those relationships that exist between that kind of data. It also improves how we connect multiple participants to a single permit or license. It gives the ability to connect participants to vessels, and improves how we connect permits to vessels. That is that one project that we're pretty thick in right now working on that. The eDR re-design, the goal is kind of to centralize the processing of dealer reporting from online API/mobile and file upload. We kind of went through this process with eTRIPS about four years ago. We're trying to do the same thing with the eDR dealer reporting side of SAFIS. Then similar to the eTRIPS re-design, we're adding switchboard-controlled partner attributes.

The SAFIS switchboard is where partners can turn on different questions, turn on what gets validated, and what are the allowed values, whether the question shows up or not. That is all part of the eDR re-design, and then that bottom really small bullet, I added there with the API enhancement work. That fits into that topic of, we didn't see this coming necessarily, but it was a high priority, and that is a task that we added in October, basically of this year.

I'll provide a bit more of an update on that in a slide or two. The eDR API re-design, the goal was basically to modernize a legacy system that had multiple components that involved a bluefin data developed PC trip ticket system. It would generate files, and then the files would get passed around to different servers, and eventually make it into SAFIS.

It's very legacy, it was hard to support, and then it became impossible to support. Well, we knew it was going to be impossible to support early this year, when the Northeast Center, well they had plans to turn off a host that was a critical part of that process flow. We kind of had an urgent deadline to sort of plug this reporting gap for about 100 dealers, and it had to be done by February, last March.

We kind of pushed for a little more time, but the important thing is we modernized that data flow, got it done by March. The data is now flowing in to a more modern API based approach, and the changes to the API included things like taking this really limited use eDR API or dealer reporting end point, and expanding it so it really handles a lot more partner data. It initially focused on GARFO and HMS data.

To add more robust error processing, the previous version of the eDR API was really, it was pretty forgiving, and it just wasn't going to work for something this big and this important of a data flow. To add a report-update feature to it, so you can actually now not just submit new dealer reports with the API, but update those reports. That was a new feature.

It all went well, I mean it wrapped up April 15, and the data is flowing through that new process now. It wasn't really the way we kind of saw ourselves starting eDR re-design, but I still think it was good timing, because we needed to kind of get our heads a little more focused on dealer reporting in SAFIS.

For these last two slides I had, I call it the API System Scaling, and what we're referring to there is this increased use of these mobile data flows. Data flows coming in for trip reports, dealer reports, locations outside the web, online type interface or file uploads, this is specifically talking about mostly mobile clients, but also some server processes, submitting trip, dealer and location data to us.

The plot that shows monthly count, monthly submissions to these endpoints. The gray there is the trip report calls coming to us to send trip data. The important point is, it is slowly increasing. It's kind of noisy, but it really is increasing, largely due to at least in the last year due to an increase in submissions from trips originating at GARFOs through Fish Online, and from Bluefin Data's VSLR program. That data eventually does get to us, even though it starts at those other Aps. There has been an increase, the dealer reporting monthly path there at the very bottom, that blue line. That is starting to pick up pretty quick now as part of the eDR API work, so it is clearly worked by trip reports, but it's changing pretty rapidly right now.

I guess the main point I had here was that overall, the sum total of these submissions to either one of these trip or dealer report input points, it's always under 60 or 70,000 calls per month, so calls to the API per month, and that is really in contrast to what happened to us early this year, when the vessel VMS program really started ramping up and started all these tracking devices started sending us location data.

That orange line is plotted on the same plot that the dealer report and trip report lines are on, they are literally just washed by this massive flux of location data that is coming into the new trip location endpoint. It's really shocking how much more data is coming in. You know these are small payloads,

but they are hitting us really frequently. It's just a time stamp and Lat and Long, but we have to process each of these individually from the VMS tracking devices.

Basically, we were seeing up to 400, we are seeing up to 400 calls per minute, 400 attempts to send this data to us per minute, up to 300,000 calls per day, 3 million calls per month. It's not always hitting us at 400 calls per minute, but across the month it's 50-fold higher than what we saw in the combined dealer and trip reporting through the APIs.

It's all good news, but there was a growing pain. It put a strain on the SAFIS connections database, and we had to really get things tuned up. There were failed connections, it just really ran us over briefly, but we kind of got it resolved. We got it tuned up pretty quick. Within a couple weeks of a little stressful, but within a couple weeks we got basically the database of SAFIS and the AWS, the cloud part of that dataflow to us.

We got things tuned up and the processing times went down, the failures are basically nonexistent, and so that was basically good news that we were able to work through that in a couple of weeks. It's still something that we've got in mind, because that was kind of short-term fixes. But there are other long-term solutions we have in mind, like splitting this VMS processing away from other type SAFIS processing, away from the dealer and trip reporting.

We can isolate that better. These are things we're talking about; we haven't done it yet. Then I put a bullet there at the bottom, just because we did really well on Inflation Reduction Act Proposal that Geoff or Julie might mention, but that is all I've got Geoff or Julie, unless you weren't planning to talk about that I could.

CHAIR McNAMEE: Great, thank you very much, Ed, good stuff. Any questions for Ed before we move on? Renee, go ahead.

MS. RENEE ZOBEL: Thanks, Ed, for the presentation. This is software related. Back in the eons ago when original eTRIPS was designed, there was intention then, and I know why it has dropped along the way and completely understand, of having dealer reports for individuals who acted as their own dealers, essentially, and had a dealer permit within the system, to have entered those three eTRIPS, so they didn't have to go in and then enter some of that duplicate information in eDR. Has that been discussed at all? I know that from a programming standpoint, I understand that. It's just a curiosity question.

DR. MARTINO: Yes, I am not familiar with it, Renee, but I didn't mention it enough in that second slide. Geoff has a point, and I'll let you jump in. I think what I'm saying is okay. It's just that I didn't mention that we're soliciting input for the overall eDR re-design. Next month we'll try to reach out to partners and say, what do you guys need as part of the broader re-design? I think Geoff might have something specific to that question.

MS. SIMPSON: Again, just to follow up on that. We are moving the E-1 ticket application into eTRIPS. We're working with Georgia on operationalizing that right now. That is something that we can use for other states as well, so common to shellfish dealers, or shellfish, they are their own dealer. We're going to be able to leverage that in eTRIPS as well, so they can essentially generate both the fishermen trip and the dealer report at the same time in one application. That will probably be coming in the next year or so.

CHAIR McNAMEE: Follow up, Renee?

MS. ZOBEL: Yes, so Julie, would we have to roll out a separate application then for, we do have a decent subset of individuals who do that, it's all small scaled, but it just turns into a big burden on a small scale, essentially.

MS. SIMPSON: No, we're doing it, it's all one platform, they would just have different permissions. We would need to know who those individuals are, and you would be able to set that up, and then they would have different questions,

because they will have to answer the dealer report portion as well.

MS. ZOBEL: Thank you very much.

CHAIR McNAMEE: We've got a hand online, David McCarron. David, go ahead whenever you're ready.

MR. DAVID McCARRON: Thanks, this is Dave McCarron at the New England Council. Did I catch that right, two and a half million hits on the API for a month?

DR. MARTINO: Yes, actually higher than that. But just to the trip location end points. That doesn't even include the dealer and trip reporting itself, just the locations coming in. They are hitting us that many times in peak months.

MR. McCARRON: We can connect offline, but I'm curious if you've looked at the quality of those connections, and if those are maybe bot generated. We've had to install, Amazon AWS, depending on what service you're using, we had to install cloud front to keep bots from hitting our website, which is basically a geographic limiting tool for APR requests. Reach out to me offline if you want, and I'll give you our experience.

DR. MARTINO: I did say two and a half or three million per month, right, not per day.

MR. McCARRON: Oh yes, even per month that is extraordinarily high.

DR. MARTINO: Yes, we can definitely talk offline, but I think the math works out when you scale a vessel sending us that data every month, or every minute, I'm sorry.

MR. McCARRON: Oh, okay. I would be curious, if you want to compare numbers at some point.

DR. MARTINO: Definitely, thanks for the comment.

CHAIR McNAMEE: Julie.

MS. SIMPSON: I just wanted to note that for those that aren't familiar with the program. The lobster vessels that have these trackers have a one-minute ping rate. When you're looking at, I think 6,000 vessels eventually, when they are out on the water they do have to send a ping every minute, so Ed is right, it is a lot of things. In any other situation it would be a rea flag, but in this case, it is mathematically correct.

CHAIR McNAMEE: Great, maybe still worth a chat though offline, just in case you see something abnormal start to happen you'll be prepared.

DR. MARTINO: Definitely. Good comment.

CHAIR McNAMEE: Any other hands online? No, Geoff, did you have something or are you ready to go?

MR. WHITE: Relevant to this.

CHAIR McNAMEE: Okay, go ahead, Geoff.

MR. WHITE: Great, thank you, Mister Chairman, thank you, Ed and Julie. This is for the Coordinating Council. A lot of the things that they've been presenting on are action plan items that take a fair amount of time to implement, including the three-year software development plan. I think what is highlighted in this is there are many hidden dependencies at a very detailed software level of what is the user interface, what are the data quality checks that are occurring, and how do we plan to implement those over time.

You are seeing a little bit more about what has gone into that and the levels of success that we were able to do at this point. Madeline, can you go back one slide, please? I did want to highlight, Ed pointed out under the IRA proposal here. This is an area for, we recognized earlier in the year that we needed more scalable redundant cloud interface. ACCSP submitted a proposal to the FIS data modernization request for proposals, using IRA funds. That was a five-million-dollar pool that was highly competitive. I think the proposals that came through asked for maybe four times the available funding. The ACCSP proposal ranked in the top five

in selection for funding, and therefore, we've got about $350,000 of additional direct funding to do this work over the next two years.

I point that out, because that is something that doesn't need to go in the next RFP for the Admin Grant to make the ACCSP systems more modern, scalable, robust, to handle these types of projects in the long run. Thanks, Ed, for the update. Thanks to Julie and Ed for your work on the proposal and the whole FIS crowd reviewed many, many proposals, and were able to evaluate and participate in that. Thank you for that so far. With that I'm going to move forward to the Recreational Section.

Alex DiJohnson would have preferred to do this, but he's out on sick leave today. I wanted to highlight kind of three areas. Number one, there has been work on a discard pilot project, in terms of developing it. Doing better at identifying discards is Priority Number 2 in the Atlantic Implementation Plan for Recreational Data.

Highlighting a couple things about the way APAIS, MRIP survey at the dock occurs right now. We asked anglers those questions about what is discards after your trip, when they may not have been paying attention. In combination with the fact that there are tighter catch regulations. There is higher effort that kind of looks at a higher proportion of overall release catch, and therefore the public appropriately questions, what are these estimates of released fish?

Are these as good as they could be? In addition to that, the released catch length data, how big was the fish that were released? There is kind of a gap in coverage for private modes that goes into the stock assessment. That is the rationale for this discards group to get going. What has happened? Well, we had this idea over a year ago, a Subcommittee was formed and they met monthly since January, 2023, and finally presented an updated design to the Recreational Technical Committee in March.

MRIP was highly involved in this proposal development. The Rec Tech Committee was guiding it. But it really was kind of a, how would this work, and the goals were really to analyze the potential of digit bias and recall bias in the current methodology, and to collect additional lengths of these released fish.

The design very broadly, during an assignment it bases the pilot project on the MRIP primary design. This is a, what is the potential to improve MRIP as a core design, instead of replace or supplement it through an extra design? These are extra assignments that can be done in parallel. The idea is to hand out some catch cards, before an angler leaves on their trip, and ask them to fill that out while they are out there.

The draw and the weight, the methodology still prioritizes interviewing anglers when they come back. But one of the tweaks is allowing for about an hour buffer time before an assignment, to hand out these catch cards, so testing a lot of different little assumptions in that. Then because this slide is about during an assignment, if I as an angler have been given a catch card when I leave for my fishing trip, and I happen to return when there is an APAIS interviewer there, I'll just hand them the card. Great way to hand it back in. I'll show you the card and then if the interviewer doesn't happen to be there it can be mailed in later. But that is the basic structure of how it's going to happen.

The catch cards themselves, the group spent a lot of time designing these. They want to get tallies for all species, the lengths on 14 managed species. The box on the lower right says, these are the priority species where we really need more data, get the lengths on these fish, to guide the anglers on how to do it.

The card can be identified, tie it back to that particular site, interviewer and state and timeline in the post processing. It has a QR code on there, not for submitting the data, but another way to get a little bit longer instruction. What happens after the assignment? Well, if an interviewer is not there, you can put that card right in the mail, postage prepaid.

The catch cards ultimately go back to the state, and the state staff, who are already involved in the state connect of MRIP surveys, will be able to enter that data into a new page on the ACCSP Assignment Tracking Application. This is something that we developed, we have it in house, state staff will be able to use their time to enter the information in there.

Then ACCSP and state staff would QA that particular part of the data. The interviewer would use the same tablet application that they are using, just flag it as a pilot assignment to collect the interview data and submit that to the central ACCSP database. These alignments with current methodology really in green, highlight the potential for these overdrawn assignments.

If the work is funded the work happens in 2025, it is done in its own little side area. But if all the math works out, it goes as well as we hope, then those extra assignments can be part of and recalculated as part of the primary MRIP estimates, and that increases sample size, and that might be a good thing across the board.

Who is interested in this? The group spent a lot of time developing it. When would it happen? They are looking at data collection in Waves 3 through 5, best case that would be 2025. In terms of state interest, the individual states by region are listed on the screen with a number of assignments that would be added for this.

The table shows anywhere between 4 and 14 percent increase in that states number of total assignments being done for a calendar year. It's a significant size of a pilot, and the regions will be kind of combined to get an adequate sample size. But what I really take out of this is the ownership of the group, and the process that they've got to develop this, meant that there are 7 states that are interested in participating in this pilot study. That is huge.

I'm not sure that would have been possible before 2016, when we started doing state conduct, and we've had these learning curves and benefits of having your state staff out in the field doing this. Very excited about the design, the creation of this project. Their plan is of course to submit this to ACCSP as a proposal, to the recently approved RFP. One more slide on this one. Next up is of course making a few changes to the proposal and submit it. I do, because discards are such a big issue, I want to note that the Gulf Commission is also hosting a workshop on release catch methodology sometime this summer. We've been in contact with Greg Bray, as the two ACCSP and GulfFIN talk pretty commonly. We will pass on that information to all of you when it exists.

Greg has told me that the Steering Committee is developing kind of the framework of that particular workshop, but they are planning for pretty open participation through state partners, both in person and remotely. As long as the timeline works out, we would like to have more folks be able to participate in that.

Next slide is what Julie had alluded to a bit earlier on the ACCSP Data Warehouse and website updates. This is cross-team project to update how the ACCSP web public and log-in Data Warehouse presented the MRIP estimates. Aligning with MRIP fields as fishing year, annual versus cumulative summarization, adding confidence intervals, and flagging different color codes for the different levels of PSE or precision.

One great thing about this is the coordination internally with MRIP flagged, just before we were ready to release this at the end of December. We were able to work directly with MRIP and get the redirection that the wave-based estimates were going to be able to stay publicly available, and so we put that back in, and that has been available since January, for anyone looking through the ACCSP recreational query interface.

That was a big desire by a lot of state and federal partners to support stock assessments, and see that level of detail. Thanks to MRIP and thanks to the ACCSP team that were able to make this work. Also, there have been updates that Julie and Marissa have done on the ACCSP website, to add in

some more information about how recreational data and projects are handled within ACCSP, and more information about MRIP.

A lot of that, the MRIP page at least, was modeled after work that was done by the Mid-Atlantic Council, I believe last year, so thanks for that. The third topic in this section is an update on the for-hire logbook methodology technical review. A lot of dates on this slide. I won't read through them all, but basically, it's a bit of a long-term project about how to use logbooks more fully. Right now, logbooks are used through GARFOs vessel trip reporting, as effort in the MRIP catch statistics, and there is a desire to use those more fully for catch estimates.

We want to maintain compatible designs. If there is a move to use logbooks and still keep the FHTS survey design in place. The goal of allowing for that phasing in to work and still keep the survey methodology there and have the outcoming data be compatible, both for two boats in the same marina, and also for states that do use these methodologies a little bit different than our neighbors.

We're really trying to develop the design prior to regulations and implementation, and obtain feedback on these components from the MRIP statistical consultants for eventual certification. That review was put in, we met with the consultants last summer. They got a report to us in October, and now we've been working with MRIP and our Rec Tech Committee a bit more about where that goes. Quick reminder on where does the certification process lie. This is an MRIP slide, thank you, Richard for sharing this long ago. The highlighted box in the middle is kind of where we've at. When it comes to certifying a new design, it's an iterative and kind of long-term process. All I'm really highlighting here is that the top three boxes of the initial stages are where we still are, and we expect a bit more of this technical review adjustments on our end, submit that in to see how that design works.

Last summer, we had a consultant's external review, and there were six terms of reference. I will kind of pause and let you read some of them here, but we'll share the presentation afterwards. I think you've seen these before. But it's really about survey design components, estimation methodologies, measuring for potential bias, under-coverage, nonresponse and response errors.

Next slide has three more terms of reference about sensitivity of the accuracy to the survey assumptions. Other potential sources of non-sampling error, and to potential error in the implementation. Those are areas that the consultants were able to review on. The green checkmarks here are really areas where there was alignment in the submitted design, and what the consultants were able to review and give us feedback on.

The design as written includes probability sampling. It uses APAIS for both estimation and validation. It appropriately waits for sample data in the variances. These are big things in the overall design, and we were glad to see these things come back. There were no new accuracy concerns. But at the moment there was limited ability to measure and evaluate some of the bias in non-sampling error, and again confirmed that many of these components were the same or similar to other certified MRIP designs.

These are things that were intentional, as ACCSP and Rec Tech were developing this. It was nice to hear that confirmation come back from the consultants. What are the areas of work? Well, one point was, did not fish reports. There were several questions by the consultants and Rec Tech came back and said, yes, we still want to include did not fish reports as a required element of this particular program.

The intention there is to have a clear data point as a fisherman saying. I did go out or I didn't go out, instead of the assumption of no report inherently means, maybe they didn't fish or maybe they didn't report. The did not fish reports are a compliance tool that they wanted to include. In terms of declarations or hail-outs, for the Atlantic Coast design the Rec Tech Committee in general said,

don't require that extra burden, but include that as an optional step, where the partner agency wants to implement that in their program.

It could be fed into the evaluation as a compliance tool. Again, the hail-outs don't exactly help the estimation math, but they are helpful in the compliance and the monitoring tools. One point the consultants raised is about Vessel Frames. If Geoff's boat has a permit that does not require logbooks right now, that boat would be in the effort survey frame.

If Geoff's boat has a permit requiring an electronic logbook that happens to meet all these design criteria, then I could be in the logbook frame. There were some questions about how often a vessel could switch between frames, how that works with the survey. We're working to clarify some of those things about a vessel within a year moving between what type of data collection would apply to it. Then finally, was how well to use APAIS as a required estimation component. There was an idea to use existing data from 2019 to 2023, to evaluate the tablet application from APAIS, the GARFO mandatory VTRs, and look at how well did those things align? What were the overall rates of reporting, and how can we test some of the assumptions on nonresponse or other estimation bias use, by using existing data.

That is a project we need to kind of scope out, and decide on how to approach, because that was something suggested by the contractors that we wanted to continue on with. With that, that is a bit of a quick fly through of some of the recreational side items. The next slide is a pause for questions in the recreational.

CHAIR McNAMEE: Thank you very much, Geoff. Any questions for any of the items that Geoff covered? John, go ahead.

MR. JOHN CLARK: Just curious on the discard study you are going to do. Are you planning to offer any incentives to recreational fishermen to fill out those cards? I mean it seems like you're asking them to take on an extra burden while they're out there.

MR. WHITE: Good question, and at the moment they have not scoped in additional incentives to do that. It would be as people are heading out on their trip, they hand them out a card that keeps it within the trip, like random design of APAIS. But that is something that the Rec Tech and the Subcommittee could look at in the coming weeks before they submit a proposal. We can certainly ask them to clarify that a little bit more.

CHAIR McNAMEE: Good, John? Okay, John Carmichael.

MR. CARMICHAEL: Geoff, on the for-hire methodology, so where does this fit in with all the various for-hire reporting and estimation processes? Is this setting some criteria the program should try to strive to, or is this going to propose maybe some programs change to comply with this or what? Can you fill me in a little bit on sort of what the end game is?

MR. WHITE: Thanks, John, I jumped right in without reviewing that part. Good question. The intent is to come up with a certified design that could be adopted by any of the current logbook programs that exist. It could be GARFO, it could be SEFHIER, it could be South Carolina. It could be a state that doesn't do logbooks now, but wants to.

New York has made some moves in this similar direction to do this as well. The intent is to set a common standard. One certification methodology, and then have partners as they choose to, meet that guideline. That way their fishermen that have those logbooks would be able to have that used for the information. It gets more data in faster.

MR. CARMICHAEL: It seems like then perhaps a benefit to say somebody with a data collection program to doing this and following those standards, is you don't have to go through your own separate MRIP certification process. Is that right?

MR. WHITE: Absolutely, yes. The intent here is to design it as a group, certify it once, and have it get adopted for implementation as partner agencies, be them state or federal, are able to implement that

on their own timeline.

CHAIR McNAMEE: Good, John? Great. Brandi, go ahead.

MS. BRANDI SALMON: I've already talked to Geoff a little bit about this before the meeting, but for the Discard Pilot Project, North Carolina is going to try to participate, but we're a little skeptical, because we, as I mentioned in, I think one of our prior meeting, North Carolina had some legislation come down back in October that is requiring all recreational anglers to report five specific species of their harvest to the Division of Marine Fisheries when they are done with their fishing.

Of course, five of the main species are caught in North Carolina, so we are not only going to have people trying to participate in APAIS, but they are also going to have to be required to report their TEDs for certain species, and have this catch card process? There is going to be probably a lot of push back on the recreational side in North Carolina.

We may even have a little bit of an adverse reaction to requiring a lot of these different ways of trying to collect data, and a lot of people may assume that this is duplicative collection of data as well. We're going to have to really make sure that we're working hard on any kind of messaging or outreach on these types of projects, so that we can make sure that people understand, like what is going on.

CHAIR McNAMEE: Response, Geoff.

MR. WHITE: I think the outreach is a big component of any of that. Certainly, understand the challenges that you have in North Carolina with a couple of these concurrent pilots. Thank you.

CHIAR McNAMEE: One more look around the room here. Before I go, there is a public comment on line, so Dan McKiernan, go ahead.

MR. McKIERNAN: Geoff, to dust off a previous question that I asked of Julie. Is there any progress being made on the request that my agency put together last year to have the MRIP interviewers have that tablet fishing location option to add, to improve the fishing location? This is especially important for Massachusetts, because we sit at the intersection of different stocks, you know that keep getting redefined. Is there any forward action on that?

MR. WHITE: There is discussion about it, in terms of how to collect more detailed areas, but again, trying to figure that out across all states with the right code. There have been more challenges than solutions identified to date. But it hasn't fallen off the radar, so it's a work in progress, but unfortunately, it's not going to be quick.

MR. McKIERNAN: Thank you.

CHAIR McNAMEE: Okay, if there are no other hands around the table here, Mr. Fletcher you can go ahead with your question.

MR. FLETCHER: Is there any possibility that either the federal under the Council system or ASMFC under their system, could require cell phone reporting by the individual angler? United National Fishermen have pushed for this for the last 15 years. But why, can you explain why we do not have individual cell phone reporting, when Bluefin Data has an AP or system that will work? What is the reason that we have not gone to individual cell phone reporting on all recreational data? Thank you, Sir.

CHAIR McNAMEE: Go ahead, Geoff.

MR. WHITE: Thank you, Mr. Fletcher. It's a good question that has not gone unrecognized. There is a reporting application by Bluefin Data, there are Applicaitons through SAFIS, there are other Apps that exist to collect individual angler fishing reports. However, the biggest challenge is about expansion of those reports.

How does the whole fishing industry get represented, instead of those that choose to use those apps in that moment? When we talk about compliance with overall reporting, we talk about statistical design and being able to expand those

reports out across effort to every fisherman that is out there.

Those are the challenges that exist. At the moment, the survey design and the statistical selection of who reports, is really driving a lot of the factors about how these data collection occur. One of the nice things that we presented about earlier about SciFish or any of the citizen science application, is that can be supplemental information about what is caught where.

That can be used on an individual basis in who selects to report that type of information. That can be used in addition to the MRIP catch estimates and release estimates that citizen science information typically goes into the stock assessment and management process after, or you know in parallel with the MRIP information. I would pause and invite Richard Cody from NOAA and MRIP to speak for it.

CHAIR McNAMEE: Go ahead, Richard, if you would like.

DR. CODY: Yes, I mean I don't want to make excuses as to why we're not adopting a full comprehensive logbook program for recreational anglers, but there are some major challenges to doing that. One is that if it is a logbook, it's complete reporting that is needed all trips, so that would be a challenge, I think, in terms of just the response burden on anglers, as well as just the logistics of managing data of that volume.

That said though, there was a workshop fairly recently in Miami that looked at citizen science-based approaches, so taking app based reporting and pooling data, whether it's processed data collection, in terms of geo-locations from cell phone use, or just reporting citizen science-based reports. I think there is a recognition among us, involved in the data collection end of things, that we need to get a handle on ancillary or auxiliary sources of data to better inform the data we already have. But also, just because it is coming to a point now where there are so many other sources of data available, that it's very difficult to just ignore them. I do support the idea of getting more comprehensive reporting from anglers. But whether that is for all anglers and all trips, or it is a panel of anglers that can be used to inform say discards, or something else. Those are things that are being looked at.

CHAIR McNAMEE: Great, thank you. We have another online hand, Julie Evans, so Julie, whenever you're ready, please feel to unmute.

MS. JULIE EVANS: Thank you for taking my question. My name is Julie Evans; I am the Secretary of the East Hampton Town Fisheries Advisory Committee. My question is regarding any preliminary data to the response of the recreational groups or individuals that you might have gotten to this point, and how they feel about this new initiative to gain more information. Then I have a follow up, if that is okay.

CHAIR McNAMEE: Geoff, do you want to take that?

MR. WHITE: Could you clarify which part, the discards or the for-hire?

MS. EVANS: For any of them. Any information you might have gotten, is it too much to talk about?

MR. WHITE: It's not too much to talk about, they are all in the planning stages, so there is no feedback from the fishermen at this point.

MS. EVANS: I kind of cut out there.

MR. WHITE: Sorry, there is no feedback from the fishermen at this point. We're still in the planning and design stages of what would be appropriate or possible from the science standpoint.

MS. EVANS: Well you had mentioned that New York is interested in instituting a logbook system that you had gone into, and nobody has commented on that at all, I'm assuming.

MR. WHITE: Working with representatives of New York DEC, they are looking at regulations about for-hire logbook reporting. They have logbook reporting in place at the moment, and it would be

just some changes to go from paper to electronic, and a couple other aspects of their program.

MS. EVANS: Could you go into those other aspects, please?

MR. WHITE: I probably wouldn't cover it as well, and Marty Gary, putting you on the spot, can you help answer that or not at this point?

MR. MARTIN GARY: I would have to phone a friend. Julie, if you can hear me, I would be happy to follow up with staff and give you a call, maybe later today or tomorrow.

MS. EVANS: I would so like to talk to you, Mr. Gary. Thanks for that information, I look forward to learning more about this, and so would the members of the Fisheries Advisory Committee. I'm hoping that it doesn't become too burdensome for people, especially for the for-hire industry, which really should be carved out of the recreational fishery, I believe, and so do many in the for-hire industry here, in East Hampton, especially Montauk, thank you.

CHAIR McNAMEE: Thank you, Julie. Okay, we've got another section to get through here, so Geoff, whenever you're ready, please take it away.

MR. WHITE: Our last section of updates is on Regional Data Coordination. There are four areas that we are going to be going through; MRIP, HMS, GARFO, and Southeast Commercial. For just an update on regional coordination relative to MRIP in 2024. We continue with you as state partners to perform the Access Point Angler Intercept Survey and the For-Hire Telephone Survey.

This year ACCSP staff, Alex and Trevor and Gabe, on our staff were able to complete two regional trainings. They think they had over 100 people in total attend those trainings, and of course the data collection has started on its regular schedule, Wave 1 in North Carolina and Wave 2 for nearly everybody else. Wave 3, the data collection starts up in New Hampshire and Maine.

We're also developing the next cooperative agreement Statement of Work. That includes the Access Point Angler Intercept Survey, the For-Hire Telephone Survey. There are also a few components of the large pelagic survey, that are funded and accomplished through this agreement, as well as catch card census programs in Maryland and North Carolina.

However, those are likely to be changing in 2025. There has been a lot of coordination work going on between those two states, HMS, the MRIP large pelagics group and ACCSP about how those programs will be accomplished in the years 2025 forward. There is a bit more alignment with the standard aspect that HMS has been running, as well as meeting a couple of the state-specific partner needs and how they would be accomplishing that.

Don't have all the answers there at the moment, but it is something that is certainly on the radar, and we are adjusting our statement of work to accommodate. I've already presented on the Discard Proposal and the For-Hire logbook design, but overall, we continue to have monthly or bimonthly MRIP communications meetings, what's going on with ASMFC, ACCSP, all of the regional groups.

There is kind of a northern and a southern contingent that goes through those meetings that we, Tina, Julie, Alex and myself sit in on. Stepping into the next slide of regional coordination with HMS. HMS has been a strong partner of ACCSP for many, many years. They have had continued eDealer support and integration within SAFIS electronic dealer reporting.

That continues and has been improving, including with the projects that Ed was pointing out in software, about how data flow gets in, as well as how additional questions can be asked and standardized and modernized. With HMS there has been a for-hire logbook field that have been added to the eVTR submissions, both in SAFIS eTRIPS and even in the API. If an angler is using an AP other than SAFIS eTRIPS but flowing through the API, so it's a different on-water application but same

database submission, same data flows than those HMS questions are available to be added in through there. Another project approved by the Coordinating Council last October was for South Carolina and HMS to adopt and adjust some of those data fields into another application, and that project is about to get started as well.

The last bullet here is really about private angler reporting systems. There has been moving to electronic for those systems within HMS, and for the MIRP For-Hire Survey. They are kind of considered modernization of those paper or catch-card reporting to electronic options, either within HMS or within a state system that we continue to work on to develop. The last two I'm going to hand over to Julie, because she has done more work on these. Julie, can you handle the GARFO and Southeast?

MS. SIMPSON: Sure, thanks, Geoff. Coordination with GARFO, Ed already mentioned the eDR API enhancement. This took a lot of coordination with GARFO, because they had been manually processing a lot of these data. As Ed said, they were coming in as files and then they would manually process them.

We needed to incorporate a lot of that into our API, as well as a bunch of the other updates that Ed mentioned. The next one is the GARFO Dealer Database Update. As the ACCSP is working on our VTR reporting redesign in the next year, GARFO is also working on dealer database updates on their end as well.

We've been participating in weekly meetings with them, to talk about their database data elements and how to work the updates they are going to be making to their system. A lot of coordination happening at that level with GARFO and the Northeast Fisheries Science Center staff. Then finally, for the mandatory lobster only reporting that went into effect on April 1st.

We had to make changes to our API and application processing. As many of you know, there was an exception for lobster only that was sort of written in everywhere. We had to go in to make sure that those folks were recognized as now having GARFO mandatory reporting, as well as adding additional lobster fields with that.

We worked with the GARFO staff on updating their switchboard, and we also updated the API that would go out to applications, so that those lobster-only vessels would get recognized as federal, and we ask the correct question. On the next slide is the Regional Data Coordination with the Southeast Commercial Group. We meet with them every other week. They are working on the commercial and HMS logbook.

These are logbooks that they do intend to make electronic sat some point. At this point they are only accepting paper. We meet with the Southeast Fisheries Science Center, HMS, and also GARFO staff. We do have GARFO staff coach these meetings, because coordination between the northeast and southeast on the commercial side we felt was really important. Lindsey has been gracious enough to attend these as well, so that we have a lot of coordination on the reporting for folks that hold permits in both regions. We just keep a spread sheet to track any issues that we have. Then the next one is the adaptations to allow submission of state data. As I mentioned, at this point the Southeast is not accepting electronic reporting. They are only accepting the paper reporting. However, our system was seeing those vessels as being required to answer federal questions.

Instead of showing them Southeast questions, we were showing them a base form, because the Southeast didn't have any questions turned on. However, that was overriding the state questions that would have been asked of that fisherman. Then the fishermen would be required to go report on paper for the Southeast.

What we've done is, if a vessel has only a southeast requirement, we're having that default back to the issuing agency of their fishing permit, so that the state questions are being asked. This way the state can continue to collect data until the southeast

commercial program becomes electronic and online.

This also is sort of the first step toward incorporating the state requirements into the one-stop reporting effort, because that is the next phase of that effort. This is that first sort of next step into that project as well. For now, at least the states aren't losing any data, which is the important part. That leads us to more questions.

CHAIR McNAMEE: Great, thank you Geoff and Julie. Any questions on the regional coordination stuff? No hands around the table, any hands online? Okay, I think we can move on then, and Geoff, I assume I'm going to you for this stuff.

MR. WHITE: Great, thank you, Mr. Chair, and thank you everybody for paying attention to all these things so far. A couple of quick announcements. Every quarter ASMFC has Employee of the Quarter, and for the first quarter of 2024 I just want to share again with you guys, I think it's already in the ASMFCs Fishery's Focus Newsletter. But Alex DiJohnson our Team Lead was awarded Employee of the Quarter, primarily for this team effort to get the MRIP queries redesigned and out there.

Also, we've had a staffing change for our Data Team lead, Mike Rinaldi left us in February, and we have a new team lead starting on May 16th, so we're excited to fill that gap, and again appreciation to both Julie, Ed and Joe Myers on the Data Team, for kind of stepping up and helping to redistribute and fill in things while we had an open position for a few months here.

Thank you for that. Another update that we think was actually pretty wild. It was months in the making, but ACCSP was the focus of an Oracle Business Innovations Webcast, and so this is using APEX, Oracle's application express tool, which is what we use for the Data Warehouse interface. We use it for the ATA, we use it for the SAFIS online electronic Dealer Reporting electronic Trip Reporting.

It's the fisheries use of Application Express driving the data collection and dissemination on the Atlantic Coast of the U.S.A. There were over a hundred people worldwide Oracle programmers and other interested parties, taking a look at what ACCSP has done as kind of an innovative approach to solving cross-agency problems in software, that could be done with a relatively low code base. While we do have Ed and three other kind of classically trained software people on staff, a lot of these applications with some outside help for initial development or some internal development work, are really things that we as classically trained biologists and on-the-job trained ITD specialists, have been able to program and maintain. It was actually a pretty wild audience and group of questions about how we were able to accomplish these things. That is more software development access activity.

We were pretty excited about that as well. The next item is just an opportunity for you guys to ask questions on anything that's been in the Committee Newsletters, so they've been coming out on a monthly basis. We've heard from the Coordinating Council that those updates have been useful, as well as the other committees. But an opportunity here to see if you have any questions there.

CHAIR McNAMEE: All right, thanks, Geoff. Questions for Geoff or Julie. Not seeing any around the table, any online? Okay, Mr. Fletcher, we're doing good on time, so I'm going to go ahead and go to you. I'm just making sure these are questions on the newsletter, so just clarifying that for you. But go ahead and open up your microphone if that what your questions are.

MR. FLETCHER: The question is on these newsletters and stuff. Is there some way to use artificial intelligence to get better input from the public? Thank you.

CHAIR McNAMEE: Thanks, Mr. Fletcher. Geoff or Julie, response.

MR. WHITE: These newsletters are identified to share with ACCSP partners and interested parties of

what our activities have been in the prior month, and what upcoming activities are going to occur. The newsletters aren't, in my understanding, the best forum to gather input, either directly through individuals or through some AI platform.

CHAIR McNAMEE: All right, one more, Richard, go ahead.

DR. CODY: Just a comment on that last question. There are some efforts around the different agencies to look at AI, in terms of large language machine models, so a machine earning. Those are efforts that use algorithms to pull pieces of text out of various types of writings, any kind of writings. It could be an article, it could be a paper, anything.

I think that some of the federal agencies are starting to evaluate the utility of that, because right now there are a handful of different models out there that use certain algorithms, and you have to repurpose them and so on. But there is some, I would say interest, in pursuing that approach, AI, to gather information specific to things like, you know key pieces of text or whatever that might provide some input or categorize or classify input from Council meetings and so on.

CHAIR McNAMEE: Great, thanks for adding that, Richard, appreciate it. Okay, not seeing any other hands around the table, I don't think there are any online either.

OTHER BUSINESS

CHAIR McNAMEE: Why don't we move along to Other Business, and Geoff, feel free to take it away.

EXPANSION OF MRIP DATA COLLECTION

MR. WHITE: Recreational Technical Committee has talked about this. We did put it at the end as a quick discussion item. But there is looking forward the potential for expanding MRIP data collection in unsampled months. Just to kind of reframe folks that may not be as familiar with MRIP. They historically kind of unsampled months in the Atlantic, Wave 1, January/February, would be Georgia, South Carolina, and then bridging all the way through Maine.

Right now, North Carolina is the one state that does participate in Wave 1 sampling on the Atlantic Coast. Also, Wave 2, which is March/April, and Wave 6, November/December are not sampled very much in Massachusetts or at all in New Hampshire and Maine at the moment. Why would this potential expansion be considered at this time?

Well, number one, the Atlantic Recreational Data Collection Implementation Plan does call for periodic effort sampling, to evaluate shifts in fisheries or fishing effort due to climate change. We've seen fisheries and timelines of fisheries moving over the years. But right now, there is not a lot of data during those unsampled months to evaluate what really is going on, in a similar methodology as the rest of the year.

As mentioned, earlier, the MRIP state conduct has been going, in our belief quite well, and that provides a good structure an opportunity for expanding some of these things as they come online and they are possible. What really brought this to focus was South Carolina came up and said Hey, we would really like to do Wave 1 sampling for 2025. Can we do it?

We've had a bunch of discussion with South Carolina, with MRIP, and the good news there is yes. I think the ACCSP and MRIP can help create those draws, specifically for for-hire telephone survey, and for APAIS the dockside intercept portions. The next slide will get into some more details for that.

In addition to this, talked about the consultants review of the for-hire logbook methodology. One of the gaps there was, what if there are logbooks in Wave 1 from a for-hire fishery, you know charterboat or headboat captain, but there is no APAIS there to balance out the calculation methodology proposed.

Good point, maybe we should look at that. The opportunity to do APAIS sampling in Wave 1 might

also be an opportunity or driver to look at. First, we say, sampling an unsampled data collection in unsampled months. There are really three components to that, and they are kind of listed in bold on the slide here.
The easiest one is the for-hire telephone survey, and I say easiest, because it is possible, with existing staff and available funds, to do a draw and make some more phone calls for the for-hire sector, with the existing methodology. This potential for South Carolina to do this in 2025, and also come to expand that to other regional coverage.

If there are other states that would want to participate in the for-hire telephone survey calls in Wave 1, to kind of expand that, you know, Georgia through North Carolina, potentially through the Mid-Atlantic, please let us know, and let us know soon, meaning in the next month or two, if you want to be considered in that particular approach if the fisheries in your state and your staff, we can work out kind of the details of that. The second zone of this would be APAIS dockside intercepts. With APAIS that is a lot more staffing, you've got to drive out to a site and stand there for six hours, and that takes increased staffing, and also increased funding. One of the things that was identified in the last two Atlantic implementation plans 2016 and 2021, was developing some criteria based on the level of effort of when APAIS dockside sampling would be appropriate, based on how much effort is being seen.

MRIP Has done some work in the past about how much effort occurs in Wave 2 and Wave 6, how much the economies of scale work for efficiency of dockside data collection. There is a bunch more work to be done there, but the idea would be to figure out at what level of effort sampling would adding in the dockside APAIS sampling be appropriate?

That is an effort that is going to take probably the rest of this year to figure out. There are opportunities for you, as a Coordinating Council to talk to us about that, both as a committee, as a council in the room together, as well as over e-mail, and in addition with staff. With that one there is a bit less of a time pressure, but if you're interested in doing that, please talk to staff about it.

Then the third one is the Fishing Effort Survey for Private Anglers. That's probably the more difficult one, in terms of timing and scoping, because that is not part of the state conduct agreement with MRIP, that is a separate approach, and of course there is a Pilot Study occurring in Calendar Year 2024.

Consulting with MRIP and thinking about it with the states and Rec Tech Committee. The change in methodologies, the FES Pilot Study and when kind of that contract or other things would be able to come in line, and which states and range would be appropriate on what timelines? The short answer for today is really, there is potential for 2026 Fishing Effort Survey in Wave 1, but it's going to need some additional work to scope out what are the requests and requirements for that effort sampling for the private anglers.

We again, have some time to figure that out. Wanted to at least raise these points to you guys, think about for-hire telephone survey and APAIS sampling coming up, and give you an opportunity for some feedback. We raised it at Rec Tech, and of course some folks were trying to figure out what that workload budget and other things might mean to them. With that, questions.

CHAIR McNAMEE: Thanks, Geoff. As Geoff mentioned, it's sort of a heads up, a request, you know if you have interest to reach out to Geoff to discuss further. I think if anybody has anything quick that they want to ask we can do that. I don't know that Geoff can get in too much detail, but Carrie, go ahead.

MS. CARRIE KENNEDY: Yes, I just wanted to remind Geoff and Julie that I want to say circa 2010, Delaware, Maryland and Virginia actually through Rec Tech, put in a proposal to have Wave 1 sampling, and we conducted Wave 1 sampling for a year or two. Our results were pretty poor, because it was really cold winters. But potentially there is room to look at what might have changed between then and now, as a place to start to consider

whether or not we would want to participate, or want or need additional sampling.

CHAIR McNAMEE: Thank you very much. Just an okay sign from Geoff on that one, thank you. Anyone else? Okay, any hands online, no hands online.

ADJOURNMENT

CHAIR McNAMEE: That brings us to the end of our agenda, thanks to Julie, Geoff and Ed for the very detailed presentation. Good questions from you all, thank you for those. Can I get amotion to adjourn. Moved by Dan McKiernan, is there a second? Okay, Renee seconds a motion to adjourn. Any objection to the motion? Seeing none; we stand adjourned, thank you very much, everybody.

(Whereupon the meeting convened at 3:15 p.m. on Monday April 29, 2024.)

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FY25 Proposal Recommendations to Coordinating Council

From the Operations and Advisory Committees

- The Operations and Advisory Committees would like to present the rankings from both groups individually.
- All Maintenance proposals and the Administrative budget should be funded in full.
- The recommendation for new proposals is to follow the average rankings with the suggestions below.
    - Fund the top three (3) projects. It should be noted that the "FY25: Enhancing Recruitment & Retention for the SAFMC Release Citizen Science Project" project was not ranked as highly by the Advisors.
    - The Operations and Advisors Committees both agree that the following projects, listed in priority order, should be funded.
        1. "Expanding the Commercial Fisheries Research Foundation's Black Sea Bass Research Fleet into the Gulf of Maine"
        2. "Port Sampling for the Maine Halibut Fishery"

** all above are consensus decisions*

FY2025 Proposal Rankings (Combined)

	Admin Grant	2,353,179	$44,423		2,397,602
3.35M	Maint @ 75%	714,299	New @ 25%		238,100
3.50M	Maint @ 75%	826,799	New @ 25%		275,600

	Project Name	Partner	Score	Cost	Cumulative Cost	3.5M Amt Remaining
1	FY24: Managing 100% Lobster Harvester Reporting in Maine	ME DMR	8.54	$ 335,537	$ 335,537	$ 491,262
2	Electronic Trip-Level Reporting for the Potomac River Fisheries Commission Commercial Fisheries Sector	PRFC	8.22	$ 142,344	$ 477,881	$ 348,918
3	FY25: North Carolina socioeconomic database construction for the management of existing and future data”	NC DMF	7.66	$ 145,020	$ 622,901	$ 203,898

includes carryover from maintenance projects

1	Pilot test of recreational released catch cards into the sampling design of the MRIP APAIS	ACCSP RTC	53.50	$ 202,487	$ 202,487	$ 277,010
2	Vessel Tracking Data and Program Management Improvements: Expansion of Vessel Tracking Data Access Controls and Upgrading the SAFIS Vessel Tracking Application	RI DEM, MA DMF, NH FGD, ME DMR	53.20	$ 108,000	$ 310,487	$ 169,010
3	FY25: Enhancing Recruitment & Retention for the SAFMC Release Citizen Science Project	SAFMC	48.89	$ 137,356	$ 447,843	$ 31,654
4	Expanding the Commercial Fisheries Research Foundation’s Black Sea Bass Research Fleet into the Gulf of Maine	ME DMR	48.34	$ 61,276	$ 509,119	$ (29,622)
5	Port Sampling for the Maine Halibut Fishery	ME DMR	48.26	$ 30,805	$ 539,924	$ (60,427)
6	Building A Modernized Framework For Anadromous Creel Surveys and Scoping Improvements to Legacy Data Collection Systems	NCDMF	46.84	$ 162,000	$ 701,924	$ (222,427)
7	Enhancing and modernizing recreational fisheries data collection through crowd-sourced citizen science, remote sensing and emerging AI technology via the GotOne fishing app	NEFSC	41.00	$ 200,000	$ 901,924	$ (422,427)
8	Pilot Observer Program for Rhode Island State Waters Trawl and Fish Pot Fisheries	RI DEM	40.46	$ 165,444	$ 1,067,368	$ (587,871)
9						

FY2025 Operations Proposal Rankings

	Admin Grant	2,353,179	$44,423		2,397,602
3.35M	Maint @ 75%	714,299	New @ 25%		238,100
3.50M	Maint @ 75%	826,799	New @ 25%		275,600

Project Name	Partner	Score	Cost	Cumulative Cost	3.5M Amt Remaining
FY24: Managing 100% Lobster Harvester Reporting in Maine	ME DMR	8.86	$ 335,537	$ 335,537	$ 491,262
Electronic Trip-Level Reporting for the Potomac River Fisheries Commission Commercial Fisheries Sector	PRFC	8.17	$ 142,344	$ 477,881	$ 348,918
FY25: North Carolina socioeconomic database construction for the management of existing and future data”	NC DMF	7.69	$ 145,020	$ 622,901	$ 203,898

includes carryover from maintenance projects

Pilot test of recreational released catch cards into the sampling design of the MRIP APAIS	ACCSP RTC	54.31	$ 202,487	$ 202,487	$ 277,010
Vessel Tracking Data and Program Management Improvements: Expansion of Vessel Tracking Data Access Controls and Upgrading the SAFIS Vessel Tracking Application	RI DEM, MA DMF, NH FGD, ME DMR	52.53	$ 108,000	$ 310,487	$ 169,010
FY25: Enhancing Recruitment & Retention for the SAFMC Release Citizen Science Project	SAFMC	49.75	$ 137,356	$ 447,843	$ 31,654
Port Sampling for the Maine Halibut Fishery	ME DMR	47.61	$ 30,805	$ 478,648	$ 849
Expanding the Commercial Fisheries Research Foundation’s Black Sea Bass Research Fleet into the Gulf of Maine	ME DMR	47.32	$ 61,276	$ 539,924	$ (60,427)
Building A Modernized Framework For Anadromous Creel Surveys and Scoping Improvements to Legacy Data Collection Systems	NCDMF	46.58	$ 162,000	$ 701,924	$ (222,427)
Enhancing and modernizing recreational fisheries data collection through crowd-sourced citizen science, remote sensing and emerging AI technology via the GotOne fishing app	NEFSC	41.67	$ 200,000	$ 901,924	$ (422,427)
Pilot Observer Program for Rhode Island State Waters Trawl and Fish Pot Fisheries	RI DEM	39.92	$ 165,444	$ 1,067,368	$ (587,871)

FY2025 Advisors Proposal Rankings

	Admin Grant	2,353,179	$44,423		2,397,602
3.35M	Maint @ 75%	714,299	New @ 25%		238,100
3.50M	Maint @ 75%	826,799	New @ 25%		275,600

Project Name	Partner	Score	Cost	Cumulative Cost	3.5M Amt Remaining
Electronic Trip-Level Reporting for the Potomac River Fisheries Commission Commercial Fisheries Sector	PRFC	8.40	$ 142,344	$ 142,344	$ 684,455
FY25: North Carolina socioeconomic database construction for the management of existing and future data"	NC DMF	7.50	$ 145,020	$ 287,364	$ 539,435
FY24: Managing 100% Lobster Harvester Reporting in Maine	ME DMR	7.40	$ 335,537	$ 622,901	$ 203,898
				includes carryover from maintenance projects	
Vessel Tracking Data and Program Management Improvements: Expansion of Vessel Tracking Data Access Controls and Upgrading the SAFIS Vessel Tracking Application	RI DEM, MA DMF, NH FGD, ME DMR	55.60	$ 108,000	$ 108,000	$ 371,497
Expanding the Commercial Fisheries Research Foundation's Black Sea Bass Research Fleet into the Gulf of Maine	ME DMR	51.80	$ 61,276	$ 169,276	$ 310,221
Pilot test of recreational released catch cards into the sampling design of the MRIP APAIS	ACCSP RTC	50.60	$ 202,487	$ 371,763	$ 107,734
Port Sampling for the Maine Halibut Fishery	ME DMR	50.60	$ 30,805	$ 402,568	$ 76,929
Building A Modernized Framework For Anadromous Creel Surveys and Scoping Improvements to Legacy Data Collection Systems	NCDMF	48.00	$ 162,000	$ 564,568	$ (85,071)
FY25: Enhancing Recruitment & Retention for the SAFMC Release Citizen Science Project	SAFMC	45.80	$ 137,356	$ 701,924	$ (222,427)
Pilot Observer Program for Rhode Island State Waters Trawl and Fish Pot Fisheries	RI DEM	42.40	$ 165,444	$ 867,368	$ (387,871)
Enhancing and modernizing recreational fisheries data collection through crowd-sourced citizen science, remote sensing and emerging AI technology via the GotOne fishing app	NEFSC	38.60	$ 200,000	$ 1,067,368	$ (587,871)

FY2025 Proposal Rankings

Operations Rank	Advisors Rank	Average Rank	Project Name	Partner	Operations Score	Advisors Score	Average Score	Cost
1	3	1	FY24: Managing 100% Lobster Harvester Reporting in Maine	**ME DMR**	9	7	9	$ 335,537
2	1	2	Electronic Trip-Level Reporting for the Potomac River Fisheries Commission Commercial Fisheries Sector	**PRFC**	8	8	8	$ 142,344
3	2	3	FY25: North Carolina socioeconomic database construction for the management of existing and future data”	**NC DMF**	8	8	8	$ 145,020
6	5	6	Building A Modernized Framework For Anadromous Creel Surveys and Scoping Improvements to Legacy Data Collection Systems	**NCDMF**	47	48	47	$ 162,000
8	7	8	Pilot Observer Program for Rhode Island State Waters Trawl and Fish Pot Fisheries	**RI DEM**	40	42	40	$ 165,444
7	8	7	Enhancing and modernizing recreational fisheries data collection through crowd-sourced citizen science, remote sensing and emerging AI technology via the GotOne fishing app	**NEFSC**	42	39	41	$ 200,000
2	1	2	Vessel Tracking Data and Program Management Improvements: Expansion of Vessel Tracking Data Access Controls and Upgrading the SAFIS Vessel Tracking Application	**RI DEM, MA DM**	53	56	53	$ 108,000
1	3	1	Pilot test of recreational released catch cards into the sampling design of the MRIP APAIS	**ACCSP RTC**	54	51	54	$ 202,487
3	6	3	FY25: Enhancing Recruitment & Retention for the SAFMC Release Citizen Science Project	**SAFMC**	50	46	49	$ 137,356
4	4	5	Port Sampling for the Maine Halibut Fishery	**ME DMR**	48	51	48	$ 30,805
5	2	4	Expanding the Commercial Fisheries Research Foundation’s Black Sea Bass Research Fleet into the Gulf of Maine	**ME DMR**	47	52	48	$ 61,276

		Partner	Title	Primary Module	Others		Cost	Max Funding Year 5/6
Maintenance	1	ME DMR	FY24: Managing 100% Lobster Harvester Reporting in Maine	Catch/Effort (100%)		$	335,537	
	2	PRFC	Electronic Trip-Level Reporting for the Potomac River Fisheries Commission Commercial Fisheries Sector	Catch/Effort (100%)		$	142,344	$ 142,344
	3	NCDMF	FY25: North Carolina socioeconomic database construction for the management of existing and future data"	Socioeconomic (100%)		$	145,020	
					Total Maintenance	**$**	**622,901**	

		Partner	Title	Primary Module	Others		Cost
New	1	NCDMF	Building A Modernized Framework For Anadromous Creel Surveys and Scoping Improvements to Legacy Data Collection Systems	Catch/Effort (100%)		$	162,000
	2	RI DEM	Pilot Observer Program for Rhode Island State Waters Trawl and Fish Pot Fisheries	Bycatch (70%)	Catch/Effort (30%)	$	188,712
	3	NEFSC	Enhancing and modernizing recreational fisheries data collection through crowd-sourced citizen science, remote sensing and emerging AI technology via the GotOne fishing app	Catch/Effort (100%)		$	200,000
	4	RI DEM, MA DMF, NH FGD, ME DMR	Vessel Tracking Data and Program Management Improvements: Expansion of Vessel Tracking Data Access Controls and Upgrading the SAFIS Vessel Tracking Application			$	108,000
	5	ACCSP RTC	Pilot test of recreational released catch cards into the sampling design of the MRIP APAIS	Catch/Effort (100%)		$	202,487
	6	SAFMC	FY25: Enhancing Recruitment & Retention for the SAFMC Release Citizen Science Project	Biological (90%)	Bycatch (10%)	$	137,356
	7	ME DMR	Port Sampling for the Maine Halibut Fishery	Biological (100%)		$	30,805
	8	ME DMR	Expanding the Commercial Fisheries Research Foundation's Black Sea Bass Research Fleet into the Gulf of Maine	Biological	Catch/Effort	$	61,276
					Total New	**$**	**1,090,636**
Admin		ACCSP	ACCSP Administrative Budget	Admin		$	2,353,179
					Grand Total Proposed	**$**	**4,066,716**

STATE OF MAINE
DEPARTMENT OF
MARINE RESOURCES
MARINE RESOURCES LABORATORY
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JANET T. MILLS
GOVERNOR

PATRICK C. KELIHER
COMMISSIONER

July 26, 2024

Atlantic Coastal Cooperative Statistics Program
1050 N. Highland St. Ste. 200 A-N
Arlington, VA 22201

Dear ACCSP:

We are pleased to submit the proposal titled "FY25: Managing 100% Lobster Harvester Reporting in Maine" for your consideration. This is a maintenance proposal which has not changed in the scope of work. The continuation of this project will allow the Maine Department of Marine Resources (MEDMR) to continue its compliance with ASMFC's Addendum 26 requirement that the MEDMR move from 10% lobster reporting to 100% electronic lobster reporting. The MEDMR implemented 100% lobster reporting starting January 1, 2023; which is a full year ahead of the addendum's requirement to be fully implemented by January 1, 2024. The MEDMR felt it was important to implement as early as possible to comply with and track the pending vertical line reductions resulting from the new regulations to reduce the risk of entanglement to right whales through the Atlantic Large Whale Take Reduction Plan. Collecting as much information on these gear configurations during the recent six year pause of these regulations is imperative to accurately document the effort and vertical line use in the lobster fishery. The MEDMR's initial goal was to implement 100% reporting in 2021; however, funding shortfalls prevented this from occurring. Continued funding of this proposal would allow MEDMR to continue the implementation.

The MEDMR does not currently have the funds needed to continually support and staff the program at the 100% reporting level. Overall, MEDMR created nine new positions that have been filled and vital to the successful roll out of 100% electronic lobster harvester reporting. Not all nine positions are included in our funding request as other one-time funding sources have been secured to alleviate the burden of our request to ACCSP. Please view all graphs in color. This proposal addresses the following 2025 ranking criteria: catch and effort, data delivery plan, regional impact, funding transition plan, in kind contribution, improvement in data quality and timeliness, impact on stock assessment and properly prepared.

During the pre-proposal review, MEDMR did not receive any questions or feedback to address. For a summary of the proposal for ranking purposes, please see page 34. Please contact Robert Watts at the MEDMR with any questions. Thank you for your consideration of this proposal.

Sincerely,

Robert B. Watts II
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(207) 633-9412

Atlantic Coastal Cooperative Statistics Program
1050 N. Highland Street. Suite. 200A-N
Arlington, VA 22201

FY24: Managing 100% Lobster Harvester Reporting in Maine

Total Cost: $335,537.01

Submitted by:

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Applicant Name: Maine Department of Marine Resources (MEDMR)

Principal Investigator: Robert Watts, Marine Resource Scientist

Project Title: FY24: Managing 100% Lobster Harvester Reporting in Maine

Project Type: Maintenance Project

Requested Award Amount (without the NOAA administration fee): $335,537.01

Requested Award Period: One year after receipt of funds

Objectives:

The objective of this proposal is to comply with Addendum XXVI (http://www.asmfc.org/uploads/file/5a9438ccAmLobsterAddXXVI_JonahCrabAddIII_Feb2018.pdf) of ASMFC's (Atlantic States Marine Fisheries Commission) American lobster Fisheries Management Plan (FMP) which required MEDMR increase the percentage of trip level landings information MEDMR collects from commercial lobster harvesters from the current "optimized draw method" (approximately 380 harvesters) to 100% (approximately 5,400 harvesters). Starting in 2019, ASMFC Addendum XXVI required MEDMR move to an "optimized draw" selection method to choose the lobster harvesters required to report for the following year. The "optimized draw" selects different percentages of license types and active/non-active harvesters based a statistical analysis of the variability of each license class using a of combination of dealer data and harvester reported data. In the past MEDMR would select approximately 700 to 800 harvesters per year, now around 350 to 400 harvesters are selected with the idea that the selected harvesters would provide the same number of trip records (See Figure 3). Addendum XXVI requires 100% reporting (electronic reporting is recommended but not mandatory) by January 2024 in addition to other new required fields that became mandatory in January 2021. MEDMR started collecting total endlines and 10 min square data at the trip level in 2020 even though ASMFC moved these requirements back to 2021. Starting January 1, 2023, MEDMR required 100% electronic lobster harvester reporting. This requirement has caused MEDMR to increase landings and licensing staff by a total of 9 positions to effectively manage, monitor and audit what was a 1000% increase in the number of trip level reports the MEDMR receives from the lobster industry on an annual basis.

National Marine Fisheries Service (NMFS) was in the process of finalizing new rules to protect North Atlantic right whales as part of the Atlantic Large Whale Take Reduction Plan (ALWTRP) for the Northeast lobster fishery. The implementation of these plans have been pushed back as part of a six year moratorium. This will allow states the ability to collect vital information such as end line counts and gear configuration with a spatial component to better map out where actual fishing activity are occurring. The MEDMR required trackers be placed on all federally permitted vessels starting December, 2023. ASMFC is requiring 100% reporting in the lobster fishery by 2024. GARFO started requiring all federal lobster permits submit eVTRs on April 1, 2024. The AWTRT has recommended on more than one occasion that fisheries move to 100% reporting as soon as possible. MEDMR strongly agrees with this recommendation because our ability to achieve and monitor the consensus goals of the AWTRT is tied to the availability of these data in the short term. MEDMR believes that the January 2023 date was necessary to meet the data guidelines outlined in Addendum 26, the needs of the AWTRT, and work out any data collection and data management issues well before the 2024 deadline. Additionally, MEDMR was interested in moving the timeframe for 100% electronic lobster harvester reporting up to as early as 2023 to track effort and vertical line use in support of pending new regulations. The FY20 proposal intended MEDMR to require 100% reporting starting in January 2021; however, lack of funding has required this timeframe be pushed back to 2023. Similarly, with the 2023 timeframe the MEDMR does not

have the funding to continuously fund all the positions necessary to effectively administer, collect, audit and distribute the data required in Addendum XXVI**.** If the MEDMR are not able to secure adequate funding, the continued implementation of the 100% reporting would need to be revisited. **The MEDMR has self-funded the creation of a new offline mobile application for both iOS® and Android® platforms through dedicated technology funds. This program was built to accept reports from all fisheries and meet NMFS electronic reporting requirements. This new program has dynamic entry pages and be completely table driven allowing the entry pages to display more concise field descriptions based on species and gears fished. There are built in data validations, reoccurring selections appear at the top of drop down lists and basic end user analytics.** The MEDMR released this program industry wide in the fall of 2021. With the release of this program, the MEDMR has required electronic reporting in multiple fisheries if there's a data management need. **The primary tasks will be electronic reporting software training, regulation compliance, data audits, data entry and general outreach. Staff will also focus on harvester outreach to help industry understand the importance of the accurate and timely reporting. Electronic reporting are required for commercial lobster harvesters and heavily pushed for those that still report other fisheries on paper. The focus on expansion of electronic reporting will require the MEDMR to spend a significant amount of time on outreach, explaining the reporting system to harvesters and troubleshooting any issues that might arise.** Currently, MEDMR only requires electronic reporting in our Atlantic herring, scallop (inshore state fishery), halibut (inshore state fishery), lobster and Atlantic menhaden fisheries. There are currently no plans to mandate electronic reporting for other fisheries, as this is not an ACCSP requirement.

Need:

Maine currently requires harvesters from 14 fisheries to report trip level landings on a variety of timelines (daily, weekly or monthly). A total of five fisheries require mandatory electronic harvester reporting (lobster, scallop, menhaden, herring and halibut). Two quota monitored fisheries (Atlantic herring and Atlantic menhaden) have daily reporting requirements during their "open quota monitored seasons (i.e. directed and episodic fishing season for menhaden) and two other fisheries (halibut and scallop) and trip level reporting due weekly during their inshore state seasons. **When the MEDMR implemented 100% lobster reporting, the number of new harvesters (see Table 1) required significant resources in outreach, tracking compliance, entering and auditing a ~500% increase in the number of reports received from approximately 60K to ~300K. In 2022, approximately 5,643 lobster harvesters were licensed to fish in Maine. Of those 5,643, MEDMR selected 474 to report trip level information. Now with 100% reporting all 5,643 will be required to report. Of the 5,643 harvesters, MEDMR dealer reports indicate 3,960 harvesters sold at least once to a licensed dealer. All 5,643 license holders regardless of activity will be required to report for each month they hold a current license. Moving to 100% reporting follows the MEDMR's change in how harvesters were selected. During the 2019 season the MEDMR move to an "optimized draw" selection method to choose the lobster harvesters required to report for the following year. The "optimized draw" selects different percentages of license types and active/non-active harvesters based a statistical analysis of the variability of each license class using a of combination of dealer data and harvester reported data. In the past MEDMR would select approximately 700 to 800 harvesters per year, in 2022 which was the last year of the optimized draw 474 were selected with the idea that the selected harvesters would provide the same number of trip records (See Figure 3) as the previous 10%**. The number of individual lobster harvesters required to report electronically increased to just under 5,700 when 100% lobster harvester reporting became mandatory in 2023.

Of the 5,372 licensed harvesters, ~1,300 (24%) of them as of April 1, 2024, are required to report to National Marine Fisheries Service (NMFS) since they possess a federal lobster permit. **Regardless of their federal permit status, MEDMR will work with all harvesters to ensure all landings are reported either to MEDMR or NMFS since the collected data will benefit all partners. MEDMR staff will also audit all records with a**

state landed of Maine but defer any federal data changes to NMFS. The rollout of federal reporting has not been smooth and met with many challenges. Data flows from Bluefin to ACCSP and GARFO have had some challenges that all parties have been working on to clear up. The biggest challenge has been "re-training" the 1,300 "new" federal harvesters that last year reported using the "state only form". The differences in form and terminology have caused an increase in the number of phone calls MEDMR staff have received since April 1. Our two Scientist I and two Specialist II's estimate that two months into the GARFO roll out that they are still spending at least 75% of their work week answering questions from federal harvesters about field names and troubleshooting data flow issues that are sporadic but ongoing. MEDMR is continuing to look for ways to streamline these reporting issues and has been in discussions with GARFO on ways to simplify the reporting process within the lobster industry.

Table 1: Increase in Individual Harvester Reporting Expected in Maine

Moving from 10% to 100% Lobster Reporting							
Year	Total Trips Entered	Lobster Only Entered	10% Active Lobster Harvesters	100% Active Lobster Harvesters	100% Lobster Harvesters	Lobster Trips From Dealer Reoprts	Lobster Harvester Reports Expected if 100% Required
2015	54,373	29,306	532	4,406	6,014	270,324	282,759
2016	57,871	30,762	566	4,504	6,009	293,919	307,439
2017	58,712	29,551	535	4,485	5,997	276,754	289,485
2018	59,082	26,655	543	4,391	5,925	264,094	276,242
2019	45,858	17,173	276	4,336	5,834	258,088	269,960
2020	44,074	17,501	297	4,063	5,773	220,608	230,756
2021	55,702	23,355	367	4,160	5,763	255,415	267,164
2022	43,636	20,250	308	3,960	5,643	211,178	220,892
2023*	273,009	242,116		4,116	5,372	220,895	231,056
*2023 data are preliminary and subject to change without notice.							
100% active license based on dealer reported data from 2015 - 2022							
100% active license count for 2023 based on harvesters that reported as of 5/24/2024							
Harvester counts are individual harvesters. Many harvesters have multiple licenses that are tracked seperately.							
Expected reports are calculated from reports received by harvesters and extraoplated based on reports received by dealers.							

*Increase in the number of harvesters and reports expected when MEDMR implements 100% lobster harvester reporting.

In 2016 MEDMR converted to a new online licensing and landings system, called Maine LEEDS (**L**icensing **E**nforcement and **E**nvironmental **D**ata **S**ystem). Using this system, harvesters and dealers are able to:

- Renew a license you previously held
- Apply for a new license you've never held before
- Order tags (for certain licenses)
- Reprint your license
- Upgrade a license (if applicable)
- Pay administrative fees
- Report landings
- Check reporting compliance status
- Upload documents to the department
- Change your password to the system

This web application has been an extremely useful tool that has allowed for more "self-service" for harvesters and dealers, has improve customer satisfaction and increase MEDMR staff efficiency. The Landings Program now utilizes this LEEDS system to send compliance emails to industry informing them of what reports are delinquent. Harvesters and dealers also have the ability to login to the system and view what reports are missing

as well. Overall this program has saved the MEDMR thousands of dollars in mailing cost as many of our correspondence have been sent via email as opposed to mail when appropriate. The process of informing harvesters that they have a license with reporting requirements has been automated and each harvester that purchases a license for the first time with reporting requirements are provided a notice included in their license packet to streamline our notification process. **In late spring 2018, MEDMR started allowing harvesters to enter their data through the LEEDS system and in 2021 released the VESL application to a group of test harvesters. Since the MEDMR provided harvesters an electronic reporting option, the number of harvesters utilizing an electronic reporting option has increased from 85 in 2018 to almost 1,300 harvesters in 2022. At the time of writing this proposal, just under 4,750 harvesters have reported electronically in 2023. Since 2018, the percentage of electronic reports has increased from just over 1% to 43% in 2022 (and 94% in 2023) (Figure 1 – view in color and Table 2 for electronic reporting breakdown).** Having industry enter their own information also saves staff time because paper reports do not need to be opened or processed through the mail, scanned into our LEEDS system or entered by hand. Staff have spent significant time training and creating outreach material (videos, electronic user guides, etc.) and communicating directly with industry. The shift to electronic reporting has caused staff to focus more of their time on data audits and outreach with industry. While MEDMR recommends industry utilize Maine LEEDS (state reporting only) or VESL (GARFO and ME state only reporting), we do not require users to use these two programs. We have users that have elected to utilize Fish Online (FOL), eTRIPS and other reporting options to fulfill their state and federal combo reporting requirements.

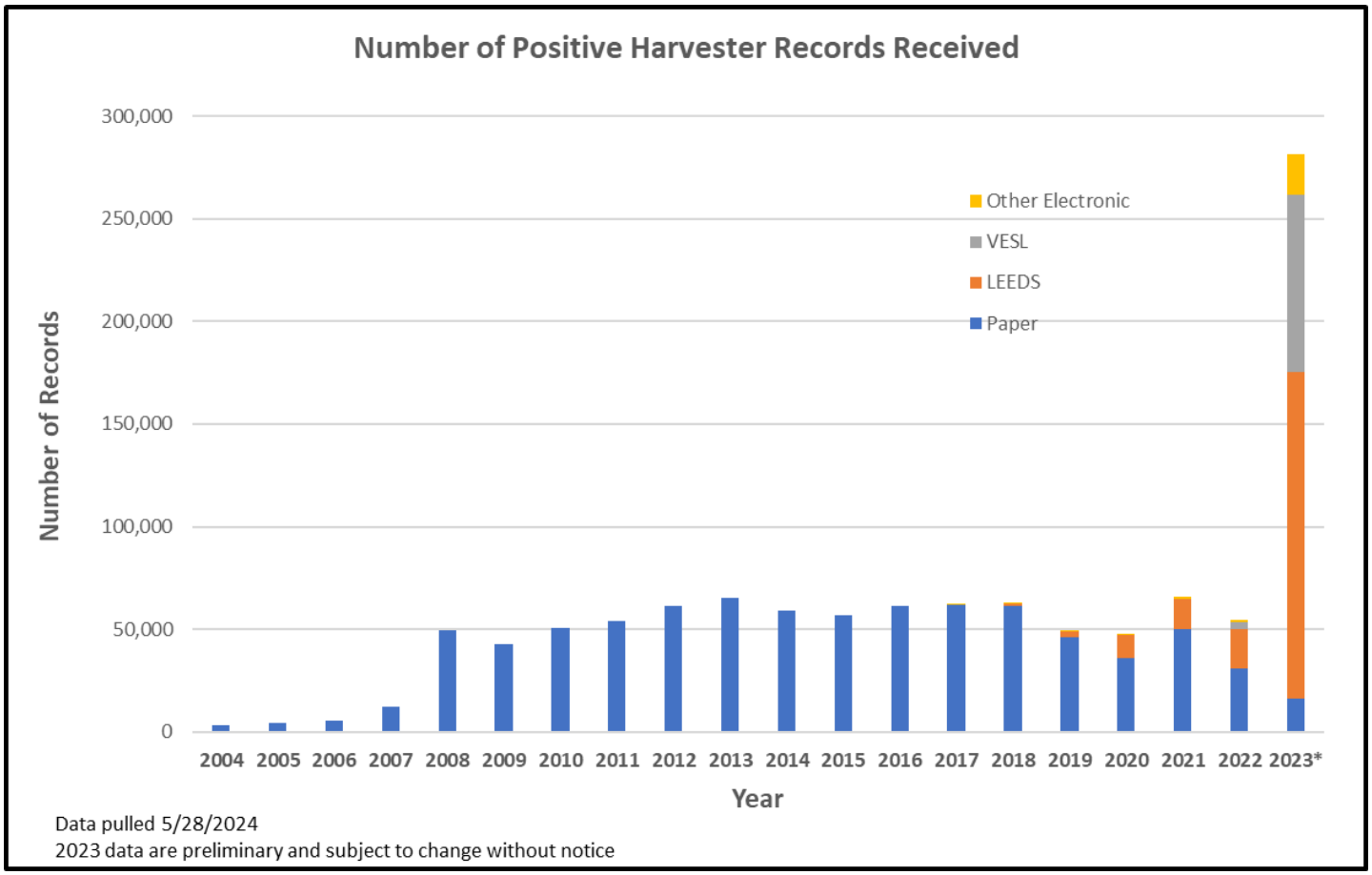


Figure 1: Number of Positive Trip Records Entered by MEDMR Staff and Industry into MARVIN and SAFIS

MEDMR Harvester Reported Data Trends (Data received through 5-28-2024)										
		Electronic Reports								
		LEEDS		VESL		Other Programs				
Year	Paper Reports	# Trips Reported	# Users	# Trips Reported	# Users	# Trips Reported	# Users	**Total Electronic**	**Total Reports**	**% Electronic**
2020	36,014	11,122	603	0	0	234	6	**11,356**	**47,370**	**24%**
2021*	50,114	14,912	764	352	15	931	15	**16,195**	**66,309**	**24%**
2022	31,038	18,946	1,240	3,297	170	1,653	92	**23,896**	**54,934**	**43%**
2023**	16,081	159,394	3,071	86,152	1,428	19,706	249	**265,252**	**281,333**	**94%**
Paper reports are entered directly into MEDMR's MARVIN database by MEDMR staff										
LEEDS is MEDMR's web based online reporting application that feeds directly to our MARVIN database.										
VESL data numbers include state only and GARFO trips										
*2021 was pilot year for roll out of VESL in Maine										
**2023 is the first year of 100% lobster reporting for MEDMR (approx 5,800 harvesters)										
MEDMR currently requires lobster, menhaden, Atlantic herring, Atlantic halibut and scallop to report electroncially.										
Number LEEDS and VESL users could overlap and be counted more than once.										
Other Programs are mostly Fish Online and eTrips										

Table 2: Breakdown of trip reports entered by Maine harvesters between 2020 and 2023 (to date)

MEDMR currently requires (with some potential exemptions based on to be determined criteria) 100% electronic harvester reporting for lobster, herring, halibut, scallop and menhaden. Reliable high-speed internet access is not available in certain parts of the state which prohibits full 100% electronic reporting. The goal is to get as close to that as possible. The addendum allows until January 1, 2024 to meet this requirement. The MEDMR has taken a strict approach to allowing harvesters under certain circumstances to report on paper. **Scallop, halibut, herring and menhaden are quota monitored species that MEDMR has identified as benefiting from requiring state only harvesters to report electronically. Starting in 2020 all herring and menhaden harvesters were required to report electronically through either Maine LEEDS or some federally accepted reporting application during the active harvest season. This requirement replaced the email system MEDMR relied upon the past few seasons to monitor quota. Requiring daily electronic reporting will save the harvesters from emailing and then filling out complete harvester reports at the end of the week/month. Starting in 2022, the MEDMR required trip level electronic reporting due weekly for scallop and halibut.** The offline mobile application MEDMR had Bluefin Data LLC build through its own funds has allowed harvesters with multiple reporting fisheries the ability to use one program to fulfill all their requirements whether they are state only or federal. **Of the 1.331 million trips for 2023 in the data warehouse, 43% of them were landed in Maine which exceeds any other state (Figure 2 – view in color). This figure includes both dealer and harvester records.** These records were submitted by both "state-only" harvesters (those that only report to MEDMR) as well as federal harvesters (those that report to fulfill both NMFS and MEDMR reporting requirements). **Because all state licensed harvesters are required to report to the MEDMR regardless if they have federal reporting requirements or not, MEDMR works with NMFS to collect data from federally permitted harvesters so they do not need to double report. MEDMR staff devotes time and resources to help all harvesters that submit data to NMFS and MEDMR.**

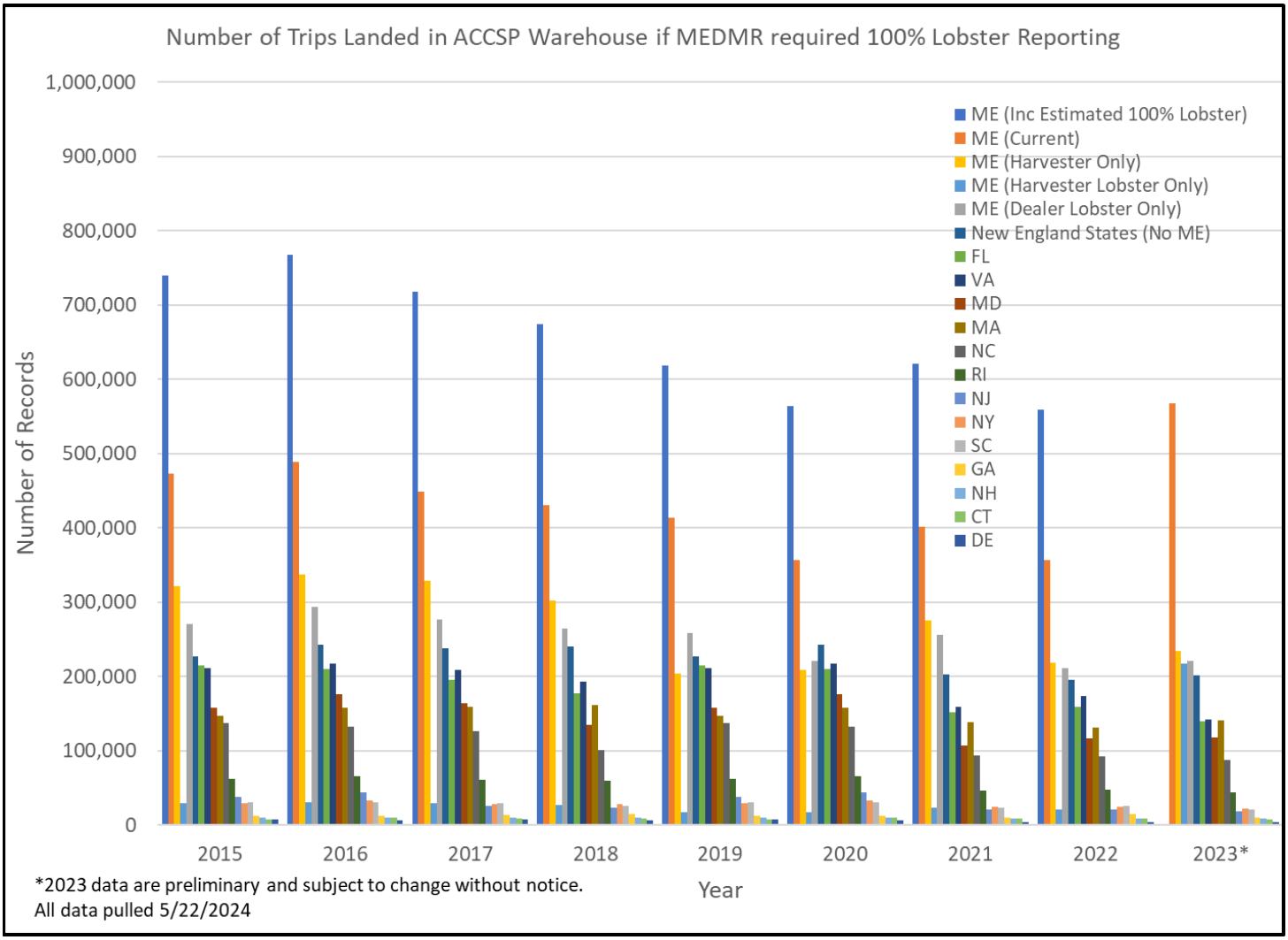


Figure 2: Number of Reported Trip Records by <u>State Landed</u> in ACCSP Data Warehouse

Since the MEDMR has required 100% lobster harvester reporting the volume of phone calls and data requests have increased. Throughout the year, approximately 40% to 60% of all harvesters are out of compliance for at least one month of reporting. In 2022 there were 3,576 harvesters with 5,394 individual licenses from all 14 fisheries that required harvester reporting and MEDMR sent out approximately 4,200 compliance letters (and emails) and fielded thousands of calls a month relating to reporting questions and compliance/license renewal status. Doubling the total number of harvesters required to report (many lobster harvesters are required to report other fisheries) will increase these figures and require more staff and staff time to provide industry with an acceptable level of customer service. In 2023, all 5,372 lobster harvesters were required to report (the penalty for not reporting is the inability to renew their license until they become compliant. If they do not renew their license before the end of the licensing year, then they forfeit their license). In all, there were 6,801 harvesters required to report for 8,694 licenses from 14 different fisheries. The MEDMR emailed or sent out 6,374 compliance letters to delinquent harvesters missing at least one mandatory report.

Additional staff are needed to assist with audits and the increase in data that will require auditing. The increase in data will increase the time it takes to complete audits. The implementation of 100% lobster harvester reporting allows the MEDMR to audit and compare 100% of our lobster dealer and harvester data. These two datasets alone account for just under 500,000 records annually and will take significant staff resources to complete. MEDMR historically matched up what the 10% harvester reports indicate against what dealers reported for the

same individuals. Any discrepancies over 2,000 pounds for the year are flagged and further research is conducted. Even with certain data validations in place, the data submitted through an electronic means will require a large amount of staff time to run the audits and research and correct any flagged records. These audits will take up significant staff time the first few years of 100% reporting. As of the writing on this proposal, MEDMR have plans to start these audits. The current staff level has been spending audit time assisting with the roll out of federal lobster harvester reporting since many of the federal lobster harvesters are using our VESL system to report. Other audits that staff perform on the data include spatial audits, trap counts, sea time, set time, gear configuration audits (this includes a spatial component to ensure that gear configuration matches regulatory requirements by area), over trip limits and basic vessel/harvester combinations.

The first few years will require significant outreach with industry. **Communicating with industry and fielding electronic reporting questions will be the biggest time burden the landings program will face. Prior to 2023, 57% of all harvester records submitted to MEDMR are key entered by MEDMR staff. This number dropped to 6% in 2023 which created its own challenge of increasing the level of audits required to ensure data accuracy. Electronic reporting has been a cultural shift for the lobster fishery, which will require diligent customer service and an intuitive reporting application. MEDMR staff have spent significant resources (mostly time) holding in person and virtual meetings with industry to assist with the implementation and education of electronic reporting options with industry.** MEDMR has funded the development of a new harvester reporting application that is user friendly and meets the reporting needs of all MEDMR reporting fisheries, as well as meet NMFS eVTR reporting requirements. MEDMR spent significant time testing ACCSP's eTRIPs V2, which was greatly improved over the previous versions. However, there are still significant concerns about the number of reporting pages it took to complete, the agility of a program that is not fully table driven, and the ease of use for different fisheries. The program MEDMR contracted with Bluefin Data LLC to build worka on both Android® and iOS® and meets all GARFO eVTR requirements so those harvesters with state and GARFO permits will be able to utilize this system. The MEDMR has a contract with Bluefin Data LLC that will allow any harvester with a MEDMR license or permit to use the VESL application free of charge. Since VESL was approved by GARFO, those harvesters with a MEDMR license or permit that also has reporting obligations to GARFO, they will be able to use VESL to fulfill their GARFO reporting requirements regardless of where they are landing. **All data collected through the new MEDMR funded harvester applications will be submitted directly to ACCSP through the newly developed API (requirements are listed here https://accsp-software.github.io/spec-unified-api-prod/).** The funding source for the new mobile applications are through dedicated technology funding within MEDMR's budget. These funds must be used for advancing technologies and cannot be used for personnel.

The number of trip records that MEDMR staff entered into MARVIN (MEDMR's database that contains all sampling, biological and landings data that MEDMR collects) has increased ~132% since 2007 (Figure 1 – view in color), which was the last year the MEDMR did not require 10% lobster harvester reporting. The overall number of reports by harvesters during this same period has increased by 2,301%. If not for the electronic reporting requirement this increase would not have been possible. Since the start of electronic reporting in ME, the number of electronic trip reports has increased 22,946% between 2023 and 2018 (265,252 reports in 2023 compared to 1,156 in 2018). When harvesters submit paper reports, they are entered into the MARVIN database. MARVIN is used for reports submitted on paper because it is a faster method of data entry and MEDMR uses this tool to audit the data before sending a copy of it to ACCSP. Routines are configured to convert the MARVIN data to ACCSP codes before they are uploaded to the ACCSP warehouse.

Landings data entered in MARVIN are uploaded to the ACCSP data warehouse. The significant increase in the amount of data entry, outreach/education and auditing are the single greatest challenge facing the landings harvester (including lobster) program staff. MEDMR currently funds seven positions that work at least part-time on harvester reporting. Currently four positions working on the harvester program are funded by ACCSP grants. **In addition to the FY24 ACCSP grant, MEDMR was able to secure additional one-time funding of $600K (funding ended on 6/20/2024) from NOAA through congressional appropriations as part of a large $1.6 million dollar bill to offset costs that might result from new regulations in the lobster fishery to protect right whales (split with MA, NH, ME and RI) and two million for a one-time ARPA funding (this is why the MEDMR did not request funding in FY2023). While this funding is vital, it does not provide MEDMR with enough funds to fully fund multiple years of lobster reporting. MEDMR continues to look for other sources of funding (both internal and external) to fund 100% lobster reporting. MEDMR has modified the current budget from previous years funded proposals to account for the ARPA and other NOAA funds. The positions listed in this grant currently have no other funding source available.** MEDMR is now requesting continued funding for four positions.

This proposal is designed to continue to assist with funding the transition from 10% harvester reporting to 100% harvester reporting where most harvesters will be required to report electronically as required by Addendum XXVI. MEDMR understands that not everyone will be able to report electronically so a paper option must still be available. The positions being funded will be doing very little data entry and will mostly be assisting harvesters with reporting questions, educating harvesters with electronic reporting options and other outreach duties along with other data entry/auditing duties.

Summary of staffing:

MEDMR Landings Program staff involved in harvester reporting who are fully funded by MEDMR:

- Scientist IV: makes decisions on the general Landings Program direction.
- Scientist III: oversees the Landings Program, participates in ACCSP committees, transfers data to ACCSP; reporting technology development and responds to data requests.
- Scientist II: manages the day-to-day operations of the Landings Program, is responsible for database development, responds to data requests and updates the Landings Program web page. This position also audits data, and monitors licenses and compliance.
- Scientist I: provides one-on-one outreach with the harvesters; trains harvesters how to report electronically or on paper; follows up on compliance issues. This position audits data from "state-only" and "NMFS" harvesters. See the *Approach* section below for further details on auditing. This position is also assigned tasks in the dealer-reporting project.
- Office Associate II: corresponds with industry regarding new suspension authority for failure to report on time; identifies and notifies delinquent reporters; follows protocols for suspending licenses; works with the licensing division to ensure licenses are re-issued when reports have been submitted.
- Office Associate I (2 positions): opens and processes mail and enters data into MARVIN.

New MEDMR Landings Program staff to be funded by additional ARPA grant:

- Marine Resource Scientist II (1 position): Oversee the daily operations of harvester reporting program, including but not limited to scheduling of duties, directly supervising four employees, managing harvester data audits, database maintenance and assisting with reporting writing.
- Marine Resource Scientist I (2 positions): Oversee the rollout of the new offline harvester reporting application, outreach with industry and overseeing data audits. These two positions will be one of the primary contacts for industry members that have reporting program questions.
- Office Specialist I Supervisor (1 position): Supervise two Office Associate I positions and two Office Associate II positions located in the West Boothbay Harbor, ME Laboratory. This position will assist

with incomplete reports, handle in-person report drop-off, report rejections, compliance mailings and calls and data audits.

- Office Associate II (1 position): Will have similar duties to the Office Associate II listed below. Will be based out of our Augusta office and will be cross-trained to assist our Licensing Department when help is needed.
- Office Associate II: Primary contact for incomplete reports, rejects reports, primary contact for compliance and reporting questions, notifies new harvesters of reporting requirements, assists with audit research.

New MEDMR Landings Program staff to be funded by ACCSP grant:

- Marine Resource Specialist II (2 positions): Help run data audits and correct erroneous data, primary data audit researcher for dealer vs harvester audits and will assist the Marine Resource Scientist I's with any industry technical outreach questions.
- Office Associate II (2 positions): Will have similar duties to the Office Associate II listed above that is currently staffed by Kristina Lewis). This position will be based out of our West Boothbay Harbor office.

The MEDMR decided against the idea to ramp up from the current number of harvesters selected to report to 100% reporting. It was determined the best way forward is to go directly to 100% harvester reporting. For MEDMR to provide excellent customer service from the beginning, the number of positions proposed were what we felt necessary to provide the best level of customer service while being as fiscally responsible as possible. Each position created was a limited period position and each year MEDMR will evaluate these positions to determine if they are still needed. We anticipate that by year 3 to 5 we might be able to reduce the number of positions as harvesters become more versed with the reporting programs.

Finding funding to help defray the costs for this federally mandated requirement is something that the MEDMR has been looking for and will continue to look for. MEDMR will also look for ways to bring the overall costs down through either staff reductions as the program evolves or any and all in-house or outside sources. MEDMR will continue to look at ways to streamline the Landings Program's operation and will continue to try and automate as many processes (compliance and audits for instance) that will cut down on staffing needs. The extra staff included in this proposal will assist with the initial roll out and anticipated help that industry will need and the ability to assist industry within a reasonable amount of time to answer their questions.

It is essential that this harvester reporting program continue to meet funding needs, which are born as a result of ASMFC's requirement that MEDMR collect trip level harvester reports from 100% of all licensed commercial lobster harvesters. The implementation of new lobster fishery regulations in the Atlantic Large Whale Take Reduction Plan to reduce the threat of entanglement to endangered right whales is expediting the timeframe to increase reporting to 100% faster than Addendum XXVI required**. Requiring 100% lobster reporting will add another tool for monitoring Maine's commercial fisheries, which are large and economically important to the U.S. seafood industry.** According to the NMFS commercial fisheries database (as of 5/29/2024), Maine was ranked as the highest state on the Atlantic Coast in commercial value ($630.7 million of which $464.4 million were lobster) and fourth highest in whole pounds landed (198.4 million of which 93.73 million were lobster) in 2023. **This comprehensive harvester reporting program also addresses ASMFC compliance issues for several fisheries, including American lobster, Atlantic herring, American eel and Atlantic menhaden.**

This grant does not include any funding for the offline mobile harvester reporting application. The MEDMR has fully funded the original programming, programmatic updates and maintenance costs associated with this project. The MEDMR will continue to fund the monthly maintenance fees. MEDMR will continue to try to identify alternative sources of funding for the harvester reporting project, but the

State of Maine is continuing to face budget challenges and there are few options for state funding to cover the total cost.

Results and Benefits:

The data collected so far through MEDMR's harvester reporting program have shown how valuable this information is for Maine's fisheries. **Currently MEDMR requires 14 fisheries to submit trip level harvester reports and prior to 2023, lobster was the only fishery not collecting 100% of harvester trips (Figure 3 shows all non-confidential fisheries trips reported over past 5 years). Maine's commercial lobster fishery is by far the largest lobster fishery on the East Coast in both volume and number of individuals.** There are just under 5,400 licensed harvesters of which MEDMR previously selected between 380 and 800 harvesters each year to report. Even with selecting only a percentage of harvesters in the lobster industry, MEDMR scientists have learned more about the fleet characteristics, gear configurations and fishing patters for full time and part time fishermen involved in this fishery than they have been able to with the current sampling programs. Other fishery managers are now analyzing landings data to learn more about the fishing fleet and the makeup of other fisheries. **Requiring 100% reporting will only increase the MEDMR's knowledge base and increase the amount of data collected. Since most data will be submitted to SAFIS and all data stored in the ACCSP Warehouse, this large dataset will be available to all partners.**

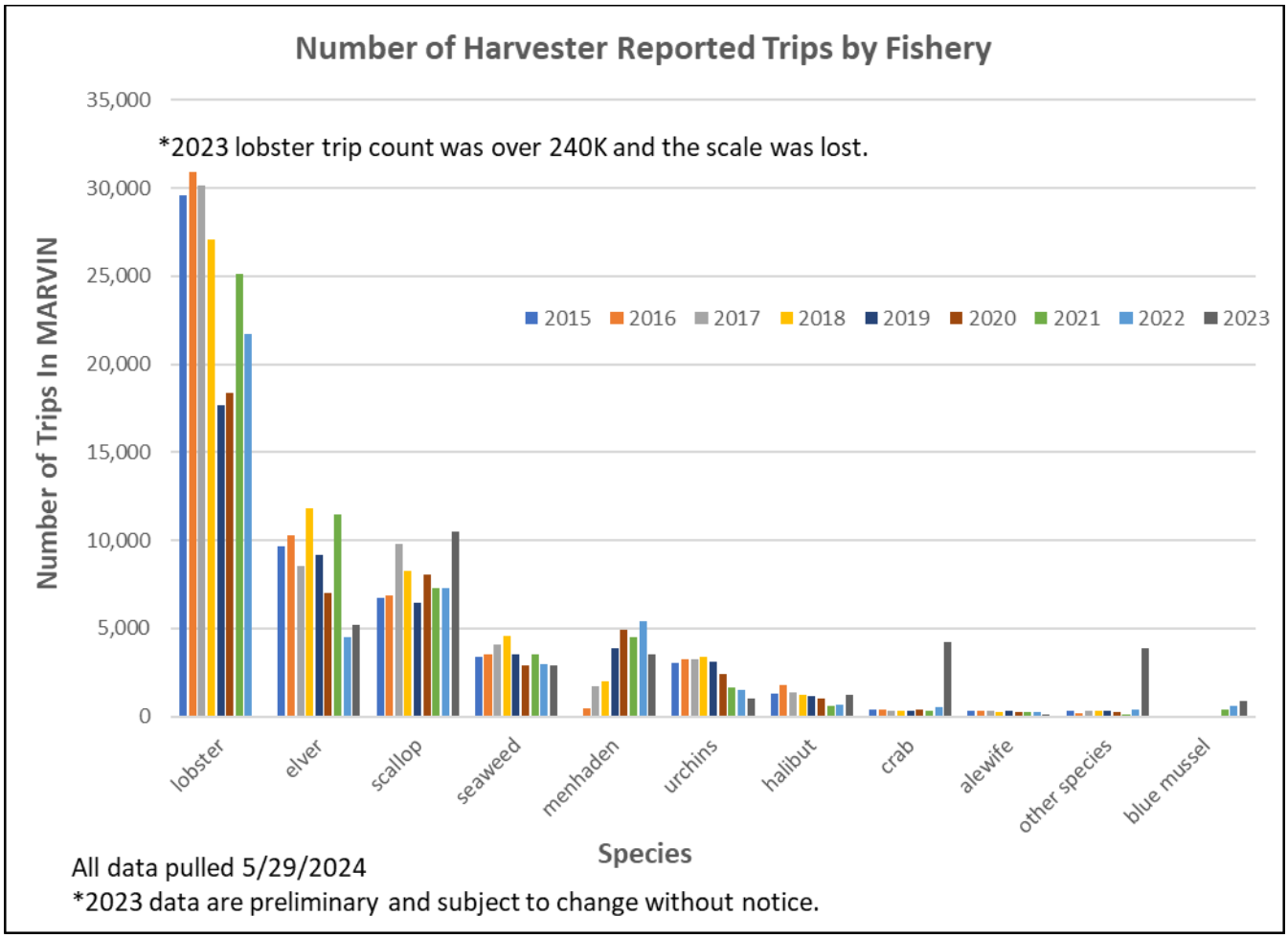


Figure 3: Number of Harvester Reported Trips by Fishery from Harvester Data

This grant will continue to allow MEDMR to meet ASMFC's Addendum XXVI target of 100% harvester reporting in the lobster fishery by January 2024. MEDMR wanted to speed up this deadline for protected

species issues and required 100% trip level reporting in the lobster fishery in January 2023. This grant will allow MEDMR the ability to continue to fund positions needed to ensure the data collected are as accurate as possible through more data auditing, especially linking dealer and harvester reports together though our "dealer vs harvester reporting" audits where we match up each harvester report to the dealer report and their total landings are scrutinized. MEDMR staff's ability to audit the spatial data while overlapping effort data has also provided fisheries managers with a level of certainty that was previously unattainable. Addendum XXVI does not necessarily require 100% electronic reporting; however, MEDMR has required nearly 100% lobster harvester electronic reporting and know that harvesters in other fisheries were looking to move from paper reporting to electronic reporting. MEDMR anticipates that harvesters that report on paper will be offset by those that have reported on paper but will be required to switch to an electronic reporting option and the data entry staff currently employed will be sufficient. Staff are fielding more calls each day asking about electronic reporting and are promoting our Maine LEEDS and VESL online reporting, but most want a mobile friendly reporting option. **MEDMR is already uploading data reported to MARVIN to ACCSP every six months and intends to start uploading every other month; which benefits all partners.**

Metadata for the harvester program will be updated as needed according to the Federal Geographic Data Committee (FGDC) and the Content Standard for Digital Geospatial Metadata (CSDGM) standards where appropriate. The resulting metadata will be reported to ACCSP as text and XML.

This project will help MEDMR meet the data collection standards of ACCSP. All partners will benefit, as all data will be uploaded to ACCSP and many of the species landed in Maine have a broad geographic range which includes many other agencies in their management. Partners will benefit from the technologies built and lessons learned from the offline harvester reporting application MEDMR intends to have in production by early summer as this will be available to any partner.

Approach:

1. Enforce compliance

MEDMR staff will enforce compliance of the trip level reporting regulation through these methods:

- **Provide initial outreach and technical support needed for harvesters to report trip level landings to MEDMR. Meet with harvesters in a group setting and one on one as needed to explain reporting procedures, install application, troubleshoot issues with reporting, and explain consequences for failing to report.**
- **Review paper reports submitted for completeness and verify the submissions in Maine LEEDS. If reports are incomplete, MEDMR will contact industry to correct reporting mistakes. If a harvester cannot be contacted by phone, the report will be returned for correction. Reports submitted electronically are deemed complete upon submission. If during the data audit process reports are unable to be reconciled, MEDMR staff will reject the electronic report back to the harvester for correction and re-submission.**
- **Send delinquent harvesters not included in the suspension process emails indicating what they are missing and send automated notifications within the Maine LEEDS program when a report is received or not.**
- **Complete suspension notices monthly to those harvesters involved in the halibut, herring, menhaden and elver fisheries that are delinquent enough to meet the minimum notification criteria as outlined in the suspension law (Attachment 4).**
- **Complete follow-up suspension notices monthly to those harvesters that are delinquent enough to meet the minimum notification criteria as outlined in the suspension law (Attachment 4).**
- **MEDMR will suspend harvester licenses for those who fail to report in a timely manner. See Attachment 4 for the law, which dictates suspension procedures MEDMR will follow.**

2. Data entry

Paper reports and electronic reports entered through the Maine LEEDS system will go directly into MARVIN and then uploaded to the ACCSP Warehouse at least every 6 months once it has been thoroughly audited.

The harvester reporting application MEDMR contracted to have built by Bluefin Data LLC includes point of entry validations for harvester, vessel, gear, gear to various other variables (i.e. fisheries, gear quantities), gear quantities, locations, pounds, dispositions for example. The data entered through these new applications will utilize ACCSP's API and all data will be submitted directly into SAFIS.

3. Encourage electronic reporting

MEDMR staff will require lobster, menhaden, scallop, halibut and herring harvesters to report electronically and encourage harvesters who report on paper for other fisherites to report using one of the two electronic reporting methods MEDMR will offer (Maine LEEDS or our own Offline Electronic Reporting Application). MEDMR staff will train all harvesters who are required to report electronically regardless if they have reporting obligations to NOAA or not.

MEDMR believes that electronic reporting will benefit industry as much as it benefits MEDMR. If harvesters enter their own data through the MEDMR proposed application, they will have the ability to run basic analytics within the application to view their own trends and harvest information. MEDMR will benefit by reducing the amount of staff time spent entering data. If MEDMR was not able to offer an electronic reporting option, the number of data entry staff required to handle approximately 280,000 records per year would be at least 7 or 8 individuals in addition to what is currently proposed. Electronic reporting will not only save MEDMR staff data entry time, we will be able to automate many of our daily reporting processes, include data validation at the point of harvester entry and automate compliance and spend more time on data audits and outreach with industry.

4. Continue outreach with industry to promote buy-in.

MEDMR staff will continue to work with harvesters to explain the purpose and benefits of harvester reporting. MEDMR staff spent three days at the annual Fishermen's Forum in March 2024 and were available to assist harvesters with setting up and demonstrating the two reporting options MEDMR are currently offering (VESL and Maine LEEDS). These three days were very successful with staff directly assisting over 100 individuals and providing information to others that were not quite ready to start fishing and just wanted to see what was available. MEDMR in 2023 held six meetings along the coast of Maine to assist harvesters with setting up their reporting software or answer questions. All six sessions were very successful and heavily attended. MEDMR staff are available by phone or video calls Monday – Friday from 8 to 4:30 but many harvesters need the extra help of someone in person to guide them through the initial set up and first few reports. Many of these individuals have little to no experience with smartphones, tablets or computers so the learning curve can be steep. MEDMR staff have also added resources on our Landings Program homepage (https://www.maine.gov/dmr/fisheries/commercial/landings-program) to assist harvesters with reporting questions. Currently we have "how-to" guides for each fishery available and will be uploading videos to help assist harvesters. Before the 100% reporting became a requirement staff (along with staff from GARFO and Bluefin Data LLC) attended the annual Maine Fishermen's Forum in March 2020 to facilitate an electronic reporting discussion. This discussion allowed MEDMR, GARFO and Bluefin Data LLC an opportunity to show harvesters the current and future electronic reporting options that are/will be available. The session was lightly attended but helped formulate ideas of how to improve this important part of outreach. In addition to the in-person trainings we have offered we will also utilize videos and remote outreach; however, there are times when it is most productive to hold a few large in-person

meetings to assist those that are not as tech savvy as others and are more comfortable having an in-person meeting. Having to on-board almost 5,400 new harvesters will require every tool we have in our toolbox. There are also areas in Maine where internet speeds and or connectivity are lacking so remote meetings are difficult (this is why we developed a reporting application that will work "offline"). We intend to rely heavily on remote meetings and self-help video and reporting how-to's to assist those individuals that are comfortable with that format but will continue to hold in-person meetings for those that need extra assistance. In addition to the above issues was the delay in NOAA requiring 100% lobster reporting until April 1, 2024. There are approximately 1,300 federally permitted lobster harvesters in Maine that also have a MEDMR commercial lobster license. The majority of these 1,300 harvesters had no previous federal reporting experience and were not familiar with NOAA's different forms and terminology. MEDMR staff have been working closely with NOAA GARFO staff to help educate these harvesters and explain the differences from what harvesters were reporting as "state only" now that they are required to report to NOAA.

Staff will work with established industry organizations, such as the MEDMR advisory councils, lobster zone councils, and dealer and harvester associations to reiterate the program goals and show results of mandatory reporting. Staff will also focus on explaining the statutory authority for suspending licenses for those who fail to report on time, and how this will help gather more accurate data.

5. Audit of harvester data submitted.

Staff will audit data submitted bi-weekly. Paper data will be audited twice per month; electronic audits sent via email from SAFIS will be corrected weekly. SAFIS audits for "state-only" harvesters will be corrected through the VESL app by either industry or MEDMR staff. **Audits concerning federal harvesters will be vetted through the NMFS Northeast Region. MEDMR staff will audit electronic data submitted by federal harvesters because these harvesters submit data in order to also fulfill MEDMR reporting requirements. MEDMR performs basic audits of records to catch potential oversights from NMFS audits.** MEDMR also compares dealer-reported landings with harvester-reported landings and identifies both parties if there are any discrepancies. In these audits, MEDMR contacts dealers and harvesters when discrepancies are discovered and works to correct records or recover missing data.

MEDMR does intend to audit 100% of all individual records that are submitted. **Many of these audits will be simple gross audits (over the trip, gear quantity, spatial audits, etc.); however, the data submitted through the new mobile application have some validations built-in for pre-submission checks. Harvesters will not be able to enter certain gear/species combinations, certain dispositions for certain species and gear quantity checks for instance. The app also utilizes validations built into ACCSP's API (species/market/grade combos for instance) Many of these audits will be canned within the audit database and will be added to a routine check. Staff have been working on incorporating spatial audits to our routine. They have added gear configuration by area reported to these audits to catch any harvesters that might be reporting their gear configuration incorrectly based on the area they reported their activity. The dealer/harvester audits are performed annually and start by looking at yearly totals with a 2,000 pound discrepancy.** Dealer/harvester audits are not performed on a trip by trip basis.

6. Transmission of harvester data to ACCSP.

MEDMR will continue to upload harvester data from MARVIN to the ACCSP data warehouse once every two months. In each data feed, the following fields are uploaded to the warehouse according to ACCSP protocols: cf_license_nbr, iss_agency, trip_type, supplier_trip_id, port, state, coast_guard_nbr, state_reg_nbr, trip_start_date, trip_start_time, trip_end_date, trip_end_time, num_crew, num_anglers, vtr_number, vessel_permit, sub_trip_type, reporting_source, fuel_used, fuel_price, charter_fee, distance, in_state, area_code, sub_area_code, local_area_code, latitude, longitude, gear, lma, gear_quantity,

gear_sets, fishing_hours, hours_days, total_gear, gear_size, mesh_ring_length, mesh_ring_width, stretch_size, target_species, avg_depth, species_itis, disposition, market_code, grade_code, unit_of_measure, sale_disposition_flag, dealer_license_nbr, date_sold, reported_quantity, price, dea_iss_agency, catch_source, catch_latitude, catch_longitude, supplier_catch_id. MEDMR enters data daily and audits data weekly, so the data uploaded to the warehouse are a mix of pre- and post-audited records. MEDMR does not keep track of what percentage of the uploaded records are "reloads" due to errors, but simply reloads all the data in MARVIN to the warehouse once every three months. **In addition, the data supplied by the MEDMR offline mobile application will be sent directly to SAFIS daily.**

The MEDMR does not upload data from MARVIN to SAFIS because MEDMR staff continually audit data each week, so the data that are uploaded to the warehouse are a mix of pre- and post-audited records. The reloading of data from MARVIN to the Warehouse is an automated process that the MEDMR loads into a temporary table provided by the Warehouse. If we were to perform the same upload method to SAFIS we would need the ability to mass delete records from SAFIS (which we do not have the ability to do at this time) before records are reloaded to avoid creating duplicate records.

7. Report metadata to ACCSP.

Metadata will be created with ESRI ArcCatalog 10 in order to conform to the FGDC (Federal Geographic Data Committee) standards and specifications. As specified by the federal standard, MEDMR metadata will include the following main sections with detailed information on: identification information, data quality information, spatial data organization information, spatial reference information, entity and attribute information, distribution information, metadata reference information, citation information, time period information and contact information. Created metadata will be available in text and XML formats.

Geographic Location: Operations will be based out of Boothbay Harbor, Maine and the project will take place throughout Maine.

Milestone Schedule:

	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Enforce harvester compliance	X	X	X	X	X	X	X	X	X	X	X	X
2. Data enter harvester reports	X	X	X	X	X	X	X	X	X	X	X	X
3. Encourage electronic harvester reporting	X	X	X	X	X	X	X	X	X	X	X	X
4. Industry outreach to promote industry buy-in	X	X	X	X	X	X	X	X	X	X	X	X
5. Audit harvester data	X	X	X	X	X	X	X	X	X	X	X	X
6. Upload harvester data to ACCSP		X		X		X		X		X		X
7. Report metadata to ACCSP												X
8. Semi-annual reports						X						X
9. Annual reports												X

Table 3. Project Accomplishments Measurement:

Goal	Measurement	2019	2020*	2021	2022	2023*
Enforce Harvester Compliance	Number of compliance letters to harvesters	3,226	2,555	1,903	3,283	6,374
Enforce Harvester Compliance	Number of harvesters suspended for failing to report timely	447	421	560	628	257
Harvester Data Entry	Number of trip records by year landed in data warehouse	46,386	44,550	56,573	44,221	233,721
Harvester Data Entry	Number of positive trip records by year landed in MARVIN	48,843	47,136	65,026	49,984	175,475
Harvester Data Entry	Number of paper trip records entered in MARVIN	46,069	36,014	50,114	31,038	16,081
Harvester Data Entry	Number of electronic trip reports entered into Maine LEEDS	2,774	11,122	14,912	18,946	159,394
Harvester Data Entry	Number harvesters entering directly into Maine LEEDS	235	603	764	1,240	3,071
Harvester Data Entry	Number of electronic trip reports entered into VESL	-	-	352	3,297	86,152
Encourage Electronic Reporting	Number harvesters entering directly into VESL	-	-	15	170	1,428
Harvester Data Entry	Number of positive trip records by year landed in SAFIS	-	234	1,283	4,950	105,858
Encourage Electronic Reporting	Number of harvesters submitting positive reports in SAFIS	-	-	30	262	1,677
Transmit Harvester Data to Data Warehouse	Frequency of data submitted by year landed	1 time every 6 months	1 time every 6 months	1 time every 6 months	1 time every 6 months	1 time every 6 months
Outreach	Number of custom data requests	479	946	733	1,044	1,057
Outreach	Number of custom data requests from portal	-	362	667	648	692

*2023 data are incomplete at time of report creation.

Cost Summary: FY25 Managing 100% Lobster Harvester Reporting in Maine					
5/1/2025 - 4/30/2026					
Personnel[A]			**Description**		**Cost**
072002692	E. Patrick	Marine Resource Specialist II	full time position for 12 months		$39,053.01
072002693	Z. May	Marine Resource Specialist II			$39,053.01
072002705	M. Angelico	Office Associate II			$36,014.93
072002706	L. Schinhofen	Office Associate II			$36,014.93
				Subtotal	**$150,135.87**
Fringe Benefits[A]					
072002692	E. Patrick	Marine Resource Specialist II	Includes health, dental, workers comp, FICA, life insurance and retirement		$25,587.76
072002693	Z. May	Marine Resource Specialist II			$25,577.39
072002705	M. Angelico	Office Associate II			$23,410.96
072002706	L. Schinhofen	Office Associate II			$23,420.81
				Subtotal	**$97,996.91**
				Total Personnel	**$248,132.78**
Travel					
1 vehicle[B]			1 car * $377.34/mo * 12 mo		$4,528.08
Mileage fee			1 car * 1,150 mi per mo * $.1533/mi * 12 mo		$2,115.54
2 Overnight stays[C]			2* $150/night		$0.00
Per diem (includes extended days)			(2 overnights @ $65/day & 5 extended days @ $24/day		$250.00
				Total Travel	**$6,893.62**
Supplies					
Year labels			1,000 labels (500/box * 2 boxes * $15.00/box)		$30.00
Folder labels			1,000 labels (500/box * 12 boxes * $24.50/box)		$49.00
Other					
Telecommunication charges[D]			5 phones * $50/mo * 12 mo		$3,000.00
				Total Supplies	**$3,079.00**
				Subtotal	**$9,972.62**
Total Direct Costs					**$258,105.40**
Indirect Costs (30%)					**$77,431.62**
Total Award to DMR					**$335,537.01**

A: Cost includes salary and benefits, which are dictated by contract with State of Maine and are non-negotiable.
B: All state agencies must rent vehicles through state's Central Fleet Agency which is non-negotiable. Vehicle costs include the following services and costs: maintenance, repairs, insurance, and gasoline.
C: DMR staff meet with and train harvesters how to electronically report to DMR and/or NMFS.
D: One cell phone for each of the Scientist II, Scientist I (2) and Specialist II (2) working on the project.

Partner Contribution For ACCSP Purposes			
J. Waller	072001271	Scientist IV (7% time)	$11,739
R. Watts	072002431	Scientist III (25% time)	$39,528
L. White, Jr	072002453	Scientist II (25% time)	$40,902
E. Layland	072002398	Scientist I (25% time)	$27,562
D. Chase	072002540	Office Associate I (85% time)	$43,002
C. Bear	072002657	Office Associate I (50% time)	$32,404
D. Young	072002647	Office Associate II (25% time)	$22,713
			$217,850

Budget Narrative for FY2025 proposal:

Personnel and Fringe Benefits: The positions in this proposal (2 Marine Resource Specialist II and 2 Office Associate II). These positions are funded part-time (75%) by this award and are Department of Marine Resources' employees. Salary and benefits for this employee are dictated by the contract with the State of Maine and are non-negotiable. Benefits include retirement benefits, FICA, health insurance, dental insurance, workers compensation and life insurance. The benefits are determined by a formula the state uses which is variable dependent upon the position classification, the pay grade of the employee (e.g. the number of years the person has been employed by the State of Maine) and type of coverage the employee selects.

Travel: The Scientists and Specialists are the employees who will be travelling. The travel is for holding electronic harvester reporting workshops, visiting harvesters to install reporting software, training harvester staff how to electronically report or troubleshooting reporting problems. Staff provide harvesters with one-on-one training first via phone but then in person if individuals need further assistance with the reporting system and help troubleshoot electronic reporting problems. Travel occurs throughout the coast of Maine, although trips to the interior are unusual unless the harvester can only meet inland. These harvesters must be trained in the use of electronic reporting and in some cases a group informational setting will not be enough for some to learn how to report their landings information.

The monthly fee for the vehicle is dictated by contract with the State of Maine Central Fleet Agency; the fee is based on the type of vehicle leased, and the mileage fee is based on how many miles the car was driven the previous year. Because of this, the vehicle fees between projects may differ. This project has one Nissan Rogue SUV which is a state-owned vehicle that MEDMR leases from the State of Maine Central Fleet Agency.

Occasional extended day travel is necessary. If multiple harvester appointments to these remote areas are made for the same day, extended days may be necessary. The rates were calculated through the GSA website for posted rates.

Supplies: Filing supplies are needed each year but as more harvesters eventually shift to electronic reporting the need for filing supplies will decrease. The filing supplies include labels (year and name) and protective coatings for these labels. These are the same folders used for all MEDMR's harvester reports and are purchased from Allied Systems Products AAK Filing system.

Other: Cell phones for the Specialists and the Scientists are necessary for communication and safety when travelling to harvester meeting locations. Staff often need to call NMFS or the programmer when installing software or troubleshooting reporting issues in the field.

Indirect costs: The Department of Marine Resources has an indirect cost rate of 33.7%; however, our commissioner has authorized this proposal to use the lower rate of 30%. See Attachment 3 for the Negotiated Indirect Cost Agreement. These indirect funds are a necessity to help defray and offset the administrative costs associated with the ASMFC's directive to increase MEDMR's lobster reporting from its current rate to 100%. These indirect monies are utilized to help cover the administrative costs not covered directly by this grant proposal and help offset any burden MEDMR assumes with fulfilling their ASMFC reporting requirements.

Cost Summary: FY24 Managing 100% Lobster Harvester Reporting in Maine						
5/1/2024 - 4/30/2025						
Personnel[A]				**Description**		**Cost**
	072002692	E. Patrick	Marine Resource Specialist II	full time position for 12 months		$37,260.66
	072002693	Z. May	Marine Resource Specialist II			$37,260.66
	072002705	M. Angelico	Office Associate II			$37,495.13
	072002706	L. Schinhofen	Office Associate II			$37,495.13
					Subtotal	**$149,511.59**
Fringe Benefits[A]						
	072002692	E. Patrick	Marine Resource Specialist II	Includes health, dental, workers comp, FICA, life insurance and retirement		$24,553.58
	072002693	Z. May	Marine Resource Specialist II			$24,533.17
	072002705	M. Angelico	Office Associate II			$24,635.70
	072002706	L. Schinhofen	Office Associate II			$24,640.32
					Subtotal	**$98,362.76**
					Total Personnel	**$247,874.35**
Travel						
	1 vehicle[B]			1 car * $377.34/mo * 12 mo		$4,528.08
	Mileage fee			1 car * 1,150 mi per mo * $.1533/mi * 12 mo		$2,115.54
	2 Overnight stays[C]			2* $150/night		$300.00
	Per diem (includes extended days)			(2 overnights @ $65/day & 5 extended days @ $24/day		$250.00
					Total Travel	**$7,193.62**
Supplies						
	Year labels			1,000 labels (500/box * 2 boxes * $15.00/box)		$30.00
	Folder labels			1,000 labels (500/box * 12 boxes * $24.50/box)		$49.00
Other						
	Telecommunication charges[D]			5 phones * $50/mo * 12 mo		$3,000.00
					Total Supplies	**$3,079.00**
					Subtotal	**$10,272.62**
	Total Direct Costs					**$258,146.97**
	Indirect Costs (30%)					**$77,444.09**
	Total Award to DMR					**$335,591.06**

A: Cost includes salary and benefits, which are dictated by contract with State of Maine and are non-negotiable.
B: All state agencies must rent vehicles through state's Central Fleet Agency which is non-negotiable. Vehicle costs include the following services and costs: maintenance, repairs, insurance, and gasoline.
C: DMR staff meet with and train harvesters how to electronically report to DMR and/or NMFS.
D: One cell phone for each of the Scientist II, Scientist I (2) and Specialist II (2) working on the project.

Partner Contribution For ACCSP Purposes			
J. Waller	072001271	Scientist IV (7% time)	$9,484
R. Watts	072002431	Scientist III (25% time)	$33,317
L. White, Jr	072002453	Scientist II (25% time)	$31,627
E. Layland	072002398	Scientist I (25% time)	$17,762
Vacant	072002540	Office Associate I (85% time)	$39,796
C. Young	072002657	Office Associate I (50% time)	$29,513
D. Young	072002647	Office Associate II (25% time)	$20,719
			$182,218

Budget Narrative for FY2024 proposal:

Personnel and Fringe Benefits: The positions in this proposal (2 Marine Resource Specialist II and 2 Office Associate II). These positions are funded part-time (90%) by this award and are a Department of Marine Resources' employees. Salary and benefits for this employee are dictated by contract with the State of Maine and are non-negotiable. Benefits include retirement benefits, FICA, health insurance, dental insurance, workers compensation and life insurance. The benefits are determined by a formula the state uses which is variable dependent upon the position classification, the pay grade of the employee (e.g. the number of years the person has been employed by the State of Maine) and type of coverage the employee selects.

Travel: The Scientists and Specialists are the employees who will be travelling. The travel is for holding electronic harvester reporting workshops, visiting harvesters to install reporting software, training harvester staff how to electronically report or troubleshooting reporting problems. Staff provide harvesters with one-on-one training first via phone but then in person if individuals need further assistance with the reporting system and help troubleshoot electronic reporting problems. Travel occurs throughout the coast of Maine, although trips to the interior are unusual unless the harvester can only meet inland. These harvesters must be trained in the use of electronic reporting and in some cases a group informational setting will not be enough for some to learn how to report their landings information.

The monthly fee for the vehicle is dictated by contract with the State of Maine Central Fleet Agency; the fee is based on the type of vehicle leased, and the mileage fee is based on how many miles the car was used the previous year. Because of this, the vehicle fees between projects may differ. This project has one Nissan Rogue SUV which is a state-owned vehicle that MEDMR leases from the State of Maine Central Fleet Agency.

Occasional extended day travel or overnight stays are necessary. If multiple harvester appointments to these remote areas are made for the same day, or appointments are made for consecutive days, overnight travel may be necessary. The rates were calculated through the GSA website for posted rates.

Supplies: Filing supplies are needed each year but as more harvesters eventually shift to electronic reporting the need for filing supplies will decrease. The filing supplies include labels (year and name) and protective coatings for these labels. These are the same folders used for all of MEDMR's harvester reports and are purchased from Allied Systems Products AAK Filing system.

Other: Cell phones for the Specialists and the Scientists are necessary for communication and safety when on travel to harvester meeting locations. Staff often needs to call NMFS or the programmer when installing software or troubleshooting reporting issues in the field.

Indirect costs: The Department of Marine Resources has an indirect cost rate of 32.83%; however, our Commissioner has authorized this proposal use the lower rate of 30%. See Attachment 3 for the Negotiated Indirect Cost Agreement. These indirect funds are a necessity to help defray and offset the administrative costs associated with the ASMFC's directive to increase MEDMR's lobster reporting from its current rate to 100%. These indirect monies are utilized to help cover the administrative costs not covered directly by this grant proposal and help offset any burden MEDMR assumes with fulfilling their ASMFC reporting requirements.

Cost Summary: FY22 Managing 100% Lobster Harvester Reporting in Maine				
5/1/2022 - 4/30/2023				
Personnel[A]		**Description**		**Cost**
	2 Marine Resource Specialist II (to be created)	full time position for 12 months	2 @ $40,816	$81,632.00
	2 Office Associate II (to be created)	full time position for 12 months	2 @ $34,361.60	$68,723.20
			Subtotal	**$150,355.20**
Fringe Benefits[A]				
	2 Marine Resource Specialist II (to be created)	Includes health, dental, workers comp, FICA, life	2 @ $24,490	$48,980.00
	2 Office Associate II (to be created)	insurance and retirement	2 @ $20,617	$41,234.00
			Subtotal	**$90,214.00**
			Total Personnel	**$240,569.20**
Travel				
	1 vehicle[B]	1 car * $377.34/mo * 12 mo		$4,528.08
	Mileage fee	1 car * 1,150 mi per mo * $.1533/mi * 12 mo		$2,115.54
	Toll allowance	Estimated		$200.00
	5 Overnight stays[C]	4* $150/night		$600.00
	Per diem (includes extended days)	(2 overnights @ $65/day & 5 extended days @ $24/day)		$250.00
			Total Travel	**$7,693.62**
Supplies				
	Year labels	1,000 labels (500/box * 2 boxes * $15.00/box)		$30.00
	Folder labels	1,000 labels (500/box * 12 boxes * $24.50/box)		$49.00
	AAK Color Coded Folders[D]	1,000 folders (50/box * 120 boxes * $23/box)		$460.00
Other				
	Printing and binding of harvester report forms	500 logbooks * $2.50 per logbook		$1,250.00
	Postage for logbooks	Mail 500 logbooks * $5.00 per logbook		$2,500.00
	Postage for info packets and letters	($0.55*1000 compliance letters)		$550.00
	Maine LEEDS enhancement programming			$2,100.00
	Telecommunication charges[E]	5 phones * $50/mo * 12 mo		$3,000.00
			Total Supplies	**$9,939.00**
			Subtotal	**$17,632.62**
	Total Direct Costs			**$258,201.82**
	Indirect Costs (30%)			**$77,460.55**
	Total Award to DMR			**$335,662.37**

A: Cost includes salary and benefits, which are dictated by contract with State of Maine and are non-negotiable.

B: All state agencies must rent vehicles through state's Central Fleet Agency which is non-negotiable. Vehicle costs include the following services and costs: maintenance, repairs, insurance, and gasoline.

C: DMR staff meet with and train harvesters how to electronically report to DMR and/or NMFS.

D: AAK Color Coded Folders are folders MEDMR uses for all harvester reporting, they are reusable but will need 2 years supply eventually.

E: One cell phone for each of the Scientist II, Scientist I (2) and Specialist II (2) working on the project.

Partner Contribution For ACCSP Purposes

Scientist IV (7% time)	$9,116
Scientist III (25% time)	$25,919
Scientist II (25% time)	$28,742
Specialist II (25% time)	$19,788
Office Associate I (85% time)	$66,322
Office Associate I (50% time)	$39,013
Office Associate II (25%)	$19,604
	$208,504

Budget Narrative for FY2022 proposal:

Personnel and Fringe Benefits: The new positions proposed in this proposal (2 Marine Resource Specialist II and 2 Office Associate II). These positions are funded full time (100%) by this award and are a Department of Marine Resources' employees. Salary and benefits for this employee are dictated by contract with the State of Maine and are non-negotiable. Benefits include retirement benefits, FICA, health insurance, dental insurance, workers compensation and life insurance. The benefits are determined by a formula the state uses which is variable dependent upon the position classification, the pay grade of the employee (e.g. the number of years the person has been employed by the State of Maine) and type of coverage the employee selects.

Travel: The Scientists and Specialists are the employees who will be travelling. The travel is for holding electronic harvester reporting workshops, visiting harvesters to install reporting software, training harvester staff how to electronically report or troubleshooting reporting problems. Staff provide harvesters with one-on-one training first via phone but then in person if individuals need further assistance with the reporting system and help troubleshoot electronic reporting problems. Travel occurs throughout the coast of Maine, although trips to the interior are unusual unless the harvester can only meet inland. These harvesters must be trained in the use of electronic reporting and in some cases a group informational setting will not be enough for some to learn how to report their landings information.

The monthly fee for the vehicle is dictated by contract with the State of Maine Central Fleet Agency; the fee is based on the type of vehicle leased, and the mileage fee is based on how many miles the car was used the previous year. Because of this, the vehicle fees between projects may differ. This project has one Nissan Rogue SUV which is a state-owned vehicle that MEDMR leases from the State of Maine Central Fleet Agency.

Occasional extended day travel or overnight stays are necessary. If multiple harvester appointments to these remote areas are made for the same day, or appointments are made for consecutive days, overnight travel may be necessary. The rates were calculated through the GSA website for posted rates.

Supplies: Filing supplies are needed each year but as more harvesters eventually shift to electronic reporting the need for filing supplies will decrease. The filing supplies include AAK folders used to store individuals log sheets, labels (year and name) and protective coatings for these labels. These are the same folders used for all of MEDMR's harvester reports and are purchased from Allied Systems Products AAK Filing system.

Other: The MEDMR will try and push electronic reporting as much as possible and will require waivers to report on paper for lobster reporting. To help cut down on costs, MEDMR will try and have harvesters print their own paper forms when necessary from the MEDMR website. We do accept forms via email, fax or U.S. mail. The bound logbook includes a carbon copy that harvesters use for their records, or to resend should the original gets lost in the mail. Many harvesters like this carbon copy feature, which is one of the main reasons why we choose to continue to purchase these bound logbooks. Cell phones for the Specialists and the Scientists are necessary for communication and safety when on travel to harvester meeting locations. Staff often needs to call NMFS or the programmer when installing software or troubleshooting reporting issues in the field. The line for Maine LEEDS enhancement programming is to cover any programmatic cost associated with enhancements identified by MEDMR's once the new 100% reporting requirement is put in place. MEDMR anticipates that after the compliance enhancement is in place, other features that will be a large time saver for MEDMR will be identified.

Indirect costs: The Department of Marine Resources has an indirect cost rate of 34.3%; however, our Commissioner has authorized this proposal use the lower rate of 30%. See Attachment 3 for the Negotiated Indirect Cost Agreement. These indirect funds are a necessity to help defray and offset the administrative costs associated with the ASMFC's directive to increase MEDMR's lobster reporting from its current rate to 100%. These indirect monies are utilized to help cover the administrative costs not covered directly by this grant proposal and help offset any burden MEDMR assumes with fulfilling their ASMFC reporting requirements.

Cost Summary: FY21 Managing 100% Lobster Harvester Reporting in Maine (Proposal Withdrawn at Operations Fall Meeting) 5/1/2021 - 4/30/2022			
Personnel[A]	**Description**		**Cost**
2 Marine Resource Specialist II (to be created)	full time position for 12 months	2 @ $37,766	$75,532.00
1 Office Associate II (Alice Mayberry)	full time position for 12 months	1 @ $45,553.89	$45,553.89
1 Office Associate II (to be created)	full time position for 12 months	1 @ $33,289	$33,289.00
		Subtotal	**$154,374.89**
Fringe Benefits[A]			
2 Marine Resource Specialist II (to be created)	Includes health, dental, workers comp, FICA, life insurance and retirement	2 @ $21,652	$43,304.00
1 Office Associate II (Alice Mayberry)		1 @ $26,116.81	$26,116.81
1 Office Associate II (to be created)		1 @ $19,085	$19,085.00
		Subtotal	**$88,505.81**
		Total Personnel	**$242,880.70**
Travel			
1 vehicle[B]	1 car * $377.34/mo * 12 mo		$4,528.08
Mileage fee	1 car * 1,150 mi per mo * $.1533/mi * 12 mo		$2,115.54
Toll allowance	Estimated		$200.00
5 Overnight stays[C]	6* $150/night		$900.00
Per diem (includes extended days)	(6 overnights @ $65/day & 36 extended days @ $24/day)		$1,254.00
		Total Travel	**$8,997.62**
Supplies			
Year labels	1,000 labels (500/box * 2 boxes * $13.95/box)		$27.90
Folder labels	1,000 labels (500/box * 12 boxes * $24.50/box)		$49.00
AAK Color Coded Folders[D]	1,000 folders (50/box * 120 boxes * $23/box)		$460.00
Other			
Printing and binding of harvester report forms	1000 logbooks * $2.50 per logbook		$2,500.00
Postage for logbooks	Mail 1000 logbooks * $5.00 per logbook		$5,000.00
Postage for info packets and letters	($0.55*3250 compliance letters)		$1,787.50
Maine LEEDS enhancement programming			$28,000.00
Telecommunication charges[E]	5 phones * $40/mo * 12 mo		$2,400.00
		Total Supplies	**$40,224.40**
		Subtotal	**$49,222.02**
Total Direct Costs			**$292,102.72**
Indirect Costs (15%)			**$43,815.41**
Total Award to DMR			**$335,918.13**

A: Cost includes salary and benefits, which are dictated by contract with State of Maine and are non-negotiable.
B: All state agencies must rent vehicles through state's Central Fleet Agency which is non-negotiable. Vehicle costs include the following services and costs: maintenance, repairs, insurance, and gasoline.
C: DMR staff meet with and train harvesters how to electronically report to DMR and/or NMFS.
D: AAK Color Coded Folders are folders MEDMR uses for all harvester reporting, they are reusable but will need 2 years supply eventually.
E: One cell phone for each of the Scientist II, Scientist I (2) and Specialist II (2) working on the project.

Partner Contribution For ACCSP Purposes

Scientist IV (7% time)	$9,116
Scientist III (25% time)	$25,919
Scientist II (25% time)	$28,742
Specialist II (25% time)	$19,788
Office Associate I (85% time)	$66,322
Office Associate I (50% time)	$39,013
Office Associate II (25%)	$19,604
Mobile Harvester Reporting App Development	$32,050
	$240,554

Budget Narrative for FY2021 proposal (Proposal withdrawn at Operations Committee Meeting 9/2020:

Personnel and Fringe Benefits: The new positions proposed in this proposal (2 Marine Resource Specialist II and 1 Office Associate II) and current Office Associate II (currently filled by Alice Mayberry). These positions are funded full time (100%) by this award and are a Department of Marine Resources' employees. Salary and benefits for this employee are dictated by contract with the State of Maine and are non-negotiable. Benefits include retirement benefits, FICA, health insurance, dental insurance, workers compensation and life insurance. The benefits are determined by a formula the state uses which is variable dependent upon the position classification, the pay grade of the employee (e.g. the number of years the person has been employed by the State of Maine) and type of coverage the employee selects.

Travel: The Scientists and Specialists are the employees who will be travelling. The travel is for holding electronic harvester reporting workshops, visiting harvesters to install reporting software, training harvester staff how to electronically report or troubleshooting reporting problems. Staff provide harvesters with one-on-one training first via phone but then in person if individuals need further assistance with the reporting system and help troubleshoot electronic reporting problems. Travel occurs throughout the coast of Maine, although trips to the interior are unusual unless the harvester can only meet inland. These harvesters must be trained in the use of electronic reporting and in some cases a group informational setting will not be enough for some to learn how to report their landings information.

The monthly fee for the vehicle is dictated by contract with the State of Maine Central Fleet Agency; the fee is based on the type of vehicle leased, and the mileage fee is based on how many miles the car was used the previous year. Because of this, the vehicle fees between projects may differ. This project has one Nissan Rogue SUV which is a state-owned vehicle that MEDMR leases from the State of Maine Central Fleet Agency.

Occasional extended day travel or overnight stays are necessary. If multiple harvester appointments to these remote areas are made for the same day, or appointments are made for consecutive days, overnight travel may be necessary. The rates were calculated through the GSA website for posted rates.

Supplies: Filing supplies are needed each year but as more harvesters eventually shift to electronic reporting the need for filing supplies will decrease. The filing supplies include AAK folders used to store individuals log sheets, labels (year and name) and protective coatings for these labels. These are the same folders used for all of MEDMR's harvester reports and are purchased from Allied Systems Products AAK Filing system.

Other: The MEDMR will try and push electronic reporting as much as possible and will require waivers to report on paper for lobster reporting. To help cut down on costs, MEDMR will try and have harvesters print their own paper forms when necessary from the MEDMR website. We do accept forms via email, fax or U.S. mail. The bound logbook includes a carbon copy that harvesters use for their records, or to resend should the original gets lost in the mail. Many harvesters like this carbon copy feature, which is one of the main reasons why we choose to continue to purchase these bound logbooks. Cell phones for the Specialists and the Scientists are necessary for communication and safety when on travel to harvester meeting locations. Staff often needs to call NMFS or the programmer when installing software or troubleshooting reporting issues in the field. The line for Maine LEEDS enhancement programming is to cover any programmatic cost associated with enhancements identified by MEDMR's once the new 100% reporting requirement is put in place. MEDMR anticipates that after the compliance enhancement is in place, other features that will be a large time saver for MEDMR will be identified.

Indirect costs: The Department of Marine Resources has an indirect cost rate of 34.3%; however, our Commissioner has authorized this proposal use the lower rate of 15%. See Attachment 3 for the Negotiated Indirect Cost Agreement. These indirect funds are a necessity to help defray and offset the administrative costs associated with the ASMFC's directive to increase MEDMR's lobster reporting from its current rate to 100%. These indirect monies are utilized to help cover the administrative costs not covered directly by this grant proposal and help offset any burden MEDMR assumes with fulfilling their ASMFC reporting requirements.

Cost Summary: FY20 Managing 100% Lobster Harvester Reporting in Maine			
3/1/2020 - 2/28/2021			
Personnel[A]	**Description**		**Cost**
1 Marine Resource Scientist II (to be created)	full time position for 12 months	1 @ $50,079	$50,079
2 Marine Resource Scientist I (to be created	full time position for 12 months	2 @ $45,340	$90,680
2 Marine Resource Specialist II (to be created)	full time position for 12 months	2 @ $37,849	$75,698
2 Office Specialist I Supervisory (to be created)	full time position for 12 months	2 @ $36,234	$72,468
1 Office Specialist I (to be created)	full time position for 12 months	1 @ $34,424	$34,424
1 Office Associate II (to be created)	full time position for 12 months	1 @ $31,741	$31,741
		Subtotal	**$355,090**
Fringe Benefits[A]			
1 Marine Resource Scientist II (to be created)	Includes health, dental, workers comp, FICA, life insurance and retirement		$32,551
2 Marine Resource Scientist I (to be created			$58,942
2 Marine Resource Specialist II (to be created)			$49,204
2 Office Specialist I Supervisory (to be created)			$47,104
1 Office Specialist I (to be created)			$22,376
1 Office Associate II (to be created)			$20,632
		Subtotal	**$230,809**
		Total Personnel	**$585,899**
Travel			
1 vehicle[B]	1 car * $188.67/mo * 12 mo		$2,264
Mileage fee	1 car * 1,000 mi per mo * $.1533/mi * 12 mo		$1,840
Toll allowance	Estimated		$100
5 Overnight stays[C]	5* $150/night		$750
Per diem (includes extended days)	(5 overnights + 5 extended days) * $65/day		$650
		Total Travel	**$5,604**
Supplies			
Filing Supplies	folders, folder labels, year labels		$500
Other			
Printing and binding of harvester report forms	1000 logbooks * $2.50 per logbook		$2,500
Postage for logbooks	Mail 1000 logbooks * $4.75 per logbook		$2,375
Postage for info packets and letters	($0.50*3250 compliance letters)		$1,625
Software (Adobe DC Professional)	8 copies at $329.65/copy		$2,637
Technology (equipment, licenses)			$500
Enhancements to Maine LEEDS system	Automate compliance for electronic reporting		$40,000
Telecommunication charges[D]	5 phones * $40/mo * 12 mo		$2,400
		Total Supplies	**$52,537**
		Subtotal	**$58,141**
Total Direct Costs			**$644,039**
Indirect Costs (30%)			**$193,212**
Total Award to DMR			**$837,251**

A: Cost includes salary and benefits, which are dictated by contract with State of Maine and are non-negotiable.

B: All state agencies must rent vehicles through state's Central Fleet Agency which is non-negotiable. Vehicle costs include the following services and costs: maintenance, repairs, insurance, and gasoline.

C: DMR staff meet with and train harvesters how to electronically report to DMR and/or NMFS.

D: One cell phone for each of the two specialists, one each for the two scientists and one scientist II working on the project.

Partner Contribution For ACCSP Purposes	
Scientist IV (7% time)	$9,115
Scientist III (25% time)	$24,542
Scientist II (25% time)	$26,854
Specialist II (25% time)	$18,710
Office Associate I (85% time)	$47,568
Office Associate I (50% time)	$37,191
Office Associate II (50%)	$32,813
Office Associate II (15%)	$10,531
Office Associate II (15%)	$9,750
Office Associate II (15%)	$8,513
Office Associate II (100%)	$65,626
Mobile Harvester Reporting App Development	$150,000
	$441,211

Budget Narrative for FY2020 proposal:

Personnel and Fringe Benefits: The new positions proposed in this proposal (1 Marine Resource Scientist II, 2 Marine Resource Scientist I, 2 Marine Resource Specialist II, 2 Office Specialist I Supervisory, 1 Office Specialist I and 1 Office Associate II). These positions are funded full time (100%) by this award and are a Department of Marine Resources' employees. Salary and benefits for this employee are dictated by contract with the State of Maine and are non-negotiable. Benefits include retirement benefits, FICA, health insurance, dental insurance, workers compensation and life insurance. The benefits are determined by a formula the state uses which is variable dependent upon the position classification, the pay grade of the employee (e.g. the number of years the person has been employed by the State of Maine) and type of coverage the employee selects.

Travel: The Scientists and Specialists are the employees who will be travelling. The travel is for holding electronic harvester reporting workshops, visiting harvesters to install reporting software, training harvester staff how to electronically report or troubleshooting reporting problems. Staff provide harvesters with one-on-one training first via phone but then in person if individuals need further assistance with the reporting system and help troubleshoot electronic reporting problems. Travel occurs throughout the coast of Maine, although trips to the interior are unusual unless the harvester can only meet inland. These harvesters must be trained in the use of electronic reporting and in some cases a group informational setting will not be enough for some to learn how to report their landings information.

The monthly fee for the vehicle is dictated by contract with the State of Maine Central Fleet Agency; the fee is based on the type of vehicle leased, and the mileage fee is based on how many miles the car was used the previous year. Because of this, the vehicle fees between projects may differ. This project has one Nissan Rogue SUV which is a state-owned vehicle that MEDMR leases from the State of Maine Central Fleet Agency.

Occasional extended day travel or overnight stays are necessary. If multiple harvester appointments to these remote areas are made for the same day, or appointments are made for consecutive days, overnight travel may be necessary. The rates were calculated through the GSA website for posted rates.

Supplies: Filing supplies are needed each year but as more harvesters eventually shift to electronic reporting the need for filing supplies will decrease. The filing supplies include folders used to store individuals log sheets, labels (year and name) and protective coatings for these labels.

Other: The MEDMR will try and push electronic reporting as much as possible and will require waivers to report on

paper for lobster reporting. To help cut down on costs, MEDMR will try and have harvesters print their own paper forms when necessary from the MEDMR website. We do accept forms via email, fax or U.S. mail. The bound logbook includes a carbon copy that harvesters use for their records, or to resend should the original gets lost in the mail. Many harvesters like this carbon copy feature, which is one of the main reasons why we choose to continue to purchase these bound logbooks. Cell phones for the Specialists and the Scientists are necessary for communication and safety when on travel to harvester meeting locations. Staff often needs to call NMFS or the programmer when installing software or troubleshooting reporting issues in the field. All Landings Program staff use Adobe DC Pro to enter or audit paper reports or .PDF's that have been received electronically. The cost for this program has been set by our OIT Department. The line for Maine LEEDS enhancement is the programmatic cost to streamline MEDMR's compliance with harvester data submitted to SAFIS. MEDMR will need to create a SQL Server table to pull any data submitted by a harvester from the ACCSP Warehouse with Maine permits and flip their Maine LEEDS compliance record to submitted. This feature will be a large time saver for MEDMR and will save at least one full-time staff position.

Indirect costs: The Department of Marine Resources has an indirect cost rate of 30%. See Attachment 3 for the Negotiated Indirect Cost Agreement. These indirect funds are a necessity to help defray and offset the administrative costs associated with the ASMFC's directive to increase MEDMR's lobster reporting from its current rate to 100%. The anticipated increase to ~300,000 new harvester records and overall ~700,000 records (dealer and harvester) supplied to ACCSP's Data Warehouse will account for roughly 42% of all reports stored in the Data Warehouse. The increase in harvester reports received by MEDMR will be roughly 538%. These indirect monies are utilized to help cover the administrative costs not covered directly by this grant proposal and help offset any burden MEDMR assumes with fulfilling their ASMFC reporting requirements.

Attachment 1. Project History

Fund Year	Title	Cost	Extension through	Actual dates funding covered	Results
2020	FY20- Managing 100% Lobster Harvester Reporting in Maine	$336,120	Apr-22	May 2020 – Apr 2021	Start preparting for MEDMR to move from mandatory 10% lobster harvester reporting to 100% lobster. Work on enhancement to Maine LEEDS program and continue work on app development.
2021	FY21- Managing 100% Lobster Harvester Reporting in Maine	$335,918.13 (withdrawn)		May 2021 – Apr 2022	Continue preperations for MEDMR to move from mandatory 10% lobster harvester reporting to 100% lobster. Finalize enhancement to Maine LEEDS program, outreach with industry and rolling out MEDMR's offline harvester application built by Bluefin Data LLC.
2022	FY22- Managing 100% Lobster Harvester Reporting in Maine	$335,662		May 2022 – Apr 2023	Final preperations before 100% reporting requirement is implemented in January 2023. Continue with outreach, audits and implementing reporting requirements.
2023	FY23- Managing 100% Lobster Harvester Reporting in Maine	No Proposal Submitted		May 2023 – Apr 2024	100% reporting requirement implemented in January 2023. Continue with outreach, audits and implementing reporting requirements. Utilized funds from FY20 and FY22 before asking for more funds.
2024	FY24- Managing 100% Lobster Harvester Reporting in Maine	$335,591		May 2024 – Apr 2025	Continue with 100% reporting requirement. Assist with GARFO harvesters once NOAA implements 100% lobster reporting in April 2024. Continue with outreach, audits and implementing reporting requirements.
2025	FY25- Managing 100% Lobster Harvester Reporting in Maine	$335,591		May 2025 – Apr 2026	Continue with 100% reporting requirement. Continue with outreach, audits and implementing reporting requirements.

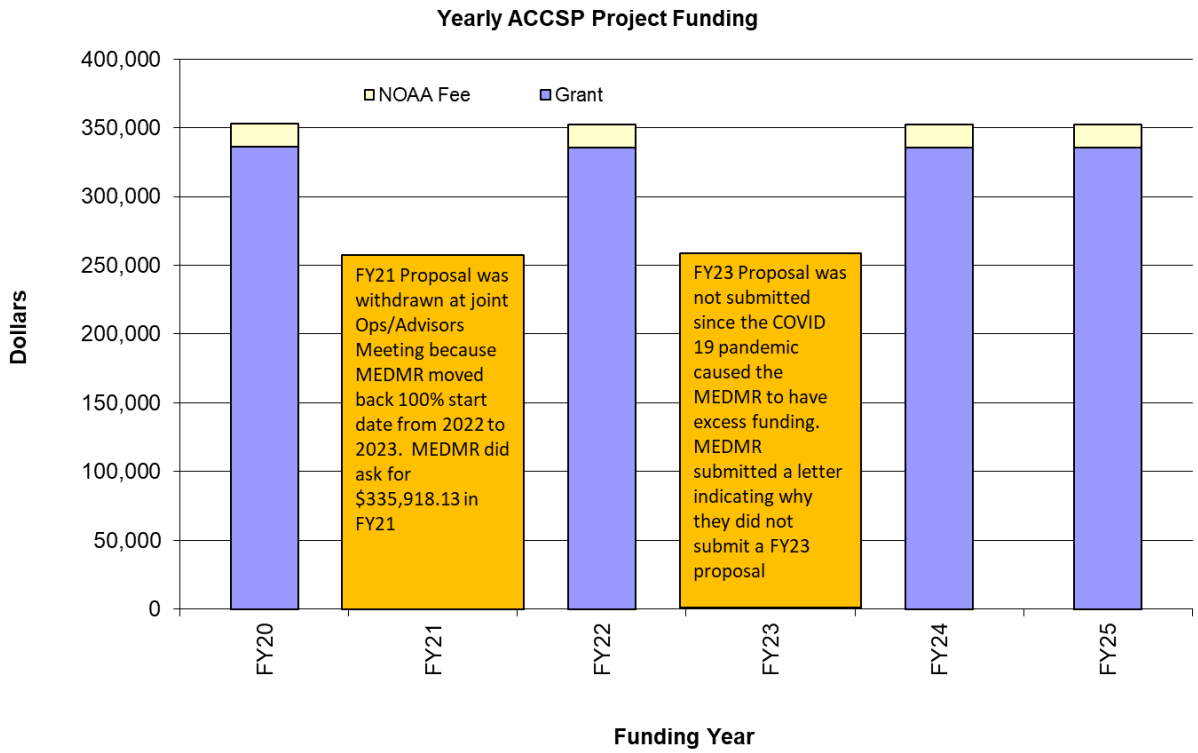


Figure 4. Project Funding History

Attachment 2: Negotiated Indirect Cost Agreement and Letter of Acknowledgement

U.S. Department of Commerce
Office of Acquisition Management – Grants Management Division
1401 Constitution Ave., NW, HCHB Rm 6412
Washington, DC 20230, Attn: Indirect Cost Program

CERTIFICATE OF INDIRECT COSTS

This is to certify that I have reviewed the indirect cost rate proposal prepared and maintained herewith and to the best of my knowledge and belief:

(1) All costs included in this proposal dated 06/08/2023 to establish indirect cost billing rates for July 1, 2023 through June 30, 2024 are allowable in accordance with the requirements of the federal awards to which they apply and 2 CFR Part 200 , "Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards". This proposal does not include any costs which are unallowable as identified in the applicable federal cost principles. For example, advertising contributions and donations, bad debts, entertainment costs or fines and penalties.

(2) All costs included in this proposal are properly allocable to federal awards on the basis of a beneficial or causal relationship between the expenses incurred and the agreements to which they are allocated in accordance with applicable requirements. Further, the same costs that have been treated as indirect costs have not been claimed as direct costs. Similar types of costs have been accounted for consistently and the Federal Government will be notified of any accounting changes that could affect the rate.

(3) The indirect cost rate calculated within the proposal is 33.70%, which was calculated using an indirect cost rate base type of Modified Total Direct Costs. The calculations were based on actual costs from fiscal year July 1, 2021 thru June 30, 2022 to obtain a federal indirect cost billing rate for fiscal year beginning July 1, 2023.

Subject to the provisions of the Program Fraud Civil Remedies Act of 1986, (31 USC 3801 et seq.), the False Claims Act (18 USC 287 and 31 USC 3729); and the False Statement Act (18 USC 1001), I declare to the best of my knowledge that the foregoing is true and correct.

Organization Name: State of Maine, Department of Marine Resources

CFO Signature: Gilbert M. Bilodeau Date: 6/8/23

Name/Title Authorized Official: Gilbert M. Bilodeau, Director, Natural Res Ser Ctr

Dept Head Signature: Date: 6/5/23

Name/Title Authorized Official: Patrick Keliher, Commissioner

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ACQUISITION AND GRANTS OFFICE

August 10, 2020

Mr. Brandon Flint
Managing Staff Accountant
Natural Resources Service Center
155 State House Station
Augusta, ME 04333

Dear Mr. Flint:

This letter supersedes the previous letter dated May 1, 2020 concerning this subject, and confirms that no further action is required under Department of Commerce Financial Assistance Standard Term & Condition A.05, Indirect Costs. Pursuant to OMB regulation 2 CFR Part 200, your organization is not required to submit an indirect cost allocation proposal or plan narrative to its cognizant agency. These plans are to be prepared and retained at the local government level. OMB regulation 2 CFR Part 200, Appendix V Il, par. D states, in part:

All department or agencies of the governmental unit desiring to claim indirect costs under Federal awards must prepare an indirect cost rate proposal and related documentation to support the costs. The proposal and related documentation must be retained for audit in accordance with the records retention requirements contained in the Common Rule.

When actual costs are known at the end of your fiscal year, you are required to account for differences between estimated and actual indirect costs by means of either: a) making an adjustment to the next year's indirect cost rate calculation to account for carry-forward (the difference between the estimated costs used to establish the rate and the actual costs of the fiscal year covered by the rate); or b) making adjustments to the costs charged to the various programs based on the actual charges calculated. Since OMB regulation 2 CFR Part 200 requires the independent auditor to determine the allowability of both direct and indirect costs, the organization's indirect cost charges will be subject to audit.

It is important to note that your organization is still required to submit to the Grants Management Division of the National Oceanic and Atmospheric Administration (NOAA) an annual Certificate of Indirect Costs. NOAA acknowledges receipt of your most recent certificate, submitted March 18, 2020 pertaining to your rate of 34.30% for Fiscal Year 2020. Additionally, your request to move to a two-year fixed rate with carry-forward schedule, is approved. Given this, the aforementioned indirect cost rate of 34.30% is also applicable for Fiscal Year 2021.

The submission of the Certificate of Indirect Costs is due to our office within six (6) months after the close of your fiscal year.

A copy of this letter will be retained in your official award file. If you have any questions, please contact Lamar Revis at 301.628.1308 or at lamar.revis@noaa.gov. Thank you.

Sincerely,

Lamar Dwayne Revis

Arlene Simpson Porter
Director, Grants Management Division

Department of Marine Resources

INTEROFFICE MEMORANDUM

TO: FILE

FROM: PATRICK KELIHER, COMMISSIONER

SUBJECT: RATE USED FOR COST ALLOCATION

DATE: 5/31/2024

In accordance with OMB Circular A-87, the Department of Marine Resources has submitted to the U.S. Department of Commerce a departmental cost allocation plan for use during state fiscal year 2024 ending June 30, 2024. The indirect cost rate proposal is 33.70%. I am authorizing the use of the lesser rate of **30%** to be used during this period.

ACCSP
"Managing 100% Lobster Harvester Reporting in Maine"
(May 1, 2025 – April 30, 2026)

5/31/24

Patrick C. Keliher Date
Commissioner

Attachment 4: Authority to Suspension Licenses for Delinquent Reporters

An Act to Improve the Quality of the Data Used in the Management of Maine's Fisheries

Be it enacted by the People of the State of Maine as follows:

Sec. 1. 12 MRSA §6301, sub-§6 is enacted to read:

6. Ownership identified. If a license issued under chapter 625 is issued to a firm, corporation or partnership, the individual who owns the highest percentage of that firm, corporation or partnership must be identified on the license application. When 2 or more individuals own in equal proportion the highest percentages of a firm, corporation or partnership, each of those owners must be identified.

Sec. 2. 12 MRSA §6412 is enacted to read:

§ 6412. Suspension of license or certificate for failure to comply with reporting requirements

1. Authority to suspend. The commissioner, in accordance with this section, may suspend a license or certificate issued under this Part if the holder of the license or certificate fails to comply with reporting requirements established by rule pursuant to section 6173. A license or certificate suspended under this section remains suspended until the suspension is rescinded by the commissioner. The commissioner shall rescind a suspension when:

A. The commissioner determines and provides notice to the holder of the suspended license or certificate that the holder has come into compliance with the reporting requirements established by rule pursuant to section 6173; and

B. The holder pays to the department a $25 administrative fee.

When a suspension is rescinded, the license or certificate is reinstated. Until the suspension is rescinded, the holder of the suspended license or certificate is not eligible to hold, apply for or obtain that license or certificate.

2. Process for suspension for failing to comply with weekly reporting. If the commissioner determines that a person who holds a license or certificate under this Part has failed to comply with a weekly reporting requirement established by rule pursuant to section 6173, the commissioner shall notify the person at the telephone number provided on the application for the license or certificate and by e-mail if an e-mail address is provided on the application. If the license or certificate holder has not complied with the reporting requirements within 2 days after the commissioner has provided the notice, the commissioner shall mail a notice of suspension to the license or certificate holder by certified mail or the notice must be served in hand. The notice must:

A. Describe the information that the license or certificate holder is required to provide pursuant to this Part that the department has not received; and

B. State that, unless all the information described in paragraph A is provided to the department or the license or certificate holder requests a hearing, the license or certificate will be suspended in 3 business days after the license or certificate holder's receipt of the notice.

If the license or certificate holder has not complied with the reporting requirements or requested a hearing within 3 business days after receipt of the notice, the commissioner shall suspend the license or certificate.

3. Process for suspension for failing to comply with monthly reporting. If the commissioner determines that a person who holds a license or certificate under this Part has failed to comply with a monthly reporting requirement established by rule pursuant to section 6173, the commissioner shall notify the person at the telephone number provided on the application for the license or certificate and by e-mail if an e-mail address is provided on the application. If the license or certificate holder has not complied with the reporting requirements within 45 days after the commissioner has provided the notice, the commissioner shall mail a notice of suspension to the license or certificate holder by certified mail or the notice must be served in hand. The notice must:

A. Describe the information that the license or certificate holder is required to provide pursuant to this Part that the department has not received; and

B. State that, unless all the information described in paragraph A is provided to the department or the license or certificate holder requests a hearing, the license or certificate will be suspended in 3 business days after the license or certificate holder's receipt of the notice.

If the license or certificate holder has not complied with the reporting requirements or requested a hearing within 3 business days after receipt of the notice, the commissioner shall suspend the license or certificate.

4. Hearing. A license or certificate holder receiving a written notice of suspension pursuant to this section may request a hearing on the suspension by contacting the department within 3 business days of receipt of the notice. If a hearing is requested, the suspension is stayed until a decision is issued following the hearing. The hearing must be held within 3 business days of the request, unless another time is agreed to by both the department and the license or certificate holder. The hearing must be conducted in the Augusta area. The hearing must be held in accordance with:

A. Title 5, section 9057, regarding evidence, except the issues are limited to whether the license or certificate holder has complied with reporting requirements established by rule pursuant to section 6173;

B. Title 5, section 9058, regarding notice;

C. Title 5, section 9059, regarding records;

D. Title 5, section 9061, regarding decisions, except the deadline for making a decision is one business day after completion of the hearing; and

E. Title 5, section 9062, subsections 3 and 4, regarding a presiding officer's duties and reporting requirements, except that notwithstanding Title 5, section 9062, subsection 1, the presiding officer must be the commissioner or the commissioner's designee.

Summary of Proposal for ACCSP Ranking

Proposal Type: Maintenance Proposal

Primary Program Priority and Percentage of Effort to ACCSP modules:

Catch and Effort (10 points): 100% of licensed lobster (and 12 other fisheries) must report trip level information. Most of these reports will be electronic.

Data Delivery Plan (2 Points): All electronic data through the MEDMR offline application will be submitted into SAFIS daily. All data entered into MEDMR's MARVIN database and will be sent to the ACCSP Data Warehouse on at least a bi-annual basis after all data have been thoroughly audited.

Project Quality Factors:

Regional Impact (5 Points): all partners will benefit, as all the data collected will be uploaded to ACCSP. Regional management organizations, such as ASMFC, will benefit from the trip level information from Maine. Partners may also benefit from the technologies/procedures tested in the new offline MEDMR mobile application. MEDMR is currently contracted with Bluefin Data LLC to build a mobile app for harvesters to use to meet the 100% lobster reporting requirement mandated in ASMFC Addendum XXVI. MEDMR is currently paying for all start-up costs associated with this project and shared findings with ACCSP. Partners will be able to utilize (the developer might charge a support fee) this application once built if they so choose.

Funding transition plan (4 Points): MEDMR will continue to look for other funding sources; however, with the timeline of 100% lobster reporting being pushed forward from the date set in Addendum XXVI, MEDMR will need help to achieve the requirements coming in the next few years. MEDMR is funding the development of an offline mobile harvester reporting application that will meets MEDMR and GARFO reporting requirements. MEDMR will pay for the ongoing monthly maintenance fee associated with this program. MEDMR has already secured an additional one-time $600K in additional federal funding and a one time 2 million ARPA fund for this project. Currently, the MEDMR does not have any plans to require electronic reporting for all fisheries but intends on pushing electronic reporting. Geographical restrictions prevent all harvesters from having reliable high-speed internet access at this time.

In-kind Contribution (3 Points): the partner contribution is listed on page 16. MEDMR's in-kind contribution is approximately 35%.

Improvement in Data Quality/Timeliness (4 Points): MEDMR can audit data at a more detailed level, including checking harvester reported data against dealer reported data. MEDMR encourages reporting timeliness through outreach with harvesters and is working with Marine Patrol to ensure industry understands the importance of submitting accurate and timely information. The Maine State Legislature also passed law that authorizes license suspensions for those who fail to report on time which has improved the timeliness and quality of the data submitted for the fisheries that utilize this law.

Potential secondary module as a by-product (in program priority order) (3 points): The offline application that MEDMR envisions will be able to eventually link up with certain dealer reports and accept tracker data which will revolutionize the way spatial data could be used to determine many effort fields and dealer and harvester reports are matched up.

This project has also been used to help with socio-economic programs such as disaster relief from flooding in the winter of 2024. Having access to landings data has proven to be useful in town/working waterfront planning.

Impact on Stock Assessment (3 Points): Regional management organizations which carry out stock assessments will benefit from the detailed landings data reported from Maine. This information is used in stock assessments for many species that are managed by regional agencies.

Properly Prepared (1 Points): MEDMR followed ACCSP guidelines and pertinent documents when preparing this proposal.

Merit (3 points): This proposal allows MEDMR to comply with mandatory ASMFC requirements. The MEDMR currently provides more data to the data warehouse than any other state and accounts for over 30% of all records landed in the Data Warehouse. MEDMR are always looking for ways to collect data in a timely and efficient manner.

Summary of Proposal for ACCSP Ranking (Abridged Ranking Process)

Achieved Goals: MEDMR did not receive FY20 funding for this grant from NOAA until June 8, 2020. MEDMR also pulled back our FY21 and FY23 proposals with the understanding that the FY22 would be treated as a maintenance proposal since our new data to require 100% lobster reporting shifted from January 1, 2022 to January 1, 2023. MEDMR has already completed the Maine LEEDS enhancement to automate electronic reporting compliance. The offline harvester application (VESL) was rolled out to industry members in 2021. The VESL software was GARFO approved in 2021 and has been submitting data directly to SAFIS since.

Data Delivery Plan (2 Points): All electronic data through the MEDMR offline application will be submitted into SAFIS daily. All data entered into MEDMR's MARVIN database and will be sent to the ACCSP Data Warehouse on at least a bi-annual basis after all data have been thoroughly audited.

Level of Funding (1 Point): In FY20 MEDMR asked for $837,251 and was awarded $336,162. In FY22 MEDMR asked for and received $335,620.77. In FY24 MEDMR is asking for $335,591.06.

Properly Prepared (1 Points): MEDMR followed ACCSP guidelines and pertinent documents when preparing this proposal.

Merit (3 points): This proposal allows MEDMR to comply with mandatory ASMFC requirements. The MEDMR currently provides more data to the data warehouse than any other state and accounts for over 30% of all records landed in the Data Warehouse. MEDMR are always looking for ways to collect data in a timely and efficient manner.

Robert B. Watts II
Maine Department of Marine Resources
(207) 633-9412
rob.watts@maine.gov

June 2023

PROFILE:

- Knowledge of Maine and federal regulations pertaining to commercial fishing and associated reporting requirements through working with the Department of Marine Resources and the National Marine Fisheries Service.
- Knowledgeable of Maine's fishing industries and how they operate.

EDUCATION:

B.S. Marine Science, Maine Maritime Academy, Castine, ME 2002

EMPLOYMENT EXPERIENCE:

May 2016 – Present **Marine Resource Scientist III**
Maine Department of Marine Resources
West Boothbay Harbor, ME

- Manages daily operations of Maine's Commercial Landings Program, which collects, compiles and distributes commercial fishery statistics for Maine's commercial fisheries.
- Supervises Landings Program personnel.
- Maintain Microsoft Access databases for licensing information, compliance and data entry.
- Communicates with industry regarding reporting requirements, monitors reporting compliance and works with the licensing division in order to ensure all mandatory reporting requirements are met and licenses are issued accordingly.
- Oversees DMR's landings suspension authority and process.
- Oversees DMR's swipe card reporting program.
- Oversees MEDMR's MARVIN database.
- Maintains dealer and harvester auditing databases.
- Oversaw Maine's Interactive Voice Response (IVR) reporting program (IVR reporting ended in 2019)
- Serves as key contact for Maine commercial landings information.
- Promotes Maine's partnership with Atlantic Coastal Cooperative Statistical Program (ACCSP), serving on the Operations Committee, Commercial Technical Committee, Information Systems Technical Committee, Standard Codes Committee and Outreach Committee; working to bring the Landings Program into compliance with ACCSP standards.

Jan 2014 – Jan 2016 **Marine Resource Scientist III (Acting Capacity)**
June 2015 – Apr 2016 **Marine Resource Scientist II**
Maine Department of Marine Resources
West Boothbay Harbor, ME

- Manages daily operations of Maine's Commercial Landings Program, which collects, compiles and distributes commercial fishery statistics for Maine's commercial fisheries.
- Supervises Landings Program personnel.
- Maintain Microsoft Access databases for licensing information, compliance and data entry.
- Communicates with industry regarding reporting requirements, monitors reporting compliance and works with the licensing division in order to ensure all mandatory reporting requirements are met and licenses are issued accordingly.

- Oversees DMR's landings suspension authority and process.
- Oversees DMR's swipe card reporting program.
- Maintains dealer and harvester auditing databases.
- Oversees Maine's Interactive Voice Response (IVR) reporting program.
- Serves as key contact for Maine commercial landings information.
- Promotes Maine's partnership with Atlantic Coastal Cooperative Statistical Program (ACCSP) through serving on the Commercial Technical Committee, Information Systems Technical Committee and Outreach Committee; working to bring the Landings Program into compliance with ACCSP standards.

Feb 2012 – Apr 2015 **Marine Resource Scientist I**
Maine Department of Marine Resources

- Manages daily operations of Maine's Commercial Landings Program, which collects, compiles and distributes commercial fishery statistics for Maine's commercial fisheries.
- Supervises five Landings Program personnel.
- Maintain Microsoft Access databases for licensing information, compliance and data entry.
- Communicates with industry regarding reporting requirements, monitors reporting compliance and works with the licensing division in order to ensure all mandatory reporting requirements are met and licenses are issued accordingly.
- Oversees outreach to industry.
- Maintains dealer and harvester auditing databases.
- Oversees Maine's Interactive Voice Response (IVR) reporting program.
- Serves as key contact for Maine commercial landings.

Oct 2007 – Jan 2012 **Marine Resource Specialist II**
Maine Department of Marine Resources

- Oversee daily operations of the harvester landings program.
- Notify new harvesters about reporting requirements.
- Maintain databases used for data audits and data entry.
- Monitor reporting compliance database and notifies harvesters if they are delinquent.
- Supervise two Landings Program personnel.
- Oversees IVR reporting.
- Prepare data requests from various sources

Jul 2005 – Oct 2007 **Marine Resource Specialist I**
Maine Department of Marine Resources

- Interviewed marine recreational anglers all over the Maine coast to help determine fish stocks. Identified, weighed, measured and recorded fish caught by anglers.
- Created publications, updated regulation handouts and updated the recreational fishing website as needed.

May 2001 – Jun 2005 **Conservation Aid**
Maine Department of Marine Resources

- Interviewed marine recreational anglers all over the Maine coast to help determine fish stocks. Identified, weighed, measured and recorded fish caught by anglers.
- Acted as a liaison between the State of Maine and the recreational anglers, answered anglers questions about fishing regulations.

Jesica Waller
Maine Department of Marine Resources
(207) 350-6440
Jesica.d.waller@maine.gov

June 2023

PROFILE:

- Knowledge and oversight of the State of Maine's programs to research, monitor, and compile data from commercial and recreational coastal marine fisheries. This includes coordination of research plans across programs and with external research partners.
- Knowledgeable of Maine's fishing industries and how they operate.
- Knowledgeable about state and federal funding structures to support this work.

EDUCATION:

B.S. Marine and Freshwater Biology, University of New Hampshire, Durham, NH 2009
M.S. Marine Biology, University of Maine, Orono, ME 2016

EMPLOYMENT EXPERIENCE:

July 2022 – Present **Marine Resource Scientist IV**
Maine Department of Marine Resources
West Boothbay Harbor, ME

- Division Director for the Division of Biological Monitoring and Assessment
- Oversee fishery monitoring and research for commercially important marine species
- Lead research around emerging fisheries and climate related topics
- Supervise a staff of 25 MEDMR researchers and maintain external collaborations
- Hire, train, and supervise research staff and students supported by MEDMR programs
- Write research proposals to federal agencies to obtain funding for MEDMR programs
- Coordinate the drafting and submission of all federal grant reporting requirements
- Conduct research and analyses, and write and review reports on timely research questions
- Work with diverse stakeholders to coordinate research in support of MEDMR priorities
- Represent MEDMR on state, regional, and federal research panels
- Advise senior staff on issues ranging from new research findings to funding opportunities
- Co-lead the MEDMR Environmental Monitoring Program and expand program capacity

March 2018 – July 2022 **Marine Resource Scientist III**
Maine Department of Marine Resources
West Boothbay Harbor, ME

- Lead question-based lobster research to support the management of the Maine lobster fishery
- Build research collaborations, submit proposals for funding and author research publications
- Co-develop the MEDMR wet lab and serve as the point person for biosecurity
- Represent MEDMR at regional meetings, research conferences, and the Maine Climate Council
- Coordinated the MEDMR Lobster Research Collaborative and organized quarterly meetings

Jan. 2017 – March 2018 **Research Technician**
Bigelow Laboratory for Ocean Sciences
East Boothbay Harbor, ME

- Designed and performed laboratory and field experiments for grant funded projects
- Contributed to authorship of peer-reviewed publications and federal/state grant proposals
- Led field and lab-based data collection for multiple projects with no supervision
- Supervised and developed research projects for summer undergraduate interns

Sept. 2014 – Dec. 2016 Graduate Student and Canadian American Center Fellow
University of Maine (UMaine), Darling Marine Center
Walpole, ME

- Thesis title: Linking Rising pCO_2 and Temperature to the Larval Development, Physiology and Gene Expression of the American Lobster (*Homarus americanus*)
- Completed all thesis research and coursework and secured fellowship funding annually
- Led the authorship and submission of grants to support travel and advanced sample analysis
- Presented research at international meetings
- Supervised undergraduate interns at UMaine and Bigelow Laboratory for Ocean Sciences
- Contributed to the data collection and analysis efforts on two lobster biology projects
- Assisted Dr. Rhian Waller in teaching SMS 480 "Invertebrates of the Maine Coast"
- Supervised and instructed 25 undergraduate students during weekly lab sessions

Selected Publications

1. Ellertson, A. A., **Waller, J. D.,** Pugh, T. L., & Bethoney, N. D. (2022). Differences in the size at maturity of female American lobsters (*Homarus americanus*) from offshore Southern New England and eastern Georges Bank, USA. *Fisheries Research*, *250*, 106276.
2. McClenachan, L., Record, N. R., & **Waller, J. D**. (2022). How do human actions affect fisheries? Differences in perceptions between fishers and scientists in the Maine lobster fishery. *FACETS, 7*(1), 174-193.
3. **Waller, J. D**., Reardon, K. M., Caron, S. E., Jenner, B. P., Summers, E. L., & Wilson, C. J. (2021). A comparison of the size at maturity of female American lobsters (*Homarus americanus*) over three decades and across coastal areas of the Gulf of Maine using ovarian staging. *ICES Journal of Marine Science*, *78*(4), 1267-1277.
4. **Waller, J.D**., Reardon, K.M., Caron, S.E., Masters, H.M., Summers, E.L. & Wilson, C.J. (2019). Decrease in size at maturity of female American lobsters *Homarus americanus* (H. Milne Edwards, 1837) (Decapoda: Nephropidae) over a 50-year period in Maine, USA. *Journal of Crustacean Biology*, *39*(4), 509-519.
5. **Waller, J. D.,** Wahle, R. A., McVeigh, H., & Fields, D. M. (2017). Linking rising pCO_2 and temperature to the larval development and physiology of the American lobster (*Homarus americanus*). *ICES Journal of Marine Science*, *74*(4), 1210-1219.

Synergistic Activities

2021-present *Steering Committee Member,* Maine Ocean and Coastal Acidification Partnership
2021-present *Advisory Committee Member*, Dalhousie University (PhD student, M. Rampual)
2021-present *Reviewer*, *Journal of Crustacean Biology*
2019-present *Agency support,* Maine Climate Council, Coastal and Marine Working Group
2019-present *Reviewer*, *Canadian Journal of Fisheries and Aquatic Sciences*
2018-2022 *Coordinator*, Maine Department of Marine Resources Lobster Research Collaborative
2017-present *Reviewer*, *ICES Journal of Marine Science*

MARYLAND - VIRGINIA
"Potomac River Compact of 1958"

Potomac River Fisheries Commission
P.O. BOX 9
Colonial Beach, Virginia 22443
TELEPHONE: (804) 224-7148 ·
www.prfc.us contactprfc@gmail.com

June 17, 2024

Atlantic Coastal Cooperative Statistics Program
1050 N. Highland St. Ste. 200 A-N
Arlington, VA 22201

Dear ACCSP:

The Potomac River Fisheries Commission (PRFC) is pleased to submit its proposal for the Fiscal Year 25 ACCSP Request for Proposal, titled "FY25: Electronic Trip-Level Reporting for the Potomac River Fisheries Commission Commercial Fisheries Sector" for your consideration. This project's continued maintenance enabled PRFC to expand its electronic catch reporting leveraging the ACCSP eTrips application while improving accuracy, timeliness, and level of detail for catch reporting throughout the Potomac River.

PRFC has made significant progress in the first four years of this project, including the initial groups of testers gaining access to eTrips, PRFC-developed training, initial ACCSP-PRFC interface development, Oracle Cloud Infrastructure (OCI) Infrastructure as a Service (IaaS)/Platform as a Service (PaaS) procurement, and the development of the new Sport & commercial Application Integrated Licensing (SAIL) tool.

The Year 5 proposal is an exciting opportunity for ACCSP and PRFC to maintain momentum as more PRFC license holders adopt eTrips for their catch reporting and interfaces constructed for bi-directional data management between SAFIS and SAIL. Additionally, the first data connection between SAIL and SAFIS will be established and certified in Year 5. Thank you for your consideration, and please contact Ron Owens with any questions.

Sincerely,

Ronald W. Owens
Executive Secretary
(804)682-1527
ron.owens@prfc.us

Proposal for Funding made to:
Atlantic Coast Cooperative Statistics Program
Operations and Advisory Committees
150N. Highland Street, Suite 200 A-N
Arlington, VA 22204

FY25: Electronic Trip-Level Reporting for the Potomac River Fisheries Commission Commercial Fisheries Sector

Submitted by:
Ronald W. Owens
Executive Secretary
Potomac River Fisheries Commission
222 Taylor Street
Colonial Beach, VA 22443
ron.owens@prfc.us

Applicant Name:	Potomac River Fisheries Commission
Project Title:	**Electronic Trip-Level Reporting for the Potomac River Fisheries Commission (PRFC) Commercial Fisheries Sector**
Project Type:	Maintenance Project **(No change in scope of work, continued emphasis on Electronic Data Reporting using eTrips, increasing participation, and integration with PRFC databases)**
Principal Investigator:	Ingrid Braun-Ricks, PRFC Asst. Executive Secretary
Project Manager:	Ronald W. Owens, PRFC Executive Secretary
Requested Award Amount:	**$142,344.00** for the year five maintenance project. This is intended to scale both participation and supporting IT infrastructure.
Requested Award Period:	One year after receipt of funds
Objective:	This is the fifth year of the project, and fourth maintenance year, to report trip-level catch and effort data using the ACCSP eTrips tools, from Commercial license holders who fish within the jurisdiction of the Potomac River Fisheries Commission (PRFC) continuing in the 2025 seasons, which begins in July 2025 for the FY25 licenses and January 2025 for the CY25 licenses.

Need:

ACCSP and its partner agencies have established the collection of trip-level data as the standard which all agencies should strive to reach and maintain. Over 60 years ago, PRFC began collecting catch and effort data from commercial shellfish (oyster and crab) and finfish permit holders, which are submitted weekly. Storage of the data in electronic databases has taken place since the late 1980s. Since that time, more details regarding the catch have been collected in terms of targeting specific locations, species, and gear. The data are reported at the trip-level on a daily basis and are submitted weekly to PRFC and provided to ACCSP twice annually for the previous calendar year.

The fifth year of the project will work to increase the use of census-style reporting by expanding the use of ACCSP eTrips technology among a group of PRFC Commercial license holders through both positive and negative incentives. Additionally, the first interface connection between PRFC SAIL and ACCSP SAFIS will be certified and used for official transmission of data between the two systems.

Participating license holders will use ACCSP eTrips tools to report their catch and effort in PRFC managed waters. In Year 5, the plan is to transition all applicable eTRIPS users to electronic catch reporting. Only allowing paper reports provided to PRFC to be submitted by PRFC staff for the waterman who do not use eTRIPS. Electronic harvest reporting has been discussed in the proceedings of meetings of advisory committees to the PRFC and the Commission itself for several years, and numerous harvesters have expressed an interest and willingness to participate. Many commercial constituents are already participating in electronic harvest reporting in Maryland or Virginia and are eager for similar opportunities to report electronically for PRFC.

Results and Benefits:
During the fourth year of the project, trip-level reporting to collect catch and effort data from commercial permit holders - harvesters is a goal for all ACCSP partners. On average, on an annual basis (Table 1):

Table 1: Average Count of License Holders and Daily Catch Reports for FY22 & CY22

Gear	License Holders	Daily Catch Reports
Oyster	204	1462
Crab	426	10082
Fish	339	12970

Presently, the PRFC staff collect, organize, validate, obtain corrections, and enter the catch data for each License Holder - Harvesters, which is a rather labor-intensive effort that potentially induces errors and is time consuming; therefore, the data stored and available for decision making reports can be lagging. **The anticipated benefits use of ACCSP eTrips are faster data entry with less errors and less staff hours required.**

Data Delivery Plan: During the fourth year of the project, ACCSP eTrips will continue to collect all catch data reports either directly entered by commercial harvesters or entered on their behalf by PRFC staff. PRFC will look at new ways to incentivize watermen to adopt eTrips vice submitting paper reports, and will look to streamline monitoring, control, and reporting to ACCSP using the PRFC SAIL application. PRFC will leverage the ACCSP eTrips database API to synchronize eTrips catch data with the new PRFC cloud-based Sport & commercial Application Integrated Licensing tool (SAIL) that was deployed for use in 2023 and currently holds ALL the catch data records that are NOT being entered directly into ACCSP eTrips by the commercial harvesters. The PRFC staff will be entering catch data for some of the paper reports that are submitted to PRFC by the commercial harvesters (see Task 2 in the Approach).

Biological Sampling Priority
PRFC's managed fisheries include five of the species identified in the FY24 Biological Sampling Priority Matrix, these include: #1 ranked Black Sea Bass, #6 ranked Atlantic

Menhaden, #7 ranked Cobia, #9 ranked Spanish Mackerel, and #20 ranked American eel.

For species such as Atlantic Menhaden, Cobia, and Spanish Mackerel, they are managed under a coastwide quota with state-by-state allocations. When a percentage of the total quota is reported, possible coastwide closures would be initiated to avoid overages. Menhaden is one of PRFC's biggest fisheries, last year PRFC reported over 3.5 million pounds landed. Currently, PRFC harvest is only reported twice a year to ACCSP with each of those data loads containing landings for the previous year to be downloaded into the ACCSP Data Warehouse. Therefore, PRFC landings are not typically accounted for on the coastwide scale until the end of the year, which leaves little room to take preventative measures. Electronic reporting and enabling PRFC system integration into SAFIS will help coastwide management.

Metadata: Below is a list of metadata that PRFC will be capturing via SAIL/eTrips and providing to ACCSP as part of this project.

Meta Data Field	Definition
Trip Type	**Type of fishing trip**
Coast Guard #	**Coast Guard vessel registration #**
State Reg #	**State vessel registration #**
Vessel Name	
Permit ID	**Permit ID #**
License Nbr	**License # (PRFC Specific)**
Fisherman	**Legal Name**
Corporate Name	**Corporate Name, if applicable**
Trip Start Date	**Start date of trip**
Trip Start Time	**Start time of trip**
Trip End Date	**End date of trip**
Trip End Time	**End time of trip**
State	**State of trip**
End Port	**End port of trip**
Submit Method	**Method of submission for trip data**
Submitted By Participant	**If submitted by someone else**
Nbr Of Crew	**# of crew on trip**
Area Code	**Code for the area of the trip**
Sub Area Code	**Code for the sub area of the trip**
Local Area Code	**Code for the local area of the trip**
In State	**State of trip origin**
Fishing Hours	**Hours fished during trip**
Gear Code	**Code for gear used during trip**
Gear Name	**Name for gear used during trip**
Gear Quantity	**Quantity of gear used during trip**

Gear Sets	**Sets of gear used during trip**
Depth	**Depth of gear used during trip**
Latitude	**Latitude of gear used during trip**
Longitude	**Longitude of gear used during trip**
Common Name	**Common name of species fished during trip**
Unit Measure	**Measure of species caught during trip**
Reported Quantity	**Quantity of measure of species caught during trip**
Market Code	**Market code sold to during trip**
Grade Code	**Grade of species caught during trip**
Disposition Code	**Disposition of species caught during trip**
Sale Disposition Flag	**If species caught were sold**
Catch Source	**Source of catch of species sold**
Nbr Fish	**Number of caught sold during trip**
Comments	**Used to capture TAG#s and other relevant data for catch and trip**
Cf Iss Agency	**PRFC**
Validating Agency	**PRFC**
Confirmed Validating Agency	**PRFC**
Vendor App Name	**Name of application used to capture information**

PRFC will continue transmitting data twice per year for all catch reports submitted for the prior year but excluding the records that have been entered into ACCSP eTrips. This will be discontinued once two consecutive reports show 100% consistency with data from ACCSP eTrips.

Approach:
During the fifth year of the project, PRFC will be fully transitioned from the legacy Microsoft (MS) Access databases and Operator interface code that require all license issuing and catch data reporting performed by PRFC staff. The new PRFC cloud-based SAIL application will be live, and the focus will be on enhancing its capabilities and integrations with ACCSP eTrips database. This enhanced integration will result in increased timeliness and accuracy of trip report data processed by PRFC being available in the SAFIS DB. PRFC will continue to expand its participation rate and update/improve training processes and materials. Additionally, PRFC will maintain a contract with a Software Development provider company or consultant to continue to maintain relevant interfaces and continue to develop the upgraded cloud application.

During Year 5, PRFC will be in maintenance for the following items:

1. Task 1 Identification of License Holder Participants: Continued Identification of commercial harvesters to participate:

In Year 5 of the project, continue to expand participation in using eTrips by commercial harvesters. It is expected that all harvesters with interest will be using eTrips in this phase, but that continued outreach and marketing will be necessary to those who are holdouts. Additionally, new innovative methods to get harvesters access to and using eTrips will be explored, i.e. kiosks and positive/negative incentives. The commercial harvester community is comprised of a mix of limited entry and open access fishery participants. Though the number varies year to year, approximately 1,400 commercial harvesters are candidates, and based upon the most recent license metrics, the target would be an additional 30% = 840 participants in year five for ACCSP eTrips. The participants will be volunteers. This would provide a large portion of the existing license holders (50%) and each Gear category. These numbers are manageable for the purpose of refining the SAIL application and the integration interfaces between eTrips and SAFIS tools, developing enhanced training guides & gaining feedback for future participant expansion.

2. Task 2 eTrips installation & training; data entry: ACCSP eTrips installation and training for commercial harvesters. It is anticipated that on average, four (4) hours will be provided to each harvester to support on data entry, submission and use of mobile devices and software. Included within the four hours are staff hours for making presentations at meetings, developing/updating "cheat sheet" guides, and identifying enhancements and overall process improvement. In addition to the harvesters, the PRFC staff will enter a sampling of a variety of paper catch reports into ACCSP eTrips:

   In Year 5, this item is expected to be complete but with ongoing adjustments and training as required based on harvester feedback and issue tracking. Additionally, PRFC will look to augment in-person training using dynamic web-based training. The PRFC staff will augment the commercial harvesters ACCSP eTrips submissions to ensure a more comprehensive data set is being processed for the purpose of identifying enhancement requests for the ACCSP eTrips tools and the data can be successfully processed (downloaded, modified / corrected, and uploaded).

3. Task 3 MS Access Operator Interface Maintenance: Maintenance of MS Access required interfaces until ACCSP eTrips collected is data is verified as 100% matching with PRFC records:
   a. Download ACCSP eTrips data from ACCSP
   b. Maintain an Operator Interface to validate downloaded data
   c. Upload verified data to ACCSP

   In Year 5, this function will be completely developed and no longer necessary to support. **All support will instead be to the new Sport & commercial**

Application Integrated Licensing tool (SAIL) to enhance its capabilities and align with eTrips and SAFIS reporting.

4. Task 4 Software Development: During year 5 of the project, PRFC intends to expand its modern database platform: SAIL. SAIL is a cloud-based application with a more consistent Operator Interface and more efficiently maintained and upgraded. The requirements will be documented, and the selected vendor will continue to develop and implement. **This effort will look to grow SAIL's capabilities from the original MS Access Database to a modern, scalable, web first tool that can more effectively capture and report on PRFC catch information in real time using advanced analytics.**

5. Task 5 Maintain Oracle Cloud Database: During Year 5 of the project, PRFC will continue to procure cloud-based resources with a focus on providing cost savings up-front and long term during the sustainment and maintenance phases. **Huge infrastructure cost savings have been achieved in Year 4 through a revamped SAIL architecture, and these savings will persist in the out years.**

6. Task 6 Develop & Maintain Oracle web-based applications: Continue development and maintenance of web based PRFC SAIL applications to perform PRFC office automation functions:
    a. Process License issue and renewal requests
    b. Print Licenses and associated tags, flags, and catch report forms, etc.
    c. Processing paper catch reports
    d. Reporting interface – currently there are approximately 25 unique reports with many that have sub-options
    e. Database Utility interface – currently there are approximately 13 unique operations required to modify lookup tables, set/re-set sequencing, and perform database integrity checks and repair
    a. Perform modifications as necessary to resolve technical problems
    b. Perform updates as necessary to support new requirements

    The current (historical) PRFC data was exported, reformatted, and imported into the new SAIL database system. **In Year 5, innovations and advanced processing will be a focus on quality of data improvements and data reporting. Examples of innovations to be reviewed for implementation include Optical Character Recognition (OCR) for hand submitted reports by non-eTrips harvesters, photo OCR submission by non-eTrips harvesters, data analytics and reporting for better data quality monitoring, Machine Learning/Artificial Intelligence (ML/AI) implementation trained on historical catch patterns to identify and flag**

potential catch data errors, and the addition of generative AI to provide natural language data queries and reports.

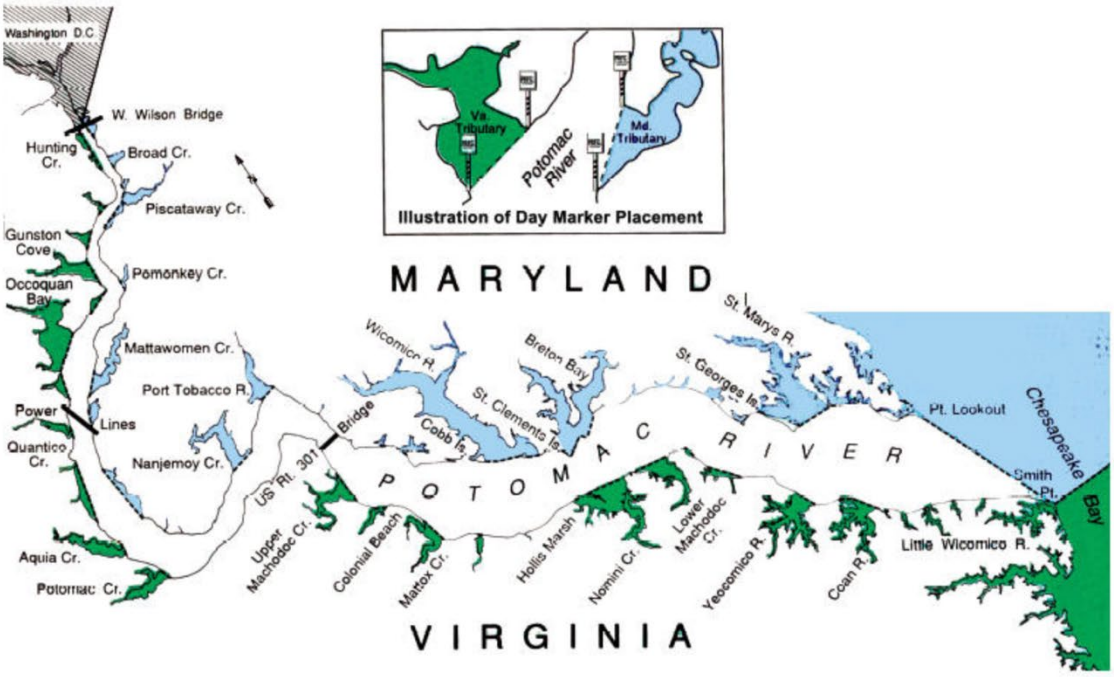
7. Task 7 Commercial Harvesters increased participation: Continue to increase the number of commercial harvesters using the ACCSP eTrips-tools:

   The goal would be to have 100% of the commercial harvesters using the ACCSP eTrips tools in Year 5, where able, and supported by PRFC staff, where not.

   To facilitate the effort to meet these goals:

   i. Provide direct support as needed using PRFC staff via phone or in-person
   ii. Presentations at various Committee meetings with demonstrations and open for questions
   iii. Creating short "tri-fold" instructions specific to various topics
   iv. Creating short YouTube video tutorials specific to various topics
   v. Utilize existing ACCSP support products (e.g., videos, tech support and other)
   vi. Incentivizing future participation by using various strategies, such as:
      1. Successful strategies used by other jurisdictions (e.g., Rhode Island license endorsement)
      2. Establishing a fee for having the PRFC staff perform the ACCSP eTrips data entry such as a flat fee - $100 per License Holder per year
      3. Fee per Gear Type - $25 for each gear type license
      4. Fee per Week per Gear Type - $5 for each weekly report for each gear type license

Geographic Location: Jurisdictional waters of the Potomac River Fisheries Commission. From the Woodrow Wilson Bridge (District of Columbia Demarcation) downriver to the confluence of the Chesapeake Bay. Approximately 100 nautical miles.



Milestone Schedule:

Task # / Month	Project Period Month											
	1	2	3	4	5	6	7	8	9	10	11	12
T1: Identification of License Holder Participants	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
T2: eTrips installation & training; data entry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
T3: MS Access Operator Interface Maintenance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
T4: Software modifications	X	X	X	X	X	X	X	X	X	X	X	X
T5: Maintain Oracle Cloud Database	X	X	X	X	X	X	X	X	X	X	X	X
T6: Develop & Maintain Oracle web-based applications	X	X	X	X	X	X	X	X	X	X	X	X
T7: Commercial Harvesters increased participation	X	X	X	X	X	X	X	X	X	X	X	X

Project Accomplishments Measurement:
The results of this project will provide the basis to improve the accuracy and timeliness of catch and effort estimations, and could subsequently inform science, stock assessments, and management policies.

The results will help determine the scope of the effort to migrate to a more robust database system that is more accessible to the Commercial License Holders.

PRFC in Year 1 completed one task fully and made progress on many others.

1. Year 1 Task 5 Completed: Established contract for the software development work required to complete Tasks 3 through 6.

PRFC in Year 2 completed five tasks for the year, with several repeating each cycle.

1. Year 2 Task 1 Completed: Identified and trained 20% of license holders with most moving to full time electronic catch reporting.
2. Year 2 Task 2 Completed: Developed eTrips installation and training guides/data for use by the license holders.
3. Year 2 Task 3: Completed all maintenance on the Access Database and have shut it down with full time operations shifting to SAIL.
4. Year 2 Task 4: Completed initial round of software modifications to support the reporting and synchronization between the Access DB and SAIL.
5. Year 2 Task 5 Completed: Maintained contract for the software development work required to complete Tasks 3 through 6. Established Oracle Cloud Infrastructure (OCI) account and procured the Infrastructure-as-a-Service (IaaS) for use in SAIL.
6. Year 2 Task 6 Completed: Completed initial development on the OCI hosted, SAIL application. Iterated through team and volunteer issues to.

PRFC in Year 3 completed five tasks for the year, with several repeating each cycle.

1. Year 3 Task 1 Completed: Continued to identified and train additional license holders, of those interested and able to adopt eTrips.
2. Year 3 Task 2 Completed: Finalized eTrips installation and training guides/data for use by the license holders.
3. Year 3 Task 3: Minimized usage of Access Database and successfully beta tested SAIL.
4. Year 3 Task 4: Completed initial round of software modifications to support the reporting and synchronization between the ACCSP SAFIS DB and SAIL.
5. Year 3 Task 5 Completed: Maintained contract for the software development work required to complete Tasks 3 through 6. Maintained, secured, and advanced Oracle Cloud Infrastructure (OCI) architecture to optimize costs and operations of SAIL.
6. Year 3 Task 6 Completed: Completed development of API and Direct DB integrations between SAIL DB and ACCSP SAFIS DB to streamline trip data timeliness and accuracy.
7. Year 3 Task 7 Completed: Initial discussions of incentives for harvesters to adopt eTrips implemented and adjusted based on feedback.

PRFC in Year 4 completed five tasks for the year, with several repeating each cycle.

8. Year 4 Task 1 Completed: Continued to identify and engage license holders with a goal of 80% of those interested and able to adopt eTrips.
9. Year 4 Task 2 Completed: Continued to refine and deliver eTrips installation and training guides/data for use by the license holders.
10. Year 4 Task 3: Continue to finalize and migrate all reports, custom queries, and dashboards to SAIL.

11. Year 4 Task 4: Finalize second round of design and architecture software modifications to support the reporting and synchronization between the ACCSP SAFIS DB and SAIL.
12. Year 4 Task 5 Completed: Maintained contract for the software development work required to complete Tasks 3 through 6. Maintained, secured, and advanced Oracle Cloud Infrastructure (OCI) architecture to optimize costs and operations of SAIL achieving significant savings.
13. Year 4 Task 6 Completed: Continued refinement of API and Direct DB integrations between SAIL DB and ACCSP SAFIS DB to streamline trip data timeliness and accuracy.
14. Year 4 Task 7 Completed: Secondary rollout of communications and marketing to harvesters to adopt eTrips implemented and adjusted based on feedback.

PRFC will continue to monitor progress and accomplishment using the following goals and measurements.

Task	Goal	Measurement
T1: Identification of License Holder Participants	Identification of remaining commercial harvester holdouts and continued marketing/engagement for enrollment in eTrips electronic catch reporting.	Records updated to reflect they have been contacted and notified about the opportunity and its benefits.
T2: eTrips installation & training; data entry	100% of identified eTrips participants who request training/support receive in person or electronic training/support. Updated training materials and classes based of eTrips users feedback.	Participant records updated to note whether training has been provided and support provided.
T3: MS Access Operator Interface Maintenance	Full archival of Access DB with not reach back required for operations and integrations in support of ACCSP.	Access DB is unmodified/accessed.
T4: Software modifications	Requirements updated on evolving ACCSP SAFIS integration and implementation.	Verification that RTM is completed and updated.

T5: Maintain Oracle Cloud Database	100% of cloud-based services procured and available.	Verification by PRFC staff that cloud services are invoiced and available.
T6: Develop & Maintain Oracle web-based applications	100% of year 5 requirements identified, developed, and delivered. Analysis completed and requirements generated for advanced technologies to be integrated into SAIL capabilities.	Completed RTM showing Year 4 requirements marked as complete and verification by PRFC staff.
T7: Commercial Harvesters increased participation	Marketing materials developed and presented at regular meetings and in routine communications. Incentives identified and presented to the PRFC Commissioners for approval. At least one incentive applied to PRFC catch report submission for harvesters not using eTrips.	Verification by PRFC staff that materials were sent and communicated during meetings. Documented minutes showing discussions at Commissioner meeting.

Project Funding Justification for Continuance / Transition Plan:

PRFC is requesting the maximum amount of maintenance funding available due to the amount of work required to completely synch SAIL with ACCSP SAFIS. Additionally, continued marketing and engagement is required for watermen who continue to use paper reporting. While great achievements have been made over the previous four years, there is still a good amount of effort to synchronize the PRFC SAIL catch report information with SAFIS in a way that does not cause harm to overall data quality and improves ACCSP/PRFC efficiency. Additionally, there are a large number of license holders that will take significant outreach and training to get them onboard with using eTrips as a replacement for the paper forms. PRFC has detailed plans to address both of these factors in Year 5.

Funding transition is expected for this project beginning in Year 6 when funding is reduced based on maintenance project rules. PRFC is working to complete all development and activities by Year 7 to minimize funding necessary to keep SAIL and eTrips usage. PRFC will leverage new state resources and existing IT budgets to cover SAIL OCI expenses and additional routine maintenance costs.

BUDGET FOR PROPOSAL PLANNING – FY2025

Description	Calculation	ACCSP Cost	PRFC Cost	Total Cost
Personnel (a)				
Principle Investigator	0 ACCSP / 500 PRFC hours @ $33.59/hr	$0.00	$16,795.00	$16,795.00
Data Administrator	0 ACCSP / 2080 PRFC hours @ $25.5/hr	$0.00	$53,040.00	$53,040.00
Data Management Specialist	0 ACCSP / 1400 PRFC hours @ $15.61/hr	$0.00	$21,854.00	$21,854.00
Executive Secretary	0 ACCSP / 160 PRFC hours @ $52.34/hr	$0.00	$8,374.00	$8,374.00
Personnel Subtotal		**$0.00**	**$83,268.00**	**$83,268.00**
Fringe (b)				
Principle Investigator	32% of salary	$0.00	$22,126.00	$22,126.00
Data Administrator	46% of salary	$0.00	$24,146.00	$24,146.00
Data Management Specialist	48% of salary	$0.00	$15,538.00	$15,538.00
Executive Secretary	22% of salary	$0.00	$23,783.00	$23,783.00
Fringe Subtotal		**$0.00**	**$63,467.00**	**$63,467.00**
Travel (c)				
n/a				
Travel Subtotal		**$0.00**	**$0.00**	**$0.00**
Equipment (d)				
Oracle Cloud VM				
a. Autonomous DB 1 instance, 744 hrs/month, 24 hours/day 1 OCPU 512 GB Storage	$100.00/month x 12 months	$1,200.00	$0.00	$1,200.00
Equipment Subtotal		**$1,200.00**	**$0.00**	**$1,200.00**
Supplies (e)				

n/a				
Supplies Subtotal		**$0.00**	**$0.00**	**$0.00**
Contractual (f)				
In-house Consultant/Developer	25 ACCSP / 20 PRFC Hours @ $109.27/hr	$2,731.82	$2,185.45	$4,917.27
Vendor/Developer	1055 ACCSP / 150 PRFC Hours @ $131.13/hr	$138,339.24	$19,669.09	$158,008.32
Contractual Subtotal		**$141,071.06**	**$21,854.54**	**$162,925.60**
Other (h)				
n/a				
Other Subtotal		**$0.00**	**$0.00**	**$0.00**
Totals				
Total Direct Charges (i)		$142,271.06	$168,589.54	$310,860.60
Indirect Charges (j)	n/a	$0.00	$0.00	$0.00
Total (sum of Direct and Indirect)		**$142,271.00**	**$168,590.00**	**$310,861.00**
Percentage		**46%**	**54%**	**100%**

BUDGET NARATIVE
(Funding Period, FY25)

Project:	Electronic Trip-Level Reporting for the Potomac River Fisheries Commission (PRFC) Commercial Fisheries Sector
Project Period:	1 July 2025 – 30 June 2026
1 Year Funding:	$142,344.00
Prepared By:	Ronald W. Owens, PRFC Executive Secretary

Personnel (Salaries) $0.00: No PRFC employee salaries will be covered using ACCSP funds, all coverage by PRFC personnel will be in-kind.

In-Kind $168,590.00: The four PRFC employees proposed in this effort spend most if not all of their remaining hours working on catch report data and the tool. For each employee, their salary + Fringe costs not covered by the ACCSP grant is considered In-Kind by the PRFC. For this proposal Principle Investigator (160 hours, $8,374.00 + $23,783.00 Fringe), Asst. Executive Secretary (500 hours, $16,795.00 + $22,126.00 Fringe), Data Administrator (2080 hours, $53,040.00 + $24,146.00 Fringe), and Data Management Specialist (1400 hours, $21,854.00 + $15,538.00 Fringe) sum up to **$168,590.00**or **54%** of total expense for Year 5.

Fringe Benefits $0.00: No PRFC personnel fringe costs will be reimbursed by ACCSP grant funds. Fringe calculations are below for in-kind evaluation.

Fringe Benefits Details					
		Principle Investigator	Data Administrator	Data Management Specialist	Executive Secretary
Gross	Annually	$69,860.00	$53,036.00	$32,475.00	$108,870.00
	Hourly	$33.59	$25.50	$15.61	$52.34
Fringe	Health	$9,216.00	$17,050.00	$9,216.00	$9,216.00
	Retirement	$10,969.00	$6,470.00	$5,099.00	$13,282.00
	Life	$824.00	$626.00	$383.00	$1,285.00
	Disability	$517.00		$240.00	
	Def Comp	$600.00		$600.00	
	Total	**$22,126.00**	**$24,146.00**	**$15,538.00**	**$23,783.00**
	Per Hour	$10.64	$11.61	$7.47	$11.43
	Rate	32%	46%	48%	22%
ACCSP Project Hours					

FY 2024 Hours / Year:		2080			
	ACCSP Hours	0	0	0	0
	Fringe Cost	$0.00	$0.00	$0.00	$0.00
	ACCSP Cost	$0.00	$0.00	$0.00	$0.00
	PRFC Hours	100	2080	2080	2080
	PRFC Fringe	$23,783.00	$24,146.00	$15,538.00	$22,126.00
	PRFC Cost	$5,234.13	$53,036.00	$32,475.00	$69,860.00

Travel $0.00: N/A

Equipment $1,200.00: Oracle Cloud Infrastructure (OCI) resources are procured to host the PRFC interface between ACCSP and PRFC's SAIL application on a monthly basis. PRFC plans to procure Oracle Autonomous Database, with APEX, to host the SAIL application and provide the primary data interface between PRFC and ACCSP catch and report information. Additionally, a cloud Compute Virtual Machine, and additional block storage will all be required to host the application business logic, interface connection management, and user interface. All cloud services will be procured in full for the year in order to lock in cloud discounts for reserved usage.

Supplies $0.00: N/A

Contractual $141,136.62:

In-house Consultant – Ray Draper: $2,731.82
Updating the existing PRFC Access based application will require the knowledge and expertise of the consultant/developer Ray Draper. Ray has designed and developed the entire PRFC application from the ground up over the last 15 years and will be the primary developer of the ACCSP interface. This work will be in a maintenance phase and requires part-time development work, estimated at 25 hours total, and PRFC has contracted with Ray at a rate of $109.27 an hour to perform these services.

Talent & Technical Solutions Corporation (TTSC): $138,339.24
Developing the new PRFC SAIL application, procuring cloud services and infrastructure, and assisting with the PRFC-ACCSP integration will be handled by TTSC. PRFC has contracted with TTSC at a rate of $131.13 an hour and expects the work to support T3, T4, T6, and T7 to take 12 months of part-time work and an estimated 1,055 hours.

Other $0.00: N/A

Summary of Proposal for Ranking

Project Details

Proposal Type: Maintenance

Primary Program Priority:

Catch and Effort (10 points / 100%): 100% of interested license holders will be providing electronic catch reporting and PRFC staff will enter the rest by hand to ensure accuracy.

Metadata (2 points): All metadata collected and supplied has been defined in this proposal.

Project Quality Factors

Multi-Partner/Regional impact including broad applications (5 points): PRFC's migration to eTrips and electronic catch reporting will benefit ACCSP and all regional partners in ensuring they have access to accurate, timely data on PRFC monitored species.

Contains funding transition plan (4 points): A detailed justification and funding transition plan is laid out in the proposal. PRFC sees a large need to continue funding at current levels in Year 4 with reduced funding in the out years and a transition to routing IT budgets and other state grants.

In-kind contributions (3 points): PRFC has provided a breakdown of the in-kind contributions made in support of this program and show that PRFC is providing 54% In-kind contributions. The contributions are significant and cover all the time for three personnel that manage and oversee the current catch reporting system.

Improvement in data quality/quantity/timeliness (4 points): Transition to eTrips and PRFC's new SAIL application will greatly increase the timeliness of reporting from bi-annually to almost real time. This will reduce manual entry and ensure much high-quality data is available for review by PRFC and other members.

Potential secondary module as a by-product (4 points): This project has led to the development of SAIL which will greatly streamline PRFC operations and interactions with ACCSP's SAFIS.

Impact on stock assessment (3 points): Regional management organizations that perform stock assessments will have better data to operate from as a direct result of this proposal and continued funding for PRFC's efforts.

Other Factors

Achieved Goals (3 point): PRFC has achieved a great number of its goals over the last four years and has plans to achieve the majority in Year 5 with this proposal.

Data Delivery Plan (2 points): A detailed data delivery plan has been included for review. PRFC will continue to work with ACCSP to increase speed of delivery as more electronic catch reports are captured and interfaces stood up.

Level of Funding (1 points): PRFC has requested a smaller level of funding compared to FY24 as an acknowledgement for the large decrease in funding given up in Year 1 to help support other projects.

Properly Prepared (5 point): PRFC followed all applicable ACCSP and RFP guidelines in preparing this document along with feedback gleaned from previous years proposal.

Merit (3 points): The Electronic Catch Reporting proposal is vital to the continued evolution of PRFC and ACCSP regional partners in implementing innovated processes for increasing data capture, quality, and timeliness.

Biological Sampling Priority: PRFC's managed fisheries include five of the species identified in the FY24 Biological Sampling Priority Matrix, these include: #1 ranked Black Sea Bass, #6 ranked Atlantic Menhaden, #7 ranked Cobia, #9 ranked Spanish Mackerel, and #22 ranked American eel.

APPENDIX A: BUDGET – FY2021 – APPROVED BY ACCSP

Description	Calculation	Cost
Personnel (a)		
Principle Investigator	60 hours @ $55.50/hr	$3,330.00
Data Administrator	200 hours @ $20.50/hr	$4,100.00
Data Management Specialist	600 hours @ $11.50/hr	$6,900.00
Fringe (b)		
Principle Investigator	14% of salary	$455.55
Data Administrator	51% of salary	$2,092.93
Data Management Specialist	49% of salary	$3,401.46
Travel (c)		
n/a		
Equipment (d)		
Oracle Cloud Database:		
a. MySQL DB Services 1 instance, 31 days/month, 24 hours/day 50 GB storage 50 GB backup	$21/month x 8 months	$168.00
b. Java Cloud Service Enterprise Edition 1 instance, 31 days/month, 24 hours/day	$550/month x 8 months	$4,400.00
c. Cloud Infrastructure 1 instance, 31 days/month, 24 hours/day 50 GB storage	$33/month x 8 months	$264.00
Supplies (e)		
n/a		
Contractual (f)		
In-house Consultant/Developer	501 hours @ $100/hr	$50,100.00
Vendor/Developer	1,080 hours @ $130/hr	$140,400.00
Other (h)		
n/a		
Totals		
Total Direct Charges (i)		$215,612.00
Indirect Charges (j)	n/a	$0.00
Total (sum of Direct and Indirect) (k)		$215,612.00

BUDGET NARATIVE

(Requested Funding Period, FY21)

Project:	Electronic Trip-Level Reporting for the Potomac River Fisheries Commission (PRFC) Commercial Fisheries Sector
Project Period:	1 March 2021 – 28 February 2022
1 Year Funding:	$215,425.44
Prepared By:	Martin L. Gary, PRFC Executive Secretary

Personnel (Salaries) $14,759.90: Three PRFC employees' salary time will be covered using these funds. The three employees are: Principle Investigator, for 60 hours ($3,429.90); Data Administrator, for 200 hours ($4,223.00), and a Data Management Specialist, for 600 hours ($7,107.00).

Fringe Benefits $5,950.00: The current PRFC fringe benefit cost is set per employee at: Principle Investigator at 14% of Salary ($455.55), Data Administrator at 51% of salary ($2,092.93), and Data Management Specialist at 49% of salary ($3,401.46). The Principle Investigator falls within the fringe guidelines set forth by NOAA, however, a full breakdown of how the Fringe Benefits are calculated below (PRFC does not have a NICRA established).

		Principle Investigator	Data Administrator	Data Management Specialist
Gross	Annually	$ 111,000.00	$ 41,000.00	$ 23,000.00
	Hourly	$ 55.50	$ 20.50	$ 11.50
Fringe	Health	$ -	$ 15,418	$ 8,333
	Retirement	$ 13,086	$ 4,945	$ 2,696
	Life	$ 1,499	$ 566	$ 309
	Disability	$ -	$ -	
	Def Comp	$ 600	$ -	$ -
	Total:	$ 15,185	$ 20,929	$ 11,338
	Per Hour:	$ 7.59	$ 10.46	$ 5.67
Hours / Year:	2000			
	Rate:	14%	51%	49%
		$ 7.59	$ 10.46	$ 5.67
	Hours:	60	200	600
		$ 455.55	$ 2,092.90	$ 3,401.40
	Total Cost:	$ 3,330.00	$ 4,100.00	$ 6,900.00

Travel $0.00: N/A

Equipment $15,372.00: Oracle Cloud Infrastructure (OCI) resources are procured to host the PRFC interface between ACCSP and PRFC's MS Access application on a monthly basis. Additionally, PRFC's modernized application runs on the OCI infrastructure as well.

Supplies $0.00: N/A

Contractual $179,343.60:

In-house Consultant – Ray Draper: $40,788.00
Updating the existing PRFC Access based application will require the knowledge and expertise of the consultant/developer Ray Draper. Ray has designed and developed the entire PRFC application from the ground up over the last 15 years and will be the primary developer of the ACCSP interface. This work will require five (5) months of part-time development work, estimated at 396 hours total, and PRFC has contracted with Ray at a rate of $103 an hour to perform these services.

Talent & Technical Solutions Corporation (TTSC): $138,555.60
Developing a new PRFC database, procuring cloud services and infrastructure, and assisting with the PRFC existing application integration will be handled by TTSC. PRFC has contracted with TTSC at a rate of $123.60 an hour and expects the work to support T3, T4, T6, and T7 to take 12 months of part-time work and an estimated 1,121 hours.

Other $0.00: N/A

APPENDIX B: BUDGET – FY2022 – APPROVED BY ACCSP

Description	Calculation	Cost
Personnel (a)		
Principle Investigator	60 hours @ $57.57/hr	$3,429.90
Data Administrator	200 hours @ $21.12/hr	$4,223.00
Data Management Specialist	600 hours @ $11.85/hr	$7,107.00
Personnel Subtotal		**$14,759.90**
Fringe (b)		
Principle Investigator	14% of salary	$455.55
Data Administrator	51% of salary	$2,092.93
Data Management Specialist	49% of salary	$3,401.46
Fringe Subtotal		**$5,949.94**
Travel (c)		
n/a		
Travel Subtotal		**$0.00**
Equipment (d)		
Oracle Cloud Database:		
d. MySQL DB Services 1 instance, 31 days/month, 24 hours/day 1 OCPU 16 GB RAM 50 GB storage 50 GB backup	$58/month x 12 months	$696.00
e. Java Cloud Service Enterprise Edition 1 instance, 31 days/month, 24 hours/day 2 OCPU	$461month x 12 months	$5,532.00
f. Cloud Infrastructure 1 instance, 31 days/month, 24 hours/day 2 X9 OCPU 32 GB X9 RAM 50 GB storage	$164/month x 12 months	$1,968.00
g. Oracle APEX 1 instance, 31 days/month, 24 hours/day 2 OCPU 1 TB Storage	$598/month x 12 months	$7,176.00
Equipment Subtotal		**$15,372.00**
Supplies (e)		
n/a		
Supplies Subtotal		**$0.00**

Contractual (f)		
In-house Consultant/Developer	396 hours @ $103/hr	$40,788.00
Vendor/Developer	1,121 hours @ 123.60/hr	$138,555.60
Contractual Subtotal		**$179,343.60**
Other (h)		
n/a		
Totals		
Total Direct Charges (i)		$215,425.44
Indirect Charges (j)	n/a	$0.00
Total (sum of Direct and Indirect) (k)		$215,425.44

BUDGET NARATIVE

(Approved Funding Period, FY22)

Project:	Electronic Trip-Level Reporting for the Potomac River Fisheries Commission (PRFC) Commercial Fisheries Sector
Project Period:	1 March 2022 – 28 February 2023
1 Year Funding:	$215,612.00
Prepared By:	Martin L. Gary, PRFC Executive Secretary

Personnel (Salaries) $14,330.00: Three PRFC employees' salary time will be covered using these funds. The three employees are: Principle Investigator, for 60 hours ($3,330.00); Data Administrator, for 200 hours ($4,100.00), and a Data Management Specialist, for 600 hours ($6,900.00).

Fringe Benefits $5,950.00: The current PRFC fringe benefit cost is set per employee at: Principle Investigator at 14% of Salary ($455.55), Data Administrator at 51% of salary ($2,092.93), and Data Management Specialist at 49% of salary ($3,401.46). The Principle Investigator falls within the fringe guidelines set forth by NOAA, however, a full breakdown of how the Fringe Benefits are calculated below (PRFC does not have a NICRA established).

		Principle Investigator	Data Administrator	Data Management Specialist
Gross	Annually	$ 111,000.00	$ 41,000.00	$ 23,000.00
	Hourly	$ 55.50	$ 20.50	$ 11.50
Fringe	Health	$ -	$ 15,418	$ 8,333
	Retirement	$ 13,086	$ 4,945	$ 2,696
	Life	$ 1,499	$ 566	$ 309
	Disability	$ -	$ -	
	Def Comp	$ 600	$ -	$ -
	Total:	$ 15,185	$ 20,929	$ 11,338
	Per Hour:	$ 7.59	$ 10.46	$ 5.67
Hours / Year:	2000			
	Rate:	14%	51%	49%
		$ 7.59	$ 10.46	$ 5.67
	Hours:	60	200	600
		$ 455.55	$ 2,092.90	$ 3,401.40
	Total Cost:	$ 3,330.00	$ 4,100.00	$ 6,900.00

Travel $0.00: N/A

Equipment $4,832.00: Oracle Cloud Infrastructure (OCI) resources are procured to host the PRFC interface between ACCSP and PRFC's MS Access application on a monthly basis. Additionally, PRFC's modernized application runs on the OCI infrastructure as well.

Supplies $0.00: N/A

Contractual $190,500.00:

In-house Consultant – Ray Draper: $50,100.00
Updating the existing PRFC Access based application will require the knowledge and expertise of the consultant/developer Ray Draper. Ray has designed and developed the entire PRFC application from the ground up over the last 15 years and will be the primary developer of the ACCSP interface. This work will require five (5) months of part-time development work, estimated at 501 hours total, and PRFC has contracted with Ray at a rate of $100 an hour to perform these services.

Talent & Technical Solutions Corporation (TTSC): $140,400.00
Developing a new PRFC database, procuring cloud services and infrastructure, and assisting with the PRFC existing application integration will be handled by TTSC. PRFC has contracted with TTSC at a rate of $130 an hour and expects the work to support T3, T4, T6, and T7 to take 12 months of part-time work and an estimated 1,180 hours.

Other $0.00: N/A

APPENDIX C: BUDGET – FY2023 – APPROVED BY ACCSP

Description	Calculation	ACCSP Cost	PRFC Cost	Total Cost
Personnel (a)				
Principle Investigator	60 ACCSP / 100 PRFC hours @ 56.46/hr	$3,387.60	$5,646.00	$9,033.60
Data Administrator	200 ACCSP / 1880 PRFC hours @ 22.4/hr	$4,480.00	$42,112.00	$46,592.00
Data Management Specialist	600 ACCSP / 1480 PRFC hours @ 12.21/hr	$7,326.00	$18,070.80	$25,396.80
Personnel Subtotal		**$15,193.60**	**$65,828.80**	**$81,022.40**
Fringe (b)				
Principle Investigator	15% of salary	$523.44	$17,622.00	$18,145.44
Data Administrator	49% of salary	$2,192.47	$20,635.00	$22,827.47
Data Management Specialist	50% of salary	$3,630.00	$8,954.00	$12,584.00
Fringe Subtotal		$6,346.00	$47,211.00	$53,556.91
Travel (c)				
n/a				
Travel Subtotal		**$0.00**	**$0.00**	**$0.00**
Equipment (d)				
Oracle Cloud Database:				
a. MySQL DB Services 1 instance, 31 days/month, 24 hours/day 1 OCPU 16 GB RAM 50 GB storage 50 GB backup	$58/month x 12 months	$696.00	$0.00	$696.00
b. Java Cloud Service Enterprise Edition 1 instance, 31 days/month, 24 hours/day	$461month x 12 months	$5,532.00	$0.00	$5,532.00

2 OCPU				
c. Cloud Infrastructure 1 instance, 31 days/month, 24 hours/day 2 X9 OCPU 32 GB X9 RAM 50 GB storage	$164/month x 12 months	$1,968.00	$0.00	$1,968.00
d. Oracle APEX 1 instance, 31 days/month, 24 hours/day 2 OCPU 1 TB Storage	$598/month x 12 months	$7,176.00	$0.00	$7,176.00
Equipment Subtotal		**$15,372.00**	**$0.00**	**$15,372.00**
Supplies (e)				
n/a				
Supplies Subtotal		**$0.00**	**$0.00**	**$0.00**
Contractual (f)				
In-house Consultant/Developer	387 Hours @ $103/hr	$39,861.00	$0.00	$39,861.00
Vendor/Developer	1121 Hours @ $123.6/hr	$138,555.60	$0.00	$138,555.60
Contractual Subtotal		**$178,416.60**	**$0.00**	**$178,416.60**
Other (h)				
n/a				
Other Subtotal		**$0.00**	**$0.00**	**$0.00**
Totals				
Total Direct Charges (i)		$215,328.20	$113,039.80	$328,367.91
Indirect Charges (j)	n/a	$0.00	$0.00	$0.00
Total (sum of Direct and Indirect) (k)		$215,328.00	$113,040.00	$328,368.00
Percentage		**66%**	**34%**	**100%**

BUDGET NARATIVE

(Funding Period, FY23)

Project:	Electronic Trip-Level Reporting for the Potomac River Fisheries Commission (PRFC) Commercial Fisheries Sector
Project Period:	1 March 2023 – 28 February 2024
1 Year Funding:	$215,328
Prepared By:	Martin L. Gary, PRFC Executive Secretary

Personnel (Salaries) $15,193.60: Three PRFC employees' salary time will be covered using these funds. The three employees are: Principle Investigator, for 60 hours ($3,387.60); Data Administrator, for 200 hours ($4,480.00), and a Data Management Specialist, for 600 hours ($7,326.00).

In-Kind $113,039.80: The three PRFC employees proposed in this effort spend most if not all of their remaining hours working on catch report data and the tool. For each employee, their salary + Fringe costs not covered by the ACCSP grant is considered In-Kind by the PRFC. For this proposal Principle Investigator (100 hours, $5,646.00 + $17,622.00 Fringe), Data Administrator (1880 hours, $42,112.00 + $20,635.00 Fringe), and Data Management Specialist (1480 hours, $18,070.80 + $8,954.00 Fringe) sum up to $113,014.41 or 34% of total expense for Year 3.

Fringe Benefits $5,950.00: The current PRFC fringe benefit cost is set per employee at: Principle Investigator at 15% of Salary ($523.44), Data Administrator at 49% of salary ($2,192.47), and Data Management Specialist at 50% of salary ($3,630.00). The Principle Investigator falls within the fringe guidelines set forth by NOAA, however, a full breakdown of how the Fringe Benefits are calculated below (PRFC does not have a NICRA established).

Fringe Benefits Details				
		Principle Investigator	Data Administrator	Data Management Specialist
Gross	Annually	$117,436.80	$46,592.00	$25,396.80
	Hourly	$56.46	$22.40	$12.21
Fringe	Health	N/A	$15,840.00	$8,572.80
	Retirement	$15,972.24	$6,337.20	$3,454.80 (Inc. Mission Square)
	Life	$1,573.68	$624.48	$340.32
	Disability			$216.00 (VLDP)
	Def Comp	$600.00		
	Total	**$18,145.92**	**$22,801.68**	**$12,583.92**

	Per Hour	$8.72	$10.96	$6.05
	Rate	15%	49%	50%
ACCSP Project Hours				
FY 22-23 Hours / Year:		2080		
	ACCSP Hours	60	200	600
	Fringe Cost	$523.44	$2,192.47	$3,630.00
	ACCSP Cost	$3,387.60	$4,480.00	$7,326.00
	PRFC Hours	100	1880	1480
	PRFC Fringe	$17,622.00	$20,635.00	$8,954.00
	PRFC Cost	$5,646.00	$42,112.00	$18,070.80

Travel $0.00: N/A

Equipment $15,372.00: Oracle Cloud Infrastructure (OCI) resources are procured to host the PRFC interface between ACCSP and PRFC's MS Access application on a monthly basis. Additionally, PRFC's modernized application runs on the OCI infrastructure as well. PRFC plans to procure a MySQL database to host the upgraded application and provide the primary data interface between PRFC and ACCSP catch and report information. Additionally, Java Cloud, a cloud Virtual Machine, and Oracle APEX will all be required to host the application business logic, interface connection management, and user interface. All cloud services will be procured in full for the year in order to lock in cloud discounts for reserved usage.

Supplies $0.00: N/A

Contractual $178,416.60:

In-house Consultant – Ray Draper: $39,861.00
Updating the existing PRFC Access based application will require the knowledge and expertise of the consultant/developer Ray Draper. Ray has designed and developed the entire PRFC application from the ground up over the last 15 years and will be the primary developer of the ACCSP interface. This work will require five (5) months of part-time development work, estimated at 501 hours total, and PRFC has contracted with Ray at a rate of $100 an hour to perform these services.

Talent & Technical Solutions Corporation (TTSC): $138,555.60
Developing a new PRFC database, procuring cloud services and infrastructure, and assisting with the PRFC existing application integration will be handled by TTSC. PRFC has contracted with TTSC at a rate of $130 an hour and expects the work to support T3, T4, T6, and T7 to take 12 months of part-time work and an estimated 1,180 hours.

Other $0.00: N/A

APPENDIX D: BUDGET – FY2024 – APPROVED BY ACCSP

BUDGET FOR PROPOSAL PLANNING – FY2024

Description	Calculation	ACCSP Cost	PRFC Cost	Total Cost
Personnel (a)				
Principle Investigator	60 ACCSP / 100 PRFC hours @ $60.42/hr	$3,625.00	$6,042.00	$9,667.00
Data Administrator	200 ACCSP / 1880 PRFC hours @ $23.97/hr	$4,794.00	$45,064.00	$49,858.00
Data Management Specialist	600 ACCSP / 1480 PRFC hours @ $13.46/hr	$8,076.00	$19,921.00	$27,997.00
Personnel Subtotal		**$16,495.00**	**$71,027.00**	**$87,522.00**
Fringe (b)				
Principle Investigator	16% of salary	$576.00	$19,398.00	$19,974.00
Data Administrator	47% of salary	$2,264.00	$21,284.00	$23,548.00
Data Management Specialist	47% of salary	$3,790.00	$9,348.00	$13,138.00
Fringe Subtotal		**$6,630.00**	**$50,030.00**	**$56,660.00**
Travel (c)				
n/a				
Travel Subtotal		**$0.00**	**$0.00**	**$0.00**
Equipment (d)				
Oracle Cloud Database:				
a. Autonomous DB 1 instance, 744 hrs/month, 24 hours/day 1 OCPU 1 TB Storage Includes APEX	$1,118.41/month x 12 months	$13,421.00	$0.00	$13,421.00
b. Compute VM AMD Standard Flex 1 instance, 744 hrs/month, 24 hours/day	$59.31/month x 12 months	$712.00	$0.00	$712.00

2 OCPU 16 GB Memory 100 GB Storage				
c. Block Storage 1 TB Balanced Performance 10 VPU 25000 Max IOPS 480 MBps Max Throughput	$42.50/month x 12 months	$510.00	$0.00	$510.00
Equipment Subtotal		**$14,643.00**	**$0.00**	**$14,643.00**
Supplies (e)				
n/a				
Supplies Subtotal		**$0.00**	**$0.00**	**$0.00**
Contractual (f)				
In-house Consultant/Developer	100 ACCSP / 20 PRFC Hours @ $106.09/hr	$10,609.00	$2,121.80	$12,730.80
Vendor/Developer	1250 ACCSP / 150 PRFC Hours @ $127.31/hr	$159,135.00	$19,096.20	$178,231.20
Contractual Subtotal		**$169,744.00**	**$21,218.00**	**$190,962.00**
Other (h)				
n/a				
Other Subtotal		**$0.00**	**$0.00**	**$0.00**
Totals				
Total Direct Charges (i)		$207,512.00	$142,275.00	$349,787.00
Indirect Charges (j)	n/a	$0.00	$0.00	$0.00
Total (sum of Direct and Indirect)		**$207,512.00**	**$142,275.00**	**$349,787.00**
Percentage		**59%**	**41%**	**100%**

BUDGET NARATIVE

(Funding Period, FY24)

Project:	Electronic Trip-Level Reporting for the Potomac River Fisheries Commission (PRFC) Commercial Fisheries Sector
Project Period:	1 March 2024 – 28 February 2025
1 Year Funding:	$207,512.00
Prepared By:	Martin L. Gary, PRFC Executive Secretary

Personnel (Salaries) $16,495.00: Three PRFC employees' salary time will be covered using these funds. The three employees are: Principle Investigator, for 60 hours ($3,625.00); Data Administrator, for 200 hours ($4,794.00), and a Data Management Specialist, for 600 hours ($8,076.00).

In-Kind $121,057.00: The three PRFC employees proposed in this effort spend most if not all of their remaining hours working on catch report data and the tool. For each employee, their salary + Fringe costs not covered by the ACCSP grant is considered In-Kind by the PRFC. For this proposal Principle Investigator (100 hours, $6,042.00 + $19,398.00 Fringe), Data Administrator (1880 hours, $45,064.00 + $21,284.00 Fringe), and Data Management Specialist (1480 hours, $19,921.00 + $9,348.00 Fringe) sum up to $121,057.00 or 34% of total expense for Year 4.

Fringe Benefits $6,630.00: The current PRFC fringe benefit cost is set per employee at: Principle Investigator at 16% of Salary ($576.00), Data Administrator at 47% of salary ($2,264.00), and Data Management Specialist at 47% of salary ($3,790.00). The Principle Investigator falls within the fringe guidelines set forth by NOAA, however, a full breakdown of how the Fringe Benefits are calculated below (PRFC does not have a NICRA established).

Fringe Benefits Details				
		Principle Investigator	Data Administrator	Data Management Specialist
Gross	Annually	$125,664.00	$49,859.00	$28,000.00
	Hourly	$60.42	$23.97	$13.46
Fringe	Health	$17,090.00	$16,099.00	$8,717.00
	Retirement	$1,684.00	$6,781.00	$3,808.00
	Life		$668.00	$375.00
	Disability	$600.00		$238.00
	Def Comp	$600.00		
	Total	**$19,974.00**	**$23,548.00**	**$13,138.00**
	Per Hour	$9.60	$11.32	$6.32
	Rate	16%	47%	47%
ACCSP Project Hours				

FY 2024 Hours / Year:		2080		
	ACCSP Hours	60	200	600
	Fringe Cost	$576.17	$2,264.23	$3,789.81
	ACCSP Cost	$3,624.92	$4,794.13	$8,076.92
	PRFC Hours	100	1880	1480
	PRFC Fringe	$19,397.83	$21,283.77	$9,348.19
	PRFC Cost	$6,041.54	$45,064.87	$19,923.08

Travel $0.00: N/A

Equipment $14,643.00: Oracle Cloud Infrastructure (OCI) resources are procured to host the PRFC interface between ACCSP and PRFC's SAIL application on a monthly basis. PRFC plans to procure Oracle Autonomous Database, with APEX, to host the SAIL application and provide the primary data interface between PRFC and ACCSP catch and report information. Additionally, a cloud Compute Virtual Machine, and additional block storage will all be required to host the application business logic, interface connection management, and user interface. All cloud services will be procured in full for the year in order to lock in cloud discounts for reserved usage.

Supplies $0.00: N/A

Contractual $169,744.00:

In-house Consultant – Ray Draper: $10,609.00
Updating the existing PRFC Access based application will require the knowledge and expertise of the consultant/developer Ray Draper. Ray has designed and developed the entire PRFC application from the ground up over the last 15 years and will be the primary developer of the ACCSP interface. This work will be in a maintenance phase and requires part-time development work, estimated at 100 hours total, and PRFC has contracted with Ray at a rate of $106.09 an hour to perform these services.

Talent & Technical Solutions Corporation (TTSC): $159,135.00
Developing the new PRFC SAIL application, procuring cloud services and infrastructure, and assisting with the PRFC-ACCSP integration will be handled by TTSC. PRFC has contracted with TTSC at a rate of $127.31 an hour and expects the work to support T3, T4, T6, and T7 to take 12 months of part-time work and an estimated 1,250 hours.

Other $0.00: N/A

APPENDIX E: Maintenance Projects History for Primary Program Priorities:

Funding Fiscal Year	Amount	Time Period	Results/Comments
2021	$215,612.00	1 Mar 2021 – 28 Feb 2022	Pilot implementation of ACCSP eTrips and initial development of PRFC Interface & modernized cloud application
2022	$215,612.00	1 Mar 2022 – 28 Feb 2023	Completed development of PRFC Cloud application SAIL v1.0, piloted eTrips with expanded waterman beta group, delivered initial SAFIS interface to synchronize data between PRFC SAIL v1.0 and SAFIS.
2023	$215,328.00	1 Mar 2023 – 28 Feb 2024	Completed development of PRFC SAIL v2.0, finalized eTrips PRFC training, revised SAFIS-SAIL two-way interface communication via API and Direct DB connections, expanded pilot to 20% of watermen, implemented initial incentives to transition to eTrips.
2024	$207,512.00	1 Mar 2024 – 28 Feb 2025	Completed deployment of SAIL and increased eTrips participation of interested watermen, finalize SAFIS-SAIL interface design.
2025	TBD	1 Mar 2025 – 28 Feb 2026	Increase eTrips participation to 100% of interested watermen, enable SAFIS-SAIL interfaces, research and implement advanced analytics/AI-ML capabilities, additional incentives to use eTrips implemented.

APPENDIX D: Resumes for all personnel proposed on the project

RONALD OWENS

CONTACT

Hayes, VA 23072

757-810-5866

ron.owens71@gmail.com

SKILLS

- Mission and Vision Oriented
- Agenda Development
- Improve Policies
- Multimedia Presentations
- Board Representation
- Policy Advisement
- Effective Communicator and Public Speaker
- Strategic Planning
- Policy and Procedure Improvement

APPOINTMENTS

Potomac River Fisheries Commission

- Commissioner (2022-2023)
- Vice Chairman (CY 2023)
- Member of the Budget Committee (CY 2023)
- OMR Review Panel
- Revenue & License Fees Review Panel

REFERENCES

References are available upon request

Results-driven professional with 30 years of experience in environmental management, compliance, and data analysis. Skilled in overseeing regulatory compliance activities, enforcing laws and regulations, and ensuring the safety of the public and natural resources. Strong expertise in program administration, database management, and strategic planning. Demonstrated leadership abilities, effective communication skills, and a track record of delivering high-quality results. Committed to promoting environmental sustainability and public health and safety.

In addition to my work experience, I have been appointed by Virginia Governor Glenn Youngkin to serve as a Commissioner of Potomac River Fisheries Commission, serving a 4-year term. I hold various positions within the commission, including Vice Chairman, member of the Budget Committee, OMR Review Panel, and Revenue & License Fees Review Panel.

Throughout my career, I have demonstrated strong leadership skills, attention to detail, and a dedication to delivering high-quality results. I am an excellent communicator and collaborator, with a proven ability to work effectively with diverse stakeholders. I am a driven and knowledgeable professional with a passion for environmental management and compliance.

WORK HISTORY

November 2023 - Current

Executive Secretary, ***Potomac River Fisheries Commission***

- Tasked with executing the directives of the appointed Commissioners, all while adhering to the stipulations outlined in the Maryland-Virginia Potomac River Compact of 1958.
- Serves as Commissions CEO and CFO
- Prepares for Quarterly Commission Meeting, assist in creating agenda, and provide background materials for meeting.
- Represents the Commission at local and interstate entities (ASMFC, MAFMC,NOAA Executive Committee GIT).
- Approving appropriate expenditures, preparing financial reports, supplying all materials related to the annual MD-VA audit, and presenting draft budgets to the financial committee.
- Prepare Grant Reports
- Manages a team of skilled professionals who support the Commission in handling of its affairs.

January 2008 - 2023
Chesapeake Bay Programs Administrator , Gloucester County

- Serve as Chesapeake Bay Local Programs Administrator enforcing local environmental, stormwater, wetland, and Chesapeake Bay preservation ordinances.
- Oversee regulatory compliance activities, coordinate program activities involving law violations, drafting environmental documents, and quality control standards.
- Frequent contacts with federal, state, and local governments, business and industry representatives, conservation non-profit organizations and citizens groups, legislative officials, County staff, and the public regarding natural resources.
- Advise Commissioners and board members on regulatory matters while also providing staff support.
- Summarizing environmental studies conducted by consultants; legislative issues, project review/development, delineation and mitigation, vegetation management; erosion and sediment, compliance determinations; environmental contract management; document and evidence preparation and restoration activities.
- August 2002 - December 2007
- Stock Assessment Director Virginia Marine Resources Commission
- Oversaw field and laboratory projects from concept through completion for team of 4 staff members.
- Applied knowledge of complex scientific, ecological principles, conservation practices, and research methods.
- Effective planning and administration to promote or ensure compliance with federal and state environmental laws and prevents or reduces negative impact on the environment, and citizen safety.
- Collaborated with stakeholders to identify new methods to protect finfish and crabs species.
- Lead teams, manage budgets, advise commissioners and board members.
- Successfully assisted in the implementation of various conservation initiatives that resulted in increased fish populations and improved ecosystem health.
- Provided analysis and interpretation data, interacted with government and regulatory groups, and collaborated with state and local universities.
- Worked with state and federal agencies on fishery compliance issues, wrote documentation for programs, and prepared yearly program reports.

October 2000 - August 2002
Compliance Officer Virginia Marine Resources Commission

- Conducted inspections and investigations; surveys; analysis and evaluation of data, records, and reports; enforcement; mediating/negotiating agreements during the permitting process; analyzing and evaluating fisheries data; interpreting, reviewing, and regulating or conducting program and resource planning; natural and recreational area management; ecological assessments; or audit activities to support environmental protection.
- Analyzed trends, presented cases at hearings, advised Commissioners on enforcement based on regulations.

November 1998 - October 2000
Fisheries Specialist Virginia Marine Resources Commission

- Assisted in quality assurance of data for Virginia commercial water harvest.
- Maintained databases and provided support in various fisheries-related activities.
- Conducted research and assisted in the implementation of various fish management plans.
- Presented information to Commission and various boards.
- Wrote bi-annual and annual grant reports.
- Represented Virginia on several technical boards.

November 1993 - November 1998
Stock Assessment Technician Virginia Marine Resources Commission

- Travel to assigned sites to interview anglers about their fishing experiences, collect a variety of information, and weigh, measure, and identify fish by species name that the anglers have caught.
- Assigned sites included beaches, piers, docks/jetties, and access points for private charter and head boats, including marinas, boat ramps and other points of entry to marine waters.
- Knowledge of applied seafood harvesting practices and business, scientific knowledge of marine species and the marine environment.
- Handled specimens and conducted tests according to established protocols, keeping efficient records on all experiments.

EDUCATION

Business Management Studies Rappahannock College, Glenns, VA

November 2004

Virginia Supervisory Institute

Virginia Commonwealth University, Richmond, VA

Ingrid Braun-Ricks

Core Competencies & Areas of Expertise

- Highly organized and skilled time manager
- Flexible and creative in meeting tight deadlines while juggling multiple projects
- Understanding the big picture (strategic) without losing sight of the details (operational)
- Working productively both independently and collaboratively as part of team

Work Experience

CHIEF FISHERIES SCIENCE & ADMINISTRATIVE OFFICER | PRFC |JULY 2022 – PRESENT

- Lead science and technology staffer, functioning as biological and technical liaison for Potomac River Fisheries Commission to the Atlantic State Marine Fisheries Commission, EPA-NOAA Chesapeake Bay Program, Chesapeake Bay Stock Assessment Committee, and other science-based groups
- Administrative oversight for PRFC's three advisory committees and PRFC's oyster programs, including logistical and financial oversight
- Oversees fixed gear fishery charting, electronic reporting, and material logistics coordination for PRFC's limited entry striped bass and crab fisheries
- Fiscal responsibilities include assistance with grant writing and reporting, budget preparation and review, front desk financial transactions, posting daily financial transactions, and daily bank deposits

GIS TECHNICIAN | IIC TECHNOLOGIES INC. | MARCH 2021 – MAY 2022

- Compiled and maintained NOAA Nautical Charts for the entire US marine territory, mainly charting depths, soundings, and other various map features as needed
- Packaged, advised and reviewed large scale mapping projects compiled by off site team
- Bridged communication between off site team(India) and National Ocean Service Marine Charting Division to complete tasks within tight deadlines

GIS/OUTREACH TECHNICIAN | PRFC | FEBRUARY 2020 – MAY 2022

- Created and maintained online maps for Fixed Fin Fish gear, PRFC Jurisdiction, and Oyster Bars in the Potomac River to integrate public with online map applications such as ArcGIS
- Delineated potential oyster planting locations for 2021 and 2022 plantings
- CREATED A PLAN FOR MOBILE APP DEVELOPMENT THAT IS INTEGRATED WITH CURRENT ONLINE MAPS TO STREAMLINE EFFICIENCY

NATURAL RESOURCE TECHNICIAN I | MD DNR | APRIL 2020 – FEBRUARY 2021

- Assisted in the reproduction of native wild oysters(diploid and triploid) for commercial industry and restorative efforts
- Maintained water chemistry in larval tanks by use of YSI observing pH, temperature, and salinity
- Outside maintenance of property and assorted tasks as needed

GIS INTERN | CITY OF CUMBERLAND DEPT. OF ENGINEERING | MAY 2019 – AUGUST 2019

- Collected survey points using Survey123 and Trimble GPS for Parks and Recreation Department to assess the condition of existing park equipment and produce maps for further use
- Maintained and updated large data sets on varying city municipalities such as street signs, hydrants, and water line maintenance
- Partnered with city engineers to integrate GIS into infrastructure to assess efficiency and develop WorkForce to better record data in field

INTERN | PRFC | MAY 2018 – JANUARY 2019

- Reviewed and assessed current PRFC regulations for two invasive species: Northern snakehead & Blue catfish, recommended regulatory and policy changes. Represented PRFC at First Annual Northern Snakehead Symposium
- Assessed the status of PRFC jurisdictional boundary markers on the Potomac River on the MD & VA shorelines
- Inputted catch reports for Blue Crab Harvest and recreational pleasure boat licenses

CLERK | AQUALAND CAMPGROUND & MARINA | APRIL 2017 – AUGUST 2021

- Set up new software system and trained employees on new procedures while maintaining inventory of campground and marina occupants
- Effectively performed day-to-day front-end operations of a busy store front; taking reservations, collecting payment for recurring charges, providing fuel(gasoline, diesel, propane) and renting Carolina skiffs to a variety of customers
- Sold PRFC Recreational Individual and Pleasure Boat licenses

Education

BACHELOR OF SCIENCE | FROSTBURG STATE UNIVERSITY | (GRADUATION DEC. 18TH, 2019)

- Major: Fisheries; Minors: Sustainability, Geography, and Biology. Cumulative GPA: 3.65, Dean's List (2016-2019)
- Related coursework: Ichthyology, Fish Management, Environmental Chemical Analysis, Surface Water Hydrology, Scientific Writing, Management & Conservation of Natural Resources
- Involvement: President(2019) & Treasurer(2018), The Wildlife Society

TECHNICAL SKILLS & HOBBIES: Proficient with Microsoft Suite (word, excel, outlook, powerpoint, access); efficient with ESRI ArcGIS software. Completed DNR Boaters Education Certification, CPR and First Aid, and MD Hunting/Firearm Safety Certification. Nationally ranked USAPL powerlifter, and wildlife/portrait photographer. Member of American Fisheries Society.

Cathy Friend

WORK EXPERIENCE

Potomac River Fisheries Commission **Colonial Beach, VA**

Administrative Specialist Jan 2012 – Present

- Operate office equipment such as fax machines, copiers, electronic postage machines, and multi-line phone systems, and use computers for spreadsheet, word processing, database management, and other applications;
- Greet customers or callers and handle their inquires or direct them to the appropriate person according to their needs;
- Prepare the daily cash report making sure all monies balance for the day, verifying receipts vs. monies received that day match;
- Prepare and mail law enforcement manual updates monthly;
- Review and process incoming commercial and recreational license applications; ensuring the correct fees are collected;
- Attend and record all advisory committee meetings and quarterly Commission meetings. Transcribe and prepare minutes from each meeting in a timely manner for review by the Executive Secretary;
- Update and prepare any regulation changes or supplement updates and mail to the appropriate recipients including Commission members, law enforcement, judges, and clerks;
- Adhere to mandatory time lines for preparing and distributing certain documents;
- Enter daily deposits into Quickbooks.

Database Specialist Jun 2006 – Present

- Trouble shoot and fix any errors associated with the operating database, including contact the IT person for help if needed;
- Maintain the integrity of the data entered by ensuring proper procedures are followed;
- Accurately entering hand written harvest catch data received weekly through the mail and in person; and reach out to any harvester with discrepancies found;
- Adhere to regulations regarding commercial activities to include making sure regulations are followed and provided to harvesters;
- Respond to customer or management request for data by creating queries in the database.

NSWC Federal Credit Union **Dahlgren, VA**

Positions held: 1992 - 2004

Human Resource Assistant

Mortgage and Home Equity Loan Officer

Mortgage Loan Clerk

Customer Service Teller

EDUCATION

Rappahannock Community College (1994 – 2000) **King George, VA**

Completed coursework towards a A.S. Accounting Specialist (degree not obtained)

West Virginia University (1986 – 1991) **Morgantown, WV**
Completed coursework towards B.S. Speech Pathologist (125 credit hours – degree not obtained)

ADDITIONAL SKILLS

- Proficient and accurate in using Microsoft Office suite, including Word, Excel, Access and Power Point;
- Entry level use of Quickbooks;
- Able to use a copier to make multiple collated copies as well as making booklets;

Morgan Shaffer

Objective

- To offer my services to a company that promotes conservation and education

Education

BACHELOR OF SCEINCE| MAY 2020 | UNIVERSITY OF MARY WASHINGTON

- Major: Environmental Science: Natural
- Minor: Environmental
  Sustainability
  Biology
- Related coursework: Introduction to GIS, Environmental Geochemistry, Field Methods in EESC & GEOL, Pollution Prevention Planning, Hydrology, Toxicology, Ornithology, Animal Behavior

ASSOCIATES | MAY 2017 | RAPPAHANNOCK COMMUNITY COLLEGE

- Major: General Arts & Sciences

Skills & Abilities

COMPUTER SKILLS

- Excellent experience using Word, PowerPoint, Excel, Publisher, and the online Google equivalences
- Good understanding of Skype, Zoom, Webinar, Google Hangouts, and online application Trello
- Experienced in GIS map building, general data analysis, and graphical analysis
- Competent in research using the internet and online databases/libraries
- Quick to learn new programs and technologies

CONSERVATION

- Led and participated in State Park conservation programs such as beekeeping, monarch butterfly raising and tracking, implementing pollinator gardens, and collecting wildflower seeds
- Cared and handled animal ambassadors such as a corn snake, eastern king snake, red-eared sliders, and saltwater fish
- Informed the general public, school groups, and day-care groups about local flora and fauna
- Inspired creativity and critical thinking in children and adults of all ages regarding environmental problems by using hands-on outdoor activities

VISITOR EXPERIENCE & CUSTOMER SERVICE

- First point of contact greeting clients and answering phone calls
- Enriched the experience of 200 – 300 park guests daily through programs, point-duty, and roving
- Performed 2-4 20min-1h long programs daily on a wide variety of subjects, tailoring topics to fit the needs and interests of park guests
- Assisted in providing information, answering questions, taking pictures, and finding resources for guests
- Established a safe environment where the public felt comfortable asking a wide range of questions Assisted in activities directly targeting 4H groups, YMCA, YCC, homeschool groups, and summer school groups
- Adapted all programming and guest interactions to follow Covid guidelines

TEAMWORK

- Basic management such as scheduling other individuals and delegating tasks while taking into account strengths, weaknesses, and time available
- Shared responsibilities with coworkers, willing to take on additional work when coworkers needed extra support
- Capable of taking initiative and handling independent duties

Experience

DATA ENTRY SPECIALIST | POTOMAC RIVER FISHERIES COMISSION | JULY 2022 - PRESENT

- First point of contact between PRFC and the public via in person, phone, or electronical communication
- Data entry and management of fishery related data to fulfill the agency's mission to conserve and improve the valuable fishery resources of the tidal Potomac River
- Handled daily front office financial transactions and bank deposits

DATA ENTRY INTERN | POTOMAC RIVER FISHERIES COMISSION | FEBUARY 2022 – JULY 2022

- Data entry and management of fishery related data
- Responsible for the daily upkeep and organization of harvest records
- Answering phone calls and taking messages for coworkers
- Analysis of data tables and catching anomalies/mistakes

INTERPRETIVE PARK RANGER | WESTMORELAND STATE PARK | MARCH 2021 – JANUARY 2022

- Supervisor of 1 other park staff and 2 AmeriCorps volunteers; in charge of fairly delegating tasks between coworkers and ensuring they submitted necessary data promptly
- Organized all park programming and the creation of fliers promoting weekly program guides
- Promoted Westmoreland State Park and offered educational programs at local events such as First Friday in Montross and the Fall Festival in Montross

- Created, revised, and transcribed educational park programs including 6 new programs
- Adapted all programming and guest interactions to follow Covid guidelines
- Enriched the experience of 3,000 – 5,000 guests during the summer months

INTERPRETIVE PARK RANGER | WESTMORELAND STATE PARK | MAY 2019 – JULY 2020

- Trained AmeriCorps volunteers
- Led guided tours and activities for park guests daily, teaching topics involving environmental and biological information
- Cared for permanent and temporary ambassador animals such as snakes, lizards, and frogs
- Planned, participated, and volunteered for yearly park events including races and family events

RESUME

Raymond (Ray) Draper

SUMMARY

More than 45 years of providing technical guidance and leadership for numerous people over a variety of computer systems and projects.

EXPERIENCE

Potomac River Fisheries Commission / Consultant, Independent Contractor (April 1993 – Present) Produced multiple database programs in support of daily operations provided by the PRFC staff. Duties included understanding the requirements, designing the database, operator interfaces, and reports.

Provided hardware support for the first ten years. Supported the transition from the old to the new facility. Provide ad-hoc consulting regarding new technology and capabilities. Provide as-needed support to the staff regarding special requests and system modifications.

Enterprise Resource Planning Supervisor & Time Management Instructor (January 2012 – November 2020) *Contractor/Consultant/Employee – depending on the company who won the follow-on contracts:*

- Primarily responsible for conducting the Instructor Led Training (ILT) that is required for personnel to perform their duties as a Supervisor, Time Keeper, and/or Time Approver.
- Developed specific Step-by-Step guides for trained personnel to use as a refresher after the ILT.
- Modified Navy produced classroom material to be specific to personnel at NSWC Dahlgren.
- Presented ERP seminars to the Government population (general users) on how to use the new ERP system who did not require ILT.
- Developed Step-by-Step guides in PDF format and a parallel video (MP4) version for the general users.
- Designed and taught Knowledge Transfer (KT) sessions on specific, user requested topics related to the Time functionality, such as how to obtain names and quantity of employees working overtime or on a telework status.
- Provide follow-up support via phone, on-site, or on-line as needed.

Naval Surface Warfare Center, Dahlgren Division (September 1984 – December 2011) *Civil Service employee assigned to various technical and managerial positions on multiple Navy projects:*

- Special Systems Intelligence & Surveillance Branch Head (2008 – 2011): Provided technical and personnel leadership to several intelligence, surveillance and reconnaissance (ISR) projects. These projects included approximately 45 personnel and twenty million dollars.
- Classified Project Software / Project Lead (2002 – 2008): Established and lead a team of software and hardware engineers, technicians, and support personnel with the development of

an intelligence

collection and data fusion system. Responsible for the requirements, design, development, documentation, installation, and training.

- Cooperative Engagement Capability Software Lead (1996 – 2002): Provided technical software oversight to the lead contractors (Raytheon and Lockheed-Martin) for the Government Program Office. Lead local team with software builds, metrics, and installation aboard ships and land sites.
- Cryptologic Systems Embedded Trainer Software Lead (1993 – 1996): Provided technical software oversight to the lead contractor (Electronic Warfare Associates) for the Government Program Office. Facilitated system and design requirements and conducted acceptance testing at the contractor's facility.
- Combat Direction Finder Software Independent Verification Lead (1989 – 1993): Provided technical software oversight to the lead contractor (Raytheon-Sanders) for the Government Program Office and conducted Independent Verification & Validation for initial systems.
- Computer Aided Design & Drafting System Software Developer / Site Lead (1984 – 1989): Developed local applications to improve efficiency with system management (printing, plotting, and data storage). Provided project leadership to cross-functional team and training across the Center.

United States Air Force (June 1974 – June 1980) *Telecommunications Specialist:*

Provided technical analysis and repair to long-haul communication systems, which included HF, VHF, landline, and tropospheric systems. Maintained cryptologic equipment and conducted training on systems to co-workers and members of the US Marine Corp during combat exercises.

EDUCATION

Embry-Riddle Aeronautical University (September 1980 – September 1984)

- BS Computer Science
- AS Aviation Management
- Commercial Pilot's License
- Flight Instructor

J. BLAIR PARSONS III,
PMP, CISSP, ITIL4

Chief Information Officer (CIO)

PROFILE

Blair Parsons is a partner and CIO of Talent & Technical Solutions Corporation (TTSC). He has been an IT industry leader for the last 16 years where he has served in various senior leadership roles, including: Activity Command Information Officer (ACIO), Senior IT Program Manager (PM), Senior Software Engineer PM, and Senior Information Systems Engineer. Blair is laser focused on continuous process improvement through advanced use of IT systems both on-prem and in the cloud to provide accountability, performance monitoring, process metrics, and advanced reporting. His accomplishments include the design and implementation of a dynamic, workflow based, custom action tracking system at NAVSEA; a custom, Talent Management application across the US Navy; and numerous successful cloud native system migrations and refactoring projects.

CONTACT

PHONE: 540.903.3537

EMAIL: blair@tts-c.com

WEBSITE: www.tts-c.com

PROFESSIONAL HIGHLIGHTS

TTSC – Chief Information Officer (CIO)
Oct 2019 – Current

- Design and execute the corporate IT solutions business strategy to include identification of solutions and services being offered, targeting of customer markets and outreach to potential clients, development of technology roadmaps and trends assessments, and establishment of partner programs for rapid execution and value maximization.
- Lead all IT related efforts, including the implementation and deployment of MS365, design and development of the TTSC Assessment Model (OAM), design and development of the tts-c.com corporate home page, and design and development of the PowerBI OAM Dashboard.

Falconwood, Inc – Senior Cloud Engineer (DevSecOps)
Sep 2019 – April 2020

CACI – Senior IT Program Manager (PM) / ACIO
Oct 2017 – Sep 2019

CACI – Developer, Group Lead, Project Manager
July 2004 – Sep 2017

EDUCATION

MASTER OF BUSINESS ADMINISTRATION (2010)
University of Mary Washington ▪ Fredericksburg, VA

MASTER OF MANAGEMENT OF INFORMATION SYSTEMS (2010)
University of Mary Washington ▪ Fredericksburg, VA

BACHELOR OF SCIENCE IN COMPUTER SCIENCE (2004)
University of Mary Washington ▪ Fredericksburg, VA

CERTIFICATIONS

PROJECT MANAGEMENT PROFESSIONAL (PMP) (2016)
Project Management Institute (PMI) ▪ ACTIVE

CERTIFIED INFORMATION SYSTEMS SECURITY PROFESSIONAL (CISSP) (2016)
International Information System Security Certification Consortium (ISC)² ▪ ACTIVE

ITIL 4 FOUNDATION (2020)
ITIL ▪ ACTIVE

Bold Comments indicate sections that help with the ranking process

Highlighted text indicates changes from the first submission

Ranking Guide - Maintenance Projects:

Primary Program Priority	**Point Range**	**Description of ranking consideration**
Catch and Effort	0-10	Rank based on range within module and level of sampling defined under Program design. When considering biological or bycatch funding rank according to priority matrices.
Biological Sampling	0-8	
Bycatch/Species Interactions	0-6	
Social and Economic	0-4	
Metadata	+2	Additional points if metadata collected and supplied to Program defined within the proposal.

Project Quality Factors	**Point Range**	**Description of ranking consideration**
Multi-Partner/Regional impact including broad applications.	0-5	Rank based on the number of Partners involved in project OR regional scope of proposal (e.g. geographic range of the stock).
> yr 2 contains funding transition plan and/or justification for continuance	0-4	Rank based on defined funding transition plan away from Program funding or viable justification for continued Program funding.
In-kind contribution	0-4	1=1%-25% 2=26%-50% 3=51%-75% 4=76%-99%
Improvement in data quality/quantity/timeliness	0-4	1=Maintain minimum level of needed data collections. ↓ 4=Improvements in data collection reflecting 100% of related module as defined within the Program design.
Potential secondary module as a by-product (In program priority order)	0-4, 0-3, 0-2, 0-1	Rank based on single additional module data collection and level of collection as defined within the Program design of individual module.
Impact on stock assessment	0-3	Rank based on the level of data collection that leads to new or greatly improved stock assessments.

Other Factors	**Point Range**	**Description of ranking consideration**
Properly Prepared	0-5	Meets requirements as specified in funding decision document Step2b and Guidelines

<u>Ranking Guide – Maintenance Projects:</u> (*to be used only if funding available exceeds total Maintenance funding requested*)

Ranking Factors	Point Range	Description of Ranking Consideration
Achieved Goals	0 – 3	Proposal indicates project has consistently met previous set goals. Current proposal provides project goals and if applicable, intermediate metrics to achieve overall achieved goals.
Data Delivery Plan	0 – 2	Ranked based if a data delivery plan to Program is supplied and defined within the proposal.
Level of Funding	-1 – 1	-1 = Increased funding from previous year 0 = Maintained funding from previous year 1 = Decreased funding from previous year
Properly Prepared	-1 – 1	-1 = Not properly prepared 1 = Properly prepared
Merit	0 – 3	Ranked based on subjective worthiness

ROY COOPER
Governor

ELIZABETH S. BISER
Secretary

KATHY B. RAWLS
Director

June 17, 2024

Atlantic Coastal Cooperative Statistics Program
Operations and Advisory Committees
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22204

To Whom it May Concern,

We are pleased to submit the proposal entitled "**FY25: North Carolina socioeconomic database construction for the management of existing and future data**" for consideration for funding in FY2025.

This maintenance proposal is being submitted to fund an additional year of monies for a developer to continue work to develop NCDMF's novel socioeconomic database application. The new socioeconomic database and associated interface will allow the socioeconomic program at NCDMF to better store data, analyze data, and develop new surveys as required by NCMDF and fishery managers. This FY2025 proposal is requesting one year of funding after the FY2023 grants ends to complete development of the socioeconomic database and web-based front-end interface that will allow for efficient data entry and survey development. NCDMF hopes to support the existing developer position with one-time monies in-between ACCSP grant periods to ensure progress is not delayed on this project.

Information about the FY2023 grant and its challenges is provided in the attached proposal.

The scope of the project has not changed which was to develop a SQL relational database for data storage and analysis and to develop a web-based interface for survey development and data entry. The new database and front-end interface will be the primary data entry, storage, analysis, and survey development tools for the socioeconomic program at the completion of this project. Work on this project is on-going and set to be completed by the end of June 2026.

Thank you for your consideration.

Sincerely,

Jason Walsh

State of North Carolina | Division of Marine Fisheries
3441 Arendell Street | P.O. Box 769 | Morehead City, North Carolina 28557
252-515-5500

Proposal for Funding made to:

Atlantic Coastal Cooperative Statistics Program
Operations and Advisory Committees
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22204

FY25: North Carolina socioeconomic database construction for the management of existing and future data

Submitted by:

Jason Walsh
North Carolina Division of Marine Fisheries
3441 Arendell Street; P.O. Box 769
Morehead City, NC 28557
jason.walsh@ncdenr.gov

Applicant Name:	North Carolina Division of Marine Fisheries
Project Title:	FY25: North Carolina socioeconomic database construction for the management of current and future data
Project Type:	Maintenance
Principal Investigator:	Jason Walsh NCDMF Fisheries Economics Program Manager
Requested Award Amount:	$145,020
Requested Award Period:	For one year, beginning after the receipt of funds.
Original Date Submitted:	June 17, 2024

Objective

To build a consolidated socioeconomic database to be used by the North Carolina Division of Marine Fisheries (NCDMF) to organize existing data for easier analysis and standardize future data entry and storage, as well as facilitate transmissions of fishery-dependent socioeconomic data to the Atlantic Coastal Cooperative Statistics Program (ACCSP) Data Warehouse.

Background/Need

North Carolina's fisheries are a significant social and economic resource to the state and its communities. The North Carolina Division of Marine Fisheries (NCDMF) works to better understand and predict the impact these fisheries have both on their communities and on the state's economy. The North Carolina Fisheries Economics Program (NCFEP) has a wide range of surveys that they use to monitor economic performance over time.

NCDMF has been collecting socioeconomic information on commercial and recreational fishing in North Carolina for more than two decades. The NCFEP collects data on all stakeholders in commercial and recreational fisheries to better understand the role fisheries play in the state of North Carolina. Due to the diversity of stakeholder groups in fisheries the data collected varies between surveys and between years as surveys are continuously updated to summarize contributions. The variables that are often collected include but are not limited to the following: demographic information, gear used, species targeted, expenditure and/or costs associated with business, income, fishing history, and perceptions and awareness of regulations. These data are collected to better understanding coastal communities that rely on the fishing industries, recreational and commercial fishermen, and the impact of all fishing industries on the State's economy through intra and interstate commerce.

The program administers surveys to stakeholders to monitor species-specific and broad fishery performance to achieve the goals of the Division. The data collected through these surveys are considered sensitive and confidential information about fishermen and dealers in North Carolina but are currently stored on a NCDMF network drive that is open to every employee within the License and Statistics Section. These data are collected and stored in Microsoft Excel or Microsoft Access formats in organized folders with corresponding metadata in Microsoft Excel or Microsoft Word documents according to standard operating procedures written by the NCFEP. Given the diversity and structure of datasets there has not been a centralized location for data to be stored. This leads to data being disorganized, difficult to work with and challenging to identify trends which is pertinent to the goal of identifying fishery economic performance and participation over time. Consolidation of these data into a database will also allow for increased protection and organization to ensure data are handled appropriately.

Some surveys are newly created every year, while other surveys are updated about every five years. In the last few years, there has been a delay in data collection due to the COVID-19 pandemic and staff turnover. To better accommodate future variability, a centralized location for data will allow for less delay and better organization and structure of resources to adequately collect, structure, and share data across management bodies.

ACCSP funded a new project in FY2023 and a developer to build this new database and interface was finally hired in January 2023. The delay in the start date was due to funds not being available to NCDMF until September 2022 and longer than expected recruitment of a contract developer. The recruitment process can be lengthy at times but for this project, the chosen candidate declined the position close to their start date in December 2022; therefore, we had to regroup to get another developer

hired. This maintenance proposal is being submitted to continue funding a contractor for development of the socioeconomic application for one year. This project is a large consolidation of past surveys that have a variety of survey question types and variables. The new system will allow for standardized storage and use of past survey data and the development of a novel survey application to meet the needs of fishery managers and the Division. The development of this interface is centered around being flexible and object oriented by using one past survey as an example to build the infrastructure of the new system but still allow the economist to add all other past surveys and their associated data without having to build additional functionality into the system. The new system will have a modular structure which will vary across fishery sectors and will provide the socioeconomic program with a simple "point and click" format that can adapt to changes in survey needs over time. Gaining an additional year of funding will allow for the developer to continue building this application. The scope of this project has not changed but will build upon the progress the developer has made to date.

Review of Previous Results:

A relational SQL Server database was developed to store existing data that have been historically housed in Access and Microsoft Excel documents on the NCDMF servers. One survey was chosen as our prototype for this project which was a survey of commercial fishermen who fish in the Atlantic Ocean. The database can be linked to the NCDMF FIN database for commercial license data and the GoOutdoors (formerly known as ALVIN) database which houses the recreational license data. The development of an interactive web-based interface has started but access to only a few of the supporting tables have been completed as of now.

Through the development of the database, it has become clear that the socioeconomic surveys are complex and variable across sectors. There is a wide variety of types of questions unique to sectors that require diverse relational structures in the database. The developer has produced versions of the database for the commercial sector and has received feedback from NCDIT and the PI. The developer is currently working with NCDIT and the PI to identify the best format for the interface to interact with data from past surveys as well as for new socioeconomic survey development.

The FY2023 grant is still in progress and a no-cost extension will be submitted to extend the grant out through December 2024. If the FY2024 maintenance proposal is approved, that project will begin in July 2025 (or whenever the money becomes available). NCDMF hopes to support the developer during this gap in ACCSP funding with one-time internal monies to ensure progress continues. The developer will continue to work with NCDIT and the PI on the development of the interactive interface if this maintenance proposal is accepted. To help facilitate the timely completion of this project, two additional NCDIT staff were included in this year's project as in-kind to support the contractor on developing the best approach to this application's development to create an application unlike others currently used by NCDMF.

Approach

NCDMF staff will work with NCDIT staff on a requirements document to detail specific needs and expectations of the new data structure and corresponding input/output (I/O) interface. This document will be fluid and will be updated as decisions are made.

All data will be consolidated into a relational database within SQL Server. This database will be able to interact with the NCDMF FIN database where the commercial license data are stored as well as access to

the Wildlife Resources Commission GoOutdoors (formerly known as ALVIN) database where the recreational license data are stored.

A web-based application will be built to serve as the front-end interface for data entry and editing. NCDMF staff will work with NCDIT staff to complete this project. Several NCDIT staff are housed at the NCDMF Headquarters office in Morehead City, NC and will be overseeing, assisting, and facilitating this project as well as helping with database development. A contractor will be hired to complete the interface development.

The new SQL Server database and web-based interface will allow for consolidation of NCFEP data for optimized use by the NCDMF to meet fishery management goals. Once the data are consolidated, a file can be submitted to ACCSP for use by other state partners and in regional fishery management plans such as Black Sea Bass, Bluefin Tuna, American Shad, Cobia, and other commercially and recreationally targeted species in North Carolina.

NCDIT at NCDMF has been using the Agile SCRUM methodology for software development over the last 8-10 years. Development of the database and interface referenced in this proposal will also be conducted using Agile development and 3-week development Sprints. User stories to define "bite-sized" pieces of functionality from the requirements document will be created to guide the development process.

Results and Benefits

Successful fulfillment of this project will provide:

- Consolidation and standardization of NCDMF's socioeconomic data
- Data that can be easily formatted to facilitate use of fishery-dependent socioeconomic data by NCDMF staff and other state partners once data are submitted to ACCSP
- Enhanced data entry and verification functionality for North Carolina NCFEP data
- Increased timeliness and cleanliness of North Carolina's socioeconomic data to state and regional fishery managers and stakeholders

Geographic Location

The NCDMF Headquarters are located in Morehead City, North Carolina. This project may be performed remotely and does not require the position to be located in Morehead City. NCDIT staff working on this project are also based in Morehead City. NCDIT contractors working for the Department are located in Raleigh, North Carolina. The current NCFEP manager is located in Kill Devil Hills, NC, which is close to the NCDMF Manteo field office.

Data Delivery Plan

Documentation of the new data entry and editing interface as well as any metadata and the new database schema will be provided to ACCSP as part of the annual report. New documentation on the new database will include data mapping tables that provide a definition of each variable. Any new stored procedures created during this project will include documentation on primary function, data tables being accessed, and corresponding variables within the procedure's SQL code.

Completed Data Delivery to ACCSP

The FY2023 project is currently in progress, and a no-cost extension will be submitted to extend the project through December 2024. Throughout the project, performance reports have been submitted as required. The annual report for FY23 will be completed by the due date.

Milestone Schedule (start date depending on time of grant award):

	Month											
Task	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Hire Contractor	**X**	**X**										
Develop requirements document	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Create user stories		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Database will be created			**X**	**X**								
Interface for data entry and editing will be built and tested				**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Finalize documentation											**X**	**X**

The contractor is expected to work 40 hours a week on this project. Report writing will follow the requirements of two semi-annual status reports and a final report due at the end of the grant award.

Project Accomplishments Measurement (Metrics and Achieved Goals)

Projects	Accomplishments
Update requirements document, as needed throughout project	• Document is completed and describes functionality that needs to be completed in new application
User stories are created for Agile Development	• User stories are written and document small tasks for developers to complete requirements within Sprints
Create database and migrate data	• Consolidated database was created and accurately contains all socioeconomic data required
Create interface for data entry	• Process completed and fully documented • Data can be entered into the new database

Projects	Accomplishments
Create interface for data verification/editing	• Process completed and fully documented • Data can be viewed and edited
Finalize documentation	• Documentation reflects new enhanced process and data structure

Project Personnel

Jason Walsh— Fisheries Economics Program Manager, NCDMF License and Statistics Section (NCDEQ)
Stephanie McInerny—Section Chief, NCDMF IT Section (NCDIT)
Brandi Salmon—Section Chief, NCDMF License and Statistics Section (NCDEQ)
Brett Messner – Applications Systems Analyst II, NCDMF IT Section (NCDIT)
Chris Capoccia – Applications Systems Analyst II, NCDMF IT Section (NCDIT)

Funding Transition Plan

This project should be completed within the proposed 1-year maintenance grant period. After the no-cost extension of the FY2023 grant, funding for the current project will end in December 2024 and funding will not be available from the proposed maintenance grant until July 2025. NCDMF hopes to support the current developer in-between ACCSP grant periods to continue progress on this project. If other funding is not secured in the interim, a new developer will need to be identified if this proposal is accepted. NCDIT and NCDMF staff can maintain the completed systems developed from this grant; therefore, subsequent years of funding are not needed once the project is completed.

FY25 Budget Narrative

The cost summary table below shows an explanation for each budget item for a one-year period. NCDIT will not charge an indirect fee for the Contractor. The cost for the developer in the summary below is based on an expert level .NET developer from NCDIT's convenience contracts.

The hours represent the time dedicated to this project from the developer, NCDIT staff, and L&S staff. The contractor that was hired on the FY23 grant is still working on this project and will continue to work on this project in the proposed maintenance window, if approved. In the case of the departure of the contractor from this project, a new contractor will be hired at the same hourly rate. Additional NCDIT staff were included in this year's project as in-kind to support the contractor on developing novel approaches to application development to facilitate this project.

FY25 Cost Summary

Category	Expense	Units	Cost	ACCSP Request	State In-Kind	Explanation
Personnel	Contractor	1	$143,520	$143,520		One Analyst @ $69/hr for 2,080 hrs (1 year)
	IT Section Chief	1			$40,768	$10,192/month for 4 months
	L&S Section Chief	1			$13,602	$6,801/month for 2 months
	IT Applications Systems Analyst II	2			$45,600	$7,600/month for 3 months
	Fisheries Economics Program Manager	1			$34,422	Average salary of $5,737/month for 6 months
Subtotal				$143,520	$134,392	
Fringe	Retirement, Social Security, Health Insurance				$44,965	Fringe=25.02% of salary ($33,625) plus $7,557/year for health insurance (1 month insurance = $630*18 months combined work=$11,340)
Indirect						No indirect needed for NCDMF contractors
Subtotal				$0	$44,965	
Supplies	Computer	1	$1,500	$1,500		Replacement laptop for contractor, if needed
Subtotal				$1,500	$0	
	Column Totals			$145,020	$179,357	Total project cost = $324,377
	Total Request					
	Percent			45%	55%	Percentage calculated from total cost

Attachment 1: Budget Narrative and Cost Summary for previously funded project (FY2023)

FY23 Budget Narrative

The cost summary table below shows an explanation for each budget item for a one-year period. NCDIT will not charge an indirect fee for the Contractor. The cost for the developer in the summary below is based on an expert level .NET developer from NCDIT's convenience contracts.

FY23 Cost Summary

Category	Expense	Units	Cost	ACCSP Request	State In-Kind	Explanation
Personnel	Contractor	1	$143,520	$143,520		One Analyst @ $69/hr for 2,080 hrs (1 year)
	IT Section Chief	1			$18,938	$9,469/month for 2 months
	L&S Section Chief	1			$11,154	$5,577/month for 2 months
	Fisheries Economics Program Manager	1			$28,134	Average salary of $4,689/month for 6 months
Subtotal				$143,520	$58,226	
Fringe	Retirement, Social Security, Health Insurance				$20,245	Fringe=24.19% of salary ($14,085) plus $7,397/year for health insurance (1 month insurance = $616*10 months combined work=$6,160)
Indirect						No indirect needed for NCDMF contractors
Subtotal				$0	$20,245	
Supplies	Computer	1	$1,500	$1,500		Laptop for contractor, if needed
Subtotal				$1,500	$0	
	Column Totals			$145,020	$78,471	Total project cost = $223,491
	Total Request					
	Percent			65%	35%	Percentage calculated from total cost

Attachment 2: Project History and Total Project Cost by Year

Year	Title	Cost	Results
2023	*North Carolina socioeconomic database construction for the management of existing and future data*	$145,020	Project currently underway, SQL database has been completed, design decisions on interface development are on-going, development started on novel web-based interface for developing new surveys and managing data

Summary of Proposal for Ranking Purposes

Proposal Type: ***Maintenance***

Program Priority

Catch and Effort: 0%

Biological Sampling: 0%

Bycatch/Species Interactions: 0%

Social and Economic: 100%

The NCFEP strives to assess and follow the economic performance of the State's marine resources. This goal includes, but is not limited to, understanding coastal communities that rely on the fishing industries, recreational and commercial fishermen, and the impact of all fishing industries on the State's economy through intra and interstate commerce. The program administers surveys to recreational fishermen, commercial fishermen, processors, and other stakeholders to achieve the goals of the Division. (Page 3-5)

Metadata:

New documentation on the new database will include data mapping tables that provide a definition of each variable. Any new stored procedures created during this project will include documentation on primary function, data tables being accessed, and corresponding variables within the procedure's SQL code. Documentation will be provided as part of the grant completion report. (Page 3)

Project Quality Factors

Multi-Partner/Regional impact including broad applications:

Although this project only covers data for North Carolina, many species within North Carolina are managed regionally. Regional management agencies such as the Atlantic States Marine Fisheries Commission (ASMFC) and Mid-Atlantic Fishery Management Council (MAFMC) would benefit from having more access to these fishery-dependent socioeconomic data. (Page 3-5)

Contains funding transition plan and/or justification for continuance:

The goals defined in this project should be completed within the grant cycle. (Page 7)

In-kind contribution:

55% (see cost table on Page 7-8)

Improvement in data quality/quantity/timeliness:

The project identified in this proposal will greatly improve data quality and timeliness by providing a more modernized format for the data with enhanced data entry/verification screens and workflows that will prepare North Carolina for future data reference and analysis. (Page 4)

Potential secondary module as a by-product:

None

Impact on stock assessment:

Although this project only covers data for North Carolina, future organization of socioeconomic data will benefit other partners as the data will be more readily available for data requests and stock assessments. Many species within North Carolina are managed regionally. Regional management agencies such as the Atlantic States Marine Fisheries Commission (ASMFC) and Mid-Atlantic Fishery Management Council (MAFMC) would benefit from having more access to these fishery-dependent socioeconomic data. (Page 3-5)

Properly Prepared:

This proposal follows the guidelines provided in the ACCSP Funding Decision Document.

Merit:

Modernizing NCDMF's Socioeconomic Database and the front-end interface that allow data entry clerks and analysts to interact with the database is crucial to the success of socioeconomic data collection programs in North Carolina. (Page 5)

Jason Walsh

Cell:(525)269-9299 **Email:** Jason.walsh@ncdenr.gov

SUMMARY OF QUALIFICATIONS

EDUCATION

University of Rhode Island **Graduated: 2021**

M.S., Environmental and Natural Resource Economics

University of North Carolina (Wilmington, NC) **Graduated: 2015**

B.A., Economics

B.S., Environmental Science

Nelson Mandela Metropolitan University (Port Elizabeth, South Africa) **January-May 2014**

Moulay Ismail University (Meknes, Morocco) **January-May 2013**

WORK EXPERIENCE

North Carolina Division of Marine Fisheries Morehead City, North Carolina

- Fisheries economics program manager **January 2022-Present**
- Supervisor of social research scientist temporary staff
- Support fishery managers in the development of fishery management plans
- Complete fiscal notes in the rule development process
- Leading PI to ongoing project identifying economic contribution of for-hire industry to North Carolina economy funded by ACFCMA
- Leading PI to ongoing project on an update status of economic contribution of shellfish aquaculture industry to North Carolina economy funded by SK grant
- Leading PI on ongoing project to create novel economic database for the NC fisheries economics program funded by ACCSP
- Member of SAFMC SSC and ASMFC CESS

McArthur Environmental Consulting Framingham, Massachusetts

- Prepare documents for clients and local municipalities **December 2020-December 2021**

Rhode Island Fish and Wildlife Wakefield, Rhode Island

- Field interview marine recreational anglers **July 2017-October 2017**

RESEARCH

Research Assistant (Dr. Todd Guilfoos, Professor of Natural Resource Economics URI) May 2017-May 2021

- 20 Hours/Week
- Creating hedonic studies on the economic effect of dam removals in New England using statistical tools Stata and ArcGIS

Student Trainee (USDA Economic Research Service) **June 2019-August 2019**

- 40 Hours/ Week
- Intern modelling nutrient runoff of farms from the agricultural resource management survey using the environmental policy integrated climate model software.

Research Assistant (Annette Bourbonniere) **September 2018-May 2019**

- 10 Hours/ Week
- A team member developing the model and performing analysis using R for a discrete choice study on the effect of removing earnings from insurance and social security payments for persons with spinal chord injuries

Research Consultant (Chris Brozyna) **December 2018-May 2019**

- 5 Hours/ Week
- A team member providing assistance during analysis and writing stages of an experimental economics study on TURFS (a rights based fishery management strategy)

Directed Independent Study (Dr. Peter Schuhmann, Professor of Economics at UNCW) **July 2015-2016**

- Used Contingent valuation methods and regression analysis to assess willingness to pay and willingness to return of tourists to Barbados

Directed Independent Study (Dr. Zachary Long, Professor of Ecology at UNCW) **July-December 2014**

- Studied macro algae at Fort Fisher recreation area to find how stability of benthic marine communities' consumers is influenced by the presence of invasive macro algae

PUBLICATIONS

A Hedonic Study of New England Dam Removals **September 2021**

- An analysis of dam removals heterogeneous effects on housing prices in New England
- https://www.sciencedirect.com/science/article/abs/pii/S0921800922002853

TURF Wars: Group Dynamics in Resource Management **October 2019**

- Working paper at the Center for Growth and Opportunity on TURF as a fishery management tool.
- https://www.thecgo.org/wp-content/uploads/2020/04/working-paper-2019.013.pdf

PRESENTATIONS

AAEA Conference Presentation **August 2018**

- Present preliminary results from first chapter of dissertation. A hedonic study on dam removals heterogeneous effect on housing prices.

Guest Lecturer **February 2019 & February 2020**

- Present results from first chapter of dissertation in an ecohydrology graduate course. A hedonic study on dam removals heterogeneous effect on housing prices. This also serves as an introduction to environmental economics to the masters of environmental management at URI.

Geoff White, Director
Atlantic Coastal Cooperative Statistics Program
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22201

August 19, 2024

Dear Mr. White,

The North Carolina Division of Marine Fisheries is pleased to submit the proposal titled, 'Building A Modernized Framework For Anadromous Creel Surveys and Scoping Improvements to Legacy Data Collection Systems' for your review.

Please address questions to Brandi Salmon of the NC DMF.

Sincerely,

Brandi Salmon
License and Statistics Section Chief
NC Division of Marine Fisheries
NC Department of Environmental Quality
3441 Arendell Street
PO Box 769
Morehead City, NC 28557-07

Proposal for FY2025 ACCSP Funding

Applicant Name:	North Carolina Division of Marine Fisheries
Project Title:	Building A Modernized Framework For Anadromous Creel Surveys and Scoping Improvements to Legacy Data Collection Systems
Project Type:	New
ACCSP Program Priorities:	Catch, Effort, and Landings
Principal Investigator:	Jeff Moore, jeffrey.n.moore@deq.nc.gov
Project Staff:	Brandi Salmon, brandi.salmon@deq.nc.gov Andrew Valmassoi, andrew.valmassoi@deq.nc.gov Stephanie McInerny, stephanie.mcinerny@deq.nc.gov Harbor Lights Software Full-time, part-time, and contract-based staff
Requested Award Amount:	$162,000
Requested Award Period:	July 1, 2025 – June 30, 2026
Submission Date:	August 19, 2024

Objectives

This proposal will be a pilot project for fiscal year 2025 to build a modernized framework for anadromous creel data collection that can be broadly applied by all regional partners to enhance the timeliness, accuracy, and regional accessibility of catch, effort, and biological data supplemental to the MRIP data stream.

The specific objectives include:

- Develop a modernized tablet based anadromous creel survey software that can adapted to regional partners needs
- Building the data architecture to standardize, transmit and house creel survey data within the ACCSP data warehouse
- Creating a web interface to allow all partners to access submitted data
- Planning and scoping improvements to legacy data collection systems

Need

North Carolina is renowned for its diversity and breadth of saltwater fishing opportunities. Well over a million licensed recreational saltwater anglers and out of state visitors take anywhere between 15 to 20 million recreational saltwater fishing trips annually (Table 1). In 2023, these recreational anglers harvested an estimated 16 million fish and released an estimated 52 million fish in North Carolina's coastal waters (Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division June 13, 2024). The North Carolina Division of Marine Fisheries (NC DMF) is committed to the sustainable management of these fisheries using the best science and data available. From early Marine Recreational Information Program (MRIP) pilot studies in 2011 to collaboration on the implementation of tablet use for MRIP Access Point Angler Intercept Survey (APAIS) data collection in 2019, NC DMF continues to be a leading proponent of improved fisheries data collection, sharing, and utilization. The Coastal Angling Program (CAP) operates under the License and Statistics Section of NC DMF and administers and manages all of the state's marine recreational fishing data collection programs. Together, these programs provide a comprehensive dataset of the coastal recreational fisheries of North Carolina needed to comply with the Magneson Stevens Fisheries Act. These programs include all aspects of MRIP, the Saltwater Activity Mail Surveys, and an anadromous creel survey. The survey data from the anadromous survey are used to produce estimates of recreational catch and effort in estuarine and adjacent riverine waters for estuarine striped bass, American shad, and hickory shad, which are species of great interest and concern.

According to the 2020 American shad benchmark stock assessment, the stock of American shad is depleted coastwide. This assessment also points out the overall low availability of recreational landings data for most stocks because most in-river angling efforts are not captured by the MRIP APAIS, which is primarily designed to intercept coastal fishing trips. A common weakness identified in the stock assessment was the paucity of data pertaining to the recreational fishery catch. Potential impacts of recreational fisheries on the population are unknown, with the exception of a few creel surveys that are mostly limited in scope and often occur at a single access point. Of the many stocks along the Atlantic coast, only the Potomac and Albemarle sound (NC) systems had sufficient data to even attempt a statistical catch at age model. The benchmark stock assessment concluded that all American shad recreational fisheries should be monitored, and that "monitoring programs should collect total catch, effort, size, individual weight, and age data at a minimum". The Atlantic Coast Cooperative Statistics Program (ACCSP) ranked American shad as a priority species.

According to the 2022 review of the Atlantic Striped Bass Stock Assessment Update, stocks of Atlantic striped bass are still overfished, and overfishing is no longer occurring. However, emergency action was required in May 2023 to change the recreational size limit due to a shocking near doubling of recreational harvest from 2021 to 2022. Striped bass stocks are heavily impacted by the recreational sector, which accounted for 90% of all removals in numbers of fish in 2022. In North Carolina waters, the status of estuarine stocks of striped bass is concerning. According to the 2022 Albemarle Sound – Roanoke River Striped Bass Stock Assessment Update, the stock is overfished and overfishing is occurring. In NOAA's 66th Northeast Regional Stock Assessment Workshop Assessment Report, **"improv[ing] estimates of striped bass harvest removals** in coastal areas during wave 1 and inland waters of all jurisdictions year round" was listed as a fishery-dependent research priority.

The NC DMF anadromous creel survey is administered in eastern North Carolina waters that are minimally covered by the MRIP APAIS and designed to specifically target the Albemarle Sound Management Area (ASMA) and Central Southern Management Area (CSMA) relevant to striped bass. Most of the catch and effort for striped bass and shad takes place in the westernmost areas of coastal rivers year-round and in freshwater rivers during the Spring spawning run. Although the anadromous creel survey is similar to APAIS, there are barriers that preclude a simple expansion of the site register to include these waters. While some sampling overlap does occur in the coastal rivers, APAIS does not sample those sites as frequently as needed to produce reliable estimates of anadromous species. Furthermore, the sites sampled during the Spring run are out of the scope of APAIS because they have a salinity of <1ppt. Other than the anadromous species

sampled, the reported catch from these sites is predominantly freshwater species. The anadromous survey affords NC DMF the ability to produce reliable estimates of anadromous species without compromising the sampling constraints of APAIS . The survey data from the anadromous creel survey provide valuable contributions to Fisheries Management Plans and Stock Assessments for estuarine striped bass, American shad, and hickory shad.

The Atlantic Costal Cooperative Statistics Program recreational technical committee determined several recreational data collection priorities for year 2024. Those include improved recreational fishery discard and release data, biological sampling for recreational fisheries separate from MRIP, and improved in-season monitoring. We propose that the modernization of NC DMF anadromous survey will achieve these priorities. This project supports several priorities outlined in the Atlantic States Marine Fisheries Commission (ASMFC) 2024 Action Plan. Atlantic striped bass and shad are both listed as high priority species. Stock assessment updates for both species are needed. To provide the scientific foundation for stock assessments to support informed management actions, the ASMFC 2024 action plan calls for increased resolution of catch and survey information, including increased monitoring of shad. The action plan also states that dependable and timely marine fishery statistics are a priority, and they encourage participation in the FIS data modernization projects. Recreational surveys are specifically mentioned as an area that could expand collection of discard data from recreational anglers. The ASMFC Striped Bass Addendum II highlights the importance and urgency of timely data collection and sharing. The ASMFC Atlantic striped bass research priorities further highlights the importance of improving inland striped bass harvest removals year round.

The need to modernize the anadromous survey arises from several factors:

- Pencil-on-paper inefficiencies: NC DMF conducts 5,000 to 7,000 angler interviews per year through participation in the anadromous creel survey. Survey data is currently recorded on paper forms by hand, and then transcribed into a database. Entering the data into an electronic mobile device would eliminate the keying of data from these interviews while providing near real-time access.
- User error: Data entry on paper forms is prone to human error, especially in the field. Electronic mobile devices can significantly decrease the error rate among entered data. Guided entry, drop down menus, data entry logic filters, would all contribute to improved accuracy of data entry.
- Decline in creel survey capacity: Anadromous creel surveys have been discontinued or scaled back in many states due to limited resources. Development of modernized creel survey and centralized database may achieve efficiencies that would increase the capacity of regional partners to collect this important data.
- Regional data sharing: Regional partners could benefit from access to NC DMF anadromous creel data, however, no system is currently in place to facilitate the sharing of this data. This is also true of state creel data collected from other states. Unlike the MRIP APAIS, a central database has not been established to standardize and house this data. States have varying levels of available creel data and no formal processes of collaboration are currently in place. Information sharing is initiated through emailed requests, which can be slow and unreliable due to competing priorities and limited staff availability. When contacted about their creel activities, other responding states have indicated a decline in their activity over time due to a variety of factors and considerable time series gaps, and not all contacted states have responded.
- Standardization: Several states conduct or have conducted state specific anadromous creel surveys, but they are independently designed in terms of data collection, frequency, duration, formatting, etc. A well-designed creel application for electronic tablets that standardizes data collection but still allows for regional flexibility would be a valuable tool for partners throughout the region.
- Legacy software modernization: The MRIP APAIS utilizes a legacy Dockside Intercept Application to administer angler intercept surveys and is used in the Atlantic, Gulf, and Hawaii. Structural improvements are needed to improve performance when over 25 intercepts have been recorded. A software modernization project would provide a unique opportunity to make and test improvements to the software structure without disrupting APAIS.

To address these needs, we propose to partner with Harbor Light Software to develop tablet based anadromous creel survey software. We will use the existing North Carolina anadromous creel standards and coordinate with other states to identify the key data collection fields for standardization. We have identified several states (VA, MA, CT, ME) who have responded positively to inquiries about their creel methodologies. We also plan to partner with ACCSP to contract development of a database structure to hold the data within the ACCSP data warehouse, a web interface to interact with the data, and an API for accessing the data. These solutions will be made available to all partners in an effort to promote and improve data sharing and collaboration. The development process will also afford opportunities to explore legacy software modernization.

Results and Benefits

This project will result in several key benefits:

- Increased capacity to **collect and share recreational fisheries data** complimentary to MRIP
- **Increased accuracy, efficiency, and cost savings** of anadromous creel survey data collection and data management
- Establishment of a **standardize framework for regional partners** to submit and access anadromous creel data
- Planning and scoping of **legacy system updates which could result in added efficiencies** to the APAIS DIA

Comprehensive recreational fisheries data will only continue to grow in demand and relevance as the impacts of the recreational sector expand, especially in relation to stocks that are now predominantly catch and release. This project will promote and strengthen valuable supplemental recreational data streams collected outside of MRIP. **Efficiencies** gained through tablet-based data collection have been well documented with the APAIS transition to the Dockside Intercept Application (DIA) and can be expected to be realized with a similar modernization of the anadromous creel survey. Entering the data into an electronic mobile device would eliminate the keying of data from these interviews while providing near real-time access. Guided entry, drop down menus, data entry logic filters, would all contribute to **improved accuracy** of data entry. **Cost savings** also include reduced staff time in data transcribing, data editing, and paper/postal supplies. This project represents an important step in increasing the **timeliness and accessibility** of the anadromous survey **catch and effort** data. Once the structure and web interface are developed for the ACCSP data warehouse, the data can be utilized by regional partners, stock assessment scientists, and managers. This is especially important considering the high priority species (e.g. shad, striped bass) data that are captured by the anadromous survey. Other states will have the ability to add their creel data to the database as well, thus **increasing coordination and data sharing** between regional partners. A comprehensive tablet-based creel survey with a built-in data stream to the ACCSP data warehouse would be a valuable resource for partners who have had to scale back their own creel efforts and may provide for a more standardized data collection scheme across states and regions. Further **savings** and utility will be achieved by including a built-in site selection feature that can be accessed through the web interface. This may result in an increased capacity across regions to conduct these surveys, ultimately resulting in a regionwide increase of data collection. Finally, this project provides a unique planning and scoping opportunity to **update the legacy DIA system**. Structural improvements can be applied and tested in the anadromous creel software development without disruption to the APAIS before they are implemented in the MRIP environment.

Data Delivery Plan

This project will establish a data stream parallel to but separate from the MRIP APAIS. We will use the existing NC anadromous creel data collection standards and Harbor Light's experience developing the DIA to design an anadromous creel application. We will also use the existing NC anadromous creel as a reference to develop the necessary database structure to hold the data within the ACCSP data warehouse, a web interface to interact with the data, and an API for

accessing the data. Upon completion of this pilot project, the structure will be in place to enable the following data flow process outlined in figure 1. Following this project, individual creel intercept data can be collected on tablets by state representatives, transmitted to the ACCSP database, and then reviewed by state reviewers. Data will then be finalized and made available to state partners.

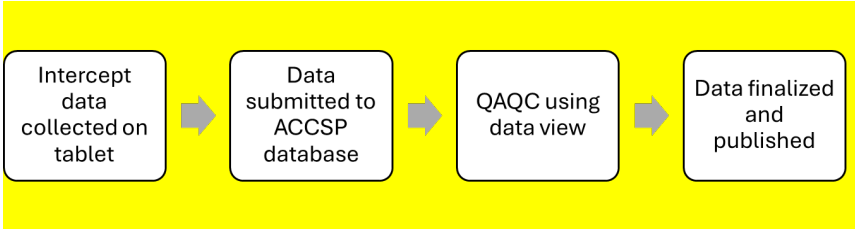


Figure 1. Data delivery plan.

Approach

There are five main components to this project:

- Software development
- Data structuring, API development, and web interface design
- Planning and scoping legacy system updates
- Local deployment and testing
- Regional deployment

Software development: We will partner with Harbor Light Software to develop tablet based anadromous creel survey software. NC DMF has successfully collaborated with Harbor Light in the past to develop the citizen science application Catch U Later. Survey interview prompts and tablet functionality will initially be modeled after the NC DMF Anadromous Survey Form (Appendix A) and the Dockside Intercept Application. During development, NC DMF will also consult with other state partners and collaborate with Harbor Light to ensure the software will meet the needs of all interested partners. Harbor Light developed the successful Dockside Intercept Application that is currently utilized by the MRIP APAIS and is well suited to take on this development project.

Database structuring, API development, and web interface design: We will partner with ACCSP to develop a data structure to hold the survey data within the ACCSP data warehouse, a web interface to interact with the data, and an API for accessing the data. Data structuring will initially model the NC DMF anadromous creel database (Appendix B). During development, NC DMF will also consult with other state partners and collaborate with ACCSP to ensure the necessary flexibility to meet the basic needs of all interested partners. API development will utilize a secured connection to automate the transfer of collected data stored on local tablets to the ACCSP data warehouse. This will prevent excessive manual processing of the data, eliminate a potential source of human error, and help to ensure adequate data security. A web interface to the data will enable partners to view, query, and download the data. Authorized state representatives will have login privileges to conduct QAQC edits on their state's data. Each state will be responsible to QAQC their own datasets and indicate the date when the data is reviewed. Once the data has been reviewed, all partners will be able to view and download the data and associated metadata using the same web interface. This work will be contracted by the ACCSP.

Planning and scoping legacy system updates: The software structure that will be developed through this project will closely resemble the legacy Dockside Intercept Application (DIA). These similarities provide a unique opportunity for this project to scope potential upgrades to legacy architecture and software and plan for future upgrades to the DIA.

Local deployment and testing: Following the completion of the development phase of this project in 2025, NC DMF staff will field test the modernized anadromous creel survey application during the 2026 season. System performance and user feedback will be evaluated and reported.

Regional deployment: This project will provide the foundational technological guidance needed by regional partners to establish or enhance their own creel survey programs. The data collection and transfer methods developed by this project will be easily transportable to regional partners. This will promote data standardization and collaboration between partners.

Funding transition plan

This project is intended to establish a new product. Funding will cover the initial costs of development. Upon completion of this project, we propose future costs be absorbed under ACCSP operating costs. We are open to exploring alternatives if the proposal is only partially funded.

Geographic Location

State specific benefits will be realized for the management of North Carolina stocks of shad and striped bass, but the data will also be made available to all state, regional, and federal partners. Broadly, the scope of this project has the potential to cover the Atlantic coast from Maine through Georgia. The intent of this project is to enhance the collection of recreational saltwater fisheries data for anadromous species in waters adjacent to coastal waters sampled under MRIP. Additional benefits from the planning and scoping of legacy software upgrades may be realized in the Atlantic region, Gulf region, as well as Hawaii in future years should data structure and system enhancements from this project be implemented in the MRIP environment.

Project Accomplishments Measurement Metrics

The success of the project will be measured by the following metrics:

Project Goals	**Metrics**
Development of creel survey software for Android tablets	- Software development is complete - Software effectively captures creel survey data - Software can be used effectively by regional partners - Software user interface is efficient, accurate, and intuitive
Data structuring, API development, and web interface design	- Data architecture is complete - Database meets needs of NC DMF anadromous survey - API is complete; data stream from tablets to ACCSP warehouse established - Web interface allows user log in and data editing by state representatives - Web interface allows all partners to view, query and download reviewed data
Planning and scoping legacy system updates	-Demonstrate system efficiencies that will support at least 40 intercepts for an assignment without performance loss -Document a plan to recommend changes to upgrade legacy system (DIA) based from the results of this project
Local deployment and testing	- Conduct initial field tests of project during 2026 season and evaluate performance in field. - Field staff are able to effectively collect data and upload to the ACCSP warehouse - During testing, evaluate - API is complete; data stream from tablets to ACCSP warehouse established - Web interface allows user log in and data editing by state representatives - Web interface allows all partners to view, query and download reviewed data

Milestone Schedule (start date depending on time of grant award):

Task	Month 1	2	3	4	5	6	7	8	9	10	11	12
Hire contractor	X	X										
Database will be created	X	X	X	X	X	X	X	X				
Interface for data entry and editing will be built	X	X	X	X	X	X	X	X				
Planning and scoping legacy system updates				X	X	X	X	X	X	X	X	
Local development and testing								X	X	X	X	X
Finalize documentation											X	X

Cost Summary (Budget)

Category	Expense	Units	Cost	ACCSP Request	State In-Kind	Explanation
Personnel	Contractor - ACCSP		$ 100,000.00	$ 100,000.00		Database, API, and web interface development
	Harbor Light Software		$ 62,000.00	$ 62,000.00		Tablet software development
	L&S Section Chief				$ 6,801.00	$6,801/month for 1 month
	DIT Section Chief				$ 30,576.00	$10,192/month for 3 months
	Program Manager				$ 21,220.00	$5,305/month for 4 months
	Biologist II				$ 20,208.00	$5,052/month for 4 months
	Field Interviewer	8			$ 88,736.00	$2,773/month for 4 months
Subtotal				$ 162,000.00	$ 167,541.00	
Fringe					$ 49,478.76	Fringe=25.02% of salary ($43,620) plus $7557/year for health insurance (1 month = $630*13 months combined work=$8190)
Indirect						NA
Subtotal					$ 49,478.76	
Supplies	Tablet	8	$ 3,742.56		$ 3,742.56	8 Samsung Galaxy Tab S9 FE tablets
Subtotal					$ 3,742.56	
	Column Totals			$ 162,000.00	$ 220,762.32	Total project cost = **$321,762**
	Total Request					
	Precent			42%	58%	Percentages from total cost

Personnel – Harbor Light Software will develop the application software, building upon existing lessons learned from the Dockside Intercept Application software build and deployment. The database structuring, API development, and web interface design will be contracted by ACCSP. The ACCSP contractor will also lead in planning and scoping of legacy system updates and coordinate this work with Harbor Light Software. NC DMF staff will provide in-kind contributions at various levels of management. The section chief positions and program manager position will coordinate closely with Harbor Light Software and ACCSP staff, collaborate with other potential partners, assist with technical complexities, and assist in planning and project management. The biologist II will assist with survey design and structure and oversee field staff during the testing phase. The field interviewers will test the product during the evaluation phase of this project.

Supplies – NC DMF has completed the purchase of eight Android based electronic tablets for the evaluation phase of this project. The tablets can be considered an in-kind contribution to the project. There are several reasons why Android tablets were chosen.

- Harbor Light has extensive experience developing Android based tablet software.
- Samsung Android tablets have been successfully deployed for the MRIP APAIS across the entire east coast and states are very familiar with their operation and maintenance.
- Samsung Android tablets are an affordable option and have proven to be durable, secure, and user friendly during their service to the MRIP APAIS.
- Selecting Samsung Android tablets provides a unique planning and scoping opportunity to explore updates to the legacy DIA system. Structural improvements can be applied and tested in the anadromous creel software development without disruption to the APAIS

Appendix A: NC Anadromous Creel Paper Form

2023 CSMA CREEL SURVEY

Interview Form

1. INTERVIEWER ID
2. YR/MO/DAY 2 0 2 3
3. INTERVIEW NUMBER
4. TYPE OF DAY
5. INTERVIEW TIME (use 2400 clock)
6. FISHING TRIP 1 Yes 2 No
7. TIME FISHING BEGAN
8. PERIOD
9. REFUSAL
10. SITE

11. HOURS FISHED . (Hours/Minutes)
12. PARTY SIZE
13. WERE YOU FISHING FROM: 1 Private Boat 2 Charterboat 3 Shore
14. AREA FISHED (Specific waterbody)
15. WATERBODY CLASSIFICATION 1 Coastal 2 Joint 3 Inland
16. WERE YOU FISHING FOR ANY PARTICULAR KINDS OF FISH TODAY? IF YES, WHAT KINDS?
1st Target
2nd Target
17. PRIMARY FISHING METHOD 1 Casting 2 Trolling 3 Cut Bait 4 Live Bait 5 Gill Net

UNAVAILABLE CATCH. Did you land any fish that are not here for me to look at? For example, any that you may have thrown back or used for bait?

THROW BACKS	SPECIES CODE	DISP	# OF FISH
1			
2			
3			
4			
5			

DISPOSITION CODES

1. Thrown back (legal fish)
2. Thrown back over bag limit
3. Thrown back under size limit
4. In slot (22-27)
5. Closed season, legal
6. Closed season, under size fish
7. Thrown back over the size limit

AVAILABLE CATCH, COMPLETE TYPE 3 RECORD BY ASKING: May I look at your fish?

KEPT	SPECIES CODE	# OF FISH	LENGTH (mm)	WEIGHT (kg)	SEX (male=1, female=2)
1				.	
2				.	
3				.	
4				.	
5				.	
6				.	
7				.	
8				.	
9				.	
10				.	

CSMA Creel Socioeconomic Questions

1) How old were you on December 31, 2022? _____

2) What state do you live in? _____

3) If the state is NC, what county do you live in? _____

4) Are you, ☐ Male ☐ Female

5) What do you consider your ethnic background? ☐ Hispanic/Latino (all races) ☐ Asian-Pacific Islander ☐ White/Caucasian ☐ Native American ☐ African-American/Black

6) How many years have you been recreational fishing? _____

7) How many fishing trips do you expect to take this year on this river for American shad, hickory shad, or striped bass? (if indicated as target species) _____

The following questions ask you about this fishing trip. If you aren't sure of the exact answer, please give your best estimate.

8) How many nights is the trip? (if none, skip questions 10 and 11).	
9) How many miles did you travel to get here?	
10) How many people who are on the trip are fishing?	
11) How much do you expect to pay for lodging per night on this trip?	
12) How much do you expect to pay for food on this trip?	
13) How much do you expect to pay for ice on this trip?	
14) How much do you expect to pay for bait on this trip?	
15) How much do you expect to pay for boat fuel and oil on this trip?	
16) How much do you expect to pay for vehicle fuel on this trip?	

17) Please rate your overall happiness with your fishing trip today on a scale of 1 to 10, with 1 being extremely unhappy and 10 being extremely happy. _____

18) Please rate your fishing success today on a scale of 1 to 10, with 1 being extremely unsuccessful and 10 being extremely successful. _____

19) The following is a hypothetical question, however, will help provide information to better understand the economic value of our fisheries resources. Please be as accurate as possible when providing an answer. Keeping in mind the total expenses that you just mentioned, what is the maximum amount of additional money that you would be willing to spend to be able to take this fishing trip today? _____

20) Out of the following income categories, would you be willing to provide your personal pre-tax annual income?

Less than $40,000 $40,000 to $80,000 $80,001 to $120,000 More than $120,000

21) Will you be willing to participate in a follow-up survey? ☐ Yes ☐ No

First	MI	Last	
Street			
City		ST	ZIP

Appendix B: NC Anadromous Creel Database Summary

ASSIGNMENT	INTERVIEW	AVAILABLE CATCH	LENGTH WEIGHT	UNAVAILABLE CATCH	SOCIO	SCHEDULE	WEEKLY EFFORT
Assignment ID	Assignment ID	Assignment ID	Assignment ID	Assignment ID	Assignment ID	Schedule Date	Date
Date	Interview ID	Interview ID	Interview ID	Interview ID	Interview ID	Day Type	Month
Period	Date	Date	Date	Date	Date	Access Area	KOD
Access Area	Day Type	Access Area	Access Area	Access Area	Period	Period	Site
Zone	Access Area	Period	Period	Period	Access Area	Start Time	Trailers Arrive
Interviewer	Period	Interview #	Interview #	Interview #	Interview #	Zone	Trailers Mid
Time Arrived	Interviewer ID	ITIS TSN	ITIS TSN	ITIS TSN	Angler Age	Access Area Probability	Trailers Depart
Time Departed	Fishing Trip	# of Fish	Centerline Length (mm)	Disposition Code	State	Time Probability	Bank Depart
Trailer Count Arrival	Refusal		Weight (kg)	# of Fish	County		Striped Bass Released
Trailer Count Mid-Count	Interview #		Sex		Gender		Striped Bass Caught
Trailer Count Departure	Interview Time				Ethnic Background		Shad Released
Bank Count Arrival	Time Fishing Began				Marital Status Household Size		Shad Caught
Bank Count Mid-Point	Hours Fished				Trip Nights		Total Fishing
Bank Count Departure	Party Size				Miles Traveled Number Fishing		Total Effort
Parties Missed	Fishing Location				Number not Fishing		
Comments	Area Fished				Lodging Cost		
	Waterbody Classification				Food Cost		
	Primary Fishing Method				Ice Cost		
	First Target				Bait Cost		
	Second Target				Boat Fuel and Oil Cost		
					Vehicle Fuel Cost		
					Guided Trip Cost Maximum Cost		
					Years Fishing # Trips This Year		
					Overall Happiness		
					Overall Success		
					Income		

Appendix C: Summary of Proposal for Ranking

Summary of Proposal for Ranking

Proposal Type: New

Primary Program Priority:

Catch, Effort, and Landings (90%)

- Recreational catch, effort, and landings data collection and sharing for striped bass, American shad, and hickory shad will be enhanced through this project.

Biological Sampling (10%)

- Biological sampling will yield **length, weight, and sex** data for harvested striped bass, American shad, and hickory shad.
- **Scale samples** for striped bass and American shad will opportunistically be taken for aging.
- Stiped bass **pelvic fin clippings** will opportunistically be collected for genetic testing.

Project Quality Factors:

Partners

- **Multi-Partner/Regional impact including broad applications** –A comprehensive tablet-based creel survey and data stream to the ACCSP data warehouse could be a valuable resource for partners. Additional benefits from legacy software upgrades may be realized in the Atlantic region, Gulf region, as well as Hawaii in future years should data structure and system enhancements from this project be implemented in the MRIP environment.

Funding

- **Contains funding transition plan** – This proposal contains a transition to funding plan on p.8.
- **In-kind contribution**: 58%.

Data

- **Improvement in data quality/quantity/timeliness** – This project will promote and strengthen valuable supplemental recreational data streams collected outside of MRIP. **Modernizing** the collection of data through the use of tablets will increase **data accuracy and improve timeliness** by streamlining the data collection and transmission process. Increased access to anadromous survey **catch and effort** data will benefit **regional** partners, stock assessment scientists, and managers. Realized **improvements to legacy systems** may also be applied in the future to improve the quality of APAIS data.
- **Impact on stock assessment** – The survey data from the anadromous survey provide valuable contributions to Fisheries Management Plans and Stock Assessments for estuarine striped bass, American shad, and hickory shad. **Biological sampling** will provide fisheries dependent data such as **length, weight, and sex** for harvested striped bass, American shad, and hickory shad. Field interviewers also collect biological samples outside of the scope of the creel survey. **Scale samples** are collected from American shad and striped bass for NCDMF's age lab. Stiped bass **pelvic fin clippings** are collected for genetic testing to determine if it was a hatchery produced fish or non-hatchery fish.

Appendix D: Curriculum Vitae for Principal Investigator

Jeffrey N. Moore
3441 Arendell St, Morehead City, NC 28557
(252) 515-5541 · Jeffrey.n.moore@deq.nc.gov

Personal Statement:

I am an experienced program manager, well versed in biological survey design, analytics, programmatic oversight, budgeting, technical writing, inter-agency coordination, and leadership.

Division of Marine Fisheries, NC DEQ – Morehead City, NC **2023-Present**
Coastal Angling Program Manger

- **Environmental Supervisor** of coast wide data collection program for the state of North Carolina, overseeing four biologists, 27 technicians, and administering budget of ~$1.5M.
- **Administer** recruitment, training, and oversight of employees. Prepare grant proposals, administer federal grant awards and reporting, coordinate with state, regional and federal agencies. Approve proposed expenditures and manage a complex database.

Division of Marine Fisheries, NC DEQ – Morehead City, NC **2022-2023**
Conservation Biologist

- **Shellfish Aquaculture Leasing Program** –Conducted assessment and sampling of proposed shellfish aquaculture leases, created and analyzed maps and charts, coordinated communication between agencies and various stakeholders
- **Benthic Habitat Mapping** – Mapped North Carolina estuarine habitat types using UAS drones and GIS software, sampled intertidal and subtidal oyster habitat using various skiffs and tong boats, sampled for Submerged Aquatic Vegetation (SAV).

SUQUAMISH TRIBE – Suquamish, WA **2016-2021**
Shellfish Biologist

- **Lead Biologist** – Planned, scheduled, and conducted advanced technical field work, monitoring, and research projects; supervised two biologists and six technicians
- **Data Management** – Created and maintained online GIS databases to monitor oyster habitat changes over time. Analyzed monitoring and fisheries data and presented translated results to wide range of audiences. Authored scientific reports, charts, and figures
- **Project Management** – Prepared and submitted habitat enhancement and conservation grant proposals, budgeted allocated funding, coordinated efforts with state, federal and tribal agencies, oversaw multiple aspects of a dynamic program simultaneously.

SKOKOMISH TRIBE – Skokomish, WA **2013 - 2016**
Shellfish Biologist

- **Fisheries science** - Planned and conducted bivalve population surveys, supervised a team of technicians (3), collected and entered field data, authored technical reports, monitored larval recruitment of native species, scientific diver.

EDUCATION

Brigham Young University, Provo UT ***M.S. Integrative Biology 2010***
B.S. Integrative Biology 2008

Miami University, Oxford OH *Additional graduate studies 2011-2012*

Atlantic Coastal Cooperative Statistics Program
1050 N. Highland Street, Suite 200A-N | Arlington, VA 22201
703.842.0780 | 703.842.0779 (fax) | www.accsp.org

TO: ACCSP Operations and Advisors Committee Members

FROM: Julie DeFilippi Simpson, ACCSP Deputy Director

DATE: July 24, 2024

SUBJECT: ACCSP Staff Workload for Proposed Project

Project Title: Building A Modernized Framework for Anadromous Creel Surveys and Scoping Improvements to Legacy Data Collection Systems

Project Type: New Project

Principal Investigators: Jeff Moore (NC DMF)

ACCSP Staff Workload Comments: *
This proposal will be a pilot project for fiscal year 2025 to build a modernized framework for anadromous creel data collection that can be broadly applied by all regional partners to enhance the timeliness, accuracy, and regional accessibility of valuable survey data supplemental to the MRIP data stream.

The technical work for project will be split between two contractors and the ACCSP staff. In addition to project and contract management, ACCSP Software Team and Recreational Team staff will be partially addressing the "Database structuring, API development, and web interface design" and "Planning and scoping legacy system updates." ACCSP staff would also be heavily involved in the standard creation process, which would have to be done by committee per ACCSP policy.

ACCSP Software Team and Recreational Team staff time required will be medium to high depending upon how the project unfolds. This has the potential to impact other scheduled projects.

ACCSP leadership is concerned that the burden of the funding transition plan will have a significant impact by having a low return on investment if other ACCSP partners do not have and/or are not interested in their own creel surveys. The object of funding transition is to have projects move from RFP funding to partner funding streams with a transition to ACCSP operations reserved for those projects with broad coastal applicability that benefit all or most partners.

This project is intended to establish a new product. Funding will cover the initial costs of development. Upon completion of this project, future costs will be managed under standard operating expenses for the ACCSP.

* Comments and opinions are based on evaluation of solely this project. Memos can be read cumulatively.

Rhode Island Department of Environmental Management
Division of Marine Fisheries

Office 401.423.1920 | Fax 401.423.1925 | dem.ri.gov/marine

Fort Wetherill Marine Laboratory
3 Fort Wetherill Road, Jamestown, RI 02835

Coastal Fisheries Laboratory
1231 Succotash Road, Wakefield, RI 02879

Geoff White, Director
Atlantic Coastal Cooperative Statistics Program
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22204

August 19, 2024

Dear Mr. White,

The Rhode Island Division of Marine Fisheries is pleased to submit the new proposal titled "Pilot Observer Program for Rhode Island State Waters Trawl and Fish Pot Fisheries" for review. This proposal will aid in collecting fisheries dependent data, answering regulatory questions surrounding fisheries in Rhode Island, and contribute to informing regional management.

Please address questions jointly to Patrick Williamson and JA Macfarlan of the Rhode Island Division of Marine Fisheries.

Sincerely,

Patrick Williamson
Rhode Island Department of Environmental Management
Division of Marine Fisheries
3 Fort Wetherill Road
Jamestown, RI 02835
Patrick.Williamson.ctr@dem.ri.gov

JA Macfarlan
Rhode Island Department of Environmental Management
Division of Marine Fisheries
3 Fort Wetherill Road
Jamestown, RI 02835
Reuben.Macfarlan@dem.ri.gov

Enclosures:
ACCSP Proposal: *"Pilot Observer Program for Rhode Island State Waters Trawl and Fish Pot Fisheries*"
Appendix A: Principal Investigators' Curricula Vitae

Proposal for funding made to the
Atlantic Coastal Cooperative Statistics Program
1050 N. Highland Street, Suite 200A-N
Arlington, VA 22201

FY25: Pilot Observer Program for Rhode Island State Waters Trawl and Fish Pot Fisheries

Total Cost: $188,712.19

Submitted By:
Patrick Williamson
Rhode Island Department of Environmental Management
Division of Marine Fisheries
3 Fort Wetherill Road
Jamestown, RI 02835
Patrick.Williamson.ctr@dem.ri.gov

JA Macfarlan
Rhode Island Department of Environmental Management
Division of Marine Fisheries
3 Fort Wetherill Road
Jamestown, RI 02835
Reuben.Macfarlan@dem.ri.gov

Bold comments intended to help with ranking

Applicant Name:	Rhode Island Department of Environmental Management Division of Marine Fisheries
Project Title:	Pilot Observer Program for Rhode Island State Waters Trawl and Fish Pot Fisheries
Project Type:	New Project
Requested Award Amount:	$188,712.19
Requested Award Period:	One year after receipt of funds (July 2025 through June 2026)
Program Priority:	Primary: bycatch (60%) Secondary: catch and effort (40%)
Date Submitted:	August 19, 2024
Project Supervisor:	John Lake Supervising Biologist, John.Lake@dem.ri.gov
Principal Investigator:	Patrick Williamson, Fisheries Specialist I, Patrick.Williamson.ctr@dem.ri.gov
Project Staff:	JA Macfarlan, Principal Biologist, Reuben.Macfarlan@dem.ri.gov Fisheries Specialist I (to be hired)

Bold comments intended to help with ranking

Atlantic Coastal Cooperative Statistics Program (ACCSP) Proposal for the State of Rhode Island

Objectives:

- **Collect bycatch and discard data in the state waters trawl and fish pot fisheries** while continuing to evaluate the feasibility of a Rhode Island state waters **observer program** for all gear types.
- **Collect catch and effort data to characterize the fishing behavior of the Rhode Island black sea bass, summer flounder, and mantis shrimp fisheries.**
    - Data reported by trawl and fish pot fishers commercial catch and effort logbooks will be validated by collecting effort data while at-sea including gear code, gear quantity, number of hauls, and days fished.
    - Additional effort data currently not reported by commercial fishers will be collected including mesh size, number of buoy lines, depth, and area fished (latitude/longitude).
- Analyze data collected and conduct modeling to **investigate: (1) bycatch in the state waters trawl and fish pot fisheries, (2) the utility of weekly aggregate limits in reducing discards, (3) the potential for regulatory changes that will increase effort and potential winter flounder bycatch for active trawlers in the mantis shrimp fishery, and (4) the size distribution of discarded target species.**

Need:

In recent years RI Department of Environmental Management (RIDEM) Division of Marine Fisheries (DMF) has received an increased number of requested regulatory changes to increase the efficiency and profitability of harvesters' operations. In 2020, a request resulted in DMF establishing a Pilot Summer/Fall Black Sea Bass and Summer Flounder Aggregate program to scope the development of weekly aggregate limits in the black sea bass and summer flounder fisheries. This scoping included an initial evaluation of feasibility funded by the Atlantic Coastal Cooperative Statistics Program (FY20 Use of Geographic Data and SAFIS Data Sources to Evaluate an Aggregate Landings Commercial Fishing Management Program). In 2024, the Summer/Fall Summer Flounder and Black Sea Bass Aggregate Program was codified in RIDEM regulation. **While the DMF worked with stakeholders and constituents to analyze the potential impact of the black sea bass and summer flounder aggregate program on discards, fishing behavior, bycatch, and quota usage, analysis focused on projections based upon a limited number of vessels allowed in the pilot aggregate program. Now that the aggregate program is a full-scale program open to all participants, and with the recent reduction to the commercial summer flounder quota, it is necessary for DMF to re-evaluate the aggregate program at the full-scale. Additionally, DMF is expecting additional requests for aggregate programs in other fisheries and has increased concern from constituents regarding this program's effects on fishing behavior, discards, and bycatch. It is therefore necessary to collect observer data from the trawl and fish pot fleets to answer questions surrounding the effectiveness of aggregate programs.**

In 2023, harvesters proposed changes to regulations in the mantis shrimp small mesh trawl fishery which is conducted at night within Narragansett Bay. This industry proposal would effectively increase effort for a fishery where there is little to no fisheries dependent data. The fishing occurs mostly in the fall converging with both a spatial closure to trawl gear and a temporary increase in mesh size. Both of those requirements are in place to protect spawning winter flounder and their eggs. Additionally, the timing and gear used in the fishery have the potential for increasing bycatch of river herring, juvenile Atlantic herring, juvenile black sea bass,

juvenile summer flounder, and winter flounder. Before the DMF could consider adopting such a proposal, data collection on fishing behavior, effort, bycatch, regulatory discards, and logbook validation is necessary. **Observing the fishery, particularly the discards, is the first step for DMF to make informed decisions on both season and mesh size in the area in which the fishery operates.**

While the Commercial Fisheries Research Foundation (CFRF) has worked with a research fleet to help collect fisheries dependent data on black sea bass, this proposed RI observer project has several key differences from the work conducted by CFRF. Importantly, the CFRF research fleet is comprised of 24 vessels from both RI an NJ who mostly fish in federal waters. The proposed observer program plans to sample from the entire RI trawl and fish pot fleets (85 vessels in 2023) when fishing exclusively in state waters.

Developing a state waters observer program for all commercial fisheries in the state of Rhode Island would be a costly, time-intensive endeavor that would also require hiring several additional staff members. As such, the DMF is conducting a pilot observer program for the state waters gillnet fleet to test the feasibility of an observer program. This pilot program has allowed DMF to develop sampling protocols and training materials, and the project will be completed in June 2025. However, the pilot gillnet observer program focuses on a single gear type that composes a small fleet (~20 vessels) with limited effort when compared to the remaining gear types used in state waters. DMF seeks to continue to scope a state waters observer program for all RI commercial fisheries, by conducting a state waters trawl and fish pot observer program in FY2025. This new program will allow DMF to answer questions regarding the feasibility of a statewide observer program that includes multiple fleets, gear types, and year-round sampling effort. **Upon completion of the proposed trawl and fish pot observer project, the DMF will complete its scoping of a statewide observer program that includes all commercial fleets and gear types. Potential funding for such program has been identified under an alternate source (e.g., Recovering America's Wildlife Act (RAWA)).**

Results and Benefits:

Conducting an expanded observer project on the RI state waters trawl and fish pot fleet will provide the DMF with an opportunity to test the feasibility of administering an observer program across multiple fleets simultaneously throughout the year. **This study will allow DMF staff to model the potential impacts of proposed regulatory changes on effort, bycatch and discards in the Rhode Island state waters trawl and fish pot fleets.** By modeling the potential impacts of these proposals, RI stakeholders, the Rhode Island Marine Fisheries Council (RIMFC), and the RIDEM will have a better understanding of any associated risks and will be able to make more informed decisions on which proposals to recommend for adoption.

Although the geographical scope of this proposal is confined to Rhode Island state waters, the Mid-Atlantic Fishery Management Council (MAFMC) has indicated that evaluating the relationship between changes in landings limits and the rates and magnitude of discarding in commercial fisheries is a high research priority for the species they manage (MAFMC, 2019). Additionally, the New England Fisheries Management Council (NEFMC) lists continuing to improve reporting accuracy, including accurate reporting of species and area fished as a research priority (NEFMC, 2022). Furthermore, the Rhode Island Trawl fleet is part of the New England Otter Trawl Fleet which is in the top quartile of the FY25 Bycatch Matrix contained in the ACCSP Request for Proposals (RFP). While New England Fish Pot is not in the top quartile of the FY25 Bycatch Matrix, the MAFMC lists improving the precision of commercial discard estimates and estimating the uncertainty of commercial black sea bass discards with an emphasis on

commercial pot and trap gear as a research priority (MAFMC, 2019). Additionally, black sea bass, is in the top quartile of the FY25 Biological Matrix contained in the ACCSP RFP. Moreover, trip reports and dealer reports indicate that this project may collect bycatch data on several of the species in the FY25 Biological Matrix including river herring, gray triggerfish, American lobster, American eel, and spiny dogfish.

Mantis shrimp are not in the top quartile of the Biological Matrix because the species has not been listed on the matrix previously. A request was made to the ACCSP Biological Review Panel to add Mantis shrimp to the matrix. Due to the fact that this committee only updates the matrix every other year, Mantis shrimp will be added and evaluated on the matrix in 2025. In the case of winter flounder, the Winter Flounder Technical Committee has noted concerns that the federal output control-based management established in Amendment 16 requires accounting of all removals, but this conflicts with the inshore effort control rules. Thus, the Plan Development Team uses long term trends with an assumption that limited new state waters measures are being considered that could substantially change the number of removals (ASMFC, 2023). **Increasing fishing effort in the mantis shrimp small mesh trawl fishery and allowing vessels into the winter flounder closed area could substantially alter winter flounder removals in RI. Similarly, bycatch data collected by this project will aid in improving river herring life stage-specific estimates of fishing mortality rates in state waters and collect data on discards of other clupeids, both of which are important research priorities (NEFMC, 2022). River herring and winter flounder have long-standing protections in Narragansett Bay which are now being challenged by the industry.** Due to the depressed state of the winter flounder and river herring stocks, the necessity of these protections has come into question. More information is needed to consider changing these long-standing protections.

Data Delivery Plan:

Data will be submitted to ACCSP as soon as a platform for submitting bycatch and discard data is made available to state partners. Data will be made available to any state partner upon request and will be submitted for inclusion in individual species stock assessments during the benchmark stock assessment process.

Approach:

The following outlines the approach that DMF staff will take to complete the proposed work regarding personnel, outreach, data collection, and analysis.

Personnel:

The DMF will contract a full-time Fisheries Specialist I to work out of the DMF offices in Jamestown, RI. This contract position will be maintained throughout the trawl and fish pot observer project to conduct at-sea data collection. The employee will go through the following:

- Standard DMF onboarding process
- At-sea vessel safety training
- Species identification training
- Fisheries data collection and data entry training
- Training on frequently landed species, and fishing practices

The employee will be provided with foul weather gear, a laptop computer, and supplies necessary to conduct at-sea data collection. Additionally, when more than three trips per week are required, DMF has designated two staff members to conduct at-sea data collection on the remainder of trips. These

individuals will be provided the same training and necessary supplies as the contracted Fisheries Specialist I, and this will allow us to ensure coverage targets are met.

Outreach:

DMF staff will continue to communicate all aspects of this project to trawl and fish pot fishers who fish in state waters to inform them of our plans and get their feedback. DMF does not anticipate any challenges in gaining participation and achieving our sampling targets.

DMF staff will send a letter to fishers who reported fishing with trawl or fish pots in 2024 to inform them that a state waters trawl and fish pot observer program will be starting. Additionally, the DMF will dedicate a page on our website to the project, discuss the proposed project at our finfish regulatory workshops in 2024 and early 2025, and present an overview of the project to our RI Marine Fisheries Council. At the start of the program, DMF staff will reach out to each fisher individually to inquire if they plan on fishing in state waters, federal waters, or both. **Any fishers who plan to fish exclusively in federal waters will be removed from the pool of fishers. This will ensure there is no overlap between our pilot observer program and the federal waters observer program.** For reference, 85 commercial fishers reported using trawl gear or fish pots in 2023.

Data Collection:

Data will be collected for this project from July 2025 through July 2026, or one year from the receipt of funds. A target of **2% sampling coverage per week for the fish pot and trawl fleet will be used to determine the number of trips sampled each week, using data from 2024 as a proxy. The value of 2% was chosen as it is the accepted pilot coverage rate used by the Northeast Fisheries Science Center when previous bycatch estimates are not available to calculate variance estimates that can be used to further define the level of sampling need (NMFS, 2004). Additionally, the ACCSP Atlantic Coast Fisheries Data Collection Standards (2012) defines adequate sampling as 2 – 5 % observer coverage (ACCSP, 2012). Due to the smaller number of trawl trips targeting mantis shrimp (<200 trips in 2023) a target coverage rate of 10% will be used for trips in this fishery. The 10% was chosen to ensure a sample size robust enough to ensure proper analysis.** Analysis of 2023 data indicates that the number of required trips per week will range from 1 – 5. Trip selection will be completed following the protocols established by the RI Pilot Gillnet Observer Program. Each licensed fisher will be assigned a random number and on Friday of each week, DMF staff will use a random draw to select 1 – 5 fishers for the following week (RIDEM, 2023). These fishers will be contacted on Friday and notified that they have been selected to have a trip observed for the following week (RIDEM, 2023). DMF will remain in close communication with these fishers the following week to coordinate trips and ensure that the required number of trips are completed (RIDEM, 2023). Should it be determined that a fisher will not be fishing at all in a selected week, an alternate fisher will be selected (RIDEM, 2023).

The sampling protocols established by the RI Pilot Gillnet Observer Program will be used. These protocols are comparable to those utilized by the Northeast Fisheries Observer Program (NEFOP) where detailed information will be collected for each haul and **individual weights and lengths will be collected for all target species to the extent practical and for non-target species as time allows (RIDEM, 2023). Sub-sampling procedures will be used for high-volume catches and notes will be made regarding the disposition of discarded fish (i.e., no quota, too small for regulation, dead, alive, unmarketable, etc.) (RIDEM, 2023). Any interaction with marine mammals or protected species will be recorded. The total weight of all catch per haul will be recorded along with the disposition code and the estimation method used, e.g. spring scale, sub-sampling, captain**

estimate, etc.) to identify the weight of each species. This will allow for complete composition of the catch for each haul.

Analysis:

All data collected at-sea will be entered into an MS Access database by DMF staff. The statistical software R, ArcGIS, and MS Excel will be used for all data analysis. The following details the analyses that will be performed to address the specific questions outlined in this proposal.

Investigating the effectiveness of weekly black sea bass and summer flounder aggregate limits

All discards of target species on each trip will be analyzed and extrapolated to estimate total landed catch and discards of each target species for each week. Data from trips fishing daily limits will be compared to those fishing aggregate limits. Appropriate quantitative analysis will be determined based on the data collected. Modeling simulations will be performed to test the effect of weekly aggregate limits on effort and discards to determine if weekly aggregate limits are significantly reducing regulatory discards and changing vessel behavior in state waters.

Examining the regulatory proposal to expand the mantis shrimp small mesh trawl fishery

Trip and haul data including day, time, latitude and longitude of the beginning and end of trawl, depth, mesh size, door spread, length of tow, duration of tow, and area trawled will be explored as factors affecting the catchability of mantis shrimp in small mesh bottom otter trawls. Length frequency data of mantis shrimp will be used to determine how many age 1 and age 2 individuals are caught per trip. Importantly discard values of Mantis shrimp and their disposition will be collected. These data will be used to (1) characterize the fishery, (2) examine size structure of retained and discarded mantis shrimp, (3) examine the spatial extent of the fishery in Narragansett Bay, (4) collect data on discarded species of importance such clupeids, flounders, and other commercial species. Given the dearth of information on the fishery ranging from the number of vessels involved, dealers, catch rates, CPUE, and discards: the data collected here will allow us to examine emerging proposals from the industry with a minimum baseline knowledge of fleet operations. These data will be used to calculate mantis shrimp densities and to build size frequency histograms of the species. To better understand the patterns of abundance, seasonality, timing of fishing activity, and fishing effort on the resource we will conduct parametric (e.g. ANOVA) and non-parametric (e.g. Kruskal-Wallis) analyses of factors that may affect the size and density of mantis shrimp collected from the observer data.

Geographic Location: This project will be conducted by RIDEM DMF staff out of Jamestown, RI. At-sea sampling will occur on vessels with commercial pots and bottom otter trawls in Rhode Island state waters.

Table 1. Milestone Schedule:

Activity	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Annual vessel safety training	X											
Conduct at-sea sampling	X	X	X	X	X	X	X	X	X	X	X	X
Analyze data									X	X	X	X
Report writing										X	X	X

Table 2. Project Accomplishments Measurement:

Goal	Metric
Safety training	Vessel safety course completed
At-sea sampling	2% weekly trip coverage with a 10% coverage rate for trips targeting mantis shrimp
Data analysis	Analysis and modeling in R
Report writing	Report submitted to ACCSP

Table 3. Cost Summary (Budget):

Budget Category	Federal ACCSP	In-Kind	Total
a. Personnel			
Supervisor (3%)	-	$2,391.00	$2,391.00
Principal Biologist (15%)	$14,012.10	-	$14,012.10
b. Fringe Benefits			
Supervisor (3%)	-	$1,141.00	$1,141.00
Principal Biologist (15%)	$5,079.74	-	$5,079.74
c. Travel	$3,537.60	-	$3,547.60
d. Equipment	-	-	-
e. Supplies	$860.94	-	$860.94
f. Contractual			
ASMFC Fisheries Specialist #1 (35%) Salary	$21,216.38	-	$21,216.38
ASMFC Fisheries Specialist #1 (35%) Fringe	$7,691.49	-	$7,691.49
ASMFC Fisheries Specialist #2 (100%) Salary	$60,618.50	-	$60,618.50
ASMFC Fisheries Specialist #2 (100%) Fringe	$21,975.72	-	$21,975.72
ASMFC Indirect (15%)	$16,725.31	-	$16,725.31
g. Training	$3,131.00	-	$3,131.00
h. Total Direct	$154,848.78	$3532.00	$158,380.78
i. Indirect			
RIDEM (22.32%)	$33,863.41	$788.34	$34,651.75
j. Total	$188,712.19	$4,320.34	$193,032.54
k. Percentage	97.8%	2.2%	100%

Bold comments intended to help with ranking

FY25 COST DETAILS:
Description of budget categories and expenses for this project
Overall match: RIDEM is providing 2.2% of services as in-kind contribution.

a. **Personnel:** The DMF project team has several staff members working in a collaborative effort to accomplish project objectives. Each staff member will spend a percentage of their time on the project as follows:

From ACCSP:

i. **Principal Biologist**: 15% funded position to act as support to the principal investigator and may conduct initial observer trips; 15% of salary ($93,414.00) for one year = $14,012.10.

From RIDEM as In-kind:

i. **Supervisor**: 3% funded to provide project oversight and staff management; 3% salary ($79,700.00) for one year = $2,391.00.

b. **Fringe Benefits:** Annual fringe benefit rates for employees vary depending upon the employee's pay rate and what the employee chooses for health care. This may include the following:

Retirement 24%
Deferred Compensation 0.4%
FICA 6.2%
Medicare 1.45%
Health care $21,937/year
Dental $1,132/year
Vision $165/year
Assessed Fringe 4.25%
Retiree Health 6.75%

From ACCSP:

i. **Principal Biologist**: Fringe benefits for 15% of the Principal Biologist = $5,079.74.

From RIDEM as In-kind:

i. **Supervisor:** Fringe benefits for 3% of the supervisor's time = $1,141.00.

c. **Travel:** Travel for this grant includes mileage to travel roundtrip from the DMF Office located in Jamestown, RI to the Port of Galilee. The ASMFC mileage rate of $0.67 per mile was used to travel 44 miles roundtrip with a total of 120 trips. A total of 120 trips were estimated based on 2% coverage of the state water trawl and fish pot fisheries and an enhanced 10% coverage for the mantis shrimp fishery using 2023 data as a proxy.

d. **Equipment:** There are no equipment costs for this project.

e. **Supplies:** Supplies for this grant includes for this grant will be for the Fisheries Specialists and additional staff member as needed to conduct at-sea sampling on-board commercial fishing

vessels. Supplies include four (4) Rite in the Rain notebooks ($25.02), twenty-four (24) pairs of sampling gloves ($29.96), Rite in the Rain paper ($226.48), three fish baskets ($79.50) and foul weather gear (boots, jacket, bib $500).

f. Contractual: The DMF project team has several ASMFC contractors working in a collaborative effort to accomplish project objectives. Each contractor will spend a percentage of their time on the project as follows:

Salary:

i. **Fisheries Specialist #1:** 35% funded position (contracted through ASMFC) to serve as the principal instigator; 35% of salary ($60,618.50) for one year is $21,216.38.

ii. **Fisheries Specialist #2**: 100% funded position (will be contracted through ASMFC) to serve as the primary fisheries observer; 100% of salary for one year is $60,618.50.

Fringe:

i. **Fisheries Specialist #1:** 35% of annual fringe benefits for the Fisheries Specialist for one year is $7,691.49.

ii. **Fisheries Specialist #2**: 100% of annual fringe benefits for the Fisheries Specialist for one year is $21,975.72.

ASMFC Indirect (15%): The ASMFC indirect for the above positions is $16,725.31.

g. Training: Training includes annual at-sea vessel safety training for the fishery specialists ($3,131.00).

h. Total Direct: The total direct from ACCSP for this program is $154,848.78. The total direct from RIDEM is $3,532.00. The total direct for the project is $158,380.78.

i. Indirect (22.32%):

From ACCSP: 22.32% of the total direct from ACCSP is $33,863.41.

From RIDEM as In-kind: 22.32% of the total direct for in-kind contributions is $788.34.

j. Total: The total ask from ACCSP is $188,712.19. The total in-kind contribution from the RIDEM is $4320.34, and the total cost of the project is $193,032.54.

k. Percentage: The RIDEM is contributing 2.2% of the total project cost through in-kind, while ACCSP is contributing 97.8% of the total cost.

SUMMARY OF PROPOSAL FOR RANKING

Proposal Type: New

Primary Program Priority: Bycatch/Species Interactions (60%)

- Bycatch and discard data (number, length, weight) will be collected from the Rhode Island trawl and fish pot with an emphasis on black sea bass, summer flounder, mantis shrimp, winter flounder, river herring, and Atlantic herring. Data will be collected on additional species as time allows.
- The Rhode Island trawl fleet is part of the New England Otter Trawl Fleet which is in the top quartile of the FY25 Bycatch Matrix contained in the ACCSP Request for Proposals (RFP).
- Several of our species of interest including black sea bass and river herring are in the top quartile of the FY25 Biological Matrix contained in the ACCSP RFP.

Data Delivery Plan: Data will be submitted to ACCSP as soon as a platform for submitting bycatch and discard data is made available to state partners. Data will be made available to any state partner upon request and will be submitted for inclusion in individual species stock assessments during the benchmark stock assessment process.

Multi-Partner/Regional Impact: Although the geographical scope of this proposal is confined to Rhode Island state waters, the collection of this data will be of great value to many ACCSP partners and species-specific stock assessments.

- The MAFMC has indicated:
    - Evaluating the relationship between changes in landings limits and the rates and magnitude of discarding in commercial fisheries is a high research priority (MAFMC, 2019).
    - Improving the precision of commercial discard estimates and estimating the uncertainty of commercial black sea bass discards from commercial pot and trap gear is a research priority (MAFMC, 2019).
- The NEFMC lists
    - Continuing to improve reporting accuracy, including accurate reporting of species and area fished as a research priority (NEFMC, 2022).
    - Collecting data that can inform life stage specific discard estimates of river herring and other clupeids in state waters as an important research priority (NEFMC, 2022).
- This project will collect data from several species in the top quartile of the FY25 Biological Matrix and from a fleet in the top quartile of the FY25 Bycatch Matrix

Contains Funding Transition Plan: This project will be used to further test the feasibility of a Rhode Island state waters observer program for all commercial gear types. This pilot project may warrant two years of data collection and therefore Rhode Island anticipates submitting this proposal for funding as a new project for one year, and up to but not exceeding, one additional year as a maintenance project. At the completion of this pilot project, Rhode Island will evaluate the feasibility of a full-scale state waters observer program and plans to apply for funding from an alternate source to fund the project moving forward.

In-Kind Contribution: In-kind contribution for this project is 2.2% as stated in the budget table.

Bold comments intended to help with ranking

Improvement in Data Quality/Quantity/Timeliness: This project will collect data that addresses priorities in the FY25 Bycatch and Biological Matrices. Additionally, data collected will address several research recommendations identified in species-specific management documents.

Potential Secondary Module: Catch and Effort (40%)

- Effort data will be collected to characterize the fishing behavior of the Rhode Island trawl and fish pot fishery.
- Data reported by trawl and fish pot fishers on commercial catch and effort logbooks will be validated by collecting effort data including gear code, gear quantity, number of hauls, and days fished.
- Additional effort data currently not reported by commercial fishers will be collected including mesh size, number of panels per string, haul time, depth, and area fished (latitude/longitude).

Impact on Stock Assessment: Data collected as part of this project will address questions regarding the quantity and size distribution of commercial discards occurring the New England trawl and fish pot fleet. Information on commercial discards remains limited for many stock assessments and in some cases is assumed to be zero but has not been validated in state waters.

Properly Prepared: This proposal meets the requirements as specified in the Funding Decision Document.

Merit: This project will sample from a fleet in the FY25 Bycatch Matrix, will collect data from several species in the FY25 Biological matrix, and will address several species-specific research needs. This project in innovative in that it is attempting to further test the feasibility of a state waters observer program by sampling multiple fleets and deploying observers year-round. In federal waters, NEFOP collects data on bycatch and discards, but fishing operations occurring in state waters are not targeted by this program. This project will not only test the feasibility of having a multi-fleet observer program in state waters, but it will fill large data gaps identified in regional fisheries management documents.

LITERATURE CITED:

Atlantic Coastal Cooperative Statistics Program. (2012). Atlantic Coast Fisheries Data Collection Standards.

Atlantic States Marine Fisheries Commission. (2023). Winter Flounder Technical Committee Meeting Summary. https://asmfc.org/uploads/file/63ff514aWF_TC_Meeting_summary_1_11_23.pdf

Mid-Atlantic Fishery Management Council. (2019). Mid-Atlantic Fishery Management Council Comprehensive Five Year (2020-2024) Research Priorities. https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/61d45ad56093c611d2ec796e/1641306837901/Updated_2020-2024+Research+Priorities+Document_01_2022.pdf

National Marine Fisheries Service (NMFS). (2004). Evaluating bycatch: a national approach to standardized bycatch monitoring programs. US Dept Commerce, https://spo.nmfs.noaa.gov/sites/default/files/tm66.pdf; 108 p.

Bold comments intended to help with ranking

New England Fishery Management Council. (2022). NEFMC Research Priorities, 2022-2026. https://d23h0vhsm26o6d.cloudfront.net/2022-26-NEFMC-research-priorities.pdf

Rhode Island Department of Environmental Management. (2023). FY23: Pilot Observer Program for Rhode Island State Waters Gillnet Fishery Sampling Protocols.

Bold comments intended to help with ranking

Appendix A: Curriculum Vitae for Principal Investigator

Patrick Williamson patrick.williamson.ctr@dem.ri.gov 401-560-4131

PROFESSIONAL EXPERIENCE

RI Department of Environmental Management, Jamestown, RI, June 2023 – Present
Fisheries Specialist I (Marine)

- Manages implementation of Addendum XXIX to Amendment 3 of the American Lobster Fisheries Management Plan and Addendum IV of the Jonah Crab Fisheries Management Plan
- Manages Summer/Fall Black Sea Bass and Summer Flounder Aggregate Program
- Participates in regional multi-agency meetings to discuss, troubleshoot, and rectify common issues regarding Addenda XXIX
- Assists in completing and implementing fisheries management actions
- Participates in discussions that shape agency policies

AIS Inc, Dartmouth, MA, February 2023 – Present
Electronic Monitoring Reviewer

- Reviews and annotates electronic monitoring footage from groundfish audit model trips

AIS Inc, Toms River, NJ, February 2021– June 2023
Task Manager

- Assisted in managing the Northeast Biological Port Sampling Program
- Analyzed, interpreted, and applied data to monitor program performance
- Produced data queries and developed reports
- Assisted in sampling lengths and collecting otoliths from commercially caught fishes

TechGlobal Inc, Bethesda, MD, June 2021 – April 2023
Principal Investigator

- Assisted in the implementation and management of NOAA Fisheries Atlantic Herring Exempted Fishing Permit
- Coordinated with service providers, harvesters, and NOAA to assist in implementing and managing the use of Electronic Monitoring in the Atlantic herring fishery
- Collaborated with other NOAA Fisheries programs to provide recommendations to participants and implement the exempted fishing permit
- Participated in Atlantic herring quota monitoring meetings and Sustainable Fisheries Division herring team meetings

AIS Inc, Toms River, NJ, July 2018 – January 2021
Field Biologist

- Sampled lengths and collected otoliths from commercially caught fishes for the Northeast Biological Port Sampling Program

Massachusetts Division of Marine Fisheries, Gloucester, MA, March 2017 – July 2017
Seasonal Fisheries Technician

- Performed field work monitoring diadromous fishes

New York Department of Environmental Conservation, New Paltz, NY, March 2016 – July 2016
Seasonal Fisheries Technician

- Performed field work monitoring diadromous fishes

SKILLS DEVELOPED

Computer and statistical skills (R, ArcMap, SPSS, Microsoft software); Field work experience on a variety of fisheries surveys.

EDUCATION

University of Regina, Regina, SK, CA, 2014 - 2015
Graduate Course Work. Major: Biology. Withdrew in good standing August 2015. Credit hours: 12. GPA: 88 out of 100.

Roger Williams University, Bristol, RI, 2010 - 2014
B.S. (May 2014) Majors: Biology, Environmental Science, Environmental Chemistry.
Thesis: "Creating effective mercury consumption advisories for recreationally important coastal fishes in southern New England". Credit hours: 155. GPA: 3.51 out of 4.0. Cum Laude.

PUBLICATIONS

Taylor, D.L. and P.R. Williamson. (2017) Mercury contamination in Southern New England coastal fisheries and dietary habits of recreational anglers and their families: Implications to human health and issuance of consumption advisories. Marine Pollution Bulletin. 114:144-156.

Campbell, S.H., P.R. Williamson, and B.D. Hall. (2017) Prevalence of Microplastics in Gastrointestinal Tracts of Fish and Water from Wascana Creek. FACETS 2:395-409

SELECT AWARDS

2015 Saskatchewan Fish and Wildlife Development Fund Student Research Award

2014 Roger Williams University Faculty Association Scholarship

2014 Roger Williams University Outstanding Senior in Environmental Science

2014 Roger Williams University Thesis with Distinction

2014 Selected to present by the American Chemical Society at the invitational Sci-Mix presentation during the national conference

Bold comments intended to help with ranking

Proposal for Funding made to:
Coordinating Council and the Operations Committee
Atlantic Coastal Cooperative Statistics Program
1050 N. Highland St., Ste. 200 A-N
Arlington, VA 22201

Enhancing and modernizing recreational fisheries data collection through crowd-sourced citizen science, remote sensing and emerging AI technology via the GotOne fishing app

Submitted by:

Anthony Wood, Ph.D.
Northeast Fisheries Science Center
Resource Evaluation and Assessment Division
Population Dynamics

Office: (401) 954-1563
Email: anthony.wood@noaa.gov

Proposal for ACCSP Funding

Applicant Name:	Anthony Wood NOAA's Northeast Fisheries Science Center American Saltwater Guides Association (ASGA) / GotOne Media
Project Title:	Enhancing and modernizing recreational fisheries data collection through crowd-sourced citizen science, remote sensing and emerging AI technology via the GotOne fishing app
Project Type:	New Project
Requested Award Amount:	$200,000
Primary Program Priority:	Biological Module (50%); Recreational Catch and Effort Module (discards) (50%)
Date Submitted:	June 17, 2024
Project Supervisor:	Luyen Chou (GotOne Media)
Principal Investigator:	Anthony Wood
Project Staff:	Tony Friedrich & Cody Rubner (ASGA) Luyen Chou, Tom Fuda, Dirk Liebich (GotOne Media) Kate Wilke & Brendan Runde (The Nature Conservancy)

Introduction:

We stand at the convergence of two transformative trends: seismic advances in multimodal AI technology and the rapid adoption of mobile apps by recreational anglers. This presents a unique opportunity to revolutionize fisheries management and science by **leveraging cutting-edge AI models and crowd-sourced data from angler apps to fill in key gaps in our understanding of coastal fisheries and stocks.**

GotOne, a new recreational angler fishing log app, launched at the beginning of 2023, has gained the support of leading organizations including the American Saltwater Guides Association (ASGA) and The Nature Conservancy (TNC). Moreover, **GotOne** has been adopted by top professional guides and tackle innovators, such as Hogy Lures and Hatch Outdoors, because it **harnesses these emerging technology innovations to improve anglers' experiences and expertise while also contributing to research needed to support sustainable marine resources.**

The app is gaining significant usership (11,000 logged fish by 2,500 anglers since inception in 2023), and we expect it to continue to grow. **One reason GotOne has established a strong and growing user base is the formation of partnerships with the Atlantic States Marine Fisheries Commission (ASMFC), Louisiana Department of Wildlife and Fish (LDWF), Massachusetts Division of Marine Fisheries (MA DMF), to fill targeted data gaps.** As such, **we believe it is critical that GotOne adopt ACCSP data standards, and implement a standardized approach via the ACCSP data warehouse to share angler data efficiently and effectively with ACCSP partner organizations**. By doing so, we also see an opportunity to promote the participation and compliance of other consumer fishing apps to similarly align their data strategies with ACCSP.

In addition, given the amount of discard length (and other) data currently being collected by GotOne's rapidly growing user base, there is an opportunity to contribute significantly to gaps in recreational fishing data.

Specifically, this project will support ACCSP Program Goals, as well as priorities set forth by the Recreational Technical committee, by improving biological data and discard data for all recreationally targeted Program Priority Species (see Fig. 1 below), plus NOAA Northeast Fisheries Science Center (NEFSC) priority species bluefish, scup, and winter flounder. Black sea bass will be included as well, which is a priority for both the Program and NOAA, and has been suffering from data and management challenges. This project proposes innovative fisheries-dependent data collection and management technology in partnership with NOAA Fisheries, leveraging ongoing partnerships with ASMFC, LDWF, MA DMF, NEFSC, SEFSC, University of Chicago's Marine Biological Lab at Woods Hole, among others.

Finally, the **participation of ASGA and TNC in the proposed project provides unique advocacy, outreach, and marketing capabilities and connections across key stakeholder communities**, including scientists, for-hire charter captains, tackle manufacturers and retailers, and the broader recreational fishing community. We believe l**everaging these capabilities and connections can drive high levels of engagement and participation in angler collection of biological and discard data to supplement and enhance current data collection methods**.

Objectives:

- **Augment the collection of recreational fisheries data through recreational angler use of the GotOne fishing app by increasing the number of anglers reporting (sample size) on priority species and increasing geographic scope of data collected.**
- **Align GotOne's fishing data with ACCSP data definitions and standards.**
- **Implement and maintain a regular data feed of fishing data collected from GotOne's users (coastal recreational anglers and professional charter captains) into the ACCSP data warehouse.**
- **Promote the importance of data standardization and integration, as well as promote broader compliance with ACCSP data standards in the recreational fishing app market.**
- **Expand species-specific recreational discard data collection for recreationally-targeted species named in the Priority Matrix, plus NEFSC priority species, including black sea bass, bluefish, scup and winter flounder (Fig. 1).**
- **Implement AI-powered species and length determination capabilities in GotOne to improve and verify data accuracy while increasing angler participation in data capture.**
- **Define species-specific, common protocols and image-based AI training models for individual fish identification, allowing GotOne to serve as a high-tech, low-cost, low-impact fish "tagging" tool to greatly increase the tracking of individual fish within defined stocks.**
- **Enable NOAA to accomplish their goal of "Re-envisioning the Recreational Fisheries Data Partnership" by providing cutting edge technology to better manage our shared marine resources.**
- **Be a partner in restoring faith in fisheries science and management, provide a path forward from MRIP, and support advancements in the NOAA Fishing Effort Survey.**

Need:

Fisheries management has long struggled with challenges related to accurate and timely data collection necessary for stock models to support fisheries policy decisions. The challenge is greater for stocks with a significant recreational component because of the large number of anglers, variety of access points, and lack of reporting requirements for both catch and discards. Specific challenges this project will address are:

- **Filling key data gaps related to recreational discards, including fish length, seasonality, and environmental covariates. Stock assessments regularly list discard lengths as an area for improvement across many economically important species.** Emerging technology can address these concerns and advance our understanding of fisheries impacts on stocks.
- Recreational data collection has been a source of frustration within the community. We have a tremendous opportunity to reshape the fisheries landscape by enhancing the current system based on the needs of scientists, managers, and the general angling community. GotOne addresses these needs by leveraging the participation of recreational anglers, who are motivated to log their fishing activities for personal improvement rather than regulatory compliance, to provide a growing abundance of data that can be shared by researchers and managers.

Consumer recreational fishing apps like GotOne provide an opportunity for large-volume collection of catch-related data "in real time" and not reliant upon memory. Emerging data and AI capabilities, such as GPS-specific location gathering, time and location-based environmental data gathering via recognized application program interfaces (APIs), and AI length and species determination through catch photography allow for a rich, and potentially more accurate capture of data that minimizes human error associated with species recognition and recall bias.

However, app-based data collection has its own limitations that have yet to be addressed:

- Inconsistent data standards and definitions (e.g. length, disposition, mode)
- Inherent biases related to factors such as user avidity, regional distribution, etc.

As such, the authors of this proposal do not propose app-based data collection as a substitute for current, official data collection methodologies (e.g., MRIP/APAIS). Instead, **the intention of the proposal is to make recreational angler data collection through apps like GotOne more useful to the management community by committing to alignment of data standards and definitions with ACCSP, and regular data feeds into the ACCSP data warehouse, and by creating validation methods (AI length and species identification).** By doing so, we hope to create the opportunity to compare data sourced from different apps and from more traditional surveys, to better identify management applications for app-based data, and to fill in gaps in current data collection.

An example of the value of this combined approach is the Massachusetts Division of Marine Fisheries Striped Bass Citizen Science Project, which uses GotOne to efficiently collect striped bass recreational discard data that includes landing time, release time, water temperature, gear type, and fish vitality. As a result of high levels of participation (over 11,000 recorded catches), significant correlations can be made between these factors and catch-and-release vitality, which is already influencing recreational angler behavior, and driving changes in fishing gear design by industry leaders like Hogy Lure Company.

Results and Benefits:

This project addresses program priorities related to Catch and Effort and Biological Sampling of recreationally targeted species ranked in top 25% of the Priority Matrix.

- **Data Collection**: Leverage the GotOne fishing app to collect large volumes of data on recreational catch and discards, including additional information such as fish length, condition, release time, and more
- **Data Protection**: Ensure the privacy of GotOne's anglers by establishing user consent, aggregating and anonymizing user-collected data, and generalizing specific location information
- **Data Sharing: Standardize and automate regular transfers of discard data to ACCSP data warehouse**, which can then be used as a central repository for ACCSP Program Partner access
- **Scientific Advancements**: Provide critical data to **fill gaps in current scientific knowledge, improving stock assessments** and management practices

- **AI Integration**: E**nhance data accuracy and utility through AI** features like automated species identification and length measurement
- **Data Standards and Integration: Integrate with ACCSP standards, leveraging SciFish API, while providing a path forward and template for other technologies to comply with shared data**

Approach:

The proposed project consists of four discrete, but related, components aligned with the objectives listed above:

1. **Integrate GotOne's data into the ACCSP:**
    a. Work with ACCSP to review GotOne and ACCSP data definitions, and align GotOne's data definitions and database accordingly. We will also work with existing research partners (e.g. LDWF) to ensure alignment between data collected on their behalf by GotOne with ACCSP data definition and architecture. For instance, this may entail modifying or clarifying the specific definition and format of "length" as reflected in GotOne's existing partners' surveys with the ACCSP standard.
    b. Work with ACCSP to design and implement an ETL (Extract, Translate, Load) process to transfer data from GotOne to the ACCSP data warehouse for broader access to ACCSP Partners. We recognize that ACCSP may require further data cleansing and validation before making this data more widely available, but the goal is to make GotOne's data available to ACCSP for research and analysis, and as a standardized method for data sharing with GotOne research partners, in lieu of direct data transfers. The approach will leverage existing SciFish platform APIs and other best practice ACCSP data tools and approaches for this integration. We plan to complete the SciFish pre-application for the October 2024 deadline.
2. **Collect and deliver species-specific discard length data via ACCSP to support stock management:**
    a. **Currently, GotOne shares species-specific recreational discard data (including length) directly with management agencies, such as NOAA, MA DMF, ASMFC and LDWF (typically via CSV or JSON files). This proposed project component would build on the work in Component 1 above to reroute these data transfers through the ACCSP data warehouse, thereby also allowing broader access for ACCSP's Partners to discard data from GotOne's users.**
    b. The **project would also expand the number of species for which GotOne is collecting and sharing discard length data to include all recreationally targeted fish from the Biological Sampling Priority Matrix, as well as scup and winter flounder, which are priorities for NOAA Northeast Fisheries Science Center (NEFSC). We believe this enhancement can result in a material increase in discard length data available to scientists and managers, a major gap in current stock assessment data. For context, NOAA Fisheries currently collects roughly 40 bluefish discard lengths per**

year. Last season alone, GotOne collected over 800 bluefish discard lengths from recreational anglers.

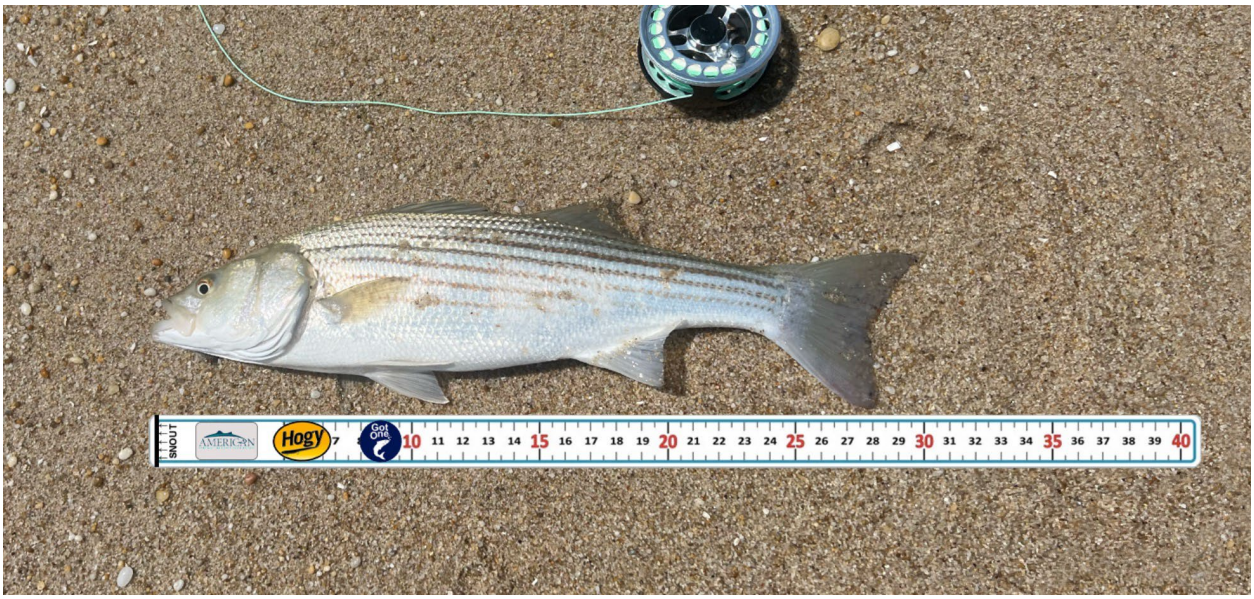
Figure 1. List of species to be added to GotOne:

Biological sampling priority matrix	Priority species currently supported by GotOne	Priority species to be added to GotOne
Black Sea Bass	Black Sea Bass	
Red Grouper		Red Grouper
Tilefish		Tilefish
Snowy Grouper		Snowy Grouper
American Shad		American Shad
Atlantic Menhaden		
River Herring	Cobia	
Spanish Mackerel		Spanish Mackerel
Atlantic Halibut		
Blueline Tilefish		Blueline Tilefish
Finetooth Shark		
Gray trigger		Gray trigger
Bluefin Tuna	Bluefin Tuna	
Gag grouper		Gag grouper
Vermillion Snapper		Vermillion Snapper
American Lobster		
Spiny Dogfish		
Red Snapper		Red Snapper
American Eel		
Sortfin Mako Shark		

Species currently supported by GotOne
Albacore (longfin)
Atlantic bonito
Bigeye tuna
Black drum
Black sea bass
Blackfin tuna
Bluefin tuna
Bluefish
Bonefish
Cobia
False albacore (little tunny)
Fluke (summer flounder)
Jack crevalle
Mahi-mahi
Permit
Red drum (redfish)
Sheepshead
Skipjack tuna
Skunk
Snook
Speckled trout
Striped bass (rockfish)
Tarpon
Tautog (blackfish)
Weakfish (squeteague)
Yellowfin tuna

Additional species to be added to GotOne
Scup
Winter flounder

3. **Train AI model for accurate discard length measurements from photographic input, and create common protocol for image capture for training AI models for future capabilities:** Recent frontier AI models have been trained to “understand” visual inputs with astonishing sophistication. If you upload a photo of a landscape, these models can now identify humans, distinguish them from animals and trees, and even identify the flora and time of year. This capability is the result of training AI vision models against vast databases of visual content, accompanied by descriptions and metadata, typically added by humans. Based on similar approaches, fishing app developers and AI researchers have made significant progress on reliable identification of fish species from web-sourced angler photos. Progress has also been made in the area of estimating fish size (length) from photographs including calibration marks or totems.



In addition, early efforts to identify individual fish within specific species via AI vision models have shown promising results, as evidenced by recent efforts by the US Geological Survey in collaboration with Trout Unlimited. Developing the capability to identify recreationally landed fish by species, and to determine accurate length measurements would be an important catalyst to the efficiency and effectiveness of crowd-sourcing discard data from consumer fishing apps, like GotOne. **From a photo of an angler's catch, all relevant data could be captured - not only time, date, location, environmental conditions, but also species and length, without any data input from the angler, while increasing the validity and accuracy of angler-contributed data.** To accelerate the training of AI models to estimate fish lengths, improve species identification, and ultimately contribute to species-specific AI identification of individual fish, **we propose to:**

a. **Create a common protocol for visual recording of recreationally landed fish** that would consist of full-length photos (one photo of each side of the fish) alongside measuring devices with calibration totems (the logo stickers in the photograph above). NOAA would work with ASGA, TNC, and GotOne to reach out to a broad cross-section of scientists, academic institutions, recreational anglers and for-hire captains to participate in the defined protocol. The resulting photographic database will then be used to train AI models to accurately estimate length. Over time, these photographic recordings may also serve a further training purpose, which is the development of species-specific models for identifying individual fish.

b. **Enhance the GotOne app to provide automatic AI length estimation of fish photographed with the calibration totem in the frame**. In the photo above, we have designed three totems for testing and calibration: The circular (GotOne) totem is the diameter of a golf ball (1.68"). The ASGA and Hogy logos are the dimensions of a US credit card (3.375" x 2.125"). After training on photos of fish recorded with the measuring device and totems in view, we anticipate being able to provide accurate estimates of fish length, simply by having anglers hold a sticker, golf ball, or credit card alongside any fish that is photographed, obviating the need for a measuring

device. This capability can significantly increase the participation of anglers in discard length recordings, and greatly improve the accuracy of such measurements.

Length measurement estimations using calibration totems is already a relatively established AI approach. While length estimation of fish from photos captured in-situ (e.g. from underwater photography of fish in their environment) has proven challenging without specialized photographic equipment (Rishoholm, et al. 2022), our approach - creating a standardized protocol that includes the fish photographed against a single surface plane, with a ruler and totem in the frame, capitalizes on best practices and recent learnings in AI measurement to minimize error. In addition, since GotOne requires anglers to manually enter the fish's length, the proposed approach creates the triple redundancy of human measurement, visual confirmation from the measuring device (ruler) and the totem itself. For further quality control, we can elect to discard data where discrepancies across the three measurements occur. As part of its quality control process, GotOne's staff will also audit and monitor recorded fish and associated lengths to identify spurious or inaccurate data, and to use such discrepancies to further refine the model training.

4. **Outreach & Communications:** Through its network of fisheries scientists, for-hire captains, tackle industry partners, and recreational anglers, The American Saltwater Guides Association will lead outreach and education activities with help from The Nature Conservancy (in-kind contribution). This will include media and PR focused on fishing shows, science symposiums, and other forms of advocacy and marketing to encourage participation in data capture via the established protocol.

Data Delivery Plan:

The project team shares a deep conviction in the importance of common, shared data standards, and open access for qualified stakeholders to fisheries data. While there are many emerging benefits from the expanding universe of fishing apps available to recreational anglers, a potential for siloed data repositories and inconsistent data definitions creates a real risk of lost opportunity to leverage crowd-sourced data to support better management. **We envision GotOne continuing to play an important role in collecting recreational fishing data for use by research partners and agencies (e.g. NOAA), but shifting its approach to put ACCSP's data standards at its core. As such, data will be delivered to existing and future GotOne partners, and also made more widely available to ACCSP's own partners, via the data warehouse, rather than directly, as currently architected**. We plan to deliver data to ACCSP monthly, or as agreed based on further discussions with ACCSP. This integration will enhance the usability and compatibility of the data for fisheries management and research purposes.

As part of this proposed project, we will work closely with ACCSP to:

- Ensure data elements and metadata conform to ACCSP standards.
- Include comprehensive details such as species, length, condition, location, and time.
- Implement validation protocols to ensure data accuracy.
- Work closely with ACCSP to streamline data sharing and usage, contributing to ACCSP's goal of improving data collection and management across the Atlantic coast.

GotOne staff will be responsible for ongoing quality audits of catch recordings and associated data, as well as building on existing validation checks (e.g. geographical, environmental readings) in the GotOne database. For example, user recordings of striped bass landed in Africa would not be included in exported data payloads.

Geographic Location:

Atlantic coast (including the south Atlantic) and Gulf of Mexico. To date over the past 16 months since launch, over 2,500 anglers have contributed data on roughly 11,000 fish from every coastal state along the Atlantic and in the Gulf, as well as from the Exclusive Economic Zone (EEZ). We have existing partnerships with Atlantic States Marine Fisheries Commission (ASMFC), Louisiana Department of Wildlife and Fish (LDWF), Massachusetts Division of Marine Fisheries (MA DMF), Northeast Fisheries Science Center (NEFSC), and Southeast Fisheries Science Center (SEFSC).

Milestone Schedule:

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.a. Align GotOne data w/ ACCSP	X	X													
1.b. Define/implement ETL approach with ACCSP		X	X	X											
2.a. Re-implement existing GotOne ETL through ACCSP				X	X										
2.b. Expand GotOne species	X	X	X												
3.a. Create common protocol for discard photo recording					X	X	X								
3.b. Enhance GotOne with AI length estimation							X	X	X	X	X	X			
Data ETLs for discard lengths to ACCSP					X	X	X	X	X	X	X	X			
Outreach, advocacy, education efforts to drive angler participation	X	X	X	X	X	X	X	X	X	X	X	X			
Semi and annual report writing							X						X	X	X

Project Accomplishments Measurement:

- **Sample Rate**: Number of data points (species, logged catches) on recreational discards and length measurements
- **User Engagement**: Number of active users and frequency of log entries
- **AI Accuracy**: Accuracy rates of AI-driven length measurement
- **Partnership Impact**: Contributions to partner projects and scientific studies
- **Outreach Effectiveness**: Levels of engagement and feedback from the fishing community
- **Data Delivery:** GotOne data delivered successfully to ACCSP warehouse and via ACCSP warehouse to research partners

Cost Summary:

Description	Cost	In-Kind
Personnel (a)		**$34,884.82**
TNC Marine Scientists (Runde/Wilke)		$19,884.82
GotOne Management support		$15,000.00
Fringe (b)		**$15,283.47**
(2) TNC Marine Scientists (32% Runde/Wilke)		$15,283.47
Travel (c)	**$0.00**	
Equipment (d)	**$0.00**	
Supplies (e)	**$0.00**	
Contractual (f)	**$200,000.00**	
GotOne - Integrate GotOne's data into the ACCSP	$40,000.00	
GotOne - Collect and deliver species-specific discard length data via ACCSP to support stock management	$50,000.00	
GotOne - Train AI model for accurate discard length measurements /Create Common protocol	$70,000.00	
ASGA - Outreach and communication to angling community and partners	$40,000.00	
Other (h)	**$0.00**	
Length data for 3 species already included in GotOne! (including infrastructure, sampling effort, outreach; valued at $10k/species = $30k)		**$30,000.00**

Totals		
Total Direct Charges (i)	$200,000.00	
Total Indirect Charges (j)		
Total In-kind		$80,168.29
Total project cost (sum of Direct and Indirect) (k)	$280,168.29	
Requested amount	**$200,000.00**	
In-kind Percent Contributions	**28.6%**	

Budget Narrative:

a. Personnel (0 Requested; $34884.82 Match) The Nature Conservancy (TNC) will provide in-kind support from two staff (@10% each over 1yr = $19,884.82). GotOne Media will provide in-kind management support ($15,000). There is no request for salary from the ACCSP. TNC and GotOne Media staff CVs are attached. TNC provides unique advocacy, outreach, and marketing capabilities and connections across key stakeholder communities, including scientists, for-hire charter captains, tackle manufacturers and retailers, and the broader recreational fishing community.
b. Fringe (0 Requested; $15,283.47 Match) TNC will provide in-kind matching funds to cover fringe expenses (32%) associated with match salary.
c. Travel (0 Requested)
d. Equipment (0)
e. Supplies (0 Requested)
f. Contractual ($200,000 Requested)

- **Integrate GotOne database with ACCSP data warehouse and transfer GotOne historical catch data ($40,000 to GotOne Media):**
    - Deliverables:
        - Discovery and design phase required to understand ACCSP data standards and requirements, and technical integration details
        - Alignment of GotOne data definitions and database with ACCSP standards, as necessitated via modifications to database or through ETL process design.
        - Modifications to current GotOne app user interface, as needed.
        - Exporting of existing (historical) GotOne catch and discard data from 2023 through 2024 into ACCSP data warehouse, including quality audit/validation of data by GotOne team (exports of existing GotOne data to ACCSP will exclude items where there is low confidence in accuracy, for instance in the case of duplicate records or catch recordings outside US coastal waters).
            - >12,700 catches, 29 species for >2,600 anglers as of August 2024
            - Data available for sharing with ACCSP:

        - Catch location (integer long/lat, state)
        - Catch time and date
        - Species
        - Length
        - Air, water temperature
        - Wind speed, direction
        - Tide and moon stage
    - Project team and cost breakdown:

	Days	Total
Front end	10	8,750
Tech lead	9	11,250
Prod man	8	6,000
Proj man	8	4,000
Back end	10	5,000
Data analyyst	10	5,000
Total:		40,000

- **Add new species to GotOne app and establish ongoing collection and delivery of catch and discard length data to ACCSP to support stock management ($50,000 to GotOne Media):**
    - Deliverables:
        - Redesign ETL approaches for current GotOne research partners to align with new ACCSP-based approach
        - Establishment of data sync processes to load GotOne data into ACCSP data warehouse for all forward-going catch recordings, including data validation.
        - Add 12 new species to GotOne for catch and discard length recording (10 new species on ACCSP's Biological Sampling Priority Matrix plus 2 NOAA priority species)
        - Establish regular ETL of discard length data for all relevant species (new and historical) into ACCSP data warehouse
        - Note that these costs cover initial setup and implementation of the 12 new species in GotOne. **Addition of new species as well as ongoing maintenance and support for data transfers will be evaluated after twelve months**

- Project team and cost breakdown:

	Days	Total
Front end	10	8,750
Tech lead	10	12,500
Prod man	9	6,750
Proj man	9	4,500
Back end	10	5,000
Data analyst	10	5,000
UX/Design	10	7,500
Total:		50,000

- **Train AI model for accurate discard length measurements from photographic input, and create common protocol for image capture for training AI models for future capabilities ($70,000 to GotOne Media)**:
  - Deliverables:
    - Define protocol for visual recording of landed fish to support training of AI length-estimation model
    - GotOne app development for enhanced visual data capture and metadata requirements
  - Project team and cost breakdown:

	Days	Total
Front end	6	5,250
Tech lead	10	12,500
Prod man	10	7,500
Proj man	10	5,000
Back end	9	4,000
Data analyst	9	4,500
AI lead developer	25	31,250
Total:		70,000

- **Outreach and communication to angling community and partners to drive awareness, engagement and participation ($40,000 to ASGA)**
    - Video Production to promote app, drive usage, and train anglers ($15k)
    - Promotional items - boat stickers with QR codes, rulers with logo to aid in AI training for fish length, occasional give-aways for App usage and adoption (example prizes - sunglasses, jackets, etc.) ($5K)
    - Outreach via events and social media - Example event ASGA roadshow https://www.saltwaterguidesassociation.com/the-asga-roadshow/ & Hands-on training for fishing guides on app usage for grassroots outreach ($15k)
    - Website upgrades & tournament integration - app usage during tournaments will serve to increase usership and uptake, this will require website investments and upgrades to facilitate (e.g. real-time web updates) ($5k)

g. Indirect ($0 Requested; $15,283.47 Match)
TNC will provide in-kind indirect charges of $15,283.47. TNC brings science and federal fisheries expertise

h. Other ($0 Requested; $30,000.00 Match)
- GotOne project leadership and oversight
- GotOne outreach to industry partners for promotion and awareness
- GotOne outreach to existing research partners to align initiatives with grant requirements
- Technical infrastructure costs (GotOne database, image storage, AI API / web services, technical maintenance and support during grant period)

First year deliverables and anticipation of future costs:

In this first year of funding, we will complete all of the activities listed under letters f, g and h above, including all maintenance and technical support requirements. The proposed project is envisioned as a pilot, and as such, we have not as yet ascertained the required ongoing costs to maintain the proposed data integrations past the grant funding period. Part of the scope of the proposed work will be to determine these forward-going requirements and costs, which may lead to a request for a maintenance grant in forward-going years. However, if such maintenance is not funded through ACCSP, our intention, as an in-market product, would be to find independent funding for the capabilities developed as part of this project proposal to support our growing user base and research partnerships. In any event, our expectation would be that any ongoing maintenance costs will be significantly lower than the initial implementation costs as the data migrations processes become increasingly automated.

References:

Goldsmith, W., K.M. Wilke, B.J.Runde, D. Moss. 2024. Future Directions for Electronic Self-Reporting in U.S. Marine Recreational Fisheries. Submitted for publication.

Risholm, P., A. Mohammed, T. Kirkhus, S. Clausen, L. Vasilyev, O. F. Øistein. 2022. Automatic length estimation of free-swimming fish using an underwater 3D range-gated camera. Aquacultural Engineering. v97. https://doi.org/10.1016/j.aquaeng.2022.102227

Summary of Proposal for Ranking Purposes

Proposal Type: New

Program Priority:

- **Biological Sampling: 50%** - photos, species ID, length (add 12 new species to GotOne for discard length recording - 10 new species on ACCSP's Biological Sampling Priority Matrix plus 2 NOAA priority species)
- **Catch and Effort: 50%** - recreational catch and discards >12,700 catches, 29 species for >2,600 anglers as of August 2024
- Social and Economic: while not the priority of this project, the GotOne! app has potential to provide valuable socio-economic data in the future which is why integration with ACCSP data standards and warehouse is important

Overview:

Catch, effort, discard, and biological data from private anglers are difficult to collect. GotOne is a consumer application, developed by fishermen to serve as a personal logbook to record catch information and corresponding environmental covariates (pulled automatically from third-party APIs with access to sensors and other established data sources). The project team has been growing usership over the last year through partnerships with ASMFC, LDWF, MA DMF, NEFSC, and SEFSC– encouraging anglers to use the app to fill data gaps for specific priority species. As anglers continue to find value in the app to enrich their fishing experience, we anticipate usership to grow over time, providing a valuable stream of data.

This project will build on our work to develop the capability to use AI as a validation technique for species identification and length. From a photo of an angler's catch, all relevant data will be captured - not only time, date, location, environmental conditions, but also species and length, without any data input from the angler, while increasing the validity and accuracy of angler-contributed data.

Through this project, GotOne! will establish a connection with ACCSP, through the SciFish API, to provide data to the ACCSP data warehouse, thus making data to project and Program partners in a timely and transparent manner. We see this project as a pilot to allow us to align with ACCSP data standards and to develop protocols for data transfer to the Program warehouse. We will estimate costs associated with on-going future data transfers.

Project Quality Factors:

Partners

- **Multi-Partner/Regional impact including broad applications -** Broad partnerships including ASMFC, LDWF, MA DMF, NEFSC, and SEFSC facilitates data collection from a wide geographic range along the Atlantic coast, including the south atlantic, and the Gulf of Mexico. The GotOne! App and AI technology can be used to collect data across a broad range of species, over the last year >12,700 catches, 29 species for >2,600 anglers have been logged. And usership continues to grow. Integration with ACCSP's data warehouse means this information will be available on an ongoing basis for data requests and stock assessments for regionally managed species.

Funding

- **Contains funding transition plan on pg 16**

  In this first year of funding, we will complete all of the activities listed under letters f, g and h above, including all maintenance and technical support requirements. The proposed project is envisioned as a pilot, and as such, we have not as yet ascertained the required ongoing costs to maintain the proposed data integrations past the grant funding period. Part of the scope of the proposed work will be to determine these forward-going requirements and costs, which may lead to a request for a maintenance grant in forward-going years. Our expectation would be that any ongoing maintenance costs will be significantly lower than the initial implementation costs as the data migrations processes become increasingly automated.

- **In-kind contribution:**

  28.6%

  TNC - $35,168.29
  GotOne! - $45,000
  Total - $$80,168.29

Data

- **Improvement in data quality/quantity/timeliness:** Quantity of discard length data will be increased. For example, NOAA Fisheries currently collects roughly 40 bluefish discard lengths per year. Last season alone, GotOne collected over 800 bluefish discard lengths from recreational anglers.
  GotOne Media will be responsible for QA/QC of data. Through this project we will align GotOne data with ACCSP data standards and use the SciFish API to provide data to the ACCSP data warehouse, demonstrating possible best practices for data-sharing by other consumer apps. The GotOne data architecture and ETL process is highly flexible and dynamic, and can provide on-demand data transfers, as needed. Currently, transfers with existing research partners are conducted as frequently as weekly. Our intention as part of

this project is to determine the optimal cadence and frequency of data deliveries based on ACCSP's desires and needs, as well as the SciFish API capabilities.

- **Potential secondary module as a by-product:** Secondary module is Catch & Effort - recreational catch, discards, and environmental covariates from 2,600 users (and growing) across 29 species. Socio-Economic data may be made available to the Program and Program Partners as a by-product of the app.
- **Innovative:** The GotOne! App is innovative in that it was designed by fishermen as a personal logbook that improves fishing success. Because it provides value to anglers, it's likely to gain increased usership and increased retention of users over time (Goldsmith *et al.*, in press). In addition, this project will build on Artificial Intelligence to be used in photo fish ID as a means of data validation.
- **Impact on stock assessment -** Agency partners have identified release lengths as a critical data gap for multiple recreational species. Released fish are an important component of the catch data for many stock assessments, however, very little information is available to characterize the length distribution of these released fish. Release lengths for multiple species collected through GotOne! and provided to the ACCSP data warehouse will be available to agency partners for use in stock assessment. These direct length observations will help reduce assumptions often made about release length distribution and improve uncertainty in model estimates.

Other Factors

- **Properly Prepared -** This proposal follows the guidelines provided in the ACCSP Funding Decision Document.
- **Merit -** This project fills gaps in biological data for ACCSP and NOAA priority species. This project also facilitates data accessibility and sharing by establishing a mechanism to deliver data collected by private anglers through a commercial app into the ACCSP data warehouse.

Geoff White, Director
Atlantic Coastal Cooperative Statistics Program
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22204

July 30, 2024

Dear Mr. White,

Rhode Island Division of Marine Fisheries, Massachusetts Division of Marine Fisheries, New Hampshire Fish and Game Department, and Maine Department of Marine Resources, are pleased to resubmit the new proposal titled "*Vessel Tracking Data and Program Management Improvements: Expansion of Vessel Tracking Data Access Controls and Upgrading the SAFIS Vessel Tracking Application*" for your review. We believe this proposal is critical to successfully managing vessel tracking programs at the state partner level. Improvements to existing applications and data access points will streamline both compliance monitoring and analyses of tracking data.

The contributing partners acknowledge there may be some hesitation regarding submitting this proposal as a "new" project. We are submitting this proposal as new for the following reasons: 1) the proposed work is an expansion of a single objective from the FY22 funded proposal, "*Integration of vessel monitoring systems and electronic reporting in SAFIS and SAFIS applications through API development and field testing of multiple hardware options: Phase 2*" and the scope of that single objective is significantly expanded into five new objectives, 2) additional state partners are now involved in this proposal, 3) there was a one year lapse in funding, and 4) a sixth objective regarding data access controls that was not addressed by previous proposals has been added.

Please address questions jointly to Rich Balouskus of the Rhode Island Division of Marine Fisheries, Anna Webb of the Massachusetts Division of Marine Fisheries, Robert Atwood of the New Hampshire Fish and Game Department, and Nathan Willse of the Maine Department of Marine Resources.

Sincerely,

Rich Balouskus (RIDMF)	Anna Webb (MADMF)	Robert Atwood (NHFGD)	Nathan Willse (MEDMR)
richard.balouskus@dem.ri.gov	anna.webb@mass.gov	robert.atwood@wildlife.nh.gov	nathan.willse@maine.gov

Enclosures: ACCSP Proposal: "*Vessel Tracking Data and Program Management Improvements: Expansion of Vessel Tracking Data Access Controls and Upgrading the SAFIS Vessel Tracking Application*"
Appendix A: Principal Investigators' Curricula Vitae
Memo from ACCSP regarding proposed work

Proposal for Funding made to:
Atlantic Coastal Cooperative Statistics Program
Operations and Advisory Committees
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22204

Vessel Tracking Data and Program Management Improvements: Expansion of Vessel Tracking Data Access Controls and Upgrading the SAFIS Vessel Tracking Application

Submitted by:

Rhode Island Division of Marine Fisheries
3 Fort Wetherill Drive
Jamestown, RI 02835

Massachusetts Division of Marine Fisheries
30 Emerson Avenue
Gloucester, MA 01930

New Hampshire Fish and Game Department
11 Hazen Drive
Concord, NH 03302

Maine Department of Marine Resources
194 McKown Point Road
West Boothbay Harbor, ME 04575

Applicant Name:	Rhode Island Division of Marine Fisheries, Massachusetts Division of Marine Fisheries, New Hampshire Fish and Game Department, Maine Department of Marine Resources
Project Title:	Vessel Tracking Data and Program Management Improvements: Expansion of Vessel Tracking Data Access Controls and Upgrading the SAFIS Vessel Tracking Application
Project Type:	New Project
Principal Investigators:	Rich Balouskus (RIDMF), Anna Webb (MADMF), Robert Atwood (NHFGD), Nathan Willse (MEDMR)
Requested Award Amount:	$108,000
Requested Award Period:	For one year, beginning after the receipt of funds
Date Submitted:	July 30, 2024

Terminology:
The contributing partners acknowledge there may be some hesitation regarding submitting this proposal as a "new" project. We are submitting this proposal as new for the following reasons: 1) the proposed work is an expansion of a single objective from the FY22 funded proposal, "*Integration of vessel monitoring systems and electronic reporting in SAFIS and SAFIS applications through API development and field testing of multiple hardware options: Phase 2*" and the scope of that single objective is significantly expanded into five new objectives, 2) additional state partners are now involved in this proposal, 3) there was a one year lapse in funding, and 4) a sixth objective regarding data access controls that was not addressed by previous proposals has been added.

Objective:
Within the scope of the project, the following objectives and deliverables will be met:

- Update the trip report to positional data matching procedures to be more efficient and comprehensive.
- Enhance the vessel tracking application (VTA) housed within Standard Atlantic Fisheries Information System (SAFIS) to improve workflows.
- Develop the ability for partners to define and implement new compliance frameworks within the VTA.
- Implement a report to identify vessels fishing in a specific region over time.
- Enhance the existing ACCSP tracking API to accept additional data fields.
- Resolve any outstanding administrative and data consumer restricted data access issues.

Need:
Satellite-based vessel-monitoring-systems (VMS) have been deployed for years on federally permitted vessels and utilized by NOAA Fisheries and NOAA Office of Law Enforcement (OLE) successfully. Most ACCSP state partners have not yet implemented this technology due to high costs and logistics. VMS technology using cellular transmission has emerged that is relatively less expensive to purchase and use, thus providing opportunity for vessel tracking management strategies to be implemented by partners with limited resources. Within the scope of this proposal we exclusively refer to cellular VMS technologies as those adopted by Addendum XXIX. State managers and law enforcement are eager to explore the utility of this technology to meet management and assessment needs as well as to allow for more flexible management programs in various fisheries.

VMS data allows for significantly more robust accountability for management programs especially where the current level of reported location data is insufficient. Furthermore, with the increasing presence of other ocean uses in recent years (e.g., renewable energy, aquaculture) in historically utilized commercial fishing areas, the ability to track spatiotemporal use with catch may be of interest to various commercial fishery participants in addition to management groups.

The robustness of spatiotemporal analyses gained from VMS data led the Atlantic States Marine Fisheries Commission (ASMFC) to publish Addendum XXIX to Amendment 3 to the Interstate Fishery Management Plan for American Lobster in March 2022. The Addendum implemented electronic cellular-based tracking requirements for federally-permitted vessels in the American lobster and Jonah crab fishery, with the goal of collecting high resolution spatial and temporal effort data. In previous proposals to ACCSP, MADMF and RIDMF collaborated with both ACCSP and ASMFC to support the successful development of a basic administrative interface, what is now

known as the VTA, for viewing tracking and trip data built within the SAFIS suite of applications. This interface was solely designed to be used by state managers for compliance issues related to Addendum XXIX. However, the backend of this interface was designed to be scalable to allow for additional frameworks (e.g., individual state opt-in programs) to be added.

By early 2024, all states with federal lobster trap permitted vessels principally ported in their state had implemented rules to establish the tracking requirement from Addendum XXIX and administrative staff began using the VTA available to state managers. Several additional needs, which became the objectives of this proposal, were quickly identified to build upon the existing application and to increase functionality of the program for both managers and enforcement.

Post hoc linking of positional data generated from VMS devices with trip-level vessel trip report (VTR) data, as well as efficient access to these data for further review, are necessary to analyze the spatiotemporal patterns of fishing activity within various fleets. This trip (VTR) to track (VMS) matching is the key procedure underlying the existing VTA and is critical to not only tracking compliance with regulations, but also analyzing spatiotemporal effort. Additionally, current data access controls restrict the ability to use these data in a consequential way due to limitations on the volume of data that can be extracted. This proposal will create an opportunity for more broad scale use of these data by managers and analysts within the bounds of confidentiality. Improving matching procedures and developing regulated data access points in order to collate the matched data into functional data products are objectives of this proposal. One example of a functional data product includes the aggregation of matched catch and effort data into an input for a stock assessment.

The ability to implement new VMS programs by partners without relying on already strained time of ACCSP staff is another objective. This work will allow partners to seamlessly build new compliance frameworks as new regulatory requirements are implemented. Already, both Rhode Island and Massachusetts have additional VMS programs in the queue that will need new compliance frameworks within the VTA. The State of Rhode Island currently administers a black sea bass/summer flounder weekly aggregate program that requires participants to report catch electronically and to have a cellular VMS device onboard. Currently state administrators are utilizing a combination of vendor provided interfaces for VMS data interrogation and an internal system for VTR aggregation. By implementing this black sea bass/summer flounder aggregate compliance framework into the VTA the workload of administrators on data accounting minutia will be greatly reduced, thus increasing efficiency and allowing for both higher compliance rates and greater analysis capabilities.

The proposed work represents the next steps necessary to continue the development of the programmatic systems needed to fully take advantage of VMS technologies, to simplify the onboarding process for new partners, and efficiently manage new and existing VMS programs.

Results and Benefits:
The addition of geographic/positional fisheries-dependent data streams is becoming a priority of many jurisdictions with improved spatial understanding of fisheries necessary to continued successful management. As such, during previously funded work, ACCSP acquired appropriate GIS licenses and dedicated staff time to advancing ACCSP's spatial data storage and use. Additionally, the Commercial Technical Committee initiated a spatial coordination working group to assist and guide ACCSP in spatial data development. ACCSP is the ideal location for this type of data

compilation as they encompass both state and federal systems and thus is usable among all partners. Having a central repository for storage and display of VMS data at ACCSP makes multi-jurisdiction management of such programs more streamlined and data more easily available and accessible to fisheries managers.

This project ultimately addresses the ACCSP's catch and effort priority by further integrating and advancing the presentation of data collected through location tracking, which further supports emerging spatial management issues and improves the quality of data used to make decisions. This work is integral to SAFIS and SAFIS applications keeping current with emerging technologies. Most likely, requests for spatial analyses will only increase over time as seen with the recent implementation of Addendum XXIX and ongoing shared ocean use conflicts.

This proposal intends to improve upon the gains made during previous work and significantly improve efficiencies regarding management of VMS data collection programs, primarily within the SAFIS VTA. While the current iteration of the VTA is operable and provides managers with numerous tools to manage compliance and analyze data, months of initial use with a now significant data set have clarified to users where upgrades can and should be made. By more accurately and precisely highlighting out of compliance vessels and improving the matching of trip (VTR) to track (VMS) processes, partner program managers will be able to streamline workflows and focus more attention on data quality, which has been identified as a problem for certain device types and requires additional review. Incorporating additional data elements into the API will further facilitate reviewing potential device failures within the VTA. Through improving quality control measures of tracking data, end users and analysts will have a more easily consumable dataset.

Data access is another pillar of this proposal. Within the bounds of confidentiality, managers and analysts need access to a clean and robust dataset. Expanding the access to layers of data under a tiered approach based on confidentiality laws will provide this function. This will benefit not only program administrators and managers, but other data consumers such as state and federal fisheries managers, stock assessment scientists, and more. After accomplishing the objectives of this proposal, partners can expect to have the ability to significantly streamline the vessel compliance management process within a given compliance framework, expand access to fully matched trip and track data within the bounds of confidentiality laws, and seamlessly and efficiently implement additional compliance frameworks for new programs.

Upon success, the results from this effort would make VMS programs more accessible to all partners. A spatiotemporally explicit catch reporting system that seamlessly joins location data to trip data will allow for easier adjustment of catch and effort information into discrete spatial units, thus precluding the need for some of the assumptions currently being used for more progressive assessments. Additionally, the availability of this type of spatially defined catch and effort information could allow for other population assessments to progress to more spatially refined structures, thus improving the stock assessment enterprise as a whole. This type of management strategy is particularly valuable for stock assessments that are spatially refined, such as those used for menhaden, black sea bass, tautog, and proposed for striped bass. Managers, harvesters, and various stakeholders may also find utility in aggregated tracking data in relationship to proposed ocean uses such as offshore renewable energy development and aquaculture, or the spatial extent of protected species and their population density estimates. While this project will not make harvester's personal tracks available for use by the public, the value of these data in large scale analyses is apparent.

By utilizing new technologies, expanding an avenue of integrated reporting, and streamlining the effectiveness of existing and new programs, this project will open new opportunities for quasi-real-time data collection and utilization by all state partners. This project emphasizes partner collaboration, including four partners as co-PIs, all while developing a product that can be used by any single partner, particularly for inshore fisheries.

Data Delivery Plan:
All data will be stored at ACCSP following established protocols. Tracks from completed trips will POST via API into ACCSP tables. Authorization schemes at the application and database level ensure that administrators only have access to location data under their jurisdiction or approved via another jurisdiction. Reports are accessed through applications in the SMS portal, and data will be available to export in multiple formats. Database connections would also be available to directly analyze trip location data from partner locations and within the bounds of confidentiality.

Approach:
Overall:
The proposed work necessitates a heavy commitment from ACCSP and/or their contractors, but this work is backed by the included letter of support. Development to be conducted by ACCSP and/or their contractors includes a range of modifications and new code resulting in application enhancements, report query updates, and database/API adjustments.

Objective 1: Trip to Track Matching
Data submitted by current ASMFC approved tracking devices include only vessel identifiers, time stamps, and vessel positions. To link vessel locations to a trip and gear type, tracking data must be matched to a VTR using solely these fields as additional information such as fishery declarations used in federal VMS programs are not included in these programs. ACCSP conducts a nightly procedure that matches VTRs to tracks that occurred between a start and end date and time reported on a VTR for a given vessel. Additionally, for efficiency purposes, only trips with a trip start date within the past 60 days are matched to vessel tracks as part of this nightly matching routine. Currently, this system is only set up for federal lobster vessels administered under Addendum XXIX.

Since April of 2024, all federal lobster permitted vessels are now required to report to NOAA Fisheries via federal VTRs. Additionally, since early 2023, another nightly routine moves a copy of all federal VTR data into the SAFIS database tables, which allows the matching of all trips regardless of the jurisdiction to which the trip was reported. Though NOAA fisheries specifies that VTRs be submitted within 48 hours of landing, late submissions of vessel trip reports are common. Additionally, failures may occur during the copying of VTR data from NOAA Fisheries to SAFIS. These delays in receiving trip reports lead to tracks failing to be associated properly to a trip during the nightly matching routine. It is estimated that roughly 20 percent of VTRs submitted by vessels with a federal lobster permit between May 1, 2023, and April 30, 2024, were received in SAFIS over 60 days past the trip end date, and therefore would not be matched under the current program design. To mitigate this delay, a monthly process will be developed and implemented to match late VTR submissions to vessel tracks and run at a time that will not negatively impact the processing power necessary for the nightly matching process.

Due to the 24/7 tracking requirement, extraneous, non-trip tracking data are collected and stored. However, using start and end date and times to bin vessel tracking data has proved problematic, as VTRs often are submitted with inaccurate start and end times. This creates additional derelict tracking data for fishing trips that are not associated with a VTR. Managing this unmatched tracking data from legitimate fishing trips has become difficult due to the large volume of data. To reduce this error, matching procedures will be updated to match tracks that occur between start and end date for a given trip rather than rely on the reported times. By removing start and end times from the matching procedure, partners foresee that most tracks will properly be associated with a trip and reduce the impact of inaccurate VTRs.

Though rare in lobster trap fisheries and therefore not a problem for the Addendum XXIX framework, this proposed matching procedure will be problematic for programs targeting fisheries with multiple trips in the same day. A new tool will be created in the VTA to properly match tracks when multiple trips may exist on the same date. This tool will be an Oracle APEX report that isolates and highlights when multiple VTRs are assigned to the same tracking data.

Objective 2: VTA Enhancements
The SAFIS VTA was developed during previously funded tracking projects, and the administrative interface of the application has been utilized by state managers to conduct compliance management and post-hoc analysis required for Addendum XXIX. While the development of the SAFIS database and administrative interface was completed prior to the initiation of Addendum XXIX, the use of the VTA has highlighted the need for enhancements to streamline the compliance management framework. The work proposed here intends to create enhancements to identify device failures in a timely manner, improve the ability to isolate activity when needed, and improve report formatting (Table 1). Proposed enhancements will streamline and standardize vessel tracking management across different state jurisdictions.

An estimate of workload is included in Table 1 after consideration by the ACCSP Software Team.

Objective 3: Compliance Framework Management
ACCSP initially developed the SAFIS administrative interface of the VTA to address Addendum XXIX but requires users to select the framework prior to entering the application. Both the program's back-end database as well as the end-user facing interface were designed to scale, allowing for the integration of additional frameworks in the future, however, the current implementation requires significant coding by ACCSP staff to complete and initiate a new framework. An objective of this project is the ability for partner administrators to seamlessly implement additional frameworks within the SAFIS VTA or SMS administrative interface and without involving ACCSP staff unless absolutely necessary.

This new module for the SAFIS vessel tracking compliance framework administrative interface will either reside within the VTA or within SAFIS SMS with other administrative tools. This interface will allow partners to initiate the creation of a new framework and manage existing frameworks for which the user has update permissions. Creating a new framework will include several steps including creating a unique identifier, defining compliance parameters, and identifying participating vessels and their reporting agency (state vs. federal).

Table 1. VTA Enhancements expected to be completed, in order of priority. Estimated workloads are based on feedback from the ACCSP Software Team and relate to number of hours needed for completion. In general, if a single developer is working on a task, Low workload enhancements would typically take 1-3 days of work, Medium is 4-7 days, and High is 8 days or more.

Feature	Need/Justification	Development Needed	Est. Work-Load
Force assign a Trip ID to location data	Changing the matching procedure as outlined in Objective 1 improves many of the issues encountered with this problem, however, this will create the need to assign a location to a specific trip when multiple trips occur within the same calendar day, or a track occurs outside of the dates reported.	Matching procedure modification	High
Create report identifying tracks matching to multiple trip ids	More efficiently identifies tracks that need to be reviewed for assigning Trip IDs based on multiple Trips per day.	Query writing, implementation of new report	Medium
Ability to query all reports by coastguard documentation number or state registration number	Currently can only query by vessel name, and this change would increase ease of searching or downloading desired data.	Query modification	Low
Create report identifying devices that have not sent a location to the API in the last day and devices where locations are impossibly far apart	Identifying device failures has been one of the more complicated tasks in the current VTA. This change would allow managers to more quickly identify potential device failures before a harvester report is submitted.	Query writing, implementation of new report	Medium
Remove automatic filtering of opt-out vessels from compliance reports and add as queryable field	Improves identification of vessels that improperly submitted opt-out paperwork.	Query modification	Low
Automatically show potential tracking points when viewing Vessel Transit page	Reduces steps needed to add unassigned location data to a trip and ensures state managers always view unassigned points when viewing a trip in the transit report. Dependent on objective 1's outcome the need for this change may be reduced.	Query and Interface/ app modification	High
Standardize time display in reports to 24hr clock. Default queries to a time period of one calendar day maintaining the ability to change the queried time.	Viewing time based on a 24hr clock reduces miscommunications. State managers are generally interested in viewing data based on a specific date, and defaulting to a calendar day reduces steps in a standard query.	Query modification	Low
Search for a trip in the Trip Viewer by trip ID	Increases ease of use of Trip Viewer when assessing a specific trip.	Query and Interface/ app modification	Medium
Add ability to mark a trip as non-fishing within a compliance framework in Unreported Vessel Transit Report so it can be filtered out of the report	Reduce time state managers spend investigating a non-fishing trip within a compliance framework.	Query, Interface/ app, and database modification	Medium
Standardize field names between different reports	Improves ease of use of report outputs in analysis.	Interface/ app modification	Low
Addition of eVTR number to reports and Trip Viewer selection options	Improves ability to identify eVTR errors or trip matching errors. May also be used for joining catch and spatial data for analysis.	Query and interface/ app modification	Low

The new framework interface must first be initiated with a unique name – which must be unique across all jurisdictions and programs so that it can be selected through the generic VTA application home page. Next, administrators will be asked if they would like to copy settings from an existing framework or start from scratch. If they choose to copy, business rules will auto-populate, but vessel lists will not. If they choose to start from scratch, no information will auto-populate. Administrators will then move into the framework builder module. From this module, a list of vessels participating in the program will need to be uploaded. The module will then prompt users to establish the baseline business rules for the program such as defining a set of compliance rules, opt in/opt out options, and potentially manipulating the trip matching algorithm frequencies or rules for number of trips per day depending on the outcome of Objective 1. Lastly, the administrator will need to grant view and update permissions for the framework to groups of users.

Finally, this framework builder module must also allow administrators to modify frameworks as needed. This can be as simple as adding new vessels or ending a vessel's participation in a program, or as complicated as modifying compliance rules to accommodate regulatory changes. Additionally, permissions should be able to be maintained through this module. Frameworks cannot be deleted, but they can have a sunset end date.

Objective 4: Identify Vessels in a Given Region over Time
An interface catering directly to the specific needs of law enforcement is needed, not only to fully address the goals Addendum XXIX as well as the Rhode Island Aggregate Program, but to utilize these data to their full extent. While some funds are requested to begin creating an interactive multi-vessel track viewer, additional scoping is necessary to define the approach for development of a full standalone application. This application will incur a significant cost, and in 2024, and with assistance from ACCSP and outside funding, the proposal PIs and other project personnel will convene with law enforcement personnel familiar with VMS data to outline requirements and investigate vendors and existing technology (V-TRACK, AIS, etc.) to find the right fit for implementation. A subsequent proposal is expected to be submitted for this standalone development after requirements are defined.

For the interim time period funded through this proposal, a few tweaks to the existing VTA are requested. This includes modifying the existing Vessel Heat Map to be able to quickly identify vessels in a specific region, likely an approximate 10-minute square, across a specific amount of time, perhaps limiting time to a specific number of days at most. Additionally, adding a speed filter to the output would allow managers to identify probable fishing activity to further reduce the output. This provides a quick access report to answer pressing concerns from law enforcement until a standalone application can be developed.

Objective 5: API
As part of the initial development of the VTA, ACCSP built a new API that would ingest the ping data sent from the devices. Currently, this API collects data on the location, date/time, vessel, and device. This project suggests that the API be enhanced to include the collection of device voltage, which is a commonly displayed field available on vendor data portals and valuable to analyze problems with the vessel device hardware. Specifically, this will be a non-required field; however, data submissions should be validated by field type. Other additions may be added pending Addendum modifications potentially in development. This task requires a small amount of ACCSP staff time and is not considered significant.

As regulations requiring the use of trackers on the vessels were implemented and devices were installed and activated, ACCSP saw a significant increase in API traffic. Since the fall/winter of 2023, the location endpoint of the API has received up to 400 calls per minute and 300,000 calls per day on peak activity days. This is resulting in over 3 million calls per month, which is over a 50-fold increase in API traffic. Bottlenecks in AWS/cloud connections and database processing can cause connection failures. ACCSP has already tuned the database and optimized the cloud hosting infrastructure, which reduced processing times and connection failures. However; there are still a significant number of vessels and trackers to come online as the fishing season begins and traffic is guaranteed to increase again. ACCSP would like to isolate the host for the locations API and implement redundant cloud instances for failover and load-balancing. Inflation Reduction Act (IRA) funding has been secured to fund the IT upgrades to handle the API traffic.

Objective 6: Data Access

VMS data can be useful to diverse audiences and end users outside of tracker management personnel with necessary data access modifications. Data release is controlled through existing ACCSP and partner standard operating procedures independently of this proposal. As part of this work, we propose a tiered data access approach to make these emerging data available to approved collaborators completing relevant analyses while ensuring uniform outputs, maintenance of confidentiality laws, and preventing diverging database formats. Levels of data accessibility through the ACCSP Data Warehouse can be differentiated by what views, rows, and/or columns are visible to end users upon log in based on the privileges of the user.

Raw data coming into the existing ACCSP database is available only to staff working directly within the tracker program for QC and analysis, and researchers with confidentiality agreements. These staff are best positioned to QC/QA these data without mischaracterizing fishery behavior. Issues with data collection, like partial trips and fishery attribution, as well as basic analyses like vessel speed and trip attribution will be completed at this tier to ensure the methodology is consistent across all subsequent access tiers. Critically, concerns about data confidentiality can be addressed at this stage to produce levels of confidential and non-confidential modeled outputs of gear distribution and QC tracker pings.

QC/QA spatial data can be committed to a separate level once reviewed and made available to the next tier of users. These users will develop modeling approaches to describe gear distribution, density, and end use products without the burden of validating mechanistic tracker program operations. Approaches to modeling gear layers and spatial analyses collaboratively developed within this group of users can be passed on to subsequent tiers of users, to prevent development of alternative gear layers without proper validation from program staff. Methodology validated by regional administrators will ensure singular versions of these data are used in end user data outputs.

Modeled data outputs represent another tier of users. This level would be able to pull modeled non-confidential data for broad purposes. These data represent an unparalleled spatial footprint of the fishery and have immediate relevant use for management and conservation cases across the Northwest Atlantic e.g. stock assessments and offshore renewable energy development. The breadth of research applications for these data drive the need for a comprehensive metadata and best practices to prevent competing versions of these data and betrayal of confidentiality in data access.

Geographic Location:
Work will be conducted between Rhode Island and Maine at all partner agencies and at ACCSP. Current data collection is occurring from Maryland to Maine in state and federal waters.

Milestone Schedule:

	Month												
Task	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Finalize requirements gathering	X	X											
Objective 1		X	X	X									
Objective 2			X	X	X	X	X	X	X	X	X		
Objective 3					X	X	X						
Objective 4							X	X	X				
Objective 5									X	X			
Objective 6										X	X	X	
Report writing						X	X					X	X

Project Accomplishments Measurement:

Project Goal	Measure of Accomplishment
Trip to track matching is less sensitive to VTR time reporting errors	Percentage of tracks of vessels' fishing activity missing trip ids is reduced as compared to current
Trip to track matching occurs for late VTRs on a regular cadence	Regular schedule for late matching is established and running successfully
Administrators have a more seamless experience managing compliance within a framework	Data quality and the ability to identify device failures quickly (before a VTR is submitted) will improve
New frameworks can be created and managed independent of ACCSP staff	Framework building module successfully developed, tested, and launched with testing if not production implementation.
Identification of a vessel in time and space is possible and can be done quickly	Response to such requests is completed within minutes.
API collects additional optionally sent information about devices	API deployed to production and vendors are notified of the new available elements.
Data consumers have tools at their disposal to use the spatial data for analyses and management decisions	Within the bounds of confidentiality, at least one method producing data outputs available to data consumers is developed, tested, and implemented.

Cost Summary:

Description	Calculation	In-Kind	Requested from ACCSP
Personnel (a)		**$0.00**	**$0.00**
Fringe (b)		**$0.00**	**$0.00**
Supplies (all divided evenly amongst partners) (c)		**$0.00**	**$0.00**
Contractual (d)		**$0.00**	**$108,000.00**
ACCSP Contractors	Development for 800 hours @ $135/hour = $108,000	**$0.00**	**$108,000.00**
Other (all divided evenly amongst partners) (e)		**$0.00**	**$0.00**
Total Direct Charges		**$0.00**	**$108,000.00**
Indirect Charges (f)		**$0.00**	**$0.00**
Totals		**$0.00**	**$108,000.00**
Total Project Cost		**$108,000.00**	
In-kind versus Direct Percent Contribution		**0.00%**	**100.00%**
Requested Amount		**$108,000.00**	

Cost Details:

a. **Personnel ($0 Requested; $0 Match)**: Partners commit to working with ACCSP contractors on the proposed work but are not requesting directed funds for personnel. Therefore, no personnel costs are included.

b. **Fringe ($0 Requested; $0 Match)**: Partners commit to working with ACCSP contractors on the proposed work but are not requesting directed funds for personnel. Therefore, no fringe costs are included.

c. **Equipment/Supplies ($0 Requested; $0 Match):** No supplies are necessary for this work as all tasks are software and application development.

d. **Contractual ($108,000 Requested; $0 Match):** All costs for the proposed work are contracted application, report, and API development hours. This is inclusive of all work for all objectives. Funds should be distributed to ACCSP for payment to contractors and no funds should be distributed to the partners. ACCSP staff time is not included in the budgeted work, and their commitment is outlined in the attached memo.

e. **Other ($0 Requested; $0 Match):** No other costs are necessary for this work as all tasks are software and application development.

f. **Indirect Charges ($0 Requested; $0 Match)**: Partners commit to working with ACCSP contractors on the proposed work but are not requesting directed funds for personnel. Therefore, no indirect costs are included.

Summary of Proposal for Ranking Purposes

Proposal Type: ***New Project***

Primary Program Priority:

Catch and Effort: 100% - This proposal focuses on enhancements to the collection and integration of positional data with catch and effort data already collected through SAFIS applications.

Data Delivery Plan: See outline on page 6.

Project Quality Factors:

Multi-Partner/Regional impact including broad applications:

This is a joint project between several Northeast partners. However, the results will be directly applicable to any partner interested in developing a location monitoring program in inshore waters. Additionally, any partner with federal lobster vessels impacted by Addendum XXIX will benefit from this work.

Contains funding transition plan/defined end-point:

This is a one-year project with a defined end goal. The goal is to enhance the existing product to better serve both managers and data consumers.

In-kind contribution: Please see the costs table on page 12.

Improvement in data quality/quantity/timeliness:

The enhancements to the SAFIS VTA will improve the ability to quality control location data collected through cellular based vessel tracking devices and posted to the ACCSP tracking API. Additionally, the improved matching procedures will make matched trip to track data more readily available to end users and reduce processing time.

Potential secondary module as a by-product:

None

Impact on stock assessment:

Access to these location and matched catch and effort data, within the bounds of confidentiality, is particularly valuable for stock assessments that are spatially refined. The availability of this type of spatially defined catch and effort information could allow for other population assessments to progress to more spatially refined structures, thus improving the stock assessment enterprise.

Appendix A: Curricula vitae for the principal investigators

Richard G. Balouskus

3 Fort Wetherill Rd · Jamestown, RI 02840
Richard.Balouskus@dem.ri.gov · (401) 423-1924

EDUCATION:

Graduate Education:

Master's of Science Degree, Marine Biosciences, *College of Earth, Ocean, and Environment*, University of Delaware, 2011

Undergraduate Education:

Bachelor of Science Degree, Environmental Science, University of Vermont, 2005

WORK EXPERIENCE:

Principal Marine Biologist, Rhode Island Division of Marine Fisheries, Jamestown, RI
February, 2019 - Present

Ongoing Responsibilities:

- Manage RI federal lobster tracking program including device distribution, harvester customer service, VTA management and development, and data analysis.
- Oversees the RI aggregate fluke and black sea bass program development. Performed extensive data analysis of fishing activity to determine efficacy of program. Works with harvesters to ensure compliance with VMS and reporting requirements.
- Lead PI for the Rhode Island ventless fish pot survey. Collects monthly samples of structure oriented species in state waters. Performs data entry and analysis on collected biological samples; maintains project database. Conducts research with state partners.
- Lead PI for the Rhode Island winter flounder spawning stock survey. Conducts weekly fyke net surveys in RI coastal ponds in winter months. Maintains winter flounder tagging project conducted since 1999. Performs data entry and analysis on collected biological samples; maintains project database. Conducts research with state partners.

Fisheries Biologist, INSPIRE Environmental, Newport, RI
July, 2017 – February, 2019

- Developed protocol and secured funding for a hook and line survey to address concerns of federal and state agencies regarding locations of spawning cod aggregations on Cox Ledge with regards to offshore wind development.
- Served as chief scientist for research; responsible for procurement and maintenance of equipment, contracting and community engagement with vessels and anglers, dissection and assessment of collected cod, data analysis and reporting.
- Additional work includes assessment of sediment profile and plan view images to assess seafloor habitat characteristics.
- Preparation of proposals to private, federal, international, and NGO RFPs. Responsible for scoping and monitoring of project budgets through to completion and delivery of final products to clients.

Project Manager, Applied Science Associates (dbs RPS ASA), Wakefield, RI
April, 2011 – July, 2017

- Performed marine fisheries and coastal habitat research calculating injuries and reporting scientific findings for the DeepWater Horizon oil spill NRDA. Conducted analyses of large fisheries and environmental datasets.
- Developed novel methodologies for assessment of marine fish and invertebrate population dynamics.

- Project manager for development, application, and training of environmental risk assessment regarding oil and offshore wind development and operation in marine and coastal waters.
- Conducted risk assessments for coastal waters incorporating socioeconomic and ecological resources, including climate change planning.
- Preparation of proposals to private, federal, international, and NGO RFPs. Responsible for scoping and monitoring of project budgets through to completion and delivery of final products to clients.

SPECIAL SKILLS:

- Relational database management including MS Access
- Proficient in Microsoft Office Suite, R, and GIS
- Small boat handling including safe boating courses

SYNERGISTIC ACTIVITIES

- Atlantic States Marine Fisheries Commission Winter Flounder Technical Committee; Chair (2020 – Present)
- Atlantic States Marine Fisheries Commission Lobster Tracking Technical Committee; Member (2022 – Present)
- New England Fisheries Management Council Groundfish Plan Development Team; Member (2019 – Present)

Anna R. Webb

30 Emerson Ave · Gloucester, MA 01930
anna.webb@mass.gov · (978) 491-6212

EDUCATION:

Continuing Education:

Intro to Programming University of Massachusetts, Lowell; Fall 2016
Relational Database Concepts, University of Massachusetts, Lowell; Spring 2015
Hands-On Technology Transfer, Inc.: SQL Programming; Fall 2014

Graduate Education:

Master of Science degree, Marine and Atmospheric Science, *Focus: Fisheries,* School of Marine and Atmospheric Sciences, Stony Brook University, 2011
Thesis title: *Understudied Species in Coastal U.S. Waters: Issues, Solutions, and Implications for Ecosystem-Based Fishery Management*

Undergraduate Education:

Bachelor of Science Degree, Marine Vertebrate Biology, Stony Brook University, 2007

WORK EXPERIENCE:

Environmental Analyst IV, Massachusetts Division of Marine Fisheries, Gloucester, MA
February, 2023 – Present
Ongoing Responsibilities:

- Program leader for Division's Fisheries Statistics Program managing up to seven employees.
- Oversee and provide support for harvester and dealer data collection, entry, quality control, and compliance, quota monitoring of various species, all special projects including the swipe card dealer reporting system and implementation of a VMS program, and data dissemination to internal personnel, other partner agencies, and the public.
- Collaborate with other Division projects, state and federal partners, and ACCSP on various applications of fishery-dependent data that support fishery management.
- Act as the business project manager for internal permitting front-end applications and a liaison between end users and developers.
- Manage and oversee development and enhancements to the statistics Oracle databases.
- Apply for new and manage ongoing federal grants as the principal investigator.
- Present information compiled by the project to the general public via public meeting forums.
- Chair of the Commercial Technical Committee, Past Chair and current member of the Information Systems Committee, and Chair of the SAFIS Outreach Committee at the ACCSP.
- Division IT liaison to the Department and EOEEA to support technological advances within the Division. Act as Division project manager for ongoing technical projects. Provide IT support, within limits, to Division staff.

Environmental Analyst III, Massachusetts Division of Marine Fisheries, Gloucester, MA
November, 2015 – February, 2023; Supervisor: Story Reed

- Project leader for Division's Fisheries Statistics Project managing up to seven employees.
- Oversee and provide support for harvester and dealer data collection, entry, quality control, and compliance, quota monitoring of various species, all special projects including the swipe card dealer reporting system, and data dissemination to internal personnel, other partner agencies, and the public.
- Collaborate with other Division projects, state and federal partners, and ACCSP on various applications of fishery-dependent data that support fishery management.
- Manage internal permitting and statistics Oracle databases and application development.

- Apply for new and manage ongoing federal grants as the principal investigator.
- Vice Chair of the Commercial Technical Committee, Past Chair and current member of the Information Systems Committee, and Chair of the SAFIS Outreach Committee at the ACCSP.
- Act as a Division IT liaison to the Department and EOEEA and support technological advances within the Division.

Program Coordinator I, Massachusetts Division of Marine Fisheries, Gloucester, MA
April, 2014 – November, 2015

- Oversee the harvester data collection, entry, quality control, and compliance for Massachusetts
- Instituted the online video tutorial series for harvesters using SAFIS and a newsletter focusing on electronic reporting for dealers and harvesters.
- Participate in the swipe card dealer application project with ACCSP and Maine Department of Marine Resources.
- Member of the Commercial Technical Committee, Vice Chair of the Information Systems Committee, and Chair of the SAFIS Outreach Committee at ACCSP.

ACCSP Fishery Specialist (Coordinator), Rhode Island Division of Fish and Wildlife-Marine Fisheries Section, Jamestown, RI
April, 2012 – April, 2014

- Oversee SAFIS data entry and compliance by dealers, harvesters, and staff.
- Participate on the quota monitoring team to make decisions regarding seasonal closures and possession limit changes for summer flounder, black sea bass, tautog, bluefish, striped bass, scup, menhaden, and monkfish.
- Manage the research-set-aside program in Rhode Island.
- Write and submit progress and final reports for ACCSP grants.
- Provide data to staff and external users while monitoring confidentiality issues.
- Member of the Commercial Technical Committee, Vice Chair of the Information Systems Committee at ACCSP, Chair of the Data Warehouse Outreach Committee.

Seasonal Field Technician, New York State Department of Environmental Conservation, East Setauket, NY
June, 2011 – April, 2012

- Conduct seining surveys of juvenile striped bass in Western Long Island bays.
- Assisted with the monitoring of 35 fish pots in a Long Island Sound fishery-independent survey of tautog and a trawl survey of Peconic Bay, NY targeting juvenile finfish species.
- Participated in onboard sampling and measurement of recreational charter boat catch including local species such as summer flounder, black sea bass, and scup.
- Monitor and collect commercial striped bass fishery samples from local fish markets
- Press and age striped bass scales.

SPECIAL SKILLS:

- Relational database management including MS Access and Oracle based databases
- Data mining large datasets for repeating errors
- Proficient in SQL in Oracle and SQL Server, Microsoft Office Suite - expert in Microsoft Excel
- Experience with R, GIS, HTML, Visual Basic

AWARDS:

- 2022 Performance Recognition Individual Citation Recipient, Department of Fish and Game
- 2020 Manuel Carballo Governor's Award for Excellence in Public Service recipient as part of the CARES team

Robert Atwood

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robert.atwood@wildlife.nh.gov · (603) 868-1095

EDUCATION:

Graduate Education:

Master of Science Degree, Zoology, Department of Biological Science, University of New Hampshire, 2016
Thesis: Oyster (*Crassostrea virginica*) Recruitment Studies in the Great Bay Estuary, New Hampshire

Undergraduate Education:

Bachelor of Science Degree, Natural Resources – Fish and Wildlife, Northland College, Ashland, Wisconsin, 2004

WORK EXPERIENCE:

Biologist II, NH Fish & Game Department, Marine Division, Durham, NH
August 2022 – Present

Ongoing Responsibilities:

- Commercial Fisheries Unit leader. Oversee commercial fisheries projects in New Hampshire.
- Oversee the harvester data collection, entry, quality control, and compliance for New Hampshire.
- Member of the ASMFC Habitat Committee, Atlantic Herring Technical Committee, Atlantic Herring PRT, Northern shrimp PDT and American Eel PDT
- Member of Atlantic Coastal Fish Habitat Partnership Steering Committee.

Biologist I, NH Fish & Game Department, Marine Division, Durham, NH
February 2010 – August 2022

- Oversee marine aquaculture activity in New Hampshire, which involves issuing licenses, conducting biological SCUBA site surveys, grant writing, and coordinating with multiple state and federal agencies.
- Plan and coordinate estuarine and marine fisheries projects including Rainbow smelt fyke net survey, Young-of-year American eel survey, and Northern Shrimp Research.
- Member of ASMFC Northern Shrimp Technical Committee, American Eel Technical Committee, Chair of ASMFC Northern Shrimp Technical Committee from 2016-2018.
- Member of ACCSP Information Systems and Commercial Technical Committee from 2010-2014.

Biological Aide, NH Fish & Game Department, Marine Division, Durham, NH
April 2008 – February 2010

- Assist biologists with marine fisheries projects. Duties included creel surveys, fieldwork with anadromous and juvenile fish, and aging rainbow smelt scales.

Everglades Field Technician, University of West Florida Pensacola
February 2006 – August 2006

- Manage and collect field samples for project on the predation of apple snails (*Pomacea paludosa*) in the Everglades and Central Florida lakes. Supervise part-time field assistants. Operate and maintain airboats and vehicles.

Wetland Technician, Voyageurs National Park, International Falls, MN
June 2005 – September 2005 & June 2004 – December 2004

- Conduct wetland vegetation field projects. Map density of *Typha* and *Phragmites*. Locate peatlands using satellite imagery and identify plants.

Desert Biological Monitor, Bureau of Land Management, El Centro, CA
February 2005 – May 2005

- Collect plant and reptile species data in the Imperial Sand Dunes. Hike approximately 8 hours a day in extreme weather conditions. Reside in a remote base camp for three months.

Hatchery Intern, Red Cliff Tribal Fish Hatchery, Red Cliff, WI
October 2003 - April 2004 & August 2001 - December 2001

- Work with Brook Trout, Walleye, and Lake Sturgeon. Maintain raceways and other parts of hatchery. Fin-clip and floy-tag Brook Trout. Identify common fish diseases and treated fungus on fish. Identify the contents of Lake Trout stomach samples.

Fisheries Biological Aide, Idaho Fish and Game Department, Lewiston, ID
June 2003 – August 2003

- Assist with implanting and tracking Bull Trout using radio telemetry. Collect stomach and blood samples from Bull Trout.

CERTIFICATIONS AND TRAINING:

- Intermediate Stock Assessment training series, ASMFC, 2016-2017
- Principles and Practices of Group Facilitation, ASMFC, March 2016
- Introduction to Stock Assessment training series, ASMFC, 2015
- Foundations of Supervision, NH Bureau of Education and Training, August 2015
- PADI Open Water Scuba Certification

PUBLICATIONS:

Atwood, R.L. and R.E. Grizzle. 2020. Eastern Oyster Recruitment Patterns on and Near Natural Reefs: Implications for the Design of Oyster Reef Restoration Projects, *Journal of Shellfish Research* 39(2), 283-289.

Grizzle, R., K. Ward, R. Konisky, J. Greene, H. Abeels, and R. Atwood. 2021. Oyster Reef Restoration in New Hampshire, USA: Lessons Learned During Two Decades of Practice. *Ecological Restoration*. 39. 260-273.

NATHAN WILLSE

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EDUCATION

University of Massachusetts, Dartmouth *2008 - 2012*
Bachelors of Science in Biology, Minor in Sustainability Studies

National Taiwan University: Chinese Language Division *2016 - 2017*
Study of Chinese Language and Traditional Chinese Characters

PhD Candidate in Marine Science *2018 - Anticipated Graduation: 2024*
University of Maine: School of Marine Sciences *2018 - 2020*
Stony Brook University: School of Marine and Atmospheric Sciences *2020 - 2024*

TECHNICAL STRENGTHS

Languages	English (native), Chinese (working knowledge)
Software & Tools	R Programming Studio, ArcGIS, LaTeX, NOAA Stock Assessment Toolbox.
Awards	Sea Grant Scholar, Pikitch Research Excellence Fellow, Eagle Scout

EXPERIENCE

Maine Department of Marine Resources: Fisheries Scientist November 2023 - Present
Fisheries Data Analyst

- Managing the Maine federal lobster fleet vessel tracking program end user data outputs. Supervise program staff to ensure data quality, interpreting fishery behaviour, leading data analyses, leading publications in line with fishery spatial management goals.
- Working with the DMR Marine Mammal division on data analyses, and interpreting vessel tracking data to advise entanglement risk reduction goals.
- Collaborating with state and federal agencies to apply Maine-specific VMS and landings data to stock and marine mammal take assessments.

Research Assistant September 2018 - Present
Graduate Student

- Fisher outreach to engage and equip volunteers for research projects. Modernize historic data and spearhead fisher surveys to fill systemic data gaps, develop and maintain database of confidential fisher data.
- Develop and publish novel quantitative analytical metrics for diverse data, specializing in cleaning and compiling historical and unconventional sources of data, synthesis of management metrics across data-deficient international fisheries, overlapping spatial and habitat distribution models, while identifying priorities for management.
- Lead international webinar series addressing current issues in crustacean fisheries stock assessment and management, identifying focal topics, curating speakers, organizing and moderating the event with NGO partners Environmental Defence Fund (EDF) and Lenfest.

International Pacific Halibut Commission May 2014 - September 2018
Lead Sea Sampler

- Direct international fisheries research and scientific vessel operations on commercial fishing craft to ensure all biological and oceanographic sampling objectives are completed.
- Field marine mammal-seabird monitoring and reporting. Vessel safety reporting.

National Marine Fisheries Service May 2012 - 2014 May
North Pacific Groundfish Observer

· Working in extreme environments with fisheries industry, designing sampling protocol across multiple fisheries, sampling a wide range of biological data on a variety of species.

PUBLICATIONS

Hodgdon, C., M.D. Mazur, K.D. Friedland, **N. Willse**, Y. Chen (2021). Consequences of model assumptions when projecting habitat suitability: A caution of forecasting under uncertainties. ICES Journal of Marine Science, 78(6), pp. 2092–2108.

Willse, N., E. Summers, Y. Chen (2022) Vertical Line Requirements and North Atlantic Right Whale Entanglement Risk Reduction for the Gulf of Maine American Lobster Fishery. Marine and Coastal Fisheries, 14(2), pp. 1-14. *Marine and Coastal Fisheries Best Manuscript of 2022 Winner*

Willse, N. *et al.* (2023). Linking crustacean life history to fishery management controls and reference points. Fisheries Management and Ecology, 00, e12691.

Hodgdon, C., **N. Willse**, N. Hunt, J. Kim, K.D. Friedland, Y. Chen (2023) Comparing Habitat Suitability Forecasts for Gulf of Maine and Southern New England American Lobster Stocks. Journal of Shellfish Research. 42.

Willse, N., K. Staples E. Summers, Y. Chen (2024) Integrating and evaluating non-traditional gear technologies to reduce the risk to whales from fixed-gear fisheries - In Prep

Willse, N., K. Staples E. Summers, Y. Chen (2024) Modernizing historic fishery effort distribution data to advise risk reduction for the North Atlantic right whale - In Prep

Willse, N. (2024) Filling critical data gaps in crustacean fisheries with a mixed approach, using stakeholder engaged research, regional expert testimony, and historic data to resolve data deficiencies. PhD Thesis - In Prep

REPORTS

ICES Stock Assessment Review Reports - Review Lead (2019,2020,2022,2023)

Finding the lowest-hanging fruits to improve crustacean fisheries with limited data and capacity (EDF, Lenfest 2023)

Indonesian Crustacean Fishery Resources Report (EDF, Lenfest 2023)

Greenland Marine Mammal and Fishery Climate Susceptibility Report (University of Maine 2022)

CONFERENCES PRESENTED

Vertical Line Use in Gulf of Maine Region Fixed Gear Fisheries. **Willse, N.**, E. Summers, Y. Chen: Maine Fisherman's Forum (2018,2019), American Fisheries Society (2019,2021), Gulf of Maine 2050 (2019),North Atlantic Right Whale Consortium (2019), University of Maine Graduate Symposium (2019,2020), RARGOM (2020,2021), ICES (2021), World Fisheries Congress (2021)

Consequences of model assumptions when projecting habitat suitability. Hodgdon, C., M.D. Mazur, K.D. Friedland, **N. Willse**, Y. Chen: American Fisheries Society (2021), ICES (2021), RARGOM (2021)

An Analysis of Biological Reference Points and Harvest Control Rules for Crustacean Fisheries Management. **Willse, N.** et al: American Fisheries Society (2022), ICES (2022)

Integrating and evaluating non-traditional gear technologies to reduce the risk to whales from fixed-gear fisheries. **Willse, N.**, et al: ICES (2023), SCAS (2023), NARW Consortium Annual Meeting (2023)

Atlantic Coastal Cooperative Statistics Program
1050 N. Highland Street, Suite 200A-N | Arlington, VA 22201
703.842.0780 | 703.842.0779 (fax) | www.accsp.org

TO: ACCSP Operations and Advisors Committee Members

FROM: Julie DeFilippi Simpson, ACCSP Deputy Director

DATE: June 17, 2024

SUBJECT: ACCSP Staff Workload for Proposed Project

Project Title: Vessel Tracking Data and Program Management Improvements: Expansion of Vessel Tracking Data Access Controls and Upgrading the SAFIS Vessel Tracking Application

Project Type: New Project

Principal Investigators: Rich Balouskus (RIDMF), Anna Webb (MADMF), Robert Atwood (NHFGD), Nathan Willse (MEDMR)

ACCSP Staff Workload Comments: *
The overall objective of this project is to develop enhancements to the administrative tool to view tracks in real time and provide a platform for advanced post-hoc analysis of spatial data. These enhancements are based on the lessons learned since the original development of the Vessel Tracking Application (VTA), which has been actively been collecting data and being used by partners for a year.

The technical work for project will be split between a contractor and the ACCSP Software staff. Partner agency staff have already proved to be willing and able to share ideas, codes, and approaches as possible to achieve efficiency through collaboration. ACCSP staff will be addressing the "Administrators have a more seamless experience managing compliance within a framework" and "API collects additional optionally sent information about devices" project objectives through the following tasks:

- Match column names to other SAFIS reports and applications (Trip.ID vs Trip.Id, End time was already changed).
- Add device voltage and vessel voltage to the SAFIS location API and make visible in the VTA.
- See VTR serial number in the trip viewer and compliance reports.
- Display all start/end times as local military time

ACCSP Software Team staff time required would be low and need to remain as such in order not to impact other scheduled projects such as the eDR redesign. Additional staff time would need to be dedicated to this project to manage the contract. While the total staff time is not insignificant, it is the opinion of the ACCSP leadership that this project is feasible.

* Comments and opinions are based on evaluation of this project individually as opposed to all proposed projects as all projects have yet to be submitted.

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Geoff White, Director
Atlantic Coastal Cooperative Statistics Program
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22201

June 16, 2024

Dear Mr. White,

The Atlantic Coastal Cooperative Statistics Program (ACCSP) Recreational Technical Committee is pleased to submit the proposal titled, 'Pilot test of recreational released catch cards into the sampling design of the MRIP APAIS' for your review. This proposal offers a novel approach to both validate existing released catch from the MRIP APAIS and to also increase the numbers of lengths from released fishes from a variety of recreational fishing modes.

Please let me know if you have any questions or require further assistance with this request.

Sincerely,

Dawn Franco
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Georgia Department of Natural Resources
Coastal Resources Division
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Angela Giuliano
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Proposal for FY2025 ACCSP Funding

Applicant Name:	ACCSP Recreational Technical Committee
Project Title:	Pilot test of recreational released catch cards into the sampling design of the MRIP APAIS
Project Type:	New
ACCSP Program Priorities:	Catch and Effort
Principal Investigator:	Dawn Franco, dawn.franco@dnr.ga.gov Angela Giuliano, angela.giuliano@maryland.gov
Project Staff:	Dave Martins, dave.martins@mass.gov John Lake, john.lake@dem.ri.gov Greg Wojcik, gregory.wojcik@ct.gov Rachel Sysak, rachel.sysak@dec.ny.gov Jeff More, jeffrey.n.moore@deq.nc.gov Brad Floyd, floydb@dnr.sc.gov Alex DiJohnson, alex.dijohnson@accsp.org Trevor Scheffel, trevor.scheffel@accsp.org Full-time, part-time, and seasonal staff
Requested Award Amount:	$202,486.83
Requested Award Period:	May 1 – December 31, 2025
Submission Date:	June 16, 2024 Resubmitted as of 8/19/2024

Highlighted text indicates changes from the first submission
Underlined text identifies key details that meet ranking criteria

Objectives

This proposal will be a pilot project for calendar year 2025 offering use of a catch card as a supplementary sampling design to enhance the understanding of discard information in recreational fisheries along the Atlantic Coast. Private/rental boat mode will be the main focus but collection from multiple modes will be possible at the discretion of participating state partners. This proposal will pilot a modified sampling design to the Marine Recreational Information Program (MRIP) Access Point Angler Intercept Survey (APAIS) to collect information from randomly selected anglers about their discarded fish during a recreational fishing trip. The specific objectives include:

- Requesting prior to the start of a fishing trip that anglers record traditional discard information that is currently collected through the APAIS (e.g., species, count, hours fished, fishing area).
- Collecting additional fields relevant to discard mortality (e.g., depth and lengths of discarded fish). This would be beneficial for the private/rental boat mode which comprises the majority of recreational discards for several key species (Figure 1).
- Using the same stratified random sample design, or probability-based sampling, as the APAIS will allow comparison to existing APAIS discard data collection and explore if bias exists.
- Compare data collected via catch cards to existing headboat and dockside sampling or other data sources.
- Educate the recreational fishing community on the importance of accurate discard information in fisheries management and stock assessment.
- Educate the recreational fishing community on discard mortality, barotrauma and safe fish handling techniques.

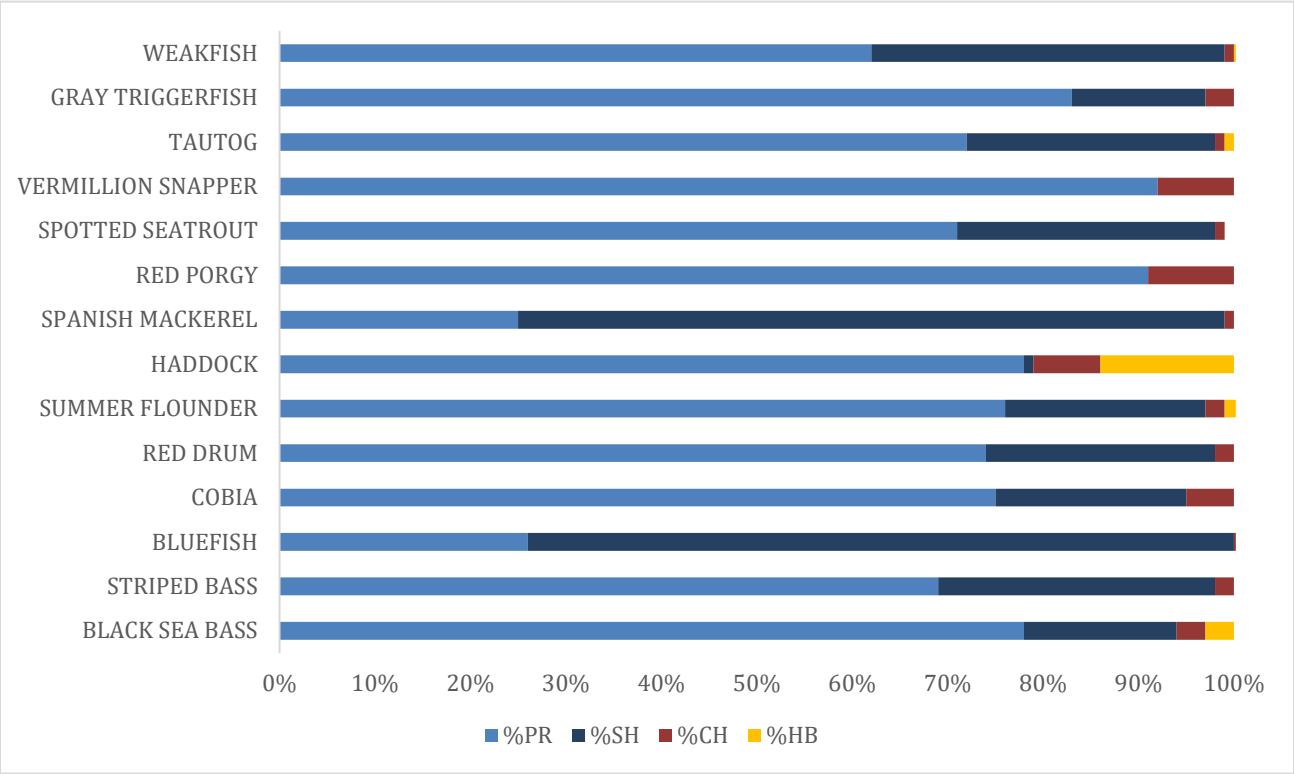


Figure 1. Percent discards of select species from ME to FL by mode, averaged for 2013 - 2022.

Need

In recent years, recreational fishing practices have shifted towards releasing a larger proportion of the estimated catch, rather than harvesting it. This shift is due to several reasons including but not limited to increasingly stringent regulations, such as shorter seasons, higher size limits, and smaller bag limits, as well as the growing popularity of catch and release angling. For example, on the Atlantic Coast from Maine through Florida, a significant number of striped bass are caught and released by recreational anglers compared to those that are harvested (Figure 2). Approximately 84% to 95% of the striped bass catch are released alive. Similar patterns are seen in other recreationally important fish species such as black sea bass and summer flounder (Figures 3 and 4). From 2000 through 2022, approximately 90% of black sea bass and summer flounder were released alive, compared to less than 40% at the beginning of the time series. In recent years (2000-2022), an average of approximately 85% of all striped bass, black sea bass, and summer flounder were released alive (Figure 5).

According to MRIP, the total number of live black sea bass discards along the Atlantic coast from Maine to Florida was 45.1 million fish in 2022 (Figure 3). Considering a 15% hook and release mortality rate, an estimated 6.8 million fish were lost due to recreational discard mortality in 2022. In the same year, black sea bass harvest was 4.9 million fish, which means discard mortality alone accounted for 58% of the total recreational removals (harvest plus dead discards).

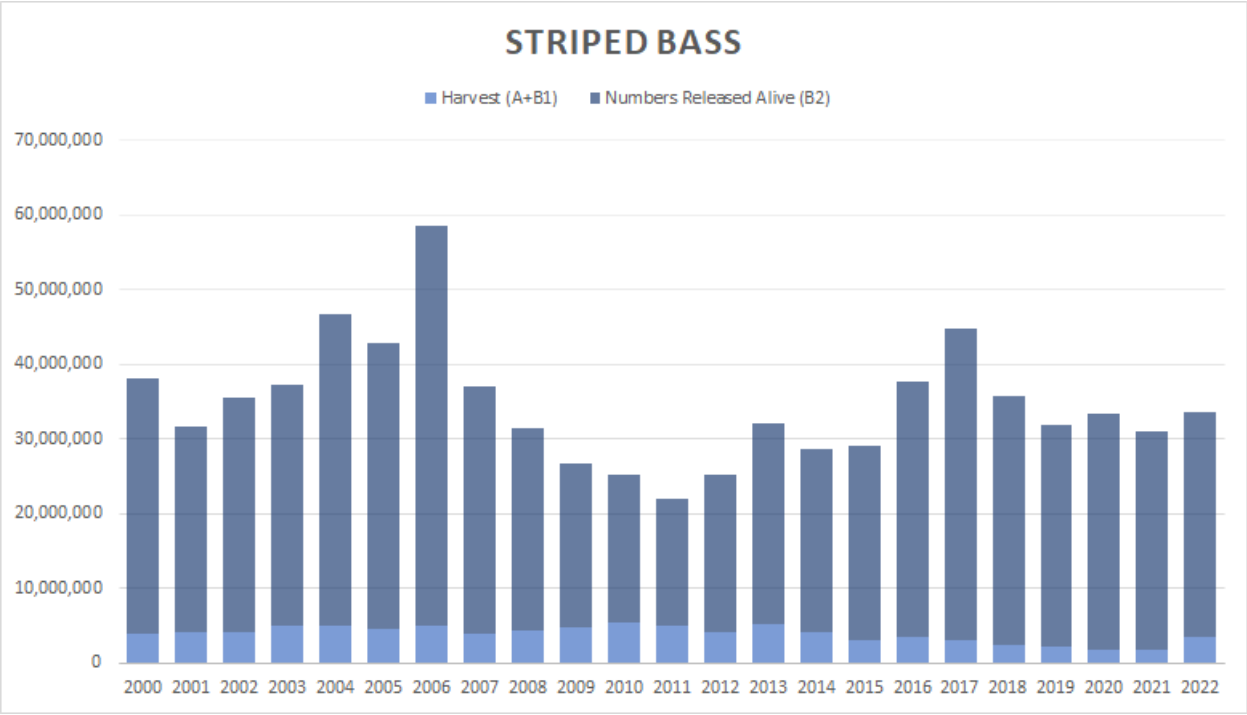


Figure 2. Catch trends in number of Striped Bass released from ME to FL, compared with harvest, illustrating released fish make up a majority of Striped Bass catch.

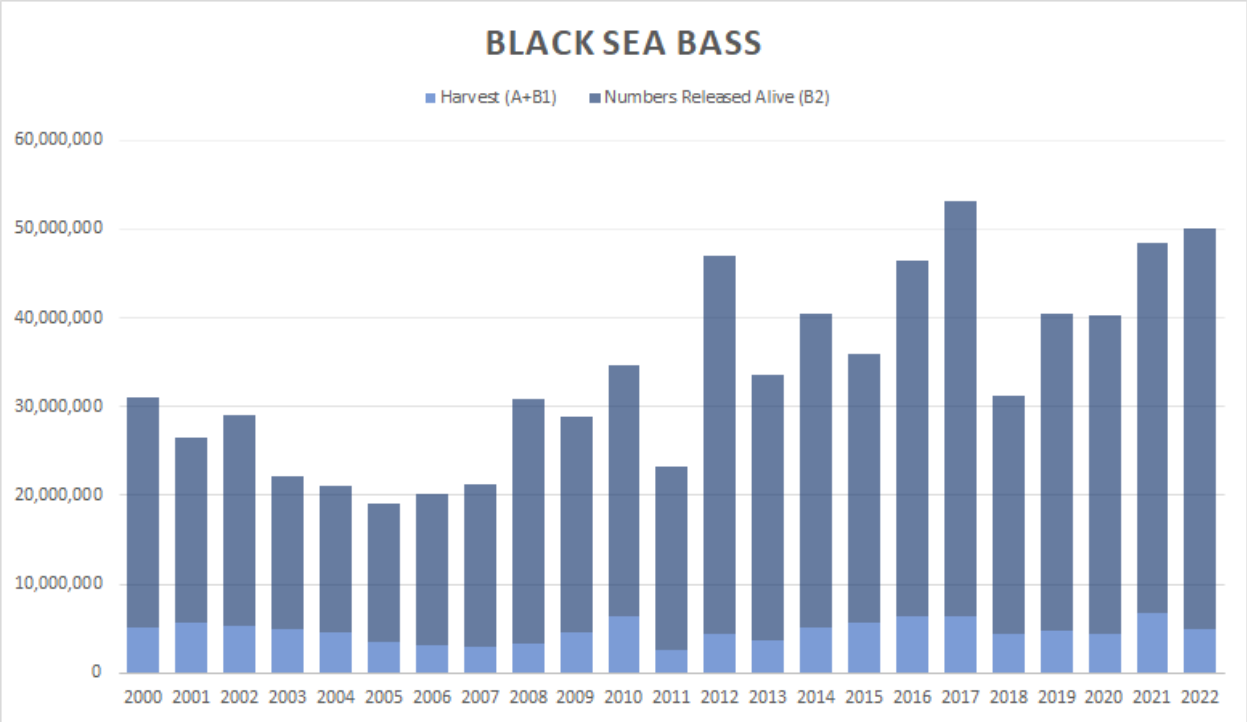


Figure 3. Catch trends in number of Black Sea Bass released from ME to FL, compared with harvest, illustrating released fish make up a majority of Black Sea Bass catch.

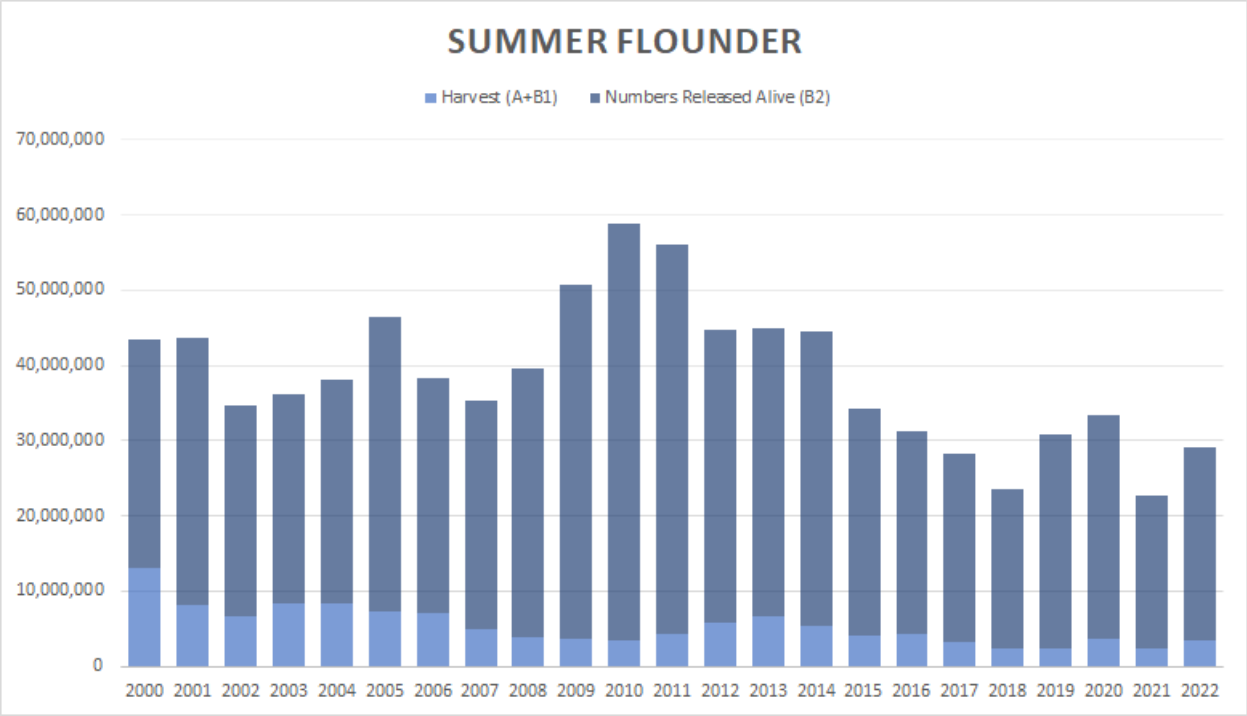


Figure 4. Catch trends in number of summer flounder released from ME to FL, compared with harvest, illustrating released fish make up a majority of summer flounder catch.

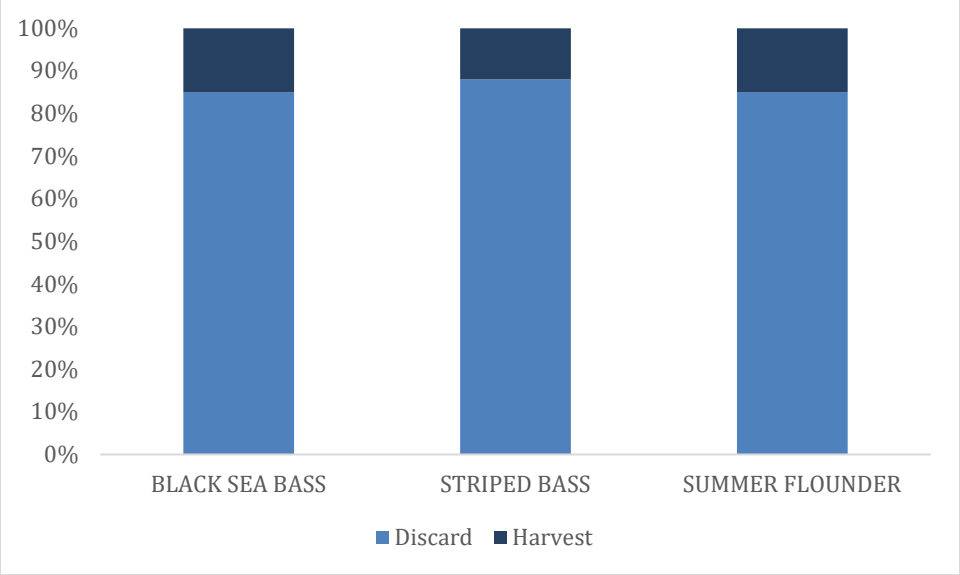


Figure 5. Percent of fish released, compared with harvest, averaged from 2000 to 2022 from ME to FL.

MRIP acknowledges that the accuracy and precision of information on released fish could be improved, especially since discarded fish represent an increasingly larger proportion of total removals from many fish populations.

The need for improved discard information in recreational fishing arises from several factors:

- Regulatory requirements**:** Recreational fishing regulations have become more stringent, with shorter seasons, higher size limits, and smaller bag limits. These regulations aim to protect fish populations and promote sustainable fishing practices. As a result, there is an increased number of fish being released.
- Catch and release angling**:** Catch and release has gained popularity among recreational anglers. Many anglers now prefer to release fish rather than harvest them. This shift in fishing practices is driven by a desire to conserve fish populations and promote their long-term sustainability.
- High release rates**:** A significant proportion of the estimated catch in recreational fishing may be released back into the water. For example, species like striped bass, black sea bass, and summer flounder have high rates of live releases, ranging from 84% to 95% of the catch. This indicates that a large number of fish are being released, and it is important to ensure accuracy of these data.
- Discard mortality**:** When fish are released after being caught, there is a risk of mortality. Factors such as handling stress, injuries from hooks or fishing gear, and post-release predation can contribute to the mortality of released fish. It is crucial that discard estimates are accurate so that the mortality associated with discards reflects the impact of catch and release practices on fish populations.
- Data gaps: The current monitoring and data collection systems for discards in recreational fishing are limited. The validated discard monitoring primarily focuses on the headboat fishery, while other fishing modes such as shore, private/rental, or charter boats have limited or no length data for discards. Using headboat data as a proxy for other fishing modes may not provide accurate length characterization due to differences in fishing methods. To improve discard estimates and mortality assessments, there is a need for mode-specific data collection.

Currently, the only source of discard length data for the recreational fleet, available coastwide in the Atlantic and used in stock assessments, is limited to the headboat fishery. Trained APAIS observers ride along on headboats to observe and record information on all fish caught by a limited number of anglers, including the species caught, lengths, quantity, and disposition of released fish. This information is extremely valuable in stock assessment models to evaluate discard mortality and total removals from a fishery, as well as the sizes of fish released in size- or age-based statistical models.

There is a lack of directly observed discard quantity and length information for other fishing modes such as shore, private/rental, or charter boats. In the absence of such data, headboat data is sometimes used as a proxy. However, applying headboat discard rates and size composition to other recreational fishery modes may not be entirely accurate due to differences in areas fished (offshore vs. inshore), depths fished (shallow vs. deep), and angler behavior (fishing method, hook type, bait type). The size composition of the fish population can vary between offshore and inshore areas. To obtain accurate characterization of each mode and estimate discard mortality, it is essential to use mode-specific data. Although some size information is available from external programs, such as state volunteer angler logbook or fish tagging programs, not all states have these programs and none currently have a statistically rigorous, peer-reviewed methodology. This study will test a method for collecting quality discard information for states that do not have a logbook or tagging program using a standardized, random sampling design.

To address these needs, our proposed solution is to pilot test an updated sampling design that increases focus on discards and expands discard length data collection to other fishing modes besides headboat mode. This can be achieved through the use of catch cards to collect release information. By obtaining more accurate discard estimates and mortality data, fisheries managers can make informed decisions to ensure the sustainable management of fish populations in recreational fishing and provide valuable data that is currently unavailable to stock assessments.

Results and Benefits

Recent management actions for several recreationally important species have resulted in reduced seasons, changing size limits, and reduced bag limits, highlighting the increasing numbers of fish being discarded and management's need for more information on this sector of the fishery. Stock assessment and management advice are likely to improve if better data can be collected about released fish. By handing out catch cards before the trip begins, anglers would be notified ahead of time that they will be asked about their discards, offering them the opportunity to record discarded catch numbers and lengths while fishing. We can compare these data to the existing APAIS, hopefully helping to provide more accurate discard numbers (i.e., less rounding) and reporting of all species discarded (i.e., including all species rather than just managed species).

One of the largest uncertainties in stock assessments is the size composition of discards, particularly from the private boat fleet which contributes the largest proportion of the catch for many important recreational species. As noted previously, data on discard lengths from this fishing sector have been difficult to observe and assessments often use data from various logbook or volunteer angler surveys to fill this data gap or sometimes must use data from other sources, such as various tagging datasets or the MRIP headboat observations. While these data represent the best data currently available, there are questions on how representative they are of the private recreational fleet. This project presents an opportunity to collect important discard length data. Data collected in a randomized, statistically valid manner is considered one of the best ways to obtain a more representative sample of discard lengths from the private/rental boat sector. In addition, getting the data directly from mode specific anglers will ensure that the data most representative of their recreational fishing fleet is being used to describe their fishing activities.

Anglers will be asked to record the lengths of discarded fish for up to fourteen regionally important recreational species (Table 1). These important recreational species were selected in consultation with state partners, Atlantic States Marine Fisheries Commission, and Councils based on the importance of length data in stock assessment processes and having a high discard to harvest ratio.

Table 1. Select list of managed species which will have length information requested on catch cards.

Black Sea Bass	Gray Triggerfish	Red Porgy	Striped Bass	Vermilion Snapper
Bluefish	Haddock	Spanish Mackerel	Summer Flounder	Weakfish
Cobia	Red Drum	Spotted Sea Trout	Tautog	

The catch card program would be voluntary and design aspects would focus on methods to reduce potential biases. These catch cards would be handed out to anglers at sites selected using the random survey design of the APAIS. It is anticipated that this method will result in a more representative sample of discard catch length information than may be obtained from a purely opt-in volunteer angler survey. Data will be collected at the individual fishing trip level so that these data can be better aligned with how data are collected in the APAIS.

The catch cards will also provide an opportunity to collect data needed for stock assessments that are not usually collected in the APAIS but are needed to improve estimates of discard mortality such as the depth fished. Improved data on this field would provide more accurate estimates of the number of fish that die after being released, improving estimated fishing mortality rates, an important metric used to manage fish stocks sustainably.

Data Delivery Plan

Waterproof cards will be provided a unique identification number to prevent fraudulent submissions. Additionally, field interviewers will indicate on every card when (e.g., date/time) and where (e.g., MRIP site number) it was distributed. Data from catch cards will be processed and manually keyed into a section on the ACCSP ATA. ACCSP will create standardized data tables formatted across all fields to ensure that state staff along the coast are entering the data the same way. Unique fields for each card will be checked for quality assurance (QA) during the data entry process to the ATA and quality control (QC) checks will be run periodically to review data issues, including outliers, after each submission via automated processes.

While electronic data submission options were discussed, physical catch cards were chosen as the preferred submission method. Previous MRIP studies for the Fishing Effort Survey (FES) have shown that having more than one data submission method (i.e., paper- vs. electronic-based) tends to produce lower overall response rates than having a single submission method. These studies have also found that anglers exhibited higher response rates through the mail rather than the web-based surveys. Additionally, electronic data collection could result in anglers who were not randomly encountered at the sites during the specific sample times being able to submit data. While anglers could still pass the paper form to someone else or collect data from a trip not within the sampling time frame, the use of physical cards with unique identification fields will reduce this issue. Appendix B summarizes the data processing.

After anglers complete their trips and record their discarded catch data on the distributed paper catch cards, anglers can submit their catch card to the associated state partner by:

- Mail using pre-paid postcards,
- Return directly to the APAIS interviewer if still on site when the angler completes their trip.

Anglers who return from their trip and hand in their catch card to an APAIS interviewer will be asked to complete an APAIS interview and the unavailable catch question will be asked. That is, the catch card will not replace the APAIS interview as this will help with the eventual comparison between current APAIS methodology and that of the catch card. Completing interviews on site with anglers, whether given the card or not, will provide opportunity to use data from

these overdrawn assignments for MRIP estimates, pending evaluation with the help of NOAA Fisheries MRIP staff. Completed interviews as part of overdrawn assignments will be uploaded to the ACCSP Assignment Tracking Application (ATA) using the same procedure as standard APAIS assignments. The total number of catch cards provided to anglers will be recorded to determine how many cards were returned for each assignment. This data will be used to assess non-response to gauge the rate of angler participation.

Approach

Assignments will be created using the same draw process as the APAIS to ensure a probability-based sampling design but will be treated as a separate draw of private/rental boat sites. These assignments will be labeled as 'Overdrawn' assignments. In coordination with NOAA Fisheries MRIP staff, this pilot proposes to conduct overdrawn APAIS assignments as if the assignment is an actual APAIS assignment in order to standardize approaches for eventual data analyses. Overdrawn assignments will not initially be a part of the existing MRIP estimation process in order to ensure that the project doesn't affect current interviewer productivity and ongoing efforts to improve PSEs along the Atlantic Coast. However, MRIP has indicated that overdrawn assignments could potentially be used in estimates, pending analyses after the sampling season if there are no significant biases between the catch card and regular APAIS assignments.

The number of overdrawn assignments will be predetermined in advance of the draw and will be state specific. The number of assignments per region was selected based on the average number of anglers that may be given a card each day (5.24), return rate of catch cards (25%) from a different pilot project in Connecticut together with APAIS results from 2022 (e.g., number of 0-interview assignments, private/rental anglers sampled with released catch), using a list of managed species by region on the Atlantic (see Appendix C). The total assignment goal (485) by region/state is as follows with sampling months described in Table 2:

- North Atlantic: 205 assignments total, 60 in MA, 70 in RI, and 75 in CT
- Mid-Atlantic: 130 assignments total, 65 in NY and 65 in MD
- South Atlantic: 150 assignments total, 50 in NC, 50 in SC, and 50 in GA

Table 2. Months of sampling overdrawn APAIS assignments for pilot project.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Massachusetts					X	X	X	X	X	X		
Rhode Island					X	X	X	X	X	X		
Connecticut					X	X	X	X	X	X		
New York					X	X	X	X	X	X		
Maryland					X	X	X	X	X	X		
North Carolina					X	X	X	X	X	X	X	
South Carolina					X	X	X	X	X	X	X	
Georgia					X	X	X	X	X	X	X	

Catch cards will be printed and distributed to anglers by APAIS field interviewers. Catch cards will be handed out mainly to private/rental boat anglers but interviewers could hand out cards to shore anglers, as encountered. In 2022, the majority (78%) of anglers interviewed started their fishing trip between the hours of 6am and noon (see Table 1 in Appendix C). Therefore, assignments will have a buffer time before the 6-hour APAIS where catch cards will be handed out for two common APAIS intervals: 0800-1400 and 1100-1700 to maximize potential of encountering anglers before

they begin their trip. This will default to a 1-hour buffer time but could potentially be extended to 2- or 3-hour buffers depending on staff availability and assignment specifics. During this buffer time, interviews cannot be conducted as the purpose of the buffer is specifically for distributing catch cards to anglers beginning their fishing trips. During the APAIS assignment interval, field interviewers will hand out catch cards to anglers departing on their trips as well as complete intercepts with anglers finishing their trips with angler intercepts taking precedence during the assignment interval.

Anglers will be given cards as they are departing the access point to begin their fishing trip, along with a brief explanation from field staff on how to fill out the card and why the information is important. A small (golf) pencil will be provided as well as a tape measure. The unit of measurement on the tape measure will include inches since that is the unit of measure most anglers are familiar with.

Data Collection

Catch cards will include data fields for the following basic fisheries information:

- Date
- Fishing mode
- Target species
- Hours fished
- Area fished (ocean <=3 miles, ocean >3 miles, or inland)
- Depth fished
- Trip end time

Catch information questions will include:

- Number of fish released per species
- Disposition (thrown back alive, thrown back dead)
- Discard lengths for fourteen regionally important/managed species (see Table 1)

Note: There are two examples provided for catch cards. Focus groups or field testing will be planned in mid- to late-2024 to gauge how easily the catch card can be understood and filled in by anglers.

Measuring Procedures

Anglers will be asked to measure up to 15 individual released fish, if included in the list of 14 species, on the catch card in the order in which each fish is caught. That is, the fish are not to be measured based on size or every 'n^{th}' individual. The recommendation for 15 is to limit angler burden or fatigue and anglers can record more than 15 individuals if desired.

Anglers would be asked to measure the total length (TL) of each fish rounded up to the nearest quarter-inch to reduce error. This measurement was selected because 0.25 inches is equal to .635 cm, which is at least +/- 1 cm consistent with lengths reported in scientific fisheries literature. Cards will be returned to the participating state that distributed the card, either by mail or to the field interviewer if they're still at the site. Field interviewers will fill in the location and date the card was given to the angler and track the total number of cards distributed each day to determine response rate.

There is limited space on the card for instructions so each card will include a link (via QR code) to provide outreach and education materials plus more complete instructions such as:

"We are conducting a study to collect information about any fish you may catch and release on your fishing trip today. Please fill out this card in its entirety, and only for fish that you specifically caught and released. Do not include any other angler's information in your party on this card. Please tell us more information about your trip in "Trip Information". We would like to know what fish were you targeting, what depth most of your fishing occurred, number of hours you were fishing, if you were fishing from a boat or the shore, how far from shore you were fishing, and time your trip ended. In "Angler's released Catch for total trip", track all species released by writing in each species name and record the total number of each species released using tally marks. You can overwrite the box with the example if you need the extra space. For the length section, only record lengths for priority species (see list below). If you release a priority species, write in the name of the species on the top line and record one total length (rounded up to the nearest quarter inch) in each box under the applicable species name. You can have multiple columns for a single species if you need more space for lengths (e.g., 2 columns for Spanish mackerel). If you did not release any fish on your trip, please check the box "I did not release any fish today".

Coastwide list of priority species for lengths:

Black Sea Bass, Bluefish, Cobia, Gray Triggerfish, Haddock, Red Drum, Red Porgy, Spanish Mackerel, Spotted Seatrout, Striped Bass, Summer Flounder, Tautog, Vermilion Snapper, and Weakfish."

In addition to the QR code, half-sheets of paper will be printed and available to hand out to anglers or for use by field interviewers at the state's discretion.

Potential Analysis Approaches and Future Validation

Direct validation of angler reported discards through observation or video recording is not practical due to the number and size of private and rental recreational fishing vessels. There are, however, various approaches to compare data collected through this catch card pilot project to other data sources. A validation component would highlight potential biases in the data collected by various methods and elucidate whether the discard lengths collected are accurate and reasonable.

Additionally, an examination of differences in the number of discarded species reported between APAIS intercepts and catch cards tests the hypothesis that anglers are more likely to report greater species diversity via catch card including less valued (infrequently targeted) species, compared with the APAIS. Data can also be analyzed to evaluate if there are fewer instances of rounding in catch card data.

One of the most important aspects of this catch card pilot project is the ability to collect length information on released fish to better describe the size composition of discarded catch. The composition of discard length frequencies from the catch cards can be compared with data sources external to APAIS such as volunteer angler logbook programs or fish tag and release data sets, or with the headboat discard data currently collected through APAIS to evaluate if differences exist.

In the future, a separate proposal could be developed to determine the efficacy of a catch card approach by directly observing shore or headboat anglers who simultaneously self-report their discards on the card as an alternative way to validate catch card data, Hawthorne effect notwithstanding. It would be interesting and important to examine whether catch card discard length data align with data from other programs as comparing the various data streams may tell us something about potential biases between the different data types (randomly distributed cards, opt-in data collection, fish tagging data sets, and APAIS headboat sampling).

Funding Transition Plan

This pilot project is intended to test several hypotheses in the initial year of conduct, including the methods of increasing discard information. If the results of the first year indicate major benefits for another year's pilot testing, additional funding would be requested. However, if this pilot proves to be successful and does not require additional testing, funding to continue or merge this methodology with the APAIS would instead be covered under the MRIP general survey's cooperative agreement on the Atlantic.

Outreach and Education

Educational outreach materials will be created to standardize data collection and explain the needs and benefits of the project. Primary program outreach will occur during initial contact a field interviewer has with an angler prior to the start of any fishing activity. At this stage, field interviewers will provide potential participating anglers with a brief overview of the project, the survey card, a measuring tape, and a pencil.

Materials created for anglers will provide card instructions, general information, and a region-specific section. Instructions will include detailed information on how to fill out the survey card, how to measure fish of varying body types, and how anglers can submit their data. The general information section will contain broad information about the purpose of the project, the importance of recreational discard information in fisheries management, and best practices for releasing fish (e.g., safe handling, circle hooks, descending devices). There is a wealth of knowledge online regarding best fish handling practices and barotrauma and educational videos and links for these will be provided on the website as angler resources. The region-specific section will include information about species frequently encountered in the region in which the fishing trip is occurring as well as information to help anglers accurately identify species that are commonly mis-identified. As a secondary form of outreach, the materials will provide links to direct anglers to more program-specific information, to websites of participating agencies, and to other sources related to recreational anglers and recreational fishing data collection.

Outreach materials will also emphasize that the release cards are meant to compliment MRIP data, not replace it, and will highlight the importance of continued participation in the MRIP APAIS surveys. The survey card, pencil, and measuring tape will ensure that anglers have the appropriate tools needed to collect the discard data, while the additional materials will describe the importance of discard information in the fishery management process and how collected data can be beneficial. Informing anglers of the importance of the data they collect prior to beginning their fishing activity has potential to 1) motivate them to participate in the program through increased awareness, and 2) increase an angler's focus on discard information during that fishing trip, in turn encouraging more accurate data.

Small items such as towels, hooks, measuring tapes, etc. can be handed out with the card to incentivize and thank anglers for their participation. The incentives are not a required part of the project but can be used at the discretion of the participating state.

Geographic Location

Broadly, this project will cover the Atlantic coast from Maine through Georgia. During the first year of the pilot project, regional coverage will be accomplished by Massachusetts, Rhode Island, and Connecticut in the North, New York and Maryland in the Mid, and North Carolina, South Carolina, and Georgia in the South.

Milestone Schedule

Date	Event
Jun 17, 2024	Proposal Submitted to ACCSP RFP
Aug 8, 2024	Pilot Partner Meeting
Aug 19, 2024	Revisions to Proposal Due
Sep-Nov, 2024	Pilot Partner Meetings
Dec 5, 2024	Full RTC Meeting - Virtual
Jan, 2025	Finalize Catch Card, arrange for printing
Jan, 2025 - Mar, 2025	Pilot Partner Meetings
Mar, 2025	Overdrawn Assignment Allocation request to MRIP
Mar-Apr, 2025	Training sessions for Pilot states, order supplies, ship to states
May, 2025	Pilot Project Conduct begins (Table 2)
Jun 15, 2025	Deadline for card data entry and data review for May
Jun, 2025	Pilot Partner Meeting – check in on process
Jul 15, 2025	Deadline for card data entry and data review for Jun
Jul, 2025	Pilot Partner Meeting – Wave review (May-Jun)
Aug 15, 2025	Deadline for card data entry and data review for Jul
Aug, 2025	Pilot Partner Meeting – Mid Season review (May to July)
Sep 15, 2025	Deadline for card data entry and data review for Aug
Sep, 2025	Pilot Partner Meeting – Wave review (Jul-Aug)
Oct 15, 2025	Deadline for card data entry and data review for Sep
Nov 15, 2025	Deadline for card data entry and data review for Oct
Nov, 2025	Pilot Partner Meeting – Wave review (Sep-Oct)
Dec 15, 2025	Deadline for card data entry and data review for Nov
Dec 31, 2025	Deadline for final data review for May-Nov
Jan 1, 2026	Data available for analysis

Project Accomplishments Measurement

Project Goals	Metrics
Discard length data collection	- 60 length measurements for each priority species by relevant spatial (e.g., state, region) and temporal (e.g., month, wave, year) category for use in stock assessments
Discard rate analyses	- Better understanding of potential recall/measurement bias to APAIS released catch by moving request for discards from after-trip to before-trip. Field staff will track and report how many cards are distributed. Interviewers could potentially distribute up to 15,000 catch cards.

Cost Summary (Budget)

Description	Calculation	Cost	In-kind
	MASSACHUSETTS		
Personnel (a)			
Interviewers (seasonal)	60 (9 hours) @ $22.00 per hour	$ 11,880.00	$ -
Data entry clerk (seasonal)	60 * .5 Hours/Assign * $22/Hour	$ 660.00	$ -
Program Staff time (2 hrs per week)	30 weeks (2hrs per week)	$ -	$ 2,709.60
Fringe (b)			
Interviewer (seasonal)	Fringe = 0.0162 * personnel (a)	$ 192.46	$ -
Data entry clerk (seasonal)	Fringe = 0.0162 * personnel (a)	$ 10.69	$ -
Program Staff time	Fringe = 0.4505 * personnel (a)	$ -	$ 1,220.67
Travel (c)			
Vehicle Mileage	$0.67/mile (60 assignments @ 70 miles average roundtrip)	$ 2,814.00	$ -
Other expenses	Parking, tolls, etc.	$ 500.00	$ -
Supplies (d)			
Printing + Angler supplies	Printing paper (60 assignments w/ avg anglers per assignment: $1.00/sheet of write-in-rain paper, $0.50/pencil, $1.00/measuring tape)	$ 4,500.00	$ -
Other (e)			
Other	Pre-paid mailing for catch cards (60 assignments w/ avg anglers per assignment: $0.80 per pre-paid expense)	$ 1,440.00	$ -
	Handout materials / reward	$ 1,200.00	$ -
Totals (c+d+e)		$ 7,844.00	$ -
Total direct charges			
Indirect charges (f)	Indirect (25.59% of Salary)	$ 4,057.04	$ 693.39
Sum of direct and indirect		**$ 27,254.19**	**$ 4,623.66**

Description	Calculation	Cost	In-kind
	RHODE ISLAND		
Personnel (a)			
Interviewers	Staff Hours @ 7 Hours w/ 2hr travel @ $22.00	$ 13,860.00	$ -
Date entry	Staff Hours @ 0.1 Hours @ $22.00 @ 15 Intercepts/Assignments	$ 2,310.00	$ -
Supervisor	Supervisor Salary	$ -	$ 2,391.00
Fringe (b)			
Interviewer (seasonal)	Fringe = 0.10 * personnel (a)	$ 1,386.00	$ -
Data entry clerk (seasonal)	Fringe = 0.10 * personnel (a)	$ 231.00	$ -
Program Staff time	Fringe = 0.10 * personnel (a)	$ -	$ 239.10
Travel (c)			
Vehicle Mileage	60 mile per assignment .67/miles	$ 2,814.00	$ -
Other expenses	Parking, Tolls, etc.	$ 500.00	$ -
Supplies (d)			
Printing + Angler supplies	Printing paper (70 assignments w/ avg anglers per assignment), pencils ($0.50), and measuring tapes ($1.00)	$ 5,250.00	$ -
Other (e)			
Other	Pre-paid mailing for catch cards (70 assignments w/ avg anglers per assignment: $0.80 per pre-paid expense)	$ 1,680.00	$ -
Totals (c+d+e)		$ 7,199.00	$ -
Total direct charges			
Indirect charges (f)	Indirect (22.32% of TDC)	$ 4,348.83	$ 533.67
Sum of direct and indirect		**$ 32,379.83**	**$ 3,163.77**

Description	Calculation	Cost	In-kind
	CONNECTICUT		
Personnel (a)			
Interviewers	Staff hours (75 assignments total: 85% w/ 1-hour buffer, 15% w/o buffer) w/ 2 hours of travel time per assignment @ $16/hour)	$ 10,620.00	$ -
Data entry clerk	Staff hours (75 assignments total, 0.5 hours per assignment for review/entry * $20/hour)	$ 750.00	$ -
Supervisor	37.5 hours over 30 weeks including fringe		$ 4,454.20
Fringe (b)			
Interviewer (seasonal)	Fringe = 0.6722 * personnel (a)	$ 7,138.76	$ -
Data entry clerk (FTE)	Fringe = 0.9047 * personnel (a)	$ 678.53	$ -
Travel (c)			
Vehicle Mileage	$0.67/mile (75 assignments @ 50 miles average roundtrip)	$ 2,512.50	$ -
Other expenses	Parking, tolls, etc.	$ 500.00	$ -
Supplies (d)			
Printing + Angler supplies	Printing paper (75 assignments w/ avg anglers per assignment: $1.00 per sheet of write-in-rain paper, $0.50 per pencil, $1.00 per measuring tape)	$ 5,625.00	$ -
Other (e)			
Other	Pre-paid mailing for catch cards (75 assignments w/ avg anglers per assignment: $0.80 per pre-paid expense)	$ 1,800.00	$ -
	Handout materials / reward	$ 1,200.00	
Totals (c+d+e)		$ 8,375.00	$ -
Total direct charges			
Indirect charges (f)	Indirect (36.93% of personnel (a))	$ 4,198.94	$ 1,644.94
Sum of direct and indirect		**$ 35,023.73**	**$ 6,099.14**

Description	Calculation	Cost	In-kind
	NEW YORK		
Personnel (a)			
Interviewers	Staff hours (65 assignments total: 85% w/ 1-hour buffer, 15% w/o buffer) w/ 3 hours of travel time per assignment @ $21.664/hour)	$ 13,870.38	$ -
Data entry clerk	Staff hours (65 assignments total, 0.5 hours per assignment for review/entry * $21.664/hour)	$ 704.08	$ -
Supervisor		$ -	$ 1,200.00
Fringe (b)			
Interviewer (seasonal)	Fringe = 0.10 * personnel (a)	$ 1,387.04	$ -
Data entry clerk (seasonal)	Fringe = 0.35 * personnel (a)	$ 246.43	$ -
		$ -	$ 420.00
Travel (c)			
Vehicle Mileage	$0.67/mile (65 assignments @ 75 miles average roundtrip)	$ 3,266.25	$ -
Other expenses	Parking, tolls, etc.	$ 500.00	$ -
Supplies (d)			
Printing + Angler supplies	Printing paper (65 assignments w/ avg anglers per assignment: $1.00 per sheet of write-in-rain paper, $0.50 per pencil, $1.00 per measuring tape)	$ 4,875.00	$ -
Other (e)			
Other	Pre-paid mailing for catch cards (65 assignments w/ avg anglers per assignment: $0.80 per pre-paid expense)	$ 1,560.00	$ -
Totals (c+d+e)		$ 7,373.75	$ -
Total direct charges			
Indirect charges (f)	Indirect (0.00% of TDC)	$ -	$ -
Sum of direct and indirect		**$ 26,409.17**	**$ 1,620.00**

Description	Calculation	Cost	In-kind
	MARYLAND		
Personnel (a)			
Interviewers	Staff hours (65 assignments total: 85% w/ 1-hour buffer, 15% w/o buffer) w/ 2 hours of travel time per assignment @ $17.66/hour)	$ 10,158.92	$ -
Data entry clerk	Staff hours (65 assignments total, 0.5 hours per assignment for review/entry * $19.26/hour)	$ 625.95	$ -
Project Manager	Scheduling/printing/data entry/etc. (1/2 month)	$ -	$ 2,500.00
Fringe (b)			
Interviewer (seasonal)	Fringe = 0.10 * personnel (a)	$ 1,015.89	$ -
Data entry clerk (seasonal)	Fringe = 0.35 * personnel (a)	$ 219.08	$ -
		$ -	$ 875.00
Travel (c)			
Vehicle Mileage	$0.67/mile (65 assignments @ 50 miles average roundtrip)	$ 2,177.50	$ -
Other expenses	Parking, tolls, etc.	$ 500.00	$ -
Supplies (d)			
Printing + Angler supplies	Printing paper (65 assignments w/ avg anglers per assignment: $1.00 per sheet of write-in-rain paper, $0.50 per pencil, $1.00 per measuring tape)	$ 4,875.00	$ -
Other (e)			
Other	Pre-paid mailing for catch cards (65 assignments w/ avg anglers per assignment: $0.80 per pre-paid expense)	$ 1,560.00	$ -
Totals (c+d+e)		$ 6,285.00	$ -
Total direct charges			
Indirect charges (f)	Indirect (10.00% of TDC)	$ 1,881.74	$ 250.00
Sum of direct and indirect		**$ 23,014.08**	**$ 3,625.00**

Description	Calculation	Cost	In-kind
	NORTH CAROLINA		
Personnel (a)			
Interviewers	Staff hours (50 assignments total: 85% w/ 1-hour buffer, 15% w/o buffer) w/ 2 hours of travel time per assignment @ $18/hour)	$ 7,965.00	$ -
Data entry clerk	Staff hours (50 assignments total, 0.5 hours per assignment for review/entry * $18/hour)	$ 450.00	$ -
Supervisor	General staff management for 37 weeks	$ -	$ 2,000.00
Fringe (b)			
Interviewer (seasonal)	Fringe = 0.10 * personnel (a)	$ 796.50	$ -
Data entry clerk (FTE)	Fringe = 0.53 * personnel (a)	$ 238.50	$ -
Supervisor	Fringe = 0.53 * personnel (a)	$ -	$ 1,060.00
Travel (c)			
Vehicle Mileage	$0.67/mile (50 assignments @ 50 miles average roundtrip)	$ 2,010.00	$ -
Other expenses	Parking, tolls, etc.	$ 100.00	$ -
Supplies (d)			
Printing + Angler supplies	Printing paper (50 assignments w/ avg anglers per assignment: $1.00 per sheet of write-in-rain paper, $0.50 per pencil, $1.00 per measuring tape)	$ 4,375.00	$ -
Other (e)			
Other	Pre-paid mailing for catch cards (50 assignments w/ avg anglers per assignment: $0.80 per pre-paid expense)	$ 1,400.00	$ -
	Incentives	$ 600.00	
Totals (c+d+e)		$ 5,935.00	$ -
Total direct charges			
Indirect charges (f)	Indirect (10.00% oof TDC)	$ 1,785.00	$ 518.00
Sum of direct and indirect		**$ 19,720.00**	**$ 3,578.00**

Description	Calculation	Cost	In-kind
	SOUTH CAROLINA		
Personnel (a)			
Interviewers	50 assignments, 100% w/ 1-hour buffer, 2 hours of travel time per assignment = 2 months of FI	$ 7,603.43	$ -
Supervisor	scheduling/printing/data entry/etc. (1 month salary *.46 fringe)	$ -	$ 5,690.42
Fringe (b)			
Interviewer (seasonal)	Fringe = 0.46* personnel (a)	$ 3,497.58	$ -
Supervisor	Fringe = 0.46* personnel (a)	$ -	$ 2,617.59
Travel (c)			
Vehicle Mileage	$0.67/mile (50 assignments @ 50 miles average roundtrip)	$ 1,675.00	$ -
Supplies (d)			
Printing + Angler supplies	Printing paper (50 assignments w/ avg anglers per assignment: $1.00 per sheet of write-in-rain paper, $0.50 per pencil, $1.00 per measuring tape)	$ 3,750.00	$ -
Other (e)			
Other	Pre-paid mailing for catch cards (50 assignments w/ avg anglers per assignment: $0.80 per pre-paid expense)	$ 1,200.00	$ -
Totals (c+d+e)		$ 4,450.00	$ -
Total direct charges			
Indirect charges (f)	Indirect (10.00% of TDC)	$ 1,110.10	$ 830.80
Sum of direct and indirect		**$ 18,836.11**	**$ 9,138.81**

Description	Calculation	Cost	In-kind
	GEORGIA		
Personnel (a)			
Interviewers (PTE)	Staff hours (30 assignments total : 8h (inc 1-2 hr buffer) plus 2 hours of travel time per assignment)	$ 4,500.00	$ -
Interviewers (FTE)	Staff hours (20 assignments total: 8h (inc 1-2 hr buffer) plus 2 hours of travel time per assignment)	$ 3,960.00	$ -
Data entry clerk	Staff hours (50 assignments total, 0.5 hours per assignment for review/entry)	$ 495.00	$ -
Manager	Staff hours (16 hours)	$ -	$ 430.90
Fringe (b)			
Interviewers (PTE)	Fringe = 0.0145* personnel (a)	$ 65.25	$ -
Interviewers (FTE)	Fringe = 0.68114* personnel (a)	$ 3,034.48	$ -
		$ -	$ 293.50
Travel (c)			
Vehicle Mileage	$0.67/mile (50 assignments @ 70 miles average roundtrip)	$ 2,345.00	$ -
Other expenses	Parking, tolls, etc.	$ 500.00	$ -
Supplies (d)			
Printing + Angler supplies	Printing paper (50 assignments w/ avg anglers per assignment: $1.00 per sheet of write-in-rain paper, $0.50 per pencil, $1.00 per measuring tape)	$ 3,750.00	$ -
Other (e)			
Other	Pre-paid mailing for catch cards (50 assignments w/ avg anglers per assignment: $0.80 per pre-paid expense)	$ 1,200.00	$ -
Totals (c+d+e)		$ 5,620.00	$ -
Total direct charges			
Indirect charges (f)	Indirect (10.00% of TDC)	$ -	$ -
Sum of direct and indirect		**$ 19,849.73**	**$ 724.40**

Description	Calculation	Cost	In-kind
	ASMFC		
Personnel (a)			
Data coordinator(s)	In-kind staff hours (520 assignments coastal total: 0.25 hours per assignment for review)	$ -	$ 6,500.00
Fringe (b)			
Interviewers (PTE)	Fringe = 0.35* personnel (a)	$ -	$ 2,275.00
Travel (c)			
-	-	$ -	$ -
Supplies (d)			
Printing	Printing paper catch cards (525 assignment w/ avg anglers per assignment) - Does not include postage cost	$ -	$ 5,000.00
Other (e)			
Other	In-kind staff hours (DIA, database, APEX programming) for Catch-Card APAIS assignments	$ -	$ 15,000.00
Totals (c+d+e)		$ -	$ 20,000.00
Total direct charges			
Indirect charges (f)	Indirect (8.00% of personnel (a))	$ -	$ 520.00
Sum of direct and indirect		**$ -**	**$ 29,295.00**
**DIA Updates will require contractor development time and centralized printing of catch cards, covered under the existing MRIP budget.*			
	Grand Total:	**Cost**	**In-kind**
		$ 202,486.83	**$ 61,867.79**

Budget Narrative

a. **Personnel ($90,412.75 Requested; $27,876.12 In-Kind)**: Part-time, full-time, and sometimes as combination of employee types will be utilized to cover assignment completion. For the most part, full-time staff will be used to convert catch cards into electronic data via the ATA. Both assignment completion and data entry are estimates based on the number of assignments and therefore number of interviews/catch cards. In-kind contributions cover supervisor time to cover project logistics (e.g., scheduling, QC and data review, etc.).

b. **Fringe ($20,138.18 Requested; $9,000.87 In-Kind)**: Fringe for part-time and full-time staff are associated with personnel funds. Requested funds are to cover assignment completion and data entry while in-kind funds are associated with supervisor time.

c. **Travel ($22,714.25 Requested; $0 In-Kind)**: Coast-wide mileage cost of $0.67/mile for the individual state number of assignments. Most states also an estimated amount to cover parking and tolls.

d. **Supplies ($37,000.00 Requested; $5,000.00 In-Kind)**: Paper for catch cards (either by page or by box of write-in-rain paper), pencils and measuring tapes to collect released catch information and lengths. Estimates were based on the average number of anglers expected to encounter per assignment. The ASMFC portion of in-kind contribution is for the centralized printing of coastal catch cards.

e. **Other ($14,840.00 Requested; $15,000.00 In-Kind)**: Pre-paid postage per estimates number of catch cards makes up the majority of requested funds. Some states are also considering outreach materials. In-kind funds cover development of database structures and updates to the existing dockside application via Harbor Light Software, used to conduct the APAIS to link catch cards to the APAIS. The latter was an estimate based on the hours required to develop, QC, and distribute application updates, both for ACCSP and Harbor Light Software staff.

f. **Indirect ($17,381.65 Requested; $4,990.80 In-Kind)**: Indirect rates range from 0 to ~37% for state partners and ASMFC/ACCSP. Percentages are mostly applied to only personnel and fringe but sometimes also to the travel, supplies, and other expenses – this is dependent on state policies.

Summary of Proposal for Ranking

Proposal Type: New

Primary Program Priority:

Catch and Effort (100%)

- Proposal will provide data to investigate differences in angler responses using pre-trip recreational catch card versus current APAIS data collected after a fishing trip is completed. Data can be used to analyze if there are differences in species diversity or number of fish reported (i.e., rounding bias) when using a pre-trip catch card.
- New data source for discard lengths and average depth fished, using stratified random probability-based sampling design, that would be informative for calculating discard mortality for private boat fleet or shore anglers.

Data Delivery Plan

- Completed catch cards will be manually keyed into a section on the ACCSP ATA on weekly basis. Completed interviews conducted as part of overdrawn assignments will be submitted and checked for errors using same timeline as APAIS assignment data. Data will be available for NOAA Fisheries to evaluate potential use in MRIP estimates no later than January 2026.

Project Quality Factors:

Partners

- **Multi-Partner/Regional impact including broad applications** – Catch data will be collected in 2-3 representative states in each of the three subregions on the Atlantic Coast (North, Mid, and South) for the pilot project. There has been broad support for the project from the ACCSP Recreational Technical Committee, including state partners from Maine through Florida, regional Councils, NOAA Fisheries, US Fish and Wildlife Service, and ASMFC members. All species will have released fish numbers and a broad, coastal list of managed species will have released lengths collected.

Funding

- **Contains funding transition plan** – This proposal contains a transition to funding plan on p.10.
- **In-kind contribution** – 30.6% of this project is funded by the ASMFC, state, and NOAA Fisheries cooperative agreement for the conduct of the MRIP.

Data

- **Improvement in data quality/quantity/timeliness** – Recreational released catch cards provide a completely unique data stream into an already existing data set, as a part of the MRIP APAIS. Since the catch cards are collected as a part of the APAIS, the overdrawn catch card assignments follow the same timeline of weekly submission to the ACCSP, potential delivery to NOAA Fisheries every month as well. Since the APAIS relies on recall, the pre-trip catch cards offer the ability to work around recall bias, improving overall quality of the APAIS if implemented more broadly.

- **Impact on stock assessment** – The list of 14 species and number of assignments per state/subregion were chosen to help bolster species stock assessments which use recreational length information, with the input from state and

Commission stock assessment scientists. The ability to collect private/rental and shore discard information creates additional data sources for the stock assessment process which has traditionally relied heavily on headboats only. At a minimum, this project will help stock assessments by increasing the overall sample sizes of discard lengths of managed species.

Appendix A: Catch Card Examples

Marine Angler Released Catch Card (MARC)

Only ONE angler's released fish per card and for this trip only.

Control Number: 12345

Trip Information

Fishing Mode	Targeted Species	Average Depth Fished (ft)
☐ Boat ☐ Shore		

Distance from Shore

- ☐ Inland
- ☐ 3 Miles or less (ocean)
- ☐ 3 Miles or more (ocean)

Trip End Time (return to shore)

Hours Fished (nearest 1/2 hour)

I did not release any fish today ☐

Released Catch: For **ALL** fish released: Record the species name and track the number released alive or dead using tally marks below.

Species	# Released Alive	# Released Dead
Spot (example)	𝍸 ||	𝍸

Length of Fish Released (Inches)

(Total length rounded up to the nearest 1/4 inch)

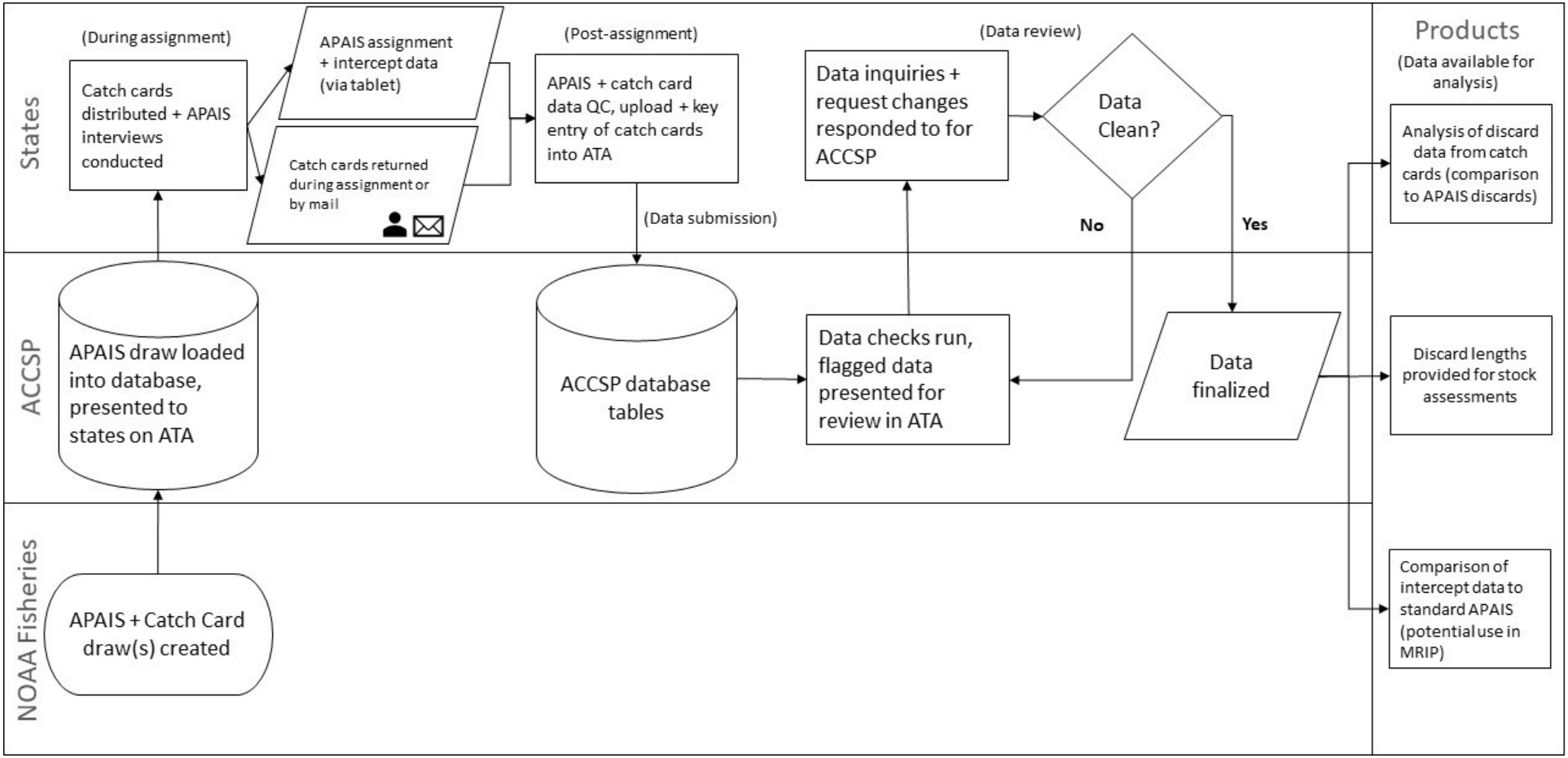
Species	Total Length (1/4 Inch)	Species	Total Length (1/4 Inch)

For detailed instructions on how to fill out this card, please scan QR code.

List of priority species for lengths:

Black Sea Bass	Weakfish	Spotted Seatrout
Bluefish	Cobia	Gray Triggerfish
Haddock	Red Drum	Red Porgy
Spanish Mackerel	Tautog	Vermilion Snapper
Striped Bass	Summer Flounder	

Appendix B: Data Flow Diagram



Appendix C: Determination of the Species of Interest and Calculation of the Number of Sampling Assignments Needed for the Released Catch Card Project

Determination of the Species of Interest for the Released Catch Card Project

Given the number of species an angler may encounter on the water and could potentially provide length information on, the Discards Subcommittee felt that it was important to focus on the species that would most benefit from the collection of discard length data. While information on non-managed species may be interesting, the subcommittee wanted to make sure the length data collected would make the most impact on species being managed and assessed by the various entities along the Atlantic coast.

To do this, a Marine Recreational Information Program (MRIP) query was initially done to identify species sampled on the Atlantic coast which had positive harvest values and where live releases (B2s) exceeded harvest (A+B1). Due to the high levels of discards, these species were thought to be ones where additional discard length information would likely be useful. Additional prioritization was chosen for those species with PSEs < 50% as those were assumed to be species that were more frequently encountered by the MRIP surveys. This analysis, however, still resulted in over 40 species being potentially identified as being of management importance.

To further refine this analysis, additional outreach was done to staff with the Atlantic States Marine Fisheries Commission (ASMFC) as well as the New England, Mid-Atlantic, and South Atlantic Fisheries Management Councils. Each was asked about the species they manage, specifically whether the species is primarily a recreationally caught species and whether or not the species is assessed using a length- or age-based assessment which would benefit from additional discard length data. Based on these answers, they were asked to select the ones that should be prioritized for the released catch card project.

The Discards Subcommittee reviewed the list of species provided in the initial analysis as well as submitted by the Commission and Councils. We first selected those that spanned multiple regions along the coast. Additional species were also selected that were regionally important (e.g., haddock in the North Atlantic, red drum in the South Atlantic). The South Atlantic species were further reduced so as not to overlap with those species that are already a focus of the South Atlantic Fishery Management Council's Release app. In total, fourteen species were selected as the focus of this project.

Calculation of the Number of Sampling Assignments Needed for the Released Catch Card Project

After the species of interest for the project were determined, a couple of members from the ASMFC Assessment Science Committee were consulted on how many discard lengths would be needed for the data to be useful for assessment and management. Based on analysis conducted for the bluefish stock assessment, a sample size of approximately 30 sample lengths was suggested as a minimum. Specific assessment needs will vary by species, depending on the geographic scale of the assessment (e.g., regional vs. coastwide) and the time scale used for the length composition data (seasonal vs. annual), so a goal was set to collect 60 lengths per year to allow for the potential development of biannual length composition data. Within an assessment, the effective sample size, or number of sampling events, is calculated for length data. This is done to account for the individual fish lengths likely not being collected independently of each other, particularly given angler behavior and the possibility of an angler fishing on a single school of fish which are likely similar in size. While this analysis did estimate the number of catch cards we expected to be returned, which would equate to the number of angler trips we would expect to get data back from, the subcommittee decided to focus on the length target, rather than a catch card target, in the pilot as it was more easily achievable to reach the 60-length goal.

Initial number of sampling assignments were set at 50, 100, 150, and 200 assignments. However, from running the Access Point Angler Intercept Survey (APAIS), we know that not all assignments will have anglers when the field interviewers are there. Based on 2022 data from the ACCSP Annual Report to MRIP, we estimated that approximately 36% of our assignments will be 0-intercept assignments coastwide. After accounting for that, we then had to calculate how many catch cards we may be able to hand out during APAIS assignments. While the APAIS design is focused on the time intervals when anglers will be completing their trips, we instead needed to determine when they usually leave on their private/rental boat trips. In the public MRIP trip dataset, there are fields for the time the intercept was collected as well as the number of hours the anglers were away from the dock. Using 2022 trip data from Maine to Florida, private/rental boat mode only, we calculated the one-hour time intervals that people leave for their fishing trips along the Atlantic coast and demonstrated that most trips (78%) leave in the 6 am-12 pm interval (Table 1). However, even sampling in the 8 am-2 pm interval would allow us to still intercept approximately 60% of the trips leaving in a day. These trips start data could also be aggregated to align with the APAIS sampling intervals and used to estimate the average number of eligible anglers we anticipate leaving on their trips per assignment (Table 2). Similar to before, we anticipate that we'll intercept the most anglers leaving for their trips during the 8 am-2 pm interval and the fewest during the 2 pm-8 pm interval (of the daytime intervals). As this project will mainly be conducted during the daytime intervals, an average of 5.24 anglers/assignment was calculated over the three intervals and was assumed to be representative of most assignments that would be conducted for the project.

Table 1. Frequency of raw APAIS fishing trips beginning within assignment intervals.

Interval	# Anglers Starting trip
00-59	29
100-159	27
200-259	75
300-359	163
400-459	531
500-559	1616
600-659	3448
700-759	4615
800-859	4839
900-959	3950
1000-1059	3280
1100-1159	2337
1200-1259	1688
1300-1359	1019
1400-1459	486
1500-1559	242
1600-1659	157
1700-1759	92
1800-1859	13
1900-1959	6
2000-2059	3
2100-2159	5
2200-2259	0
2300-2359	0

Total	28744
600-1200	22469
600-1200	78%
800-1400	17113
800-1400	60%
1100-1700	5929
1100-1700	21%
1400-2000	996
1400-2000	3.5%

Table 2. Number of raw APAIS fishing trips (interviews + eligible) per APAIS assignment with trips starting within 0800-1400, 1100-1700, and 1400-2000 intervals

800-1400		1100-1700		1400-2000	
AVG	5.11	AVG	3.08	AVG	2.29
MAX	45	MAX	30	MAX	13
SUM	17131	SUM	5931	SUM	996
ALL ELIG	25696.5	ALL ELIG	8896.5	ALL ELIG	1494
EST AVG ALL ELIG	7.67	EST AVG ALL ELIG	4.62	EST AVG ALL ELIG	3.44

Once we had an estimate of the approximate number of catch cards we may hand out to anglers during an assignment, we then had to make an assumption on how many catch cards we may have filled out and returned to us. Based on previous experience by Connecticut with their catch card project, we estimated this to be 25%. Since about 30% of private/rental boat anglers intercepted in 2021 and 2022 didn't report releasing any species to the APAIS field interviewers, that leaves around 45% of anglers who we assume either don't record the data or submit the card.

Since the card asks anglers to tally the total number of releases for all species but only record lengths for the fourteen prioritized species, it's possible that some of the cards returned will only have tally marks and no lengths due to the species caught. To determine how many of the returned cards may have lengths recorded for species of interest, the remaining calculations were done per species for each Atlantic coast subregion, as defined by MRIP. First, the percentage of angler intercepts that said they released the species of interest was calculated (Table 3). This gave us an estimate of the number of cards that may be returned with lengths for that particular species. Second, we calculated the average number of fish released by an individual angler for each prioritized species (Table 4). This gave us an estimate of approximately how many lengths we may collect from an angler who caught and released that species. By multiplying the number of cards, we expected back for each of the fourteen species by the average number of fish released for each species, we were able to estimate how many fish lengths we may be able to receive for each species in each subregion (Tables 5-7). In these tables, green cells indicate assignment totals which we estimate will provide 60 length samples for that region, yellow cells indicate assignment totals where we estimate we will provide 30-60 length samples for that region, and red cells indicate assignment totals where we estimate fewer than 30 length samples for that region. Black cells indicate species we don't expect to collect any sample lengths.

Based on these analyses, the various regions decided on a minimum number of overdrawn sample assignments to complete for their region. It is estimated to take 130-245 overdrawn assignments to reach the 60-length sample

minimum size for the most commonly encountered species in each region. There will be 245 overdrawn catch card assignments in the North, 130 in the Mid, and 250 in the South Atlantic.

Table 3. The percentage of anglers who release one of the 14 species of interest. Note: Some 0% values are rounded up and represent a very small percentage.

Species	North Atlantic	Mid-Atlantic	South Atlantic
Black Sea Bass	35%	25%	16%
Bluefish	8%	5%	7%
Haddock	3%	0%	0%
Spanish Mackerel	0%	1%	3%
Striped Bass	38%	17%	2%
Summer Flounder	11%	31%	0%
Tautog	11%	7%	0%
Weakfish	0%	2%	2%
Cobia	0%	1%	1%
Red Drum	0%	2%	19%
Spotted Sea Trout	0%	3%	22%
Gray Triggerfish	0%	0%	0%
Red Porgy	0%	0%	0%
Vermillion Snapper	0%	0%	1%

Table 4. The average number of releases per trip of the 14 species of interest.

Species	North Atlantic	Mid-Atlantic	South Atlantic
Black Sea Bass	5.6	6.3	5.2
Bluefish	2.7	3.1	2.9
Haddock	4.8	0.0	0.0
Spanish Mackerel	1.3	2.9	3.2
Striped Bass	4.9	4.6	2.9
Summer Flounder	3.0	4.1	2.0
Tautog	8.8	8.0	1.2
Weakfish	2.7	2.6	5.4
Cobia	0.0	1.7	1.5
Red Drum	0.0	3.2	3.1
Spotted Sea Trout	0.0	6.0	4.5
Gray Triggerfish	1.5	2.7	2.3
Red Porgy	0.0	0.0	4.4
Vermillion Snapper	0.0	0.0	4.2

Table 5. Estimated Number of Lengths Collected by Species of Interest in the North Atlantic region.

Time Slot	Number of Add On Assignments	Black Sea Bass	Bluefish	Haddock	Spanish Mackerel	Striped Bass	Summer Flounder	Tautog	Weakfish	Cobia	Red Drum	Spotted Sea Trout	Gray Triggerfish	Red Porgy	Vermilion Snapper
Avg over All Time Slots	50	82.1	9.2	5.2		77.2	14.1	40.3							
Avg over All Time Slots	100	164.2	18.3	10.4		154.4	28.2	80.6							
Avg over All Time Slots	150	246.3	27.5	15.6		231.6	42.2	120.9							
Avg over All Time Slots	200	328.5	36.7	20.8		308.8	56.3	161.2							
Avg over All Time Slots	300	492.7	55.0	31.2		463.2	84.5	241.8							

Table 6. Estimated Number of Lengths Collected by Species of Interest in the Mid-Atlantic region.

Time Slot	Number of Add On Assignments	Black Sea Bass	Bluefish	Haddock	Spanish Mackerel	Striped Bass	Summer Flounder	Tautog	Weakfish	Cobia	Red Drum	Spotted Sea Trout	Gray Triggerfish	Red Porgy	Vermilion Snapper
Avg over All Time Slots	50	64.8	7.0			32.2	52.3	23.8	2.6		2.5	7.2			
Avg over All Time Slots	100	129.6	14.1		1.5	64.5	104.6	47.7	5.2		5.1	14.5			
Avg over All Time Slots	150	194.3	21.1		2.3	96.7	157.0	71.5	7.8	1.3	7.6	21.7			
Avg over All Time Slots	200	259.1	28.1		3.1	129.0	209.3	95.4	10.4	1.8	10.2	28.9			
Avg over All Time Slots	300	388.7	42.2		4.6	193.5	313.9	143.1	15.6	2.7	15.3	43.4			

Table 7. Estimated Minimum Number of Lengths Collected by Species of Interest in the South Atlantic region.

Time Slot	Number of Add On Assignments	Black Sea Bass	Bluefish	Haddock	Spanish Mackerel	Striped Bass	Summer Flounder	Tautog	Weakfish	Cobia	Red Drum	Spotted Sea Trout	Gray Trigger fish	Red Porgy	Vermilion Snapper
Avg over All Time Slots	50	34.0	8.8		4.3	1.9			4.8		24.0	42.3			1.4
Avg over All Time Slots	100	68.1	17.5		8.5	3.8			9.6		48.0	84.6			2.7
Avg over All Time Slots	150	102.1	26.3		12.8	5.7			14.4	1.2	72.0	126.9			4.1
Avg over All Time Slots	200	136.2	35.0		17.0	7.6			19.2	1.6	96.1	169.2			5.4
Avg over All Time Slots	300	204.2	52.6		25.6	11.4			28.8	2.4	144.1	253.9			8.1

Appendix D: Curriculum Vitae for Principal Investigators

Dawn M. Franco (912) 266-4156
dawn.franco@dnr.ga.gov 177 Brooksdale Rd, Brunswick, GA 31523

Education

Savannah State University — Savannah, GA
Master of Science in Marine Sciences — May 2014

Old Dominion University — Norfolk, VA
Bachelor of Science — May 2002

Work experience

Georgia Department of Natural Resources, Coastal Resources Division
Marine Biologist — August 2014 to present

- Coordinate and manage the Access Point Angler Intercept Survey (APAIS) and For Hire Telephone Survey (FHTS) for Georgia within the Marine Recreational Information Program (MRIP)
- Georgia representative on several ASMFC committees including the Recreational Technical Committee, Atlantic Croaker Technical committee, Spot Plan Review Team, Electronic Monitoring Standards Working Group, and NOAA Transition Team
- Coordinate Red Snapper special data collection efforts during open seasons.
- Participation in other fisheries survey activities including otter trawl, eel trap, seine-net, gill-net, trammel-net, long-line, hook and line and habitat restoration
- Provide commercial and recreational data for, and completion of, ASMFC, SAFMC and SFR reports
- Panel member and data provider for Stock Assessment Data and Review (SEDAR) and ASMFC Stock Assessments
- Public liaison presenting fisheries dependent data results to educators, students, or general public
- Certified diver with GADNR CRD Dive Team

Georgia Department of Natural Resources, Coastal Resources Division
Natural Resources Technician II — November 2007-August 2014

- Coordinate and execute Georgia's participation in the Access Point Angler Intercept Survey (APAIS) within the Marine Recreational Information Program (MRIP)
- Participation other fisheries survey activities including Otter trawl, seine-net, gill-net, trammel-net, long-line, hook and line surveys and habitat restoration
- Public liaison for GADNR CRD and therefore knowledgeable of regulatory information that impacts the public
- Data entry and database management
- Presentation of fisheries dependent data to educators
- GADNR representative for Atlantic croaker technical committee (TC) and spot plan review team (PRT)
- Diver in training for GADNR CRD Dive Team
- Collection, processing, and ageing of Atlantic croaker *Micropogonias undulatus*

Georgia Department of Natural Resources, Coastal Resources Division
Marine Technician I April 2007-November 2007

- Participated in the National Marine Fisheries Service (NMFS) Marine Recreational Fisheries Statistics Survey (MRFSS)
- Participated in fisheries independent research, monitoring, and survey field sampling efforts

Technology, Skills and Certifications

- Proficient use of Microsoft Office (Word, Excel, Outlook, PowerPoint, and Access),
- Familiar with ArcGIS, SQL, Oracle Databases, R, SAS, SPLUS, and SPSS
- Seamanship skills onboard small and large vessels, completed Boat U.S. Boating Safety Course for Georgia
- Identification, collection and processing biological samples of marine organisms commonly found in the South Atlantic Region (e.g., operculum, scales, otoliths, vertebrae, gonads, and fin clips)
- SCUBA, Nitrox, and DAN oxygen provider certified

Angela Giuliano (410) 260-8284
angela.giuliano@maryland.gov 580 Taylor Avenue, B-2, Annapolis, MD 21401

Education

University of Michigan, Ann Arbor, Michigan 2011
School of Natural Resources and Environment
M.S. Aquatic Sciences: Resource Ecology and Management

St. Mary's College of Maryland, St. Mary's City, Maryland 2005
B.A. Biology, *Magna cum laude*
Concentration in Environmental Studies

Research and Work Experience

Research Statistician IV, Analysis and Assessment Program, Fishing and Boating Services, Maryland Department of Natural Resources, *February 2020-present*

Research Statistician III, Analysis and Assessment Program, Fishing and Boating Services, Maryland Department of Natural Resources, *January 1, 2016-February 11, 2020*

Research Statistician II, Analysis and Assessment Program, Fishing and Boating Services, Maryland Department of Natural Resources, *April 2014-December 31, 2016*

- Conduct data analysis on various state and coastwide datasets for species managed in Maryland, including those managed through the Atlantic States Marine Fisheries Commission (ASMFC). Data are analyzed using a variety of techniques from simple statistical analyses to more complex models, such as population dynamics models and fish tagging models. Write reports summarizing the results, present the results both internally and externally, and provide state and coastal fisheries management advice for both Maryland and other states through the ASMFC.
- Review new analysis methods based on literature and write new analysis codes as needed.
- Serve as the primary contact regarding recreational fishing surveys and data collection in Maryland tidal waters and serve as Maryland's representation to the ACCSP Recreational Technical Committee (current Chair).
- Serve as a consultant for biologists within the Fishing and Boating Services and periodically organize and lead staff trainings on data analysis.
- Have participated on ASMFC fishery management plan development teams for striped bass and cobia, including the analysis of bag and size limits and season analysis.
- Member of the ASMFC Red Drum Stock Assessment Subcommittee, Striped Bass Tagging Subcommittee, Weakfish Stock Assessment Subcommittee, Cobia Technical Committee (current Chair), and Cobia Plan Review Team. Also, a member of the Maryland Oyster Stock Assessment Committee.

Natural Resources Biologist II, Striped Bass Program, Fisheries Service, Maryland Department of Natural Resources, *September 2008-April 2014*

- Participated in the collection of biological data on striped bass in Maryland including a spawning stock gill net survey, juvenile seine survey, sampling pound net catches, and monitoring of the commercial and recreational fisheries in support of striped bass stock assessments.
- Supervised the trophy creel survey, sampling charter boat catches and interviewing recreational anglers with supervision over one seasonal biologist.
- Participated in the tagging of striped bass, using tagging models such as Program MARK and the Instantaneous Rates Catch and Release (IRCR) model, and serving as a representative from Maryland on the Atlantic States Marine Fisheries Commission (ASMFC) Striped Bass Tagging Subcommittee.
- Provided technical support to the striped bass program, including GIS mapping, statistical analysis of data, evaluation of the gill net selectivity model, and report writing.

Natural Resources Technician IV, Monitoring and Non-Tidal Assessment, Maryland Department of Natural Resources, *February-September 2008*

- Assisted with sampling streams across Maryland as part of the Maryland Biological Stream Survey. Data collected included water chemistry, physical habitat, and fish, macroinvertebrate, and herpetofauna data.
- Other duties included data entry, calibration of water quality sondes, and working with ArcGIS.

Aquatic Ecologist, CILER Summer Fellowship at NOAA Great Lakes Environmental Research Lab (GLERL), *May-August 2007*

Worked on a project with Dr. Stuart Ludsin and George Leshkevich to examine the influence of river plumes in the western basin of Lake Erie to the survival of larval yellow perch to recruitment. Duties included: using ArcGIS to determine the area covered by plumes between April and June based on satellite imagery; beginning work to determine the properties of the plumes using satellite and CTD data; processing water samples for water chemistry analysis and analyzing chlorophyll, suspended matter, and phosphorus concentrations; and some field work aboard the R/V Laurentian collecting zooplankton and larval fish as well as preserving stomach contents of predators.

Research Assistant, Institute for Fisheries Research and the University of Michigan, *May-August 2006*

GIS project mapping yellow perch catch in Lake Erie and lake trout in Lake Superior using data from the agencies along the lakes. Data manipulated in Microsoft Excel and Access for use in ArcGIS. Date were mapped to look for spatial patterns in catch by catch method, year, season, and age class and correlated with habitat data.

Computer and Statistical Skills

Microsoft Office Programs (Word, Excel, PowerPoint, Access), ArcGIS, Statistical Package for the Social Sciences (SPSS), R, SAS, AD Model Builder, Program MARK, Stock Synthesis 3, National Fisheries Toolbox programs

Awards

2021 Maryland Department of Natural Resources Fishing and Boating Services Team of the Year (Access Point Angler Intercept Survey Team)

2017 Maryland Department of Natural Resources Fishing and Boating Services Employee of the Year

Teaching Experience

Graduate Student Instructor, NRE 409: Ecology of Fishes, School of Natural Resources and Environment, University of Michigan. Winter 2007.

Graduate Student Instructor, CHEM 125/126: General Chemistry Lab, Chemistry Department, University of Michigan. Fall 2006.

Teaching Assistant for Ecology and Evolution, St. Mary's College of Maryland. Spring 2004, Spring 2005.

Teaching Assistant for Principles of Biology I, St. Mary's College of Maryland. Fall 2002.

Presentations

Giuliano, A.M. Climate Effects on the Timing of Maryland Striped Bass Spawning Runs. 151st Annual Meeting of the American Fisheries Society, Baltimore, MD, November 6-10, 2021.

Giuliano, A.M., E.S. Rutherford, C. Riseng, M. Luttenton, and M.J. Wiley. Effects of Zebra Mussels on a Lake Michigan Tributary Fish Community. 137th Annual Meeting of the American Fisheries Society, San Francisco, California, September 2-6, 2007.

Publications

Giuliano, A. 2023. Climate effects on the timing of Maryland Striped Bass spawning runs. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science*, 15, e10274. https://doi.org/10.1002/mcf2.10274

Brown, S. C., Giuliano, A. M., & Versak, B. A. 2024. Female age at maturity and fecundity in Atlantic Striped Bass. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science*, 16, e10280. https://doi.org/10.1002/mcf2.10280

SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

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Carolyn N. Belcher, Ph.D., Chair | Trish Murphey, Vice Chair
John Carmichael, Executive Director

August 19, 2024

Atlantic Coastal Cooperative Statistics Program
1050 N. Highland St. Ste. 200 A-N
Arlington, VA 22201

We are pleased to submit the proposal titled," FY25: Enhancing Recruitment & Retention for the *SAFMC Release* Citizen Science Project". The proposal objectives are summarized below:

- Continue data collection through the *SAFMC Release* citizen science project on released shallow-water grouper (Black, Gag, Red, Scamp, Yellowfin and Yellowmouth Groupers; Red Hind; Rock Hind; Coney and Graysby) and Red Snapper in the South Atlantic
- Use license data from the National Saltwater Angler Registry (NSAR) to recruit private recreational fishermen for the *SAFMC Release* citizen science project
- Continue opportunistic strategies to recruit fishermen for the *SAFMC Release* citizen science project
- Enhance *SAFMC Release*'s participant retention and reactivation within the project

The proposed work will help address key research needs on released shallow water grouper and Red Snapper – characterizing the size of released fish and helping to better understand how many released fish survive. It incorporates use of the NSAR as a recruitment tool - adding a statistical design element to recruit project participants. Data collection is done via the SciFish platform, using ACCSP data standards and making the data more easily accessible for assessment and management.

This proposal is being submitted as a new project. It builds on work from the FY20-FY22 ACCSP funded SciFish projects, but several objectives have changed. Thus, we felt it was more appropriate for submission as a new proposal as opposed to a maintenance proposal.

This proposal has been revised based on the reviewers' feedback. The requested funding amount in the cover sheet is the amount requested from ACCSP. The total proposal cost, which includes in-kind funding, is available in the budget. In this submission, the bold text indicates sections that help with the ranking process and yellow highlighted text indicates changes from our initial submission.

Please let us know if you have any questions or would like any additional information.

Best,

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South Atlantic Fishery Management Council
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Lauren.Dolinger.Few@noaa.gov

Applicant Names:	South Atlantic Fishery Management Council (SAFMC) NOAA Fisheries' Southeast Fisheries Science Center (SEFSC) NOAA Fisheries' Office of Science & Technology (S & T)
Project Title:	FY25: Enhancing Recruitment & Retention for the *SAFMC Release* Citizen Science Project
Project Consultants:	South Carolina Department of Natural Resources (SCDNR) & Georgia Department of Natural Resources (GADNR)
Project Type:	New
Requested Award Amount:	$137,356
Requested Reward Period:	One year upon receipt of funds
Submission Date:	August 19, 2024

FY25 Atlantic Coastal Cooperative Statistics Program (ACCSP) Proposal for the SAFMC, NOAA SEFSC and NOAA S & T

OBJECTIVES:

- Continue data collection through the *SAFMC Release* citizen science project on released shallow-water grouper (Black, Gag, Red, Scamp, Yellowfin and Yellowmouth Groupers; Red Hind; Rock Hind; Coney and Graysby) and Red Snapper in the South Atlantic
- Use license data from the National Saltwater Angler Registry (NSAR) to recruit private recreational fishermen for the *SAFMC Release* citizen science project
- Continue opportunistic strategies to recruit fishermen for the *SAFMC Release* citizen science project
- Enhance *SAFMC Release*'s participant retention and reactivation within the project

NEED:

Fishery managers often consider the biology and sustainability of a fish stock in concert with socio-economic values of the resource and fishery when developing fishery management plans. Despite substantial efforts, perennial data gaps still exist. If addressed, new data could be useful in developing improved stock assessment models and associated management considerations.

Citizen science is growing in the United States and other countries (McKinley et al. 2017) and has been used for research, management, policy, and public engagement (Poisson et al. 2020). **A growing number of publications has shown that diverse citizen science projects can produce data on par with traditional scientific data when properly designed, implemented, and evaluated (McKinley et al. 2017, Kosmala et al. 2016, Freitag et al. 2016). Data that are self-reported by fishermen show increasing promise to address multiple data limitations (Johnston et al. 2021; Oremland et al. 2022).** Indeed, citizen science approaches are currently being investigated to address state and federal management needs including catch at size, shark depredation, biological data, and post release fishing mortality. Examples of this can be seen in recent efforts by the South Atlantic Fishery Management Council's (SAFMC) *SAFMC Release* project, North Carolina Division of Marine Fisheries' Catch U Later project, Massachusetts Division of Marine Fisheries' Striped Bass Citizen Science Project, and Florida Atlantic University's Shark Depredation Grant. Additionally, **ACCSP recognized the potential of citizen science to fill data gaps and developed the SciFish platform to support, develop, and administer this type of research.**

Discard mortality has been an increasing contributor to the total mortality experienced by many stocks and is a major source of mortality for Red Snapper as well as other species in the snapper-grouper complex (SEDAR 73, SEDAR 2021a). Importantly, released fish are not available for sampling by typical dockside monitoring programs. In the South Atlantic, observer coverage ranges from limited in commercial and for-hire fisheries to non-existent in private recreational fisheries. As such, there is often no or limited information available to characterize the size and fate of these losses for stock assessment modeling. **Improving information on released fish is commonly highlighted in stock assessment research recommendations and is often a top priority in agency research plans. This project will focus on characterizing the size distribution of shallow-water grouper and Red Snapper releases in the South Atlantic region and gathering information to help understand how**

many of these releases survive. In the ACCSP request for 2025 proposals, improved recreational fishery release data as well as biological sampling for recreational fisheries separate from MRIP are the #3 and #5 recreational priorities, respectively. Additionally, Red Snapper, Gag Grouper, and Red Grouper are in the top 25% of the biological priority matrix, and the snapper grouper hook and line fishery is in the top 25% of the bycatch matrix. Discard characterization and information on barotrauma mitigation practices are priorities in the South Atlantic Fishery Management Council's (SAFMC) Research and Monitoring Plan for 2023-2027 and for the SAFMC's Citizen Science Program.

The *SAFMC Release* project was developed through the SAFMC's Citizen Science Program. It provides a streamlined approach for fishermen to provide a photograph of released fish along with details such as length, release location and depth caught, condition, and use of barotrauma mitigation techniques. The project focuses on collecting data on the size of released fish and information that helps characterize how many released fish survive. *SAFMC Release* began as a pilot project in June 2019 partnering with recreational, for-hire, and commercial fishermen to gather information on released Scamp Grouper via the *SAFMC Release* mobile application. In August 2021, *SAFMC Release* transitioned to the ACCSP's SciFish mobile application/platform and expanded to collect information on all shallow-water grouper species. In April 2022, Red Snapper was added to the project.

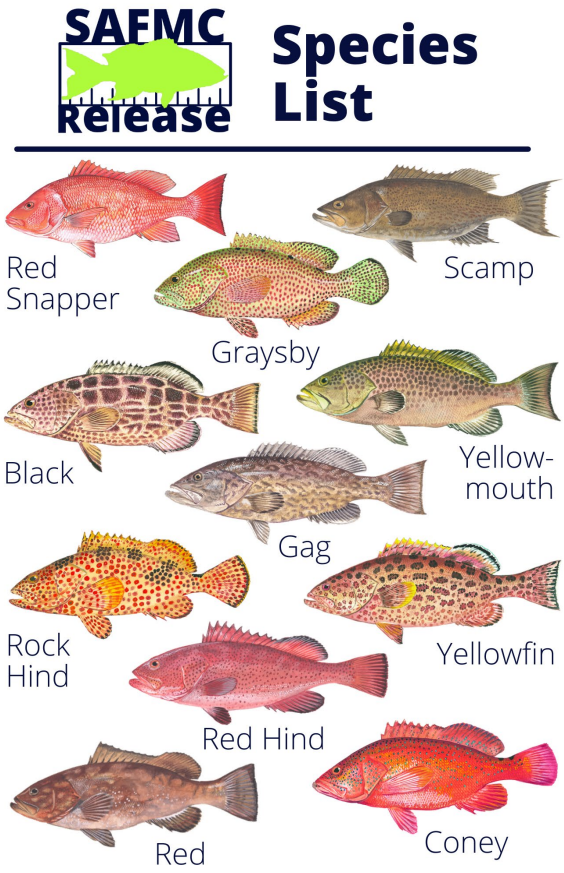

Figure 1. *SAFMC Release* Species List.

Bold text indicates sections that help with the ranking process.
Yellow highlighted text indicates changes made from the initial proposal.

Recruitment for *SAFMC Release* has largely been through opportunistic outreach strategies (e.g., tackle shop visits, fishing seminars and expos, SAFMC-related meetings, online and media, etc.) and has been limited by capacity and resources (e.g., personnel, time, funding). Through collaborations with the SAFMC's Best Fishing Practices initiative, Sea Grant, state agencies, and other partners, the project has reached broader audiences than Citizen Science Program staff could have done alone. In spring 2022, the Council collaborated with the North Carolina Division of Marine Fisheries (NCDMF) to mail information to 10,000 NC recreational fishing license holders to recruit participants to the Catch U Later and *SAFMC Release* projects. In June 2023, the Council collaborated with Florida Fish and Wildlife Commission (FL FWC) on an email solicitation to Florida State Reef Fish Designees on the Atlantic Coast to encourage participation in FL FWC's State Reef Fish Survey and recruit fishermen to the *SAFMC Release* project.

The number of project participants and data submissions within the *SAFMC Release* project have been growing over time. Each year, *SAFMC Release* develops Annual Data Summaries which are initially shared with project participants and then posted to the project webpage. The 2021, 2022, and 2023 SAFMC Annual Data Summaries are available at the following links: *SAFMC Release* Data Summary 2021, *SAFMC Release* Data Summary 2022, and *SAFMC Release* Data Summary 2023. Aggregate length composition for Red Snapper and aggregate release treatment by depth figures are provided below as an example of the data collected through the project over time (Figure 2 and Figure 3).

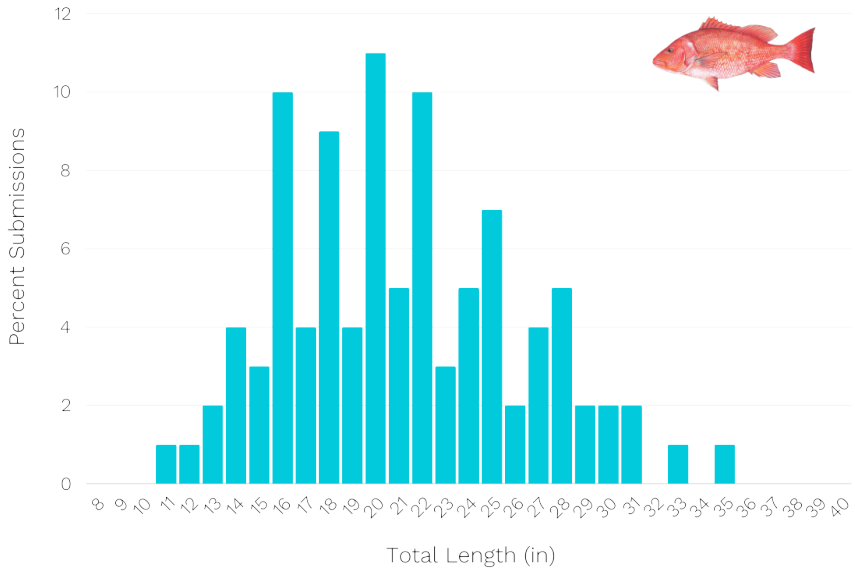

Figure 2. Red Snapper release length frequency logged through *SAFMC Release*, April 2022 – July 2024. Red Snapper was added to *SAFMC Release* in April 2022.

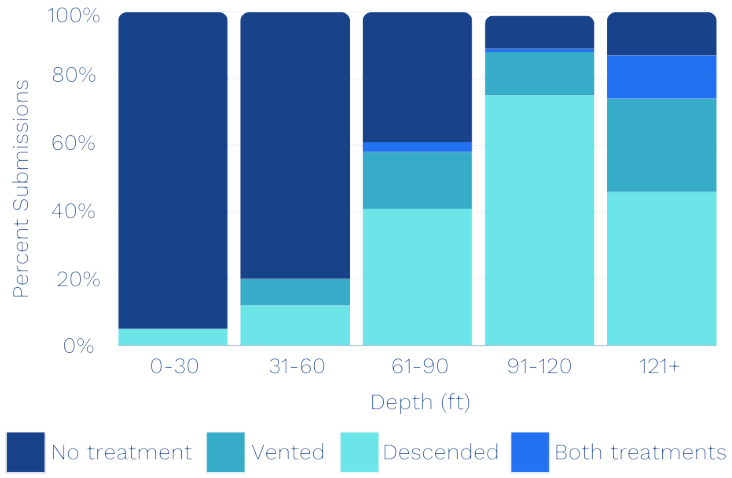

Figure 3. Release treatment by depth logged through *SAFMC Release*, June 2019 – July 2024.

When new participants sign up for *SAFMC Release*, they are asked to share where they heard about the project via an open-ended question. Based on these data, **in-person outreach (41%) and directed recruitment mailings in collaboration with state partners (NCDMF mailing – 21% and the FL FWC solicitation email -12%) have been critical recruitment strategies for the project to date (Figure 4).**

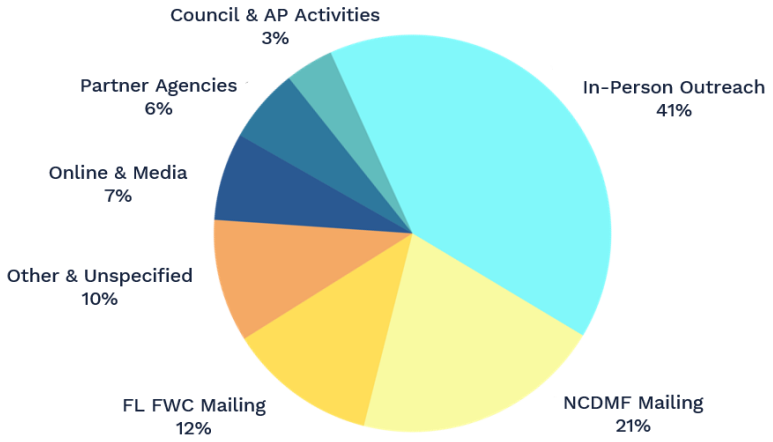

Figure 4. *SAFMC Release* participants by origin (June 2019 – April 2024).

Through *SAFMC Release* outreach efforts, staff have been able to build new and strengthen existing relationships with project participants and other stakeholders within the fishing community. However, participant recruitment and retention remain a challenge for the project. **This proposal will support the continuation of opportunistic outreach strategies to assist with participant recruitment and relationship building within the fishing community, focusing on in-person outreach that has been critical for project participation. Additionally, it will use data from the National Saltwater Angler Registry (NSAR) as a recruitment tool for private recreational fishermen in Georgia**

(GA) and South Carolina (SC). *SAFMC Release* has not had an opportunity to do recruitment mailings to saltwater recreational fishing license and permit holders in GA and SC, in part due to limitations in license holder confidentiality. Partnering with NOAA Fisheries to use the NSAR data in collaboration with state partners provides an opportunity to increase project participation rates in GA and SC. Direct mailings to license holders in these states will likely reach a broader group of fishermen, many of whom may not be in the Council's current network.

To help with participant retention *SAFMC Release* launched a Participant Recognition Program (PRP) in spring 2023. When volunteers reach identified milestones, they receive participant recognition or awards. Participant recognition programs are often beneficial to improve volunteer retention within citizen science projects (Robinson et al. 2021). Such programs have been shown to increase the quantity of data submissions and support retention by providing recurring volunteer engagement opportunities (Dickinson et al. 2012; Diekert et al. 2023). Thus, a recognition program is an important element of a retention strategy for the *SAFMC Release* project.

Programs such as Catch a Florida Memory (CAFM), in which anglers submit catch information to the Florida Fish and Wildlife Conservation Commission to earn rewards, have had success in motivating continued participation by providing a variety of incentives for participants to earn (J. Christopherson, personal communication, May 1, 2024). Of CAFM participants surveyed in 2023, 88% reported that earning prizes was 'somewhat important' or 'very important' motivation for participating in the program and approximately 54% of respondents reported being 'very satisfied' with the prize packages they earn (internal CAFM data). Also cited as contributing to program success are goals that re-engage volunteers after reaching all available milestones (J. Christopherson, personal communication, May 1, 2024).

Due to SAFMC funding limitations and stipulations, *SAFMC Release* initially provided only public recognition (e.g. listed in monthly newsletters or annual data summary) to participants who met PRP milestones. In 2024, the Council partnered with Sea Grant to adopt some of the PRP milestones (2024 PRP milestones). As participants meet these adopted milestones, they earn Sea Grant "recognition packets" and may win best fishing practices gear. However, Sea Grant can only provide best fishing practices-related items. As participants continue to meet milestones and build their repertoire of best fishing practices gear, the motivation to earn these items is likely to wane. **The success demonstrated by programs such as CAFM indicates that incorporating a more substantial recognition program into *SAFMC Release*'s retention strategy can increase the quantity of data collected through the project, improve participant satisfaction, and support the long-term engagement of participants.**

RESULTS & BENEFITS:

This project will continue to collect data on released fish via *SAFMC Release*, building on the work done through the FY20-FY22 ACCSP-funded SciFish projects. Observer funding for most fisheries along the Atlantic Coast has never been adequate. Many fisheries, such as the private recreational or the commercial snapper grouper hook and line, are challenging to sample through conventional observer techniques due to their small vessels which could present safety concerns, potential liability issues, and logistical challenges. Although a few specific fisheries are highlighted in this project, **the proportion of catch attributed to releases is increasing in many popular fisheries**

along the Atlantic Coast so the insights, tools, and best practices developed through this project may be beneficial to other partners.

***SAFMC Release* will continue collecting biological information on the component of catch that is released, addressing the ACCSP FY25 Request for Proposal priority 1b and Recreational Technical Committee priority 3. *SAFMC Release* will continue to collect biological and fishery data that is independent of APAIS/MRIP, addressing Recreational Technical Committee priority 5.**

The specific benefits to each data type and the rank of the target species within priority matrices included in the project are addressed below.

Primary Program Priority: Biological Sampling: 90%

Biological information from the commercial, for-hire, and recreational fisheries will continue to be collected on released shallow-water groupers (Black, Gag, Red, Scamp, Yellowfin and Yellowmouth Groupers; Red Hind; Rock Hind; Coney and Graysby) and Red Snapper. Gag Grouper, Red Grouper, and Red Snapper are in the top 25% of the ACCSP biological sampling priority matrix. *SAFMC Release* data collection includes:

- Data collected for each trip: trip type (commercial, recreational, headboat, charter), date, user (ACCSP ID);
- Data collected for each fish released: species (user's determination), length (based on ACCSP standards), location (state required, specific latitude/longitude optional), depth, time, fate (dead or alive release), hook type, hook location, use of barotrauma mitigation (descending device, venting, line cut), shark depredation, and photograph (to validate and evaluate species IDs and lengths); and
- Users may also file a 'no fish released' report to share information on harvested fish

Secondary Module as a by-product: Bycatch: 10%

The snapper-grouper hook and line fleet is ranked in the top quartile of the ACCSP bycatch priority matrix (ranked 9th out of 19 fleets). Information collected through *SAFMC Release* can help provide information on length of released shallow water grouper and Red Snapper and release treatment (e.g., use of barotrauma mitigation devices) to supplement the data available through observer coverage and discard logbooks to help characterize the bycatch within this fleet.

Stock Assessment and Management Benefits and Impact:

By continuing data collection on released fish through the *SAFMC Release* project, the positive impact of this project to stock assessments could be substantial and realized. Stock assessments rely upon accurate information on total catch and removals from the stock and accurately allocating those removals to year classes. For fish that are landed, these requirements can be addressed through straightforward methods such as catch reporting or creel surveys to estimate removals and dockside sampling to collect length measurements and age samples. Surveying and dockside sampling approaches do not work when the fish are released on the water. Using the South Atlantic as an example, very limited information is available to classify the size composition of released fish in the commercial snapper grouper hook and line fleet, the private

recreational fleet, or the charter fleet. In some areas, fisheries observers are used to collect information on released fish, but observer coverage is limited due to high cost. Moreover, even if funding were available, logistics and liabilities remain a concern for some fisheries due to the small size of many commercial and private recreational vessels and lack of safety gear requirements on private recreational vessels. Limited observer coverage is available for the headboat fleet and charter fleet (FL only), but changes in fleet size, targeted species, and behavior raise concerns about the validity of such data to characterize removals from other fishery sectors. This lack of information is a major source of stock assessment uncertainty, as assumptions must be made to assign released and discarded fish into length and thus age classes.

In years past, the lack of accurate information on discarded fish was not a major assessment concern or source of uncertainty as landed fish generally accounted for the majority of stock removals. However, this is changing as regulations and fishing behavior are leading to increased discarding. The most recent Red Grouper assessment (SEDAR 53, SEDAR 2017) indicated that over fifty percent of the fishing mortality experienced by Red Grouper is due to discard losses. Given that this stock was found to be overfished and overfishing was occurring, these discard removals are significant, and therefore the assumptions made regarding their size and composition are critical. In this instance, the length composition and selectivity for the discard losses was based on observer records from the headboat fishery and it was assumed these data were representative of all fishery sectors. As noted above, there are no data to test this assumption so its impact on assessment uncertainty and bias is unknown. The most recent assessment of South Atlantic Gag Grouper (SEDAR 71, SEDAR 2021b) indicated the stock was overfished and overfishing was occurring. Although discards accounted for a small proportion of fishing mortality in the assessment, the restrictive management measures implemented in response to the assessment through SAFMC's Snapper Grouper Amendment 53 will increase the proportion of discards within the fishery. SEDAR 71 relied on limited headboat observer data to characterize the size of discards from the recreational fleet with no data available from the charter and private recreational sectors. Having additional data sources to supplement these data will become increasingly important as the discards in the Gag fishery increase. In SEDAR 73, the most recent South Atlantic Red Snapper assessment, the stock was found to be overfished and undergoing overfishing. In recent years, discards have accounted for over 90% of removals so characterizing their size is critical. Length compositions and selectivity for discards were based on limited commercial, headboat, and charter (Florida only) observer data. Sampling recommendations in the report noted that it remains important to monitor discards year-round and any potential methodological or sampling improvements should be implemented if possible. Having additional information to help characterize the substantial discards could help meet this critical need.

A similar lack of information exists to classify the depth where fish are captured and released and the use of tools to address barotrauma, such as venting tools and descending devices. Fishing depth is positively correlated with release mortality rates for most species due to impacts of barotrauma. However, it is challenging to estimate release mortality for use in a stock assessment without having information on the depths where fish are caught and when the species is impacted by barotrauma.

Small improvements in estimates of discard mortality, based on data rather than assumption, can result in large changes in the estimated removals from a fish stock. Based on the results of

ACCSP-funded headboat observer studies, as cited in the FY2019 Recreational Technical Committee proposal, the Red Snapper release mortality was reduced from 37% to 28.5% due to the use of circle hooks. Applying this percentage change to the estimated 2018 MRIP discards reduced the discard losses to the population by 274,000 fish. This is quite a difference when compared to the 2018 recreational annual catch limit of 29,656 fish. The ability to accurately characterize discards could substantially improve stock assessments and management decisions.

The SAFMC's Snapper Grouper Regulatory Amendment 29, which requires descending devices on-board vessels fishing for or possessing snapper grouper species, was implemented in July 2020. Federal law requires comparing the No Action alternative (not requiring) with proposed management actions. Having information on usage of descending devices would have benefited the analysis for impacts of requiring a descending device both in the cost to anglers and for estimating changes in the estimate of discard mortality. Luckily, most stakeholders regarded this as a positive management action. But quantitative information on fishing practices that can be collected through a data collection app could be used to make more informed decisions on the impact of management actions. When reviewing the SEDAR 73 (South Atlantic Red Snapper) assessment at their April 2021 meeting, the SAFMC's Science and Statistical Committee raised concerns about the level of descender device usage due to the lack of information on how widespread usage is in the fishery. This is of note since the assumed level does have an impact on recommended catch levels - highlighting the need for this data. The upcoming South Atlantic Red Snapper assessment terms of reference (SEDAR 90) include consideration of the *SAFMC Release* data.

DATA DELIVERY PLAN:
The SciFish application for the *SAFMC Release* project will collect and deliver data directly to ACCSP through the SciFish API and will be stored in SAFIS. Data can be entered by fishermen when no internet connection is available and later uploaded to SAFIS when a connection exists.

APPROACH:

Task A: *SAFMC Release* Participant Recruitment via National Saltwater Angler Registry
Overview

- Recruit new *SAFMC Release* participants from GA and SC using the National Saltwater Angler Registry (NSAR) database via random stratified mailings. Mailings will include a recruitment letter with an individual's license number, quick response (QR) code to NSAR specific *SAFMC Release* account sign up page, and a *SAFMC Release* promotional item. State specific recruitment letters can be used to share information on *SAFMC Release* in context with other initiatives being conducted within the state.
- Target to send recruitment mailings to a total of 24,000 NSAR licensees evenly distributed between GA and SC. Mailings will be iterative and consist of an initial mailing during March and a subsequent mailing during May. These mailings will target unique licensed anglers between the ages of 16 and 85 that are coastal county residents of the target state that currently possess an active annual saltwater fishing license or permit. Mailings will coincide with peak activity of the fishery as identified from the NOAA Marine Recreational Information Program (MRIP) dockside survey (May-October).

- The proposed stratification scheme for solicitation mailings will include the following strata: state, wave, county of residence, and zip code. The stratification scheme was informed by effort and catch data from the (MRIP) Access Point Intercept Survey (APAIS) (1981-2023). Records were selected that included catch (kept or discarded fish) from any of the constituent *SAFMC Release* species. See Appendix 1 for more details on the proposed stratification methodology.

Roles of Collaborators

NOAA

- NSAR mailing selection draw for all recruitment mailings
- Draft recruitment letter in collaboration with SAFMC and states
- Coordinate with contractor to complete NSAR recruitment mailings

SAFMC

- Draft recruitment letter in collaboration with NOAA and states; provide *SAFMC Release* promotional item for mailing
- Set up and monitor *SAFMC Release* project account creation forms
- Create user accounts and onboard new participants (sharing login details, training materials, add to *SAFMC Release* email list & PRP if opt in, troubleshoot SciFish login/app issues)

SCDNR & GADNR

- Consult on NSAR recruitment letter and stratification for their states, respectively

Task B: Continue and expand current *SAFMC Release* recruitment strategies

Roles of Collaborators

SAFMC

- Visit tackle shops in South Atlantic states (NC, SC, GA, and FL) to distribute *SAFMC Release* and Best Fishing Practices materials for project promotion and recruitment
- Participate in relevant fishing expos, seminars, collaborations with fishing organizations to promote *SAFMC Release* and best fishing practices and recruit new project participants
- Collaborate with state partners to share information on *SAFMC Release* at events and via other outreach efforts and communication platforms, as appropriate
- Share *SAFMC Release* project information at Council related meetings and via Council communication platforms (e.g., South Atlantic Bite newsletter, social media)
- Set up and monitor *SAFMC Release* project sign up forms
- Create user accounts and onboard new participants (sharing login details, training materials, add to *SAFMC Release* email list & PRP if opt in, troubleshoot SciFish login/app issues)

SCDNR & GADNR

- Consult on participant recruitment strategies

Task C: *SAFMC Release* Participant Retention Strategies

Overview

- The *SAFMC Release* team will employ a multi-pronged approach to support year-round participant engagement with the project including regular participant communications, development of data summaries, and the expansion of the PRP.
- To support engagement with the *SAFMC Release* project year-round, recognition program milestones will reward participants using multiple strategies. Figure 5 outlines the proposed strategies for milestones, associated rewards, and other forms of recognition.

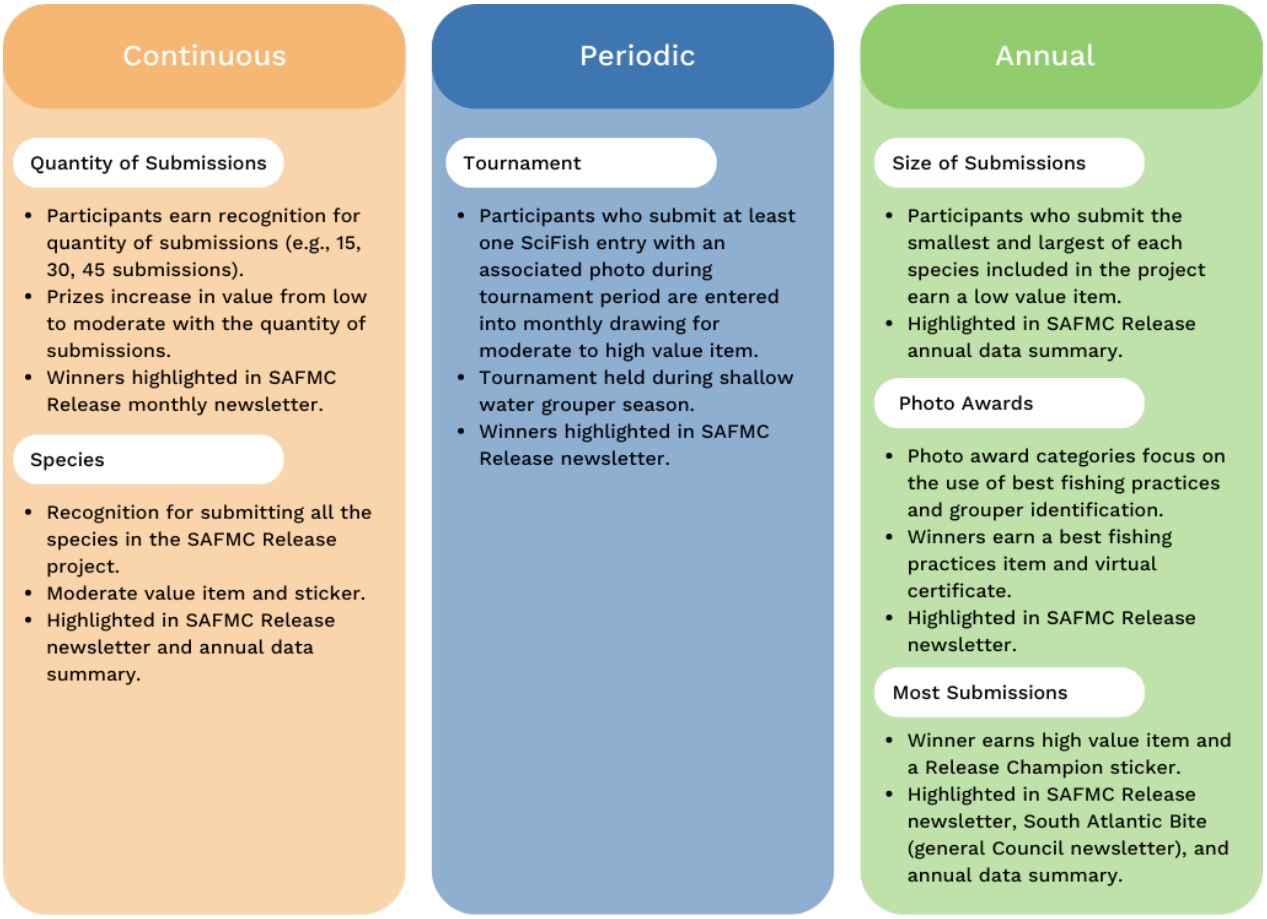

Figure 5. *SAFMC Release* proposed PRP milestones, rewards, and recognitions.

Roles of Collaborators

SAFMC

- Participant Communications
  - Distribute monthly e-newsletters to participants
  - Email and phone communication with participants to thank them for submissions, troubleshoot issues, etc.
- Annual Data Summary
  - Provide annual data summary to participants and post to project webpage
  - Explore additional data summary options for participants
- Participant Recognition Program (PRP)
  - Monitor participant PRP progress

- Provide participant awards for PRP milestones

SCDNR & GADNR

- Consult on participant retention strategies

Task D: Data collection, QA/QC, and analysis

Roles of Collaborators

SAFMC

- Data successfully submitted via app to SAFIS/Data Warehouse
- SAFMC provide QA/QC for data collected through project; edit/correct as necessary
- Share summary data with project partners
- Data made available for assessment and management, as necessary
- Continue to explore long term solutions for addressing QA/QC and validation needs of the data (e.g., photographic and species identification), considering volunteers and citizen science approaches
- Compare data collected via NSAR recruited participants to those collected by participants recruited via other strategies, as appropriate
- Review success of recruitment strategies and make recommendations for future efforts

NOAA

- Assist with the development of data management strategies for NSAR vs opportunistically recruited participants
- Assist with data analytics

GEOGRAPHIC LOCATION:

The *SAFMC Release* project partners with fishermen to collect data on released fish in South Atlantic waters in North Carolina, South Carolina, Georgia and the east coast of Florida through the Florida Keys. Project partners include SAFMC, NOAA SEFSC, and NOAA Office of Science & Technology. Project consultants include SCDNR and GADNR. Letters of support have been provided by NCDMF, SCDNR, and FL FWC (see Appendix 2). Data collected through the project will be available for consideration in South Atlantic stock assessments and management.

In addition to contributing data for consideration in stock assessments and management, this project will collect information on the effectiveness of various recruitment and retention strategies for *SAFMC Release*. With the growing interest in using citizen science as a tool to help supplement marine fisheries data collection, the information gained on volunteer recruitment and retention could be informative for other citizen science projects being pursued by partners along the Atlantic coast.

FUNDING TRANSITION PLAN:

Project PI's will be developing additional proposals and exploring other funding opportunities to help support additional years of funding for this project.

MILESTONE SCHEDULE:

Table 1. Milestone Schedule

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Finalize NSAR mailing stratification in consultation with states	x	x										
Complete NSAR Mailings in SC & GA				x		x						
SAFMC Release Opportunistic Recruitment Outreach Strategies: Tackle shop outreach, seminars, fishing expos, etc.	x	x	x	x	x	x	x	x	x	x	x	
SAFMC Release Retention Strategies: Regular Communication, Newsletters, PRP coordination & implementation	x	x	x	x	x	x	x	x	x	x	x	
Data Collection, QA/QC & Analysis	x	x	x	x	x	x	x	x	x	x	x	
Semi & Annual Report Writing						x					x	x

PROJECT ACCOMPLISHMENTS MEASUREMENTS:

Table 2. Project Accomplishments Measurements

Project Component	Deliverables
SAFMC Release NSAR Recruitment Mailing	Total of 24,000 *SAFMC Release* recruitment letters sent to saltwater recreational fishing license holders in SC and GA; new SC and GA participants recruited to *SAFMC Release* via mailing
SAFMC Release Opportunistic Recruitment Outreach	Continue outreach to promote *SAFMC Release* in South Atlantic states with a target to visit tackle shops and collaborate on a seminar/outreach event at least once per state; new participants recruited to *SAFMC Release* via in-person and online outreach
SAFMC Release Retention Strategies	Monthly newsletters and annual data summary distributed to project participants; continuous, periodic, and annual milestones incorporated into Participant Recognition Program (PRP); increase in participants submitting data and meeting PRP milestones
Data Collection, QA/QC & Analysis	Participants continue to submit data on the targeted species using the application; QA/QC completed; data available for management and assessment, as needed
Report Writing	Progress and final reports submitted

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FY25 COST SUMMARY (BUDGET):

Item	ACCSP Share	Partner Share	Total
PERSONNEL COSTS			
SAFMC Citizen Science Project Coordinator – 6 months	$24,024		
SAFMC Release hourly position (part-time)	$10,400		
SAFMC Personnel Julia Byrd, Citizen Science Program (10%)		$9,700	
NOAA Personnel Drew Cathey, SEFSC (5%) Lauren Dolinger Few, S & T (~ 1 week)		$3,950 $3,400	
FRINGE			
SAFMC Citizen Science Project Coordinator – 6 months	$14,294		
SAFMC Personnel Julia Byrd, Citizen Science Program (10%)		$5,772	
CONTRACT			
NSAR recruitment mailing	$54,363		
SUPPLIES			
Promotional materials	$4,000		
Participant Recognition Program incentives	$15,000		
Software packages	$3,300		
TRAVEL			
Travel to support outreach and promotional	$4,430		

Bold text indicates sections that help with the ranking process.
Yellow highlighted text indicates changes made from the initial proposal.

opportunities for *SAFMC Release*			
Indirect Costs (10% of non-contract costs)	$7,545		
TOTAL	**$137,356**	**$22,822**	**$160,187**
Percentage	**86%**	**14%**	**100%**

FY25 BUDGET NARRATIVE:

Personnel ($34,424): Personnel funds of $24,024 will support 6 months of the SAFMC Citizen Science Project Coordinator position who leads daily project management for the *SAFMC Release* project. The remaining personnel funds ($10,400) will be used by SAFMC to hire a part-time hourly at $20/hour for 520 hours for the *SAFMC Release* project to help with account creation, coordination of the Participant Recognition Program, and QA/QC.

Fringe ($14,294): Fringe funds will support 6 months of benefits for the SAFMC Citizen Science Project Coordinator position. Fringe benefits charged at 59.5% of total compensation.

Contractual ($54,363): NOAA Fisheries will contract with Gallup to coordinate and implement the NSAR recruitment mailings to GA and SC. Target is to send 24,000 recruitment letters (12,000 to each state). Costs are estimated at ~$2.27 per piece for $54,363.

Supplies ($22,300): Partners will utilize funds to print promotional materials (e.g., wallet cards, rack cards, stickers, etc.) to promote and recruit users for *SAFMC Release*. Cost for promotional materials range from wallet cards (~$0.05 each) to stickers (~$1.50 each). Using an average cost of $0.77 per item, $4,000 will allow us to print ~5,195 items for distribution. The PRP will include low, medium, and high value items when participants meet identified milestones. Cost for low value items range between $10-$20, medium value items range between $25-$100, and high value items range between $200-$600. Using an average cost of $15 for low value items - $13,000 will allow us to distribute ~860 items; an average of $63 for medium value items -$500 will allow us to distribute ~8 items; and an average of $400 for high value items -$1500 will allow us to distribute ~4 items. Costs for software include an annual subscription to Wufoo ($330) for online forms for account creation and an upgrade to the shiny application to provide an additional tool for project participants to explore and query their data.

Travel ($4,430): Travel by partners will be used to promote *SAFMC Release* by visiting tackle shops, fishing clubs and expos, and other related venues to allow for distribution of outreach and promotional materials. Funds are requested to support travel for staff members for 4 trips, approximately 3-4 days each. Costs are estimated for a total of 14 hotel nights at $120/night ($1,680), 16 days per diem at

$75/day ($1,200), ~1200 miles at $0.625/mile ($750), and two airplane fares at ~$400/ticket ($800). Travel rate estimates are based on federal reimbursement and per diem rates.

Indirect ($7,545): Indirect charges of 10% are applied to the non-contract budget items for a total of $7,545. The contract with Gallup will be administered through NOAA Fisheries, so was excluded from the indirect calculations.

SUMMARY OF PROPOSAL FOR RANKINGS:

Proposal Type: New

Primary Program Priority: Biological 90%
Biological information from the commercial, for-hire, and recreational fisheries will be collected on released shallow-water groupers (Black, Gag, Red, Scamp, Yellowfin and Yellowmouth Groupers; Red Hind; Rock Hind; Coney and Graysby) and Red Snapper. Gag Grouper, Red Grouper, and Red Snapper are in the top 25% of the ACCSP biological sampling priority matrix. *SAFMC Release* data collection includes:

- **Data collected for each trip: trip type (commercial, recreational, headboat, charter), date, user (ACCSP ID)**
- **Data collected for each fish released: species (user's determination), length (based on ACCSP standards), location (state required, specific latitude/longitude optional), depth, time, fate (dead or alive release), hook type, hook location, use of barotrauma mitigation (descending device, venting, line cut), shark depredation, and photograph (to validate and evaluate species IDs and lengths)**
- **Users may also file a 'no fish released' report to share information on harvested fish**

Data Delivery Plan:
The SciFish application for the *SAFMC Release* project will collect and deliver data directly to ACCSP through the SciFish API and will be stored in SAFIS. Data can be entered by fishermen when no internet connection is available and later uploaded to SAFIS when a connection exists.

Project Quality Factors:

- **Multi-partner/Regional impact including broad applications:**
  The *SAFMC Release* project partners with fishermen to collect data on released fish in South Atlantic waters in North Carolina, South Carolina, Georgia and the east coast of Florida through the Florida Keys. Project partners include SAFMC, NOAA SEFSC, and NOAA Office of Science & Technology. Project consultants include SCDNR and GADNR. Letters of support have been provided by NCDMF, SCDNR, and FL FWC. Data collected through the project will be available for consideration in South Atlantic stock assessments and management.

  In addition to contributing data for consideration in stock assessments and management, this project will collect information on the effectiveness of various recruitment and retention strategies for SAFMC Release. With the growing interest in using citizen science as a tool to help supplement marine fisheries data collection, the information gained on volunteer recruitment and retention could be informative for other citizen science projects being pursued by partners along the Atlantic coast.

- **Contains funding transition plan:**
  Project PI's will be developing additional proposals and exploring other funding opportunities to help support additional years of funding for this project.

- **In-kind contribution: 14%**

- **Improvement in data quality/quantity/timeliness**
  - **Provides improvement in data quality and quantity**
  - **There are currently no data available to assign released shallow water groupers and Red Snapper to length classes other than limited commercial and for-hire observer effort. *SAFMC Release* collects data on length of released shallow water group and Red Snapper for commercial, for-hire, and recreational fishermen.**
  - **There are limited data available to classify the depth where fish are captured and released and the use of barotrauma reduction techniques which are significantly correlated with release mortality rates. The data collected through *SAFMC Release* provides finer scale information on released fish which can help refine the overall release mortality rate applied for a stock assessment.**

Potential secondary module as a by-product: Bycatch 10%.
The snapper-grouper hook and line fleet is ranked in the top quartile of the ACCSP bycatch priority matrix (ranked 9th out of 19 fleets). Information collected through *SAFMC Release* can help provide information on length of released shallow water grouper and Red Snapper and release treatment (e.g., use of barotrauma mitigation devices) to supplement the data available through observer coverage and discard logbooks to help characterize the bycatch within this fleet.

Impact on stock assessment:
Stock assessment impacts are significant. Assessments rely on accurate catch data for individual species, accurate assignments of catches to length and thus age classes, and accurate accounting of total population removals including release mortality. Limited data are available to classify the size composition of released fish in the commercial snapper grouper hook and line fleet, the private recreational fleet, or the charter fleet. When the SAFMC's Science and Statistical Committee reviewed recent stock assessments (SEDAR 73 – South Atlantic Red Snapper), they raised concerns about the level of descender device usage due to lack of information on how widespread usage is in the fishery. *SAFMC Release* will provide data to help fill these data gaps which are important to assessments.

Other Factors:

- **Innovative**
  Interest in using citizen science to help fill data gaps in marine fisheries has been growing in recent years. This project will support the continuation of the *SAFMC Release* citizen science project which is helping address key research priorities on released fish. In

addition to using opportunistic recruitment strategies, it uses the NSAR adding a statistical design to recruit citizen scientists. This will allow for comparison of data collected via NSAR recruited participants to those collected by participants recruited via other strategies.

- **Properly prepared**
  This proposal follows the guidelines under the ACCSP Funding Decision Process Document.

- **Merit**
  This project supports the continuation of the *SAFMC Release* citizen science project that addresses key research needs on released shallow water grouper and Red Snapper – helping to characterize the size of released fish and helping better understand how many of those released fish survive. It incorporates using the NSAR as a recruitment tool adding a statistical design element to recruit project participants. Data collection is done via the SciFish platform, using ACCSP standards and making the data easily accessible for assessment and management. *SAFMC Release* data will be considered in the upcoming South Atlantic Red Snapper assessment per the SEDAR 90 Terms of Reference. Additionally, this project will collect information on the effectiveness of various recruitment and retention strategies for *SAFMC Release* which could be informative for other citizen science projects along the Atlantic coast.

Appendix 1. Proposed stratification scheme for NSAR recruitment mailing for *SAFMC Release*

***SAFMC RELEASE*: ACCSP FY25 RFP**

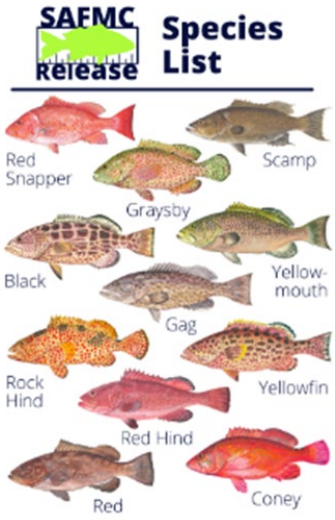
Leveraging the National Saltwater Angler Registry to Solicit a Stratified Random Sample of Participants for the SAFMC RELEASE Project

Prepared by Andrew Cathey

Stratified random sampling (SRS) is useful when a population consists of multiple equivalent groups. For these populations, initial stratification can be paired with SRS to select samples from each group (Fricker 2008). Importantly, a stratified approach can reduce cost and logistical difficulties of reaching the target audience. This approach is readily applicable to collect data from specialized recreational fisheries due to the small number of participants relative to the total population of recreational anglers (NCDMF 2023. Chapter 5).

The South Atlantic recreational shallow-water grouper complex fishery is boat-based with catch predominantly originating offshore in the EEZ. As such, it is characteristic of a recreational fishery well suited for applying a stratified random sampling approach. The current methodology uses intercept data from the National Oceanic and Atmospheric Administration (NOAA) Access Point Angler Intercept Survey (APAIS) to identify an appropriate stratification scheme for species included in the current iteration of *SAFMC RELEASE* (Figure 1.). Effort and Catch data from the APAIS (1981-2023) were selected that included catch (kept or discarded fish) from any of the constituent RELEASE Species. The proposed stratification scheme includes the following strata ***State/Wave/County of Residence/Zip Code.***

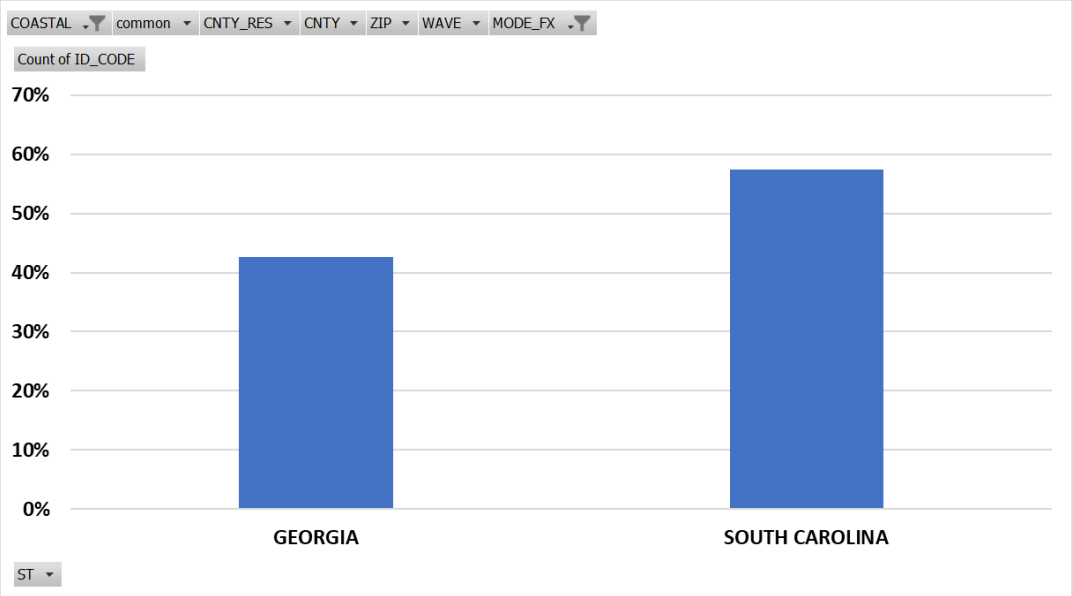
Figure 1) SAFMC *RELEASE* Species



Strata 1: *State/Wave/County of Residence/Zip Code*

An initial spatial sampling strata will be identified for our area of interest and include South Carolina and Georgia. Figure 2. demonstrates a spatial differential regarding the number of intercepted anglers with observed or reported catch of RELEASE species. These records are from coastal residents intercepted from private boat mode. South Carolina and Georgia contributed 58% and 42% respectively. These results suggest an initial spatial stratification by state that is proportional to state contribution.

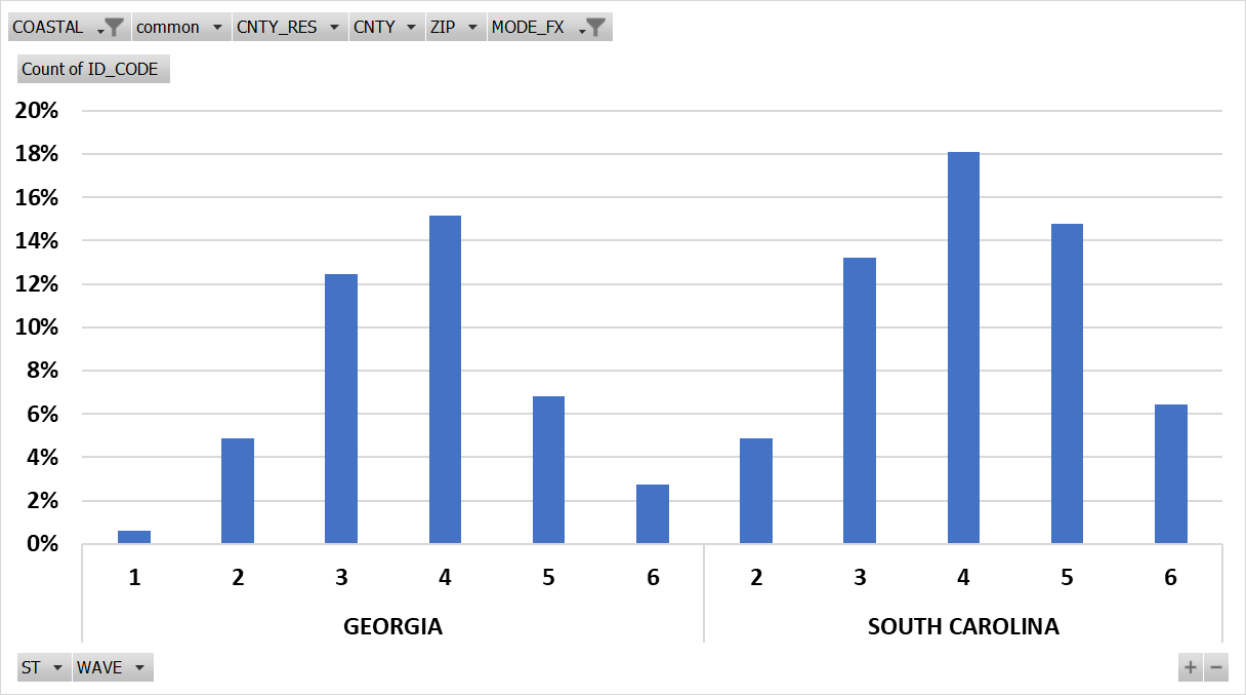
Figure 2) Percentage of Intercepts from Private Boat Mode for Coastal Residents with Catch of RELEASE spp. by State.



Strata 2: *State/Wave/County of Residence/Zip Code*

A temporal sampling strata will be at the wave level (bi-monthly sampling interval Jan/Feb=Wave1, etc.). Figure 3. demonstrates an interactive effect between state and wave regarding intercepts with observed or reported catch of RELEASE species. These records are from coastal residents intercepted from private boat mode. Both South Carolina and Georgia exhibit a bell-shaped distribution with peak intercepts occurring during waves 3, 4, & 5.

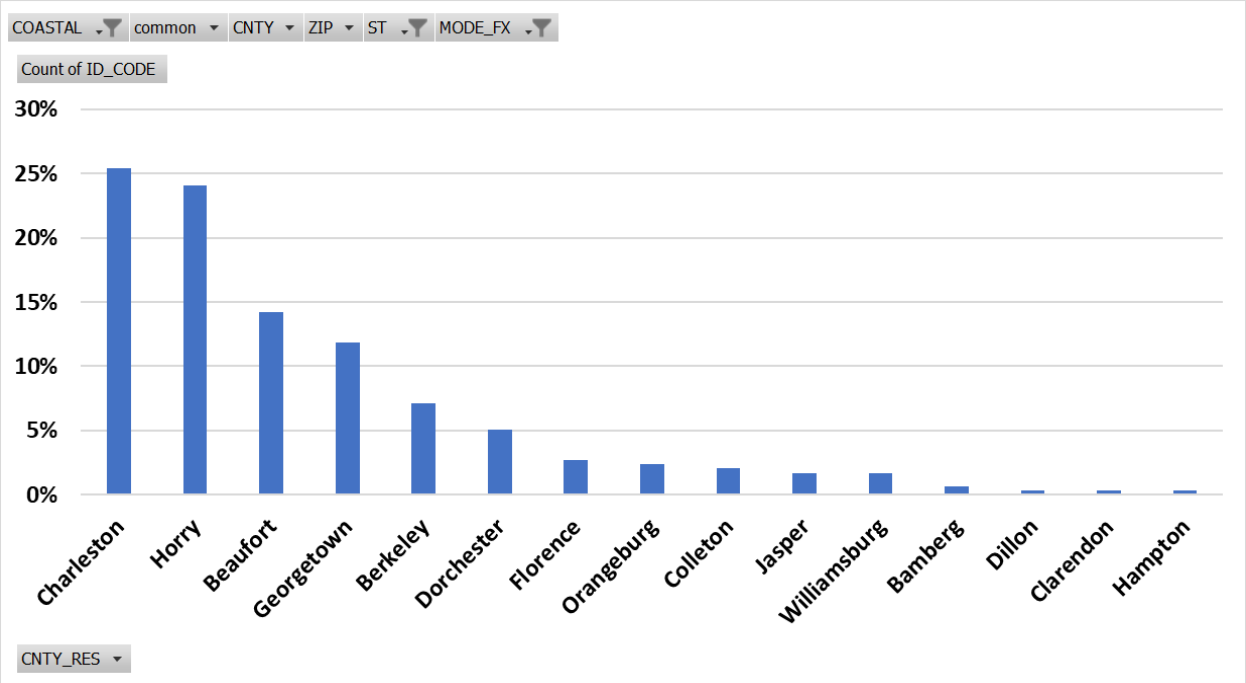
Figure 3) Percentage of Intercepts from Private Boat Mode Coastal Residents with Catch of RELEASE spp. by State and Wave (1981-2023).



Strata 3: *State/Wave/County of Residence/Zip Code*

The remaining sampling strata will use South Carolina as a case study. Figure 4. represents the spatial distribution of APAIS intercepts from coastal county residents with observed or reported catch of RELEASE species by South Carolina County of Residency. The top five counties contribute >87% of total intercepts and include Charleston (25.4%), Horry (24.1%), Beaufort (14.2%), Georgetown (11.9%), Berkeley (7.1%) and Dorchester (5.1%).

Figure 4) Percentage of Intercepts from Private Boat Mode Coastal Residents with Catch of RELEASE spp. by South Carolina County of Residence (1981-2023).



Strata 4: *State/Wave/County of Residence/Zip Code*

Figure 5. represents the spatial distribution of APAIS intercepts with observed or reported catch of RELEASE species by Zip Code for Charleston County South Carolina. These results demonstrate increased spatial resolution within Charleston County. Importantly, similar spatial differentials exist within all coastal counties and states. Within the constituent county of Charleston 4 zip codes (*29412, 29414, 29464, 29455*) contribute 60% of APAIS intercepts with RELEASE species. Within Charleston County the zip code with the highest level of contribution is *29464* (22.6%) (Figure 6). The application of Zip code as the final sampling strata is the finest spatial resolution available from APAIS intercept data.

Figure 5) Percentage of Intercepts from Private Boat Mode Coastal Residents with Catch of RELEASE spp. by South Carolina Zip Code within Charleston County (1981-2023).

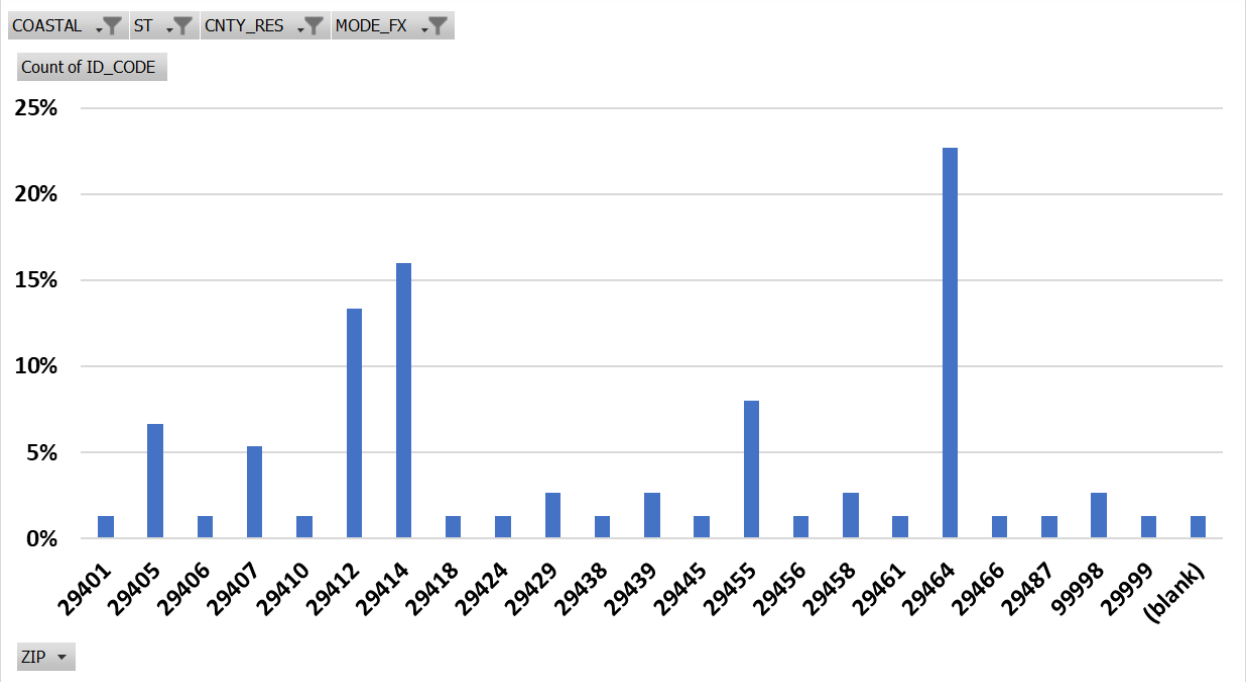
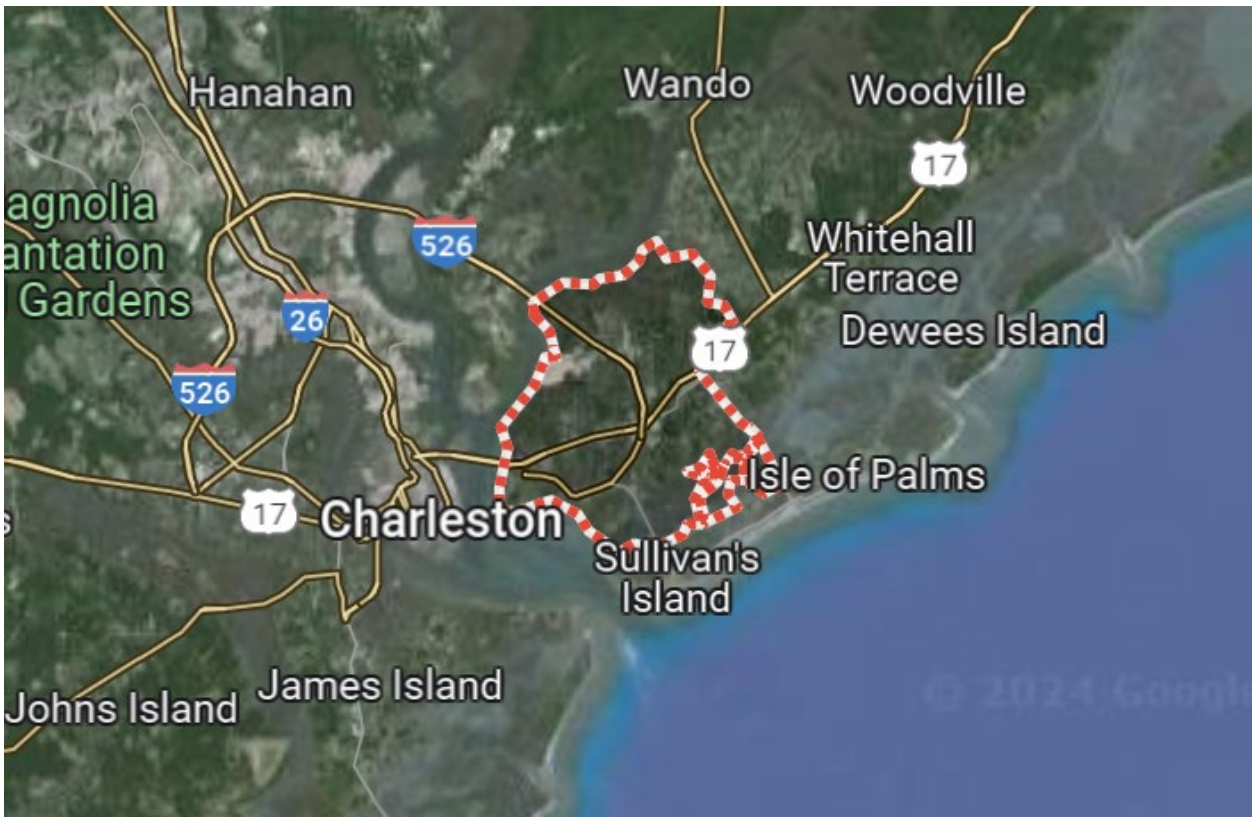


Figure 6) Location of Zip Code ***29464*** within Charleston County South Carolina



Literature Cited:

Fricker, Ronald D. "Sampling methods for web and e-mail surveys." *The SAGE handbook of online research methods. London: SAGE Publications Ltd* (2008).

NCDMF. 2023. North Carolina Division of Marine Fisheries License and Statistics Section Annual Report. North Carolina Department of Environmental Quality, Division of Marine Fisheries, Morehead City, NC.

Appendix 2. SCDNR, NCDMF, and FL FWC Letters of Support

South Carolina Department of Natural Resources

Robert H. Boyles, Jr.
Director

Blaik Keppler
Deputy Director for Marine Resources

June 5, 2024

Attn: Geoffrey White
Atlantic Coastal Cooperative Statistics Program
1050 N. Highland St., Ste 200A-N
Arlington, VA 22201

Dear Mr. White,

The Atlantic Coastal Cooperative Statistics Program recently issued a Request for Proposals to program partners and committees for FY25 funding. Please find this letter as confirmation that the South Carolina Department of Natural Resources (SCDNR) is in support of the South Atlantic Fishery Management Council (SAFMC), in partnership with the NOAA Fisheries Southeast Fisheries Science Center and the Office of Science & Technology, proposal entitled, "Enhancing Recruitment & Retention for the SAFMC Release Citizen Science Project".

The proposal objectives specify a continued and expanded data collection effort for many South Atlantic reef fishes through the SAFMC Release citizen science application, using the National Saltwater Angler Registry (NSAR) license data as a tool to recruit more private recreational fishermen for SAFMC Release. They also plan to develop an incentive program to enhance participant retention and reactivation. SCDNR supports these efforts to encourage voluntary fisheries dependent data submissions from the recreational sector for use in fisheries management decisions.

Once funded, SCDNR will directly assist the project through coordinated information exchange as the project is executed. Actions will include review of the solicitation letter and documentation prior to dissemination to the NSAR South Carolina recreational anglers and collaborate on ideas to gain more participants and improve retention.

If you have any questions, please feel free to contact us at (843) 953-9313.

Sincerely,

Amy Dukes,
Regional Fisheries Manager

Elizabeth Gooding,
Fisheries Statistics Section Manger

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
KATHY B. RAWLS
Director

June 17, 2024

Dear Sir or Madam:

I am writing to express the North Carolina Division of Marine Fisheries' (NCDMF) support for the proposal titled "Enhancing Recruitment and Retention for the SAFMC Release Citizen Science Project". North Carolina is currently exploring various means of collecting better fisheries data, particularly for the recreational sector, and the Release Citizen Science Project will contribute to that goal. NCDMF has previously demonstrated this commitment through partnering with SAFMC Release Citizen Science Project to distribute approximately 10,000 mail solicitations to NC Coastal Recreational Fishing License holders encouraging them to participate. This partnership ultimately accounted for the recruitment of over 20% of the total number of participants for the first phase of this project, which has already delivered valuable release data.

Improved data collection using smartphone technology for the recreational fishing sector has been a hot topic in recent years, and this proposal will help to further explore this method of data collection. Despite general support from the recreational fishing public to use a smartphone application to submit fishing data, it has been shown that retention of application users tends to decrease over time. This proposal will provide the ability to investigate new ways of revitalizing the Release app with the goal of increasing participation.

The results of this project will better inform NCDMF on new approaches to recruit and retain smartphone application users, which will be extremely beneficial as the Division prepares for new mandatory harvest reporting legislation to take effect December 1, 2024. Again, NCDMF fully supports the "Enhancing Recruitment and Retention for the SAFMC Release Citizen Science Project" proposal and recommends the proposal be funded.

Sincerely,

Kathy Rawls
NC Division of Marine Fisheries Director
(252) 515-5520
Kathy.Rawls@deq.nc.gov

State of North Carolina | Division of Marine Fisheries
3441 Arendell Street | P.O. Box 769 | Morehead City, North Carolina 28557
252-726-7021

Bold text indicates sections that help with the ranking process.
Yellow highlighted text indicates changes made from the initial proposal.

Florida Fish and Wildlife Conservation Commission

Commissioners
Rodney Barreto
Chairman
Coral Gables

Steven Hudson
Vice Chairman
Fort Lauderdale

Preston Farrior
Tampa

Gary Lester
Oxford

Albert Maury
Coral Gables

Gary Nicklaus
Jupiter

Sonya Rood
St. Augustine

Office of the Executive Director
Roger A. Young
Executive Director

Charles "Rett" Boyd
Assistant Executive Director

George Warthen
Chief Conservation Officer

Jessica Crawford
Chief of Staff

Division of Marine Fisheries Management
Jessica McCawley
Director

850-487-0554

Managing fish and wildlife resources for their long-term well-being and the benefit of people.

620 South Meridian Street
Tallahassee, Florida
32399-1600
Voice: 850-488-4676

Hearing/speech-impaired:
800-955-8771 (T)
800-955-8770 (V)

MyFWC.com

August 13, 2024

Geoffrey White
Atlantic Coastal Cooperative Statistics Program
1050 N. Highland St., Ste 200A-N
Arlington, VA 22201

Dear Mr. White,

The Florida Fish and Wildlife Conservation Commission (FWC) is supportive of the South Atlantic Fishery Management Council (SAFMC) research proposal entitled, "Enhancing Recruitment & Retention for the SAFMC Release Citizen Science Project" that has been submitted to the Atlantic Coastal Cooperative Statistics Program for FY25 funding.

This is a collaborative project in partnership with NOAA Fisheries Southeast Fisheries Science Center and the Office of Science & Technology. Specifically, this project will expand recreational data collection for many South Atlantic reef fish species through the SAFMC Release citizen science application by collaborating with the National Saltwater Angler Registry license data to recruit more private recreational fishermen for the SAFMC Release.

Once funded, FWC will assist the project through coordinated information exchange as the project is executed as well as review of materials as needed.

If you have any questions, please feel free to contact me at

Sincerely,

Jessica McCawley

Bold text indicates sections that help with the ranking process.
Yellow highlighted text indicates changes made from the initial proposal.

Andrew M. Cathey

National Oceanic and Atmospheric Administration
Southeast Fisheries Science Center
Fisheries Statistics Division
Survey Development, Data Management, and Dissemination Branch
101 Pivers Island Road
Beaufort NC 28516
Mobile:(252)-558-3404
E-mail: Andrew.Cathey@NOAA.gov

Professional Preparation:

East Carolina University, PhD, Interdisciplinary Biological Sciences, 2013
Appalachian State University, BS, Ecology and Environmental Biology, 2004

Professional Experience:

Fish Biologist, Southeast Fisheries Science Center, Fisheries Statistics Division, National Oceanic and Atmospheric Administration: Sep 2022-present
Program Supervisor, Coastal Angling Program, North Carolina Division of Marine Fisheries: Jan 2021-Aug 2022
Chief Data Analyst, Coastal Angling Program, North Carolina Division of Marine Fisheries: Nov 2017-Dec 2020
Statistician, Coastal Angling Program, North Carolina Division of Marine Fisheries: Jul 2014-Nov 2017
PhD Candidate, East Carolina University: Oct 2011-Dec 2013

Publications and Technical Reports:

Cathey AM, Byrd J (2021) FY20: SAFIS Expansion of "SAFMC Release" and "NCDMF Catch U Later" Discard Reporting Applications. *Atlantic Coast Cooperative Statistics Program Final Project Report*.

Cathey AM (2016). Evaluating an Ongoing Recreational Flounder Gigging Mail Survey using Dockside Intercepts. *North Carolina Division of Marine Fisheries Final Project Report*. Grant Number 2007-F206

Cathey AM (2015). Assessing Electronic Mobile Devices for the Collection of Recreational Fishing Data. *NOAA Final Project Report*, Task Title: Assessing the Use of Electronic Mobile Devices in Recreational Angling Data, Grant Number EA-133F-12-BA-0034

Cathey AM, Miller NR, Kimmel DG (2014). Spatiotemporal Stability of Trace and Minor Elemental Signatures in Early Larval Shell of the Northern Quahog (Hard Clam) Mercenaria mercenaria. *Journal of Shellfish Research* 33(1):247-255

Cathey AM, Miller NR, Kimmel DG (2012) Microchemistry of Juvenile *Mercenaria mercenaria* shell: Implications for Modeling Larval Dispersal. *Marine Ecology Progress Series* 465:155-168

Contracts and Grants Awarded:

$116,182. Standard Atlantic Fisheries Information System (SAFIS) Expansion of Customizable Fisheries Citizen Science Data Collection Application. National Marine Fisheries Service/Atlantic Coast Cooperative Statistics Program. 07/01/2022 06/30/2023 Co-PI: **Cathey AM**, Co-PI: Julia Byrd

$118,500. Standard Atlantic Fisheries Information System (SAFIS) Expansion of "SAFMC Release" and "NCDMF Catch U Later" Discard Reporting Applications. National Marine Fisheries Service/Atlantic Coast Cooperative Statistics Program. 10/30/2019 05/20/2021 Co-PI: **Cathey AM**, Co-PI: Julia Byrd

$199,340. Annual surveys of recreational license holders. North Carolina Division of Marine Fisheries Coastal Recreational Fishing License Grant. 07/01/2018 06/30/2023. PI: **Cathey AM**

$72,500. Determination of species-specific size compositions of recreationally discarded finfish species. North Carolina Division of Marine Fisheries Coastal Recreational Fishing License Grant. 07/01/2018 06/30/2020. PI: **Cathey AM**.

$142,000. Evaluating an Ongoing Recreational Flounder Gigging Mail Survey using Dockside Intercepts. North Carolina Division of Marine Fisheries Coastal Recreational Fishing License Grant. 01/01/2016 11/30/2016. PI: **Cathey AM**

$29,042. Assessing Electronic Mobile Devices for the Collection of Recreational Fishing Data. National Marine Fisheries Service. 08/01/2013 12/15/2014. PI: **Cathey AM**

Select Presentations:

American Fisheries Society, 151st Annual Meeting. Baltimore Maryland, September 6-10, 2021.
Oral Presentation: Development of the SciFish Application, a Customizable Citizen Science Project Builder

American Fisheries Society, 151st Annual Meeting. Baltimore Maryland, September 6-10, 2021.
Oral Presentation: Minimizing Bias in Citizen Science

Cape Hatteras Surf Fishing Heritage Celebration - Cape Hatteras National Seashore (U.S. National Park Service), November 2, 2019. Oral Presentation: Trends in Recreational Surf Fishing on the Northern Outer Banks.

JULIA ISOBEL BYRD

1489 Littlerock Blvd.
Charleston, SC 29412
Hometown: Asheville, NC

Work: (843)302-8439
Cell: (828)215-1414
Email: julia.byrd@safmc.net

EDUCATION: UNIVERSITY OF CHARLESTON, SC, Charleston, SC
-**Masters of Environmental Studies**, December 2004

WAKE FOREST UNIVERSITY, Winston-Salem, NC
-**Bachelor of Science** in **Biology**, Minor in **Environmental Studies**, May 2000

WORK EXPERIENCE:

Citizen Science Program Manager, South Atlantic Fishery Management Council (SAFMC)
Charleston, SC, March 2019 – present

Adjunct faculty at the College of Charleston
Charleston, SC, 2020 to present

Southeast Data Assessment and Review (SEDAR) Coordinator, SAFMC
Charleston, SC, August 2012 – February 2019

Wildlife Biologist III, Office of Fisheries Management, South Carolina Department of Natural Resources
Charleston, SC, August 2005 – August 2012

MARMAP hourly, South Carolina Department of Natural Resources
Charleston, SC, April 2005 – August 2005

Intern, In-Water Sea Turtle Abundance Study, South Carolina Department of Natural Resources
Charleston, SC, May 2003 – August 2003 and May 2004 – September 2004

Education Coordinator, Conservation International
Washington, DC, January 2002 – July 2002

SELECT GRANT PROPOSALS FUNDED as PI or co-PI:

FY2024. Expansion of the FISHstory Citizen Science Project. Julia Byrd (SAFMC) and Dr. Jie Caio (NC State University). Atlantic Coastal Cooperative Statistics Program. $123,068.

FY2023. Expansion of the FISHstory Citizen Science Project. Julia Byrd (SAFMC) and Dr. Jie Caio (NC State University). Atlantic Coastal Cooperative Statistics Program. $121,076.

FY2022. SAFIS Expansion of the SciFish Customizable Fisheries Citizen Science Data Collection Application. Julia Byrd (SAFMC) and Dr. Andrew Cathey (NC Division of Marine Fisheries). Atlantic Coastal Cooperative Statistics Program. $116,182.

FY2021. SAFIS Expansion of Customizable Fisheries Citizen Science Data Collection Application. Julia Byrd (SAFMC). Atlantic Coastal Cooperative Statistics Program. $114,792.

FY2020. SAFIS Expansion of "*SAFMC Release*" and "*NC DMF Catch U Later*" Discard Reporting Applications. Atlantic Coastal Cooperative Statistics Program. $118,500.

FY2019. The FISHstory Project - Documenting historical catch and length estimates from historic photos in the for-hire sector using electronic data collection and imagery analysis platforms and crowdsourcing approaches. Julia Byrd (SAFMC) and Amber VonHarten (SAFMC). NOAA-Fisheries Information Systems. $75,000.

SELECTED PUBLICATIONS:

- Byrd, J. W.R. Collier, and A. Iberle. 2022. Designing the FISHstory project to support fisheries management. Fisheries: 44 (11): 492-498.
- Oremland, L., A. Furnish, J. Byrd, and R. Cody. 2022. How fishery managers can harness the power of the crowd: Using citizen science and non-traditional data sources in fisheries management. Fisheries: 44 (11): 459-462.
- Bonney, R., J. Byrd, J. T. Carmichael, L. Cunningham, L. Oremland, J. Shirk, and A. Von Harten. 2021. Sea Change: Using Citizen Science to Inform Fisheries Management. BioScience: 71(5): 519-530.
- Brown, S.K., M. Shivani, R. Koeneke, D. Agnew, J. Byrd, M. Cryer, C. Dichmont, D. Die, W. Michaels, J. Rive, H. Sparholt, and J. Weiberg. 2020. Patterns and practices in fisheries assessment peer review systems. Marine Policy: 117,103880.
- SEDAR. 2015. SEDAR Procedural Workshop 7: Data Best Practices. SEDAR, North Charleston, SC. 151pp. (editor).

SELECTED PROFESSIONAL PRESENTATIONS:

- Byrd, J. and J. Simpson. 2024. SciFish Platform & Policies. NOAA Enterprise Data Management Workshop. (Oral presentation.)
- Byrd, J., C. Collier, and M. Withers. 2023. Supporting Fisheries with Citizen Science: The South Atlantic Fishery Management Council's Approach. NOAA Central Library Seminar Series. (Oral presentation).
- Byrd, J. C. Collier, and A. Iberle. 2022. FISHstory, using citizen science to describe historic catches. SAFMC Seminar Series. (Oral presentation).
- Byrd, J. A. Iberle, C. Collier, D. Cathey, J. Simpson, F. Karp, B. Spain, K. Knowlton, and M. Bucko. 2021. Development of the SciFish Application, a customizable citizen science project builder. American Fisheries Society Annual Meeting. (Oral presentation).
- Byrd, J. C. Collier, and A. Iberle. 2020. The SAFMC's Citizen Science Program: Designing a program to support fisheries science and management decision making. American Fisheries Society Annual Meeting (held virtually). (Oral presentation).
- Byrd, J., J. Carmichael, and J. Neer. 2017. The Importance of Peer Review in SEDAR Stock Assessments. American Fisheries Society Annual Meeting, Tampa, FL. (Oral presentation).
- Carmichael, J., A. VonHarten, and J. Byrd. 2016. Efforts to Develop a South Atlantic Fishery Management Council Citizen Science Program. NOAA Fisheries Quantitative Ecology and Socioeconomics Training Program Webinar Series. (Webinar presentation).
- VonHarten, A. and J. Byrd. 2016. Building a Fishery Citizen Science Program in the U.S. South Atlantic to Improve Management and Policy. 4th International Marine Conservation Congress. (Oral presentation and helped facilitate focus group).

SELECTED HONORS:

- National Conservation Leadership Institute, Cohort 7 (2012-2013)
- Emerging Wildlife Conservation Leaders, Pilot Class (2005-2007)

SELECTED TRAININGS:

- Management Assistance Team (MAT) Leader as Communicator Training
- Smithsonian's Communication & Facilitation Skills for Conservation Managers Course
- Technology of Participation (TOP) Facilitation Methods
- NOAA Coastal Service Center Planning and Facilitating Collaborative Meetings
- Well's National Estuarine Research Reserve Coastal Training Program Collaborative Learning Workshop
- NOAA Coastal Service Center Project Design and Evaluation Workshop
- NOAA Coastal Service Center Public Issues and Conflict Management Workshop
- University of Maryland's Communicating Science Effectively Workshop
- Atlantic States Marine Fisheries Commission Basic Stock Assessment Workshop
- Atlantic States Marine Fisheries Commission Maximum Likelihood Modeling Workshop

PROFESSIONAL MEMBERSHIPS:

- Association for Advancing Participatory Sciences
- American Fisheries Society & SC Chapter of the American Fisheries Society
- ACCSP Operations Committee (2015-present) and SciFish Advisory Panel (2024)

Bold text indicates sections that help with the ranking process.
Yellow highlighted text indicates changes made from the initial proposal.

Contact

lauren.dolinger.few@gmail.com

www.linkedin.com/in/laurendolingerfew (LinkedIn)
www.st.nmfs.noaa.gov/st1/recreational/queries/ (Other)
www.countmyfish.noaa.gov/register/home.jsp (Other)

Top Skills

Data Policy
SAS (Programming Language)
Data Strategies

Lauren Dolinger Few

Data Manager at NOAA
Ellicott City, Maryland, United States

Summary

Specialize in integrating data management into program management. Develop and implement standards for survey methods and data management. Create applications for survey data management and collaborate across regions, agencies and sectors for data management needs. Communicate business requirements from partners, statisticians and other scientists for application development. Provide SAS analytical support to both internal staff and external partners, enhancing data-driven decision-making processes.

Experience

NOAA Fisheries

Data Management and Program Development Analyst
June 2003 - Present (21 years 1 month)
Silver Spring, MD

Identify and integrate data management requirements into overall program management.
Develop, implement, and monitor program-specific standards for survey methods and data management practices.
Educate and support scientists, analysts, and data managers on the importance and methodologies of data documentation (metadata).
Create and maintain applications to facilitate survey data management.
Collaborate with various departments and agencies on the development and management of databases for survey frames.
Work with regional partners and clients to ensure streamlined access to decentralized data sources.
Coordinate data management needs across multiple programs and agencies.
Communicate business requirements to the support team for application development.
Provide SAS analytical support to staff and external partners.

PBS&J

Senior Scientist
June 2000 - June 2003 (3 years 1 month)
Burtonsville, MD

Developed flexible programs and macros in SAS, Visual Basic and MS Access
Modeled fisheries populations under direction of statisticians
Extracted, transferred, and loaded data between ASCII, Excel, Access and SAS
Generated graphics, reports, and statistics primarily using SAS/Graph and SAS/Stat
Presented data using SAS, and VB graphical interfaces

URS Corporation
Senior Environmental Scientist
January 1996 - June 2000 (4 years 6 months)
Blue Bell, PA

Managed fisheries, chemical and environmental databases (Access, Excel)
Supervised data entry staff for fisheries independent program
Performed environmental and wetland investigations
Prepared summary statistics and wrote reports for clients

Education

Drexel University
M.S, Bioscience and Biotechnology · (1994 - 1997)

Long Island University
B.S, Environmental Biology · (1990 - 1994)

July 18th, 2024

Atlantic Coastal Cooperative Statistics Program

1050 N. Highland St. Ste. 200 A-N Arlington, VA 22201

Dear ACCSP:

We are pleased to submit the proposal titled “Port Sampling for the Maine Atlantic Halibut Fishery” for your consideration. This is a New Project proposal that will collect new data streams to better inform halibut stock assessment. We have also included a letter of support from Richard McBride, Chief of the Population Biology Branch at the Northeast Fisheries Science Center.

During the initial pre-proposal review process, we received no questions, though we have clarified on page 2 that the actual requested award amount is $30,805.00 versus the total project cost of $68,655.10 including DMR contributions.

For a summary of the proposal for ranking purposes, please see page 13. Please contact William DeVoe at the MEDMR with any questions. Thank you for your consideration of this proposal.

Sincerely,
William DeVoe
Marine Resources Scientist III
William.DeVoe@maine.gov
(207) 592-7084

Proposal for Funding made to:
Atlantic Coastal Cooperative Statistics Program
Operations and Advisory Committees
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22204

Port Sampling for the Maine Atlantic Halibut Fishery

Submitted By:
William DeVoe
Maine Department of Marine Resources
PO Box 8
W. Boothbay Harbor, ME 04575

Applicant Name:	Maine Department of Marine Resources
Project Title:	Port Sampling for the Maine Atlantic Halibut Fishery
Project Type:	New project
Principal Investigator:	William DeVoe (Maine DMR)
Requested Award Amount:	$30,805.00
Requested Award Period:	For one year, beginning after the receipt of funds
Date Submitted:	7/18/2024

Objective:

To improve the data on the stock structure and life history of Atlantic halibut by collecting otolith, maturity, genetic and morphometric data from halibut at dealer locations in Maine.

Need:

Atlantic halibut is an economically important species to many New England fishing communities but relatively little is known about its life history and stock structure. Atlantic halibut is managed by the United States and Canada as distinct stocks defined largely by the jurisdictional boundaries of each country (Shackell et al 2016). However, tagging data from multiple studies has shown that halibut migrate great distances and occupy waters of both countries. Additionally, recent genetic work has shown that Gulf of Maine, Scotian Shelf, and Grand Banks halibut are genetically homogeneous (Kess et al 2021). Halibut are listed as species of "Species of Concern" under the US Endangered Species Act; however, in Canada the fishery is certified as sustainable by the Marine Stewardship Council. A further cross-border disparity occurs in the legal size of halibut in the US vs Canada; in US waters, only halibut over 41 inches in length can be landed, while in Canada the minimum size limit is 32 inches. This dichotomy between management strategies necessitates further research be conducted to understand the nature of the Northwest Atlantic halibut stock.

Recent electronic tagging work conducted by Maine DMR has shown that halibut utilize multiple spawning areas ranging from the Northeast Channel in the Gulf of Maine to The Gully just south of the Laurentian Channel (where the Saint Lawrence River reaches continental margin). Spawning activity has been indicated by abrupt vertical rises of several hundred meters in archival depth time series during the December-February months. The location of the spawning activity has been determined using geolocation modeling and acoustic detections (Liu et al 2019, internal DMR research). Archival data has indicated that some halibut perform spawning rises for multiple subsequent years, yet others engage in skip spawning. This aligns with recent evidence of skip spawning from gonad histology (McBride et al 2022). Results from acoustic tags have indicated that some halibut migrate as far as The Gully and return to the Maine coast in the spring (internal DMR research). The results of this work have drawn further attention to the transboundary nature of Gulf of Maine halibut and the need for further studies on halibut stock structure.

While economically important, there remain many questions about the biology of halibut. Traditional trawl surveys are not ideal to capture halibut and thus provide limited opportunities to sample the species. As a result, Atlantic halibut are considered a data-poor species and are ranked as a high priority species (upper 25% of matrix) for biological sampling by the ACCSP Biological Review Panel. The current assessment model used for Atlantic halibut is a data-poor approach called the First-Second Derivative model which is unable to produce biological reference points or support an analytical determination of stock status. To improve the assessment capabilities for halibut, research efforts are needed to increase the biological understanding of this data-poor species. Tagging produces estimates of movement patterns

and spawning activity but provides no estimates of stock structure and can only estimate growth rates for adult fish. There is a need for updated age-length keys for halibut as well as maturity indices to inform a better stock assessment. In Maine, recent otolith work occurred as part of Julia Beaty's 2014 Master's thesis (Beaty 2014) and the work done by Richard McBride's team (McBride et al 2022), which also established methods to detect indicators of spawning activity and maturity from gonad histology. The proportion of the stock that is sexually mature over time is an essential component of a stock assessment.

Atlantic halibut occupy a preferred temperature range that may make them vulnerable to climate change as the Gulf of Maine continues to warm; additionally, their spawning areas occur in regions that may experience shifting current conditions due to climate change, such as the Northeast Channel. This could result in changes in the distribution patterns of larvae. The dynamic nature of the Gulf of Maine in the face of climate changes means that there is a constant need for updated data on all marine species, including halibut, to assess if changes in the distribution, range and population structure of the species are occurring.

Results and Benefits:

There are many benefits to collecting more biological samples from halibut. Collecting otolith samples will allow further age estimates of halibut landed in Maine, and will allow for the development of an age-length key for the state halibut fishery. This age data is crucial for estimating population structure, growth rates, and recruitment patterns, which are essential components of a stock assessment. Increasing the number of otolith samples would enhance the accuracy and precision of age determination, providing data needed to for an age based stock assessment, leading to more reliable stock assessments. Otoliths also provide information about the growth rates of individual halibut by measuring the distance between annuli. By sampling a larger number of otoliths, a more representative sample of the population and clearer picture of the species' life history traits will be obtained, which are vital for accurate stock assessment.

Gonad samples provide essential information about the reproductive potential of Atlantic halibut. Examining the size, maturity stage, and spawning indicators present in the gonads will provide insights into the reproductive health and potential of the population. This information is vital for estimating the reproductive output and the capacity of the Atlantic halibut population to sustain itself. Collecting more gonad samples would provide a larger dataset for assessing the reproductive potential, helping to identify any changes in reproductive patterns and potential impacts on population abundance. Specifically, gonad histology can reveal the proportion of landed halibut that are sexually mature and the sizes at maturity. Previous work (McBride et al 2022) has shown that the proportion of sexually mature halibut is increasing as the stock is expanding and aging; further gonad histology samples would allow this proportion to be recalculated over time, to inform stock assessment biologists if the stock is truly expanding. Richard McBride has included a letter of support for this proposal, noting that continual estimates of size at maturity is necessary to utilize the data-poor assessment tool

described in McBride et al 2022; moreover, in a rebuilding fishery, the size at maturity could increase over time and thus requires continual monitoring.

Halibut is currently managed on a Plan B assessment that does not allow for the estimation of reference points; therefore, currently the assessment is index-based only (NOAA 2022). One of the reference points necessary for a full assessment is Spawning Stock Biomass (SSB). However, even if SSB is known, this number is better informed by knowledge of the frequency of skip spawning within the population.

Analyzing the genetic information contained within halibut samples can reveal valuable insights into the population structure of Atlantic halibut. Genetic markers can help identify distinct subpopulations, migration patterns, and levels of gene flow. Understanding the population structure is crucial for an effective stock assessment, as it enables the identification of separate management units and helps estimate population size accurately. Increasing the number of genetic samples would improve the resolution of genetic analysis, leading to a more comprehensive understanding of the population structure of Atlantic halibut on both sides of the US-Canada border. The analysis of these genetic samples is being funded and led by Fisheries and Oceans Canada, and only requires the collection of genetic samples during port sampling. Previous genetic work by Fisheries and Oceans Canada has revealed large scale trends in the genetics of Northwest Atlantic halibut; specifically, only the Gulf of Saint Lawrence halibut were shown to be a genetically distinct stock as compared with the Gulf of Maine, Scotian Shelf, and Grand Banks regions (Kess et al 2021). Further genetic samples will be used to examine close-kin relationships between sampled halibut, which will be valuable for examining geographic connectivity within the population. This information will eventually be useful in the assessment process for determining stock delineation.

Morphology is an understudied aspect of halibut biology. Seasoned halibut fishermen will often note physical differences between halibut captured (“skinny long black ones”, “thick grey ones”) and some claim to be able to determine the sex externally by the morphology. However, only one study of halibut morphometrics occurs in the literature (Haug and Fevolden 1986). Image capture is a quick and effective method to capture multiple measurements from a single fish for morphometric analysis. Dealer locations are ideal for capturing these images, as the fish are deceased and on a stationary platform (vs an open boat). Analysis of halibut morphology may reveal patterns relating to sex, maturity, and origin that could be used to classify halibut from images instead of tissue samples. Recent work by the International Pacific Halibut Commission (IPHC) has discovered that halibut tail patterns can be used to identify individual fish (IPHC 2018); it is likely that other morphological markers relating to less-individualistic features (like sex and maturity) exist.

Halibut has a strong cultural and economic value in Maine, with participation by both commercial and recreational fishers. The fishery occurs at a time of year when lobstering has yet to pick up, and often provides needed income at a lean time of the year for fishing communities. The fishery in past years has produced $6 million of ex-vessel revenue in Maine. The State’s halibut fishery is also one of the few remaining open-access fisheries in the

Northeast. Continued sampling to monitor the halibut fishery and inform stock assessments is essential to maintaining this culturally and economically important fishery.

There are also regional benefits to improved halibut biological sampling. Halibut is managed by the New England Fisheries Management Council as a part of the Northeast Multispecies Fishery Management Plan. Participation in the federal halibut fishery is tied to a federal groundfish permit and participation spans multiple states, with New Bedford and Gloucester serving as two primary ports. Thus, while the proposed sampling is geographically focused on Maine, there are broader regional benefits that would result from an improved halibut assessment that supports a federal groundfish fishery.

In addition to the better inputs for stock assessments created by the above data streams, there is also the intrinsic value beyond commercial exploitation gained by increasing our understanding of the halibut species. Studying halibut helps us better understand their ecological role and contribution to marine ecosystems. Halibut are a significant predator in their habitats and interact with numerous prey species, and gaining insights into their biology enhances understanding of the broader marine ecosystem.

Data from this program will directly address ACCSP's priorities in the Ranking Guide for *"Biological Sampling"*; additionally, Atlantic halibut is listed on the Biological Review Panel Recommendations Based on Matrix, ranking in the top 5 species among those that are present in Maine.

Data Delivery Plan:

Data collected will be entered into DMR's MARVIN Oracle database, which is the standard data store for many DMR projects. Port sampling projects for several other fisheries in Maine already utilize this database.

All data collected as part of this project will be submitted on an annual basis to ACCSP for appropriate use by partner agencies.

Approach:

The percentage of project effort devoted to each of the ACCSP Program Priorities is as follows: 100% biological sampling.

DMR staff will sample halibut from dealer locations during Maine's state halibut season. Maine's state halibut fishery represents a unique opportunity to efficiently collect biological information as Maine's season is short in duration (May-June) but has higher participation per day than the federal fishery leading to more fish being present at dealer locations. The primary dealers for halibut landings will be identified using past dealer data; these dealers will be solicited before the state season begins to discuss ideal times for scheduling sampling trips and will also be consulted throughout the season to optimize the sampling schedule. DMR will hire

a halibut port sampling contractor whose primary job duty during the state halibut season will be obtaining halibut samples from dealers. The halibut biologist will also assist in this effort, as well as any other DMR sampling staff who may be available and willing. The port sampling contractor will also be trained on halibut otolith processing, otolith aging, histology, and image analysis.

Port sampling will collect several data elements to support better understanding of halibut biology. Total center line length will be taken for all halibut sampled. Additionally, an image of the fish over a scale grid will be taken for geometric morphometric analysis. Halibut will be examined for intact gonads, which are sometimes removed by harvesters. When available, the gonads will be removed for identification of halibut sex and maturity state; for female fish, a sample will be taken from the gonads for further histological examination. Gonad samples will be grossed, stored in cassettes preserved in formalin, and sent to a commercial lab for histological sectioning and mounting on slides. Otoliths will be removed for aging post-season. Lastly, genetic samples will be taken for a Fisheries and Oceans Canada project examining Atlantic halibut genetics and close kin relationships. DMR currently collects genetic samples for this project opportunistically during electronic tagging trips and the Maine-NH Inshore Trawl Survey, and this project is expecting to continue soliciting samples through 2025. Sex will be determined genetically for samples submitted for genetic analysis; this will be of benefit for samples where gonads were removed prior to the fish reaching the dealer, as no other method of sex determination will be available.

Since the number of gonads reaching dealer locations will be unpredictable, sample bottles will also be given to volunteer halibut fishermen to collect additional samples. Ten halibut fishermen throughout Maine will be solicited to provide gonad samples; if each participant is able to provide ten female samples, the targeted number of gonads (100) will be collected.

After the state season closes, the port sampling contractor and halibut biologist will work to process samples collected. Otolith samples will be sectioned, imaged, and aged in DMR's imagery lab. This proposal includes the purchase of additional equipment to support this effort, including an otolith saw and imaging system. Additionally, all otolith images will be run through the DeepOtolith tool (Politikos et al 2022) and potentially other otolith processing models to examine the accuracy of automated aging models vs human age readers; this could potentially provide more innovative and economically methods for aging halibut otoliths in future projects.

Female gonad samples will be imaged and examined to determine spawning condition following methods described in McBride et al 2022. This proposal includes costs for an external lab performing gonad histology, as well as the cost of a digital microscope for imaging gonad samples. Lastly, images of halibut will be analyzed to obtain morphometric measurements for subsequent analysis.

Results from the initial year of halibut port sampling will be disseminated in a final report to ACCSP. Results will also be shared with the New England Fishery Management Council's

Groundfish Plan Development Team, as well as the halibut stock assessment scientist at the Northeast Fishery Science Center.

Geographic Location:

The geographic scope of this project will cover dealers from throughout coastal Maine. These locations represent most of the Atlantic halibut landings in the United States. Between 2018-2022 the top five Maine ports for halibut landings were Portland, Machiasport, Port Clyde, Stonington, and Cutler.

Milestone Schedule:

Below is a schedule which outlines the work plan for halibut port sampling. Month 3 corresponds to March, which is the start of the ACCSP fiscal year.

	3	4	5	6	7	8	9	10	11	12	1	2
Prepare sampling data sheets/protocols	X											
Identify/interview primary halibut dealers	X											
Hire port sampling contractor		X										
Collect halibut samples from Maine ports			X	X								
Process samples including aging otoliths					X	X	X					
Semi-annual progress report							X					
Present results at AFS annual meeting							X					
Other exploratory analysis; automated otolith aging and morphometrics						X	X	X				
Final analysis of data from port sampling and draft final report								X	X	X		
Final report for first year of port sampling											X	

Project Accomplishments Measurement:

The following table outlines the project goals for the halibut port sampling program.

Project Goal	Measurement of Accomplishment
Collect samples from halibut dealers	Number of halibut sampled
Analyze otoliths to add to halibut age-length keys	Number of halibut otoliths analyzed
Analyze gonads to establish halibut sex and maturity level	Number of halibut gonads analyzed
Analyze images to examine halibut morphology	Number of halibut images analyzed
Communicate results of port sampling to inform management	Submission of final report to ACCSP, NEFSC, and Groundfish PDT

Budget Narrative:

Personnel and Fringe: The PIs time for 1 month of the year is included as an in-kind contribution. This includes both a 1/12 fraction of annual salary as well as fringe benefits. Benefits include retirement benefits, FICA, health insurance, dental insurance, workers compensation and life insurance.

Contracts: Two contracts are included. The first contract is for a 6-month contractor position that will assist in port sampling collection and subsequent processing of otoliths at the DMR lab. The second contract is for histological preparation of up to 100 gonad samples, with the expectation the amount collected may be less. These contracts are included as in-kind contributions.

Travel: All travel costs associated with the proposal will be covered by the MEDMR as in-kind contributions. Travel costs include the cost of lodging and per diems during actual port sampling work. Also includes is travel for two DMR staff to attend trainings in halibut otolith aging at MADMF. This will allow DMR staff to effectively age halibut otolith, and will also expand the number of available agers in New England beyond MADMF.

Capital Equipment: Included are the purchase of an additional otolith processing setup (saw and camera) as DMR's current otolith processing saw and camera are in full time use. A microscope for imaging gonad histological samples is also included.

Supplies: Includes a saw blade and fixture for the otolith saw, a camera setup for morphometric imaging, and various gonad/otolith sampling supplies like cassettes, formalin, and envelopes.

Cost Summary:

		ACCSP	DMR
Personnel:			
	Marine Resource Scientist III Salary 1 month	$0.00	$7,079.52
	Subtotal	*$0.00*	*$7,079.52*
Fringe:			
	Marine Resource Scientist III Benefits 1 month	$0.00	$2,106.58
	Subtotal	*$0.00*	*$2,106.58*
Contracts:			
	Temp Agency: Outdoor/Remote (4000 obj)	$0.00	$22,140.00
	Gonad Histology ($30/sample @ 100 samples max)	$0.00	$3,000.00
	Subtotal	*$0.00*	*$25,140.00*
Travel:			
	Port Sampling - Ferry	$0.00	$100.00
	Port Sampling - Lodging (10 overnight trips)	$0.00	$1,200.00

	Port Sampling - Per Diem Meals (30 day trips + 10 overnights)	$0.00	$1,560.00
	Otolith Aging Training at MADMF - Hotels (2 nights, 2 people)	$0.00	$428.00
	Otolith Aging Training at MADMF - Per Diem (2 days, 2 people)	$0.00	$236.00
	Subtotal	*$0.00*	*$3,524.00*
Capital Equipment (>$5k):			
Indirect Waived	TechCut 4 Precision Low Speed Otolith Saw	$5,900.00	$0.00
	Otolith Camera Setup	$12,000.00	$0.00
	Leica S9i HD Digital WiFi Microscope on LED Stand	$5,300.00	$0.00
	Subtotal	*$23,200.00*	*$0.00*
Supplies (<$5k):			
	Saw Bone Fixture	$250.00	$0.00
	Saw Blades	$1,600.00	$0.00
	Camera/tripod for morphology images	$2,000.00	$0.00
	gonad/otolith collection and processing supplies	$2,000.00	$0.00
	Subtotal	*$5,850.00*	*$0.00*
Other:			
	Subtotal	*$0.00*	*$0.00*
	Total Subtotal	**$29,050.00**	**$37,850.10**
	Total Subtotal (Indirect Applied To)	**$5,803.00**	
	30% Indirect	**$1,755.00**	
	Total Costs (including indirect)	**$30,805.00**	**$37,850.10**
		ACCSP	**DMR**

In-kind contributions include:
Below is a list of in-kind contributions to this proposal from Maine DMR.

Item	In-Kind Contribution
William DeVoe (1 month of staff time)	$9,186.10
Port Sampling Travel Costs	$2,860.00
Otolith Aging Training Travel	$664.00
Sampler and Histology Contracts	$25,140.00

The total DMR contribution of $37,850.10 divided by the total project cost of $68,655.10 equates to an in kind percentage of 55%.

References:

Armsworthy, Shelley L., and Steven E. Campana. 2010. "Age Determination, Bomb-Radiocarbon Validation and Growth of Atlantic Halibut (Hippoglossus Hippoglossus) from the Northwest Atlantic." *Environmental Biology of Fishes* 89: 279–95. https://doi.org/10.1007/s10641-010-9696-8.

Beaty, Julia M. 2014. "Assessing Growth and Habitat Preferences of Atlantic Halibut Off the Coast of Maine Using Biological Samples and Fishermen's Knowledge." Master's thesis, University of Maine Electronic Theses; Dissertations. 2110. https://digitalcommons.library.umaine.edu/etd/2110.

Haug, T., and S. E. Fevolden. 1986. "Morphology and Biochemical Genetics of Atlantic Halibut, Hippoglossus Hippoglossus (l.), From Various Spawning Grounds." *Journal of Fish Biology* 28 (3): 367–78. https://doi.org/10.1111/j.1095-8649.1986.tb05173.x.

Kess, Tony, Anthony L Einfeldt, Brendan Wringe, Sarah J Lehnert, Kara K S Layton, Meghan C McBride, Dominique Robert, et al. 2021. "A Putative Structural Variant and Environmental Variation Associated with Genomic Divergence Across the Northwest Atlantic in Atlantic Halibut." Edited by Lorenz Hauser 78 (7): 2371–84. https://doi.org/10.1093/icesjms/fsab061.

Liu, Chang, Crista Bank, Michael Kersula, Geoffrey W Cowles, Douglas R Zemeckis, Steven X Cadrin, and Christopher McGuire. 2019. "Movements of Atlantic Halibut in the Gulf of Maine Based on Geolocation." *ICES Journal of Marine Science* 76 (7): 2020–32.

McBride, Richard, and George Maynard, Scott Elzey, Daniel Hennen, Emilee Tholke, Jocelyn Runnebaum, and Christopher McGuire. 2022. "Evaluating Growth Dimorphism, Maturation, and Skip Spawning of Atlantic Halibut in the Gulf of Maine Using a Collaborative Research Approach." *Journal of Northwest Atlantic Fishery Science* 53 (October): 57–77. https://doi.org/10.2960/j.v53.m736.

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Politikos, Dimitris V., Nikolaos Sykiniotis, Georgios Petasis, Pavlos Dedousis, Alba Ordoñez, Rune Vabø, Aikaterini Anastasopoulou, et al. 2022. "DeepOtolith V1.0: An Open-Source AI Platform for Automating Fish Age Reading from Otolith or Scale Images." *Fishes* 7 (3): 121. https://doi.org/10.3390/fishes7030121.

Shackell, Nancy L., Kenneth T. Frank, Janet A. Nye, and Cornelia E. den Heyer. 2016. "A Transboundary Dilemma: Dichotomous Designations of Atlantic Halibut Status in the Northwest Atlantic." *ICES Journal of Marine Science* 73 (7): 1798–1805. https://doi.org/10.1093/icesjms/fsw042.

Summary of Proposal for ACCSP Ranking

Proposal Type: New

Proposal Primary Program Priority and Percentage of Effort to ACCSP modules:

Biological Sampling (8 points): Halibut port sampling will collect otolith, maturity, genetic and morphometric data from a traditionally data-poor species. These data steams may eventually be used to inform and improve the stock assessment process. Atlantic halibut is a priority species as defined by the Biological Priority Matrix, ranking within the top 10 species in the upper 25% of the matrix.

Data Delivery Plan (2 Points): All port sampling data will be submitted to ACCSP.

Project Quality Factors:

Regional Impact (5 points): Halibut port sampling will cover the entirety of Maine, which is a significant portion of the stock within the Gulf of Maine. Additionally, all data collected will be made available to ACCSP for partner use. Improved halibut biological sampling supports the broader Northeast multispecies fishery, whose participations span multiple states.

Contains funding transition plan / Defined end-point (4 points): This project aims to collect halibut port sampling data for 2025. This project has multiple off roads depending on outcome, including ending the project or funding from other sources.

In-kind contribution (4 points): the partner contribution of 55% is listed on page 10, equating to 3 points.

Improvement in data quality/quantity/timeliness (4 points): This project will improve the quality and quantity of biological data available on Atlantic halibut by collecting otolith, maturity, genetic and morphometric data.

Innovative (5 points): Halibut port sampling will combine tried and true methods of biological sampling such as otolith collection with newer and more innovative methodologies such as morphometrics and genetic samples.

Impact on stock assessment (3 points): Halibut port sampling will collect information on age-length, length at first maturity, sex ratio, and skip spawning frequency. All of these are informative to a better stock assessment. Additionally, this project will collect genetic samples which may inform insights into the broader stock structure of halibut across the Northwest Atlantic.

Other Factors:

Properly Prepared (5 Points): MEDMR followed ACCSP guidelines and pertinent documents when preparing this proposal.

William L DeVoe
Maine Department of Marine Resources
194 McKown Point Rd
Boothbay, Harbor, Maine
(207) 592-7084
William.DeVoe@maine.gov

Education

Hartwick College, Oneonta, NY.
B.A. Biology

Work Experience

Maine Department of Marine Resources, West Boothbay Harbor, ME.

Marine Resource Scientist III: Spatial Scientist, Technology Coordinator, Atlantic Halibut Biologist, July 2022 – present.

Marine Resource Scientist II: GIS & Oil Spill Response Coordinator, Atlantic Halibut Biologist, June 2017 – June 2022.

Marine Resource Scientist I: Water Quality Scientist, March 2017 – May 2017.

Marine Resource Specialist II (AC): Shoreline Survey Project Leader, October 2017 – March 2017.

Marine Resource Specialist I: Water Quality Specialist, May 2016 – September 2016.

East West Technical Services LLC (EWTS), ports out of New England states. May 2010 – Jan 2013
At-sea monitor

University of Iceland, Hólar, Iceland. August – September 2009.
Lake Ecology Field Technician

Garcia and Associates (GANDA), San Clemente Island, California. June – July 2009
Island Fox Field Technician

National Park Service, Grand Canyon, Arizona. March – June 2009.
Mexican Spotted Owl Observer

US Fish & Wildlife Service, Ray Brook, NY. May – August 2006.
Biological Technician, Sea Lamprey Control

Technical Skills

Data Science and Programming:

- Proficient in the use of ArcGIS and R to produce maps and process geospatial data.
- Focused experience in R using the tidyverse, sf, and raster packages for geospatial analysis, and the Shiny and Leaflet packages for web application development.
- Experience developing R packages for internal agency use.
- Experience interacting with Oracle and MS SQL Server databases using SQL, as well as higher-level languages like Python and R.
- Basic experience with HTML/CSS/JS.
- Experience programming Arduino-compatible microcontrollers using C++, including base Arduino boards, Adafruit variants, and Particle boards.
- Experience designing and building Arduino-based data loggers and sensors for use in the marine environment.
- Experience using version control for project management and collaboration, including Git and GitHub.

Field skills:

- Experience in small boat handling and trailering and marine navigation.
- Experience performing surgery on marine fish (Atlantic halibut) to embed archival and acoustic tags.
- Experience deploying acoustic receiver arrays.
- Skilled in conducting field work in backcountry and offshore environments.
- Proficient with carpentry hand and power tools, maintenance of shop power tools, and restoration/sharpening of hand tools.
- Electrofishing (backpack and deepwater), gill-netting, otter trawls, plankton tows, radio tracking/telemetry, PIT tagging, blood drawing, game calling, spotting scopes, remote cameras, and various other wildlife/fisheries associated technologies.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Science Center
166 Water Street
Woods Hole, MA 02543-1026

June 5, 2024

To Whom It May Concern,

I am writing in enthusiastic support for William DeVoe's proposal for "Port Sampling for the Maine Atlantic Halibut Fishery." The data-poor status of Atlantic halibut creates uncertainty around evaluating the status and trends of this fishery species. By all accounts, Atlantic halibut is rebuilding and we should be documenting what is likely a success story. His proposal will help with this.

In 2022, I published a synthesis of Atlantic halibut life history information (McBride et al. 2022). Our study demonstrates the capability of working with cooperating fishermen to improve the data availability for assessing this iconic species. Working with industry boosted our sample size tremendously and I am pleased to see Mr. DeVoe take this same approach.

With such large samples we were able to estimate a size at maturity and develop a data-poor assessment tool to track size of retained fish in this bycatch fishery (McBride et al. 2022; Figure 11). This tool suggested steady rebuilding of the population between the period 2009 – 2020. Robust, continued use of this tool, requires re-estimation of the size at maturity, because it would be predicted that size at maturity could increase over time in a rebuilding fishery (f.ex., summer flounder, Terceiro, 2024).

Our study, which was funded by NOAA's Saltonstall-Kennedy grant program, is complete. Thus, Mr. DeVoe offers the fresh opportunity to continue monitoring the life history of Atlantic halibut in the Gulf of Maine that is needed. We continue to sample fish from our Center's surveys, and we will be happy to share what we have, but our sample sizes are typically small (~ a dozen females per year). I know of no other group in this region sampling Atlantic halibut for life history data.

Our methods for maturity determination are spelled out in the supplemental materials of our paper, and I have been in regular contact with Mr. DeVoe over many years

now. I continue to be available for consultation if new samples lead to new questions about best practices or interpretation of gonads.

Sincerely yours,

Richard McBride, Ph.D.
Supervisory Research Fishery Biologist
Chief, Population Biology Branch

Citations.

McBride, R. S., Maynard, G. A., Elzey, S. P., Hennen, D. R., Tholke, E. K., Runnebaum, J. M., & McGuire, C. H. (2022a). Evaluating growth dimorphism, maturation, and skip spawning of Atlantic halibut in the Gulf of Maine using a collaborative research approach. *Journal of Northwest Atlantic Fishery Science, 53*, 57-77. doi:10.2960/J.v53.m736

Terceiro, M. (2024). The Summer Flounder Chronicles IV: four decades of population dynamics, 1976-2022. *Northeast Fisheries Science Center Reference Document 24-04*. doi:10.25923/6x52-6728

STATE OF MAINE
DEPARTMENT OF MARINE RESOURCES
MARINE RESOURCES LABORATORY
P.O. BOX 8, 194 MCKOWN POINT RD
W. BOOTHBAY HARBOR, MAINE
04575-0008

JANET T. MILLS
GOVERNOR

PATRICK C. KELIHER
COMMISSIONER

July 25, 2024

Atlantic Coastal Cooperative Statistics Program
1050 N. Highland St. Ste. 200 A-N
Arlington, VA 22201

Dear ACCSP:

We are pleased to submit the proposal titled "Expanding the Commercial Fisheries Research Foundation's Black Sea Bass Research Fleet into the Gulf of Maine" for your consideration. This new project proposal will provide funding to support adding Maine fishing vessels using lobster gear and/or hook and line gear to the Commercial Fisheries Research Foundation's (CFRF) Black Sea Bass Research Fleet. The data collected from this project will expand the biological sampling for black sea bass into Maine state waters. Black sea bass has been identified as the highest priority species for additional biological sampling according to the ACCSP Biological Review Panel and this project will provide data on the spatial and temporal distribution of black sea bass in Maine as well as provide data on sizes of black sea bass that are being seen in the Gulf of Maine.

The Maine Department of Marine Resources does not currently have the funding to support this type of data collection for black sea bass. Current fishery-independent surveys encounter black sea bass; however, they use gear that may not effectively capture black sea bass and occur at times of the year when black sea bass may not be migrating or in high abundance in the Gulf of Maine. The expansion of CFRF's research fleet would pilot a fishery-dependent sampling program for black sea bass. CFRF's research fleet is a proven, efficient, and cost-effective way to collect biological information on black sea bass. This proposal addresses the following 2025 ranking criteria: biological sampling, data delivery plan, regional impact, funding transition plan, in kind contribution, improvement in data quality and timeliness, potential secondary module as by-product in catch and effort, impact on stock assessment, innovative, properly prepared, and merit.

For a summary of the proposal for ranking purposes please see page 14. Thank you for your consideration of this proposal.

Sincerely,

Rebecca Peters
Marine Resource Scientist IV
Rebecca.j.peters@maine.gov
(207) 557-5276

Proposal for Funding made to:
Atlantic Coastal Cooperative Statistics Program
Operations and Advisory Committees
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22204

Expanding the Commercial Fisheries Research Foundation's Black Sea Bass Research Fleet into the Gulf of Maine

Submitted By:

Rebecca Peters
Maine Department of Marine Resources
PO Box 8
W. Boothbay Harbor, ME 04575

Hannah Verkamp
Commercial Fisheries Research Foundation
P.O. Box 278
Saunderstown, RI 02874

Applicant Name: Maine Department of Marine Resources, Bureau of Marine Science and the Commercial Fisheries Research Foundation

Project Title: Expanding the Commercial Fisheries Research Foundation's Black Sea Bass Research Fleet into the Gulf of Maine

Project Type: New Project

Requested Award Amount: $61,275.50

Requested Award Period: March 1, 2025 – February 28, 2026

Primary Program Priority: Biological Sampling

Date Submitted: 7/25/2024

Principal Investigators: Rebecca Peters, Marine Resource Scientist IV, Maine Department of Marine Resources

Jesica Waller, Marine Resource Scientist IV, Maine Department of Marine Resources

Corrin Flora, Marine Resource Management Coordinator, Maine Department of Marine Resources

Hannah Verkamp, Senior Research Associate, Commercial Fisheries Research Foundation

N. David Bethoney, Executive Director, Commercial Fisheries Research Foundation

Objective:

The goal of this proposed project is to pilot the expansion of the Commercial Fisheries Research Foundation's (CFRF) Black Sea Bass Research Fleet into the Gulf of Maine by adding five vessels from the lobster fleet and hook and line industry in Maine State waters through a partnership with Maine Department of Marine Resources (ME DMR). This project aims to cover the biological (100%) module.

The species distribution of black sea bass has expanded northward; however, little is known about the leading edge of this black sea bass biomass in the Gulf of Maine. To enhance biological data collection in an under-sampled region and support sustainable management of the stock, ME DMR requests funds to support a pilot project in which Gulf of Maine vessels are added to the CFRF Black Sea Bass Research Fleet. Sampling through CFRF is possible year-round; however, ME DMR anticipates the greatest sampling effort will take place in the summer, corresponding to when fishermen are participating in other fisheries.

Specific objectives of the project include:

- Expand the CFRF Black Sea Bass Research Fleet into the Gulf of Maine, an under-sampled area, with the addition of five vessels.
- **Improve the quantity of biological data collected on black sea bass in the Gulf of Maine, thereby supporting the stock assessment and sustainable management of the stock.**
- Better characterize the black sea bass biomass off Maine's coast, including understanding the northern extent of black sea bass, their size distribution, and seasonal patterns.
- **Establish a fishery-dependent sampling program that will lay the foundation for improved management of black sea bass in Maine as the species biomass is expected to increase.**
- **Transmit black sea bass biological data to ACCSP and communicate results with partners**.

Need:

Black sea bass is a species that has become synonymous with the impacts of environmental change on spatial distribution. The 2023 Research Track Assessment for black sea bass found that the range of black sea bass has shifted poleward, with relative increases in biomass in the northern region and stable biomass levels in the southern region[1]. Further, spatiotemporal modeling of trawl survey data found that the effective area occupied by black sea bass in the northern region has increased, indicating black sea bass have experienced "a general northeastward shift in center of gravity with a range expansion in the Gulf of Maine" [2]. Given the expanding black sea biomass in the northern region; the shift to higher landings by states such as New York, Rhode Island, and Massachusetts over the last 15 years[3]; and the fact that

[1] Report of the Black Sea Bass *(Centropristis striata)* Research Track Stock Assessment Working Group. 2023. Page 12.
[2] Report of the Black Sea Bass *(Centropristis striata)* Research Track Stock Assessment Working Group. 2023. Page 39.
[3] Report of the Black Sea Bass *(Centropristis striata)* Research Track Stock Assessment Working Group. 2023. Page 57.

New Hampshire recently declared an interest in black sea bass via the Atlantic States Marine Fisheries Commission, it is highly likely that black sea bass are off of Maine's coast and will be increasing in biomass.

Black sea bass have been identified as the highest priority species for additional biological sampling according to the ACCSP Biological Review Panel. This is in part driven by the limited data on black sea bass at their northern extent. ME DMR has very little information on the black sea bass resources in its waters, including how far east black sea bass can be found in the Gulf of Maine, the size distribution of black sea bass off Maine's coast, and their seasonality. This type of information will be critical to effectively manage a fishery in the future. The Research Track Assessment made significant advancements to incorporate spatial patterns into the assessment model, including developing regionally specific age-length keys. However, the Assessment Report noted that while there were efforts to determine whether growth in the Gulf of Maine differed from the broader northern region, there was insufficient age and length data from the Gulf of Maine to support this analysis.[4]

As the range of black sea bass expands, sampling efforts must be initiated at the leading edge of the range. Existing fishery-independent trawl surveys can serve as a starting point; however, the timing of these surveys in the spring and fall are often mis-aligned with the presence of black sea bass in the Gulf of Maine, which are thought to be most prominent in the summer. Ventless trap surveys are another source of potential data and were recently explored in the Research Track Assessment; however, it was determined that a longer time-series is needed before this data can be incorporated as indices of abundance.

Fishery-dependent data represents another avenue to collect data on the leading end of a species' range expansion. While Maine has no substantial directed fishery for black sea bass, there is significant commercial fishing effort throughout state waters. The extensive footprint of Maine's fisheries in both time and space provides a unique opportunity to broadly conduct sampling. Some lobstermen, such as those in Maine's western lobster zones, anecdotally report black sea bass bycatch in their traps, indicating that the species is present in portions of the state.

This proposal seeks to pilot a fishery-dependent sampling program for black sea bass by expanding the CFRF Black Sea Bass Research Fleet into the Gulf of Maine. The CFRF Research Fleet approach is a proven, efficient, and cost-effective way to collect biological information. It leverages fishermen participation to effectively collect information on landings and discards. Data collected through the CFRF Research Fleet was considered in the recent Research Track Assessment, and size information on discarded fish as well as age-length data were incorporated to support expanded discard-at-lengths and the development of age-length keys. There is currently no participation from the Gulf of Maine in the CFRF Black Sea Bass Research Fleet. As a result, this proposal would support enhanced sampling of black sea bass in an under-sampled region, while also collecting baseline data that will be essential to support future management in Maine. **Further, the proposal will directly address a high priority research recommendation in the Research Track Assessment to**

[4] Report of the Black Sea Bass *(Centropristis striata)* Research Track Stock Assessment Working Group. 2023. Page 28.

enhance sampling to support estimation of fishery length and age compositions, with an emphasis on spatial coverage.[5]

Results and Benefits:

The results of this proposed project are:

- Improved quantity of biological data for black sea bass in the Gulf of Maine.
- Expanded data collection via a proven method that allows for sampling outside of the spring and fall trawl surveys.
- Increased biological data being sent to ACCSP via an established process for data transmission with CFRF.

The benefits of this proposed project are:

- **Address ACCSP's highest priority species for biological sampling, black sea bass, to support assessment and management efforts.**
- Fill data gaps on the leading edge of the black sea bass spatial distribution.
- Involve fishermen in the collection of biological data and support strong partnerships between fishermen, scientists, and managers.
- **Support partner collaboration between ME DMR and CFRF by expanding regional extent of an existing fishery-dependent data fleet to which many jurisdictions contribute.**
- **Support future improvements to the black sea bass stock assessment model by collecting biological data from an under sampled region.**
- Support sustainable management of black sea bass at various levels, including ME DMR and via the interstate fishery management plan at ASMFC and MAFMC.

Data Delivery Plan:

This project includes a data delivery plan through which CFRF will regularly share data with ACCSP, ME DMR, fishing industry participants, stock assessment scientists, and managers. CFRF already has an established data sharing process for data collected via the Black Sea Bass Research Fleet and this pilot project will follow the same process.

Vessels participating in the pilot Gulf of Maine Black Sea Bass Research Fleet will utilize the CFRF's custom fishery dependent data collection application On Deck Data. Data collected via the application will be uploaded and integrated into the existing CFRF SQL database like all existing Research Fleet participants. CFRF staff will audit data regularly and perform quality control checks. Project staff from ME DMR will be granted database credentials to view and export data collected by the five Gulf of Maine vessels supported by this project. **CFRF will include the data collected by this project in their ongoing biannual data submissions to ACCSP, which occur in January and July**. A vessel ID system will be used to maintain the confidentiality of participant fishing vessels. The CFRF will maintain open communication with the ACCSP data coordinator and will remain available to provide any necessary metadata along with data submissions. The data submission format and process were established in consultation with ACCSP staff, and all data collected by the existing Black Sea Bass Research Fleet has been

[5] Report of the Black Sea Bass *(Centropristis striata)* Research Track Stock Assessment Working Group. 2023. Page 120.

successfully transmitted and accepted into the ACCSP bio samples database. In addition, fishing industry participants will retain joint ownership of the data they collect. CFRF will send participants quarterly data reports in the same manner as existing Research Fleet participants receive. The quarterly reports contain summaries of the data collected by each participant, and participants can request all of the raw data they have collected at any time. Finally, **data collected via this pilot program will be made available to fishery scientists at the NEFSC in support of future stock assessment work**.

Approach:

The proposed project seeks to collect, communicate, and analyze critically needed biological, catch, and bycatch data on northern Atlantic black sea bass. Project components include: 1) Leveraging the project approach established by the CFRF Black Sea Bass Research Fleet 2) Collection of fishery-dependent biological (sex and length) black sea bass data and fishery characteristics for up to 12 months in the Gulf of Maine region; 3) Internal data analysis to address research questions about spatiotemporal patterns in the black sea bass population and fishery; 4) Compilation and communication of project data and results to ACCSP, stock assessment scientists, and fisheries managers; and 5) Outreach and education activities to share findings. Methodological details are outlined below.

Participant Selection:

Project staff will distribute a call for applications to participate in this pilot project from commercial fishing vessels in their networks. For the purposes of this one-year pilot project, applications will be solicited only from fishermen who operate in Maine state waters, ranging from the New Hampshire border to the western end of Penobscot Bay, and utilize lobster pots (lobster fishery) or hook and line gear. Interested fishermen will submit an application (developed by the CFRF) that will be reviewed by the project PIs. This initial pilot project will select five vessels to participate in data collection based on areas fished, months fished, familiarity with the species of focus, and experience with biological data collection and collaborative research, with final approval by project PIs. We are aiming to start with five vessels for data collection to pilot this project in year one with hopes of adding more vessels to the Research Fleet in following years. We are starting with only a small number of vessels to provide initial data on black sea bass and hope this initial start will then also recruit interested fishermen in the future to participate if data shows that fishery-dependent sampling in Maine provides data on black sea bass catch and distribution.

Participant Training

To ensure project participants have access to local project staff for support, CFRF project staff will initially train ME DMR project staff on Research Fleet sampling protocols and data collection using the CFRF's custom data collection application, One Deck Data. CFRF will also provide ME DMR with all necessary sampling supplies for participants. ME DMR will then be primarily responsible for the day-to-day tasks associated with training and supporting Research Fleet participants. Prior to data collection, ME DMR staff will meet with selected participants in person for a training session, which will include an overview of the project, use of the tablet and data collection application, sampling requirements, and invoicing procedures, and to provide them with sampling supplies. Participants will be compensated with a one-time training stipend upon completion of training. This stipend will serve as an incentive to attend the training and

will provide funds to the vessels in the instance that no black sea bass are caught during fishing efforts in the pilot year.

Data Collection

Project staff will apply for a Special License from ME DMR to allow participant vessels to sample black sea bass from Maine state waters. Once participants have received training, they can sample black sea bass during commercial fishing activities on an opportunistic basis. The black sea bass data collection application, On Deck Data, was developed in the first year of the CFRF's Black Sea Bass Research Fleet project to enable participants to collect standardized black sea bass data. On Deck Data will be leveraged by this pilot project to streamline and standardize data collection within the existing database. Participating fishermen will use Samsung Galaxy tablets pre-programmed with the On Deck Data application to efficiently and accurately record and transmit data. As such, the proposed project will also continue to advance the use of electronic technology in at-sea biological data collection, management, and analysis efforts.

When participants choose to sample black sea bass from their catch, they will initialize On Deck Data and begin a sampling session, which is defined as one fishing gear haul in one location. The sampling date, time, and location will be automatically recorded by the internal tablet GPS and calendar. The app will then prompt participant fishermen to record the NOAA statistical area, depth, habitat type, target species, gear type, effort deployed (Table 1), and the total number/pounds of black sea bass retained and discarded. Participants will then record the length, sex, and disposition (kept or discarded) of individual black sea bass. Standardized fish measuring boards will be used to ensure a consistent measure of fish total length to the nearest centimeter. Upon completion of the sampling session, the data will be stored in the tablet's internal storage. Once connected to WI-FI, participants will then wirelessly upload the data to a MySQL database owned and managed by CFRF. Data uploads will be continually monitored by the project team. This data communication, review, management, and storage process was established and vetted during the first year of the CFRF's Black Sea Bass Research Fleet.

Table 1. Summary of fishing effort data collected by the Black Sea Bass Research Fleet.

Commercial Hook & Line	**Lobster/ Crab Traps**
Time Spent Fishing (hours)	Soak Time (days)
Number of Rods Fished	Number of Traps
Humber of Hooks Used	Escape Vent Size (inches)
	Escape Vent Shape

The goal for current Black Sea Bass Research Fleet participants in Southern New England and the Mid-Atlantic region is to conduct three at-sea sampling sessions per month, with a target of 50 individual black sea bass sampled per sampling session (resulting in a target of 150 black sea bass sampled per month). The realized sampling frequency, however, varies widely as it depends on a variety of factors, including weather, seasonal black sea bass distribution and catch, and fishery status. For this pilot project, we will maintain this sampling target for the Gulf of Maine

vessels. At the conclusion of the pilot year, PIs will evaluate if this goal is feasible based on project results and participant feedback. Participants will be compensated with a sampling stipend each month they catch and sample black sea bass. Stipend amounts will remain the same as current Black Sea Bass Research Fleet stipends. Participants will receive $600 each month they sample at least half of the targeted number of black sea bass (75 fish). Stipends will be prorated to $300 if the number of sampled fish is at least one but less than 75 fish. Participants will submit invoices to CFRF each month they sample, and CFRF will distribute stipends directly to participants.

Internal Data Analysis:

The data collected during this pilot project will be used to better characterize the biology, catch, bycatch, and fishery characteristics of black sea bass in the GOM region. After the pilot year of the project, PIs will conduct exploratory analyses on the gear-specific and spatiotemporal patterns in catch composition and determine which further analyses may be warranted. As described in the Data Delivery Plan, data will also be regularly shared with ACCSP, participant fishermen, stock assessment scientists, and fisheries managers for further analysis and application.

Outreach:

Education, outreach, and ongoing communication are an integral part of the overall work plan for the proposed project. These components support the goal of fostering collaborative working partnerships among scientists, managers, and members of the fishing industry through all phases of research, as well as the goal of ensuring the project is as impactful as possible.

As described previously, project staff will share project information and data with a variety of interest groups, including the commercial fishing industry, stock assessment scientists, fisheries managers, state and federal agencies, and outside researchers who are interested in using the Research Fleet data or learning more about its methods. To ensure the project is widely accessible and impactful, the CFRF will integrate information about this pilot project on their existing Black Sea Bass Research Fleet webpage (https://www.cfrfoundation.org/black-sea-bass-fleet), which contains an overview of the project's background, objectives, and outcomes. Additionally, the CFRF will prepare a project summary document to be displayed online, at the Commercial Fisheries Center of Rhode Island, and at industry events attended by the CFRF or ME DMR. Project updates will be shared across the CFRF's social media platforms, which have a combined audience of over 2,300, as well as in at least two posts in the CFRF's monthly newsletter, which is sent to over 1,800 subscribers. Further, the project methods and results may be shared at a relevant scientific or management conference. Finally, project staff will host a meeting with members of the research, management, and fishing industries upon completion of the pilot project to share project results, discuss participant experiences, and highlight priorities for moving forward.

This pilot project is within the following program priority module: Biological sampling.

Geographic Location:

This proposed project would take place in Maine state waters, ranging from the New Hampshire border to the western end of Penobscot Bay. The focus of sampling in the western half of Maine

reflects where ME DMR believes black sea bass are more likely within the State and is informed by anecdotal information from fishermen. Should the pilot project indicate the presence of sea bass throughout the study region, future work could include sampling in the eastern half of the State.

Milestone Schedule:

Month	1	2	3	4	5	6	7	8	9	10	11	12
Submit permit to MEDMR	x											
Purchase supplies, recruit, and train industry members for GOM BSB fleet sampling	x	x	x									
BSB fleet data collection			x	x	x	x	x	x				
Data QA/QC and analysis			x	x	x	x	x	x	x	x		
Write and submit progress report							x					
Submit data to ACCSP					x						x	
Report writing										x	x	x

Project Accomplishments Measurement Metrics:

Project Goal	Metrics
Expand CFRF Black Sea Bass Research Fleet into the Gulf of Maine	• Number of vessels engaged in research fleet • Number of months data is collected
Improve quantity of black sea bass biological data collected in the Gulf of Maine in support of future stock assessments	• Numbers of biological data collected (e.g. length, sex)
Better characterize black sea bass biomass off Maine's coast	• Assess spatial and seasonal extent of black sea bass sampled in Maine research fleet • Assess size distribution of black sea bass sampled by Maine research fleet • Compare catches and lengths from CFRF's research fleet to MEDMR fishery independent surveys
Transmit black sea bass biological data to ACCSP	• Successful transmission of biological data from CFRF to ACCSP

Cost Summary (Budget and Budget Narrative):

		ACCSP	DMR-In kind
Personnel:			
	Marine Resource Scientist I - TBD		$12,551.00
	Marine Resource Scientist IV – Rebecca Peters		$4,732.00
	Marine Resource Scientist IV – Jesica Waller		$5,719.00
	Subtotal		*$23,002.00*
Fringe:			
	Marine Resource Scientist I - TBD		$8,357.00
	Marine Resource Scientist IV – Rebecca Peters		$3,678.00
	Marine Resource Scientist IV – Jesica Waller		$3,310.86
	Subtotal		*$15,345.86*
Contracts:			
	subaward/contract to CFRF	$45,835	
	Subtotal	*$45,835*	
Travel:			
	Training travel	$1300	
	Subtotal	*$1300*	
	Total Subtotal	$47,135.00	$38,347.86
	30% Indirect	$14,140.50	
	Total Costs (including indirect)	$61,275.50	

The budget justification for the proposed budget is below:

A. Personnel and fringe: $38,347.86 In-kind (MEDMR). ME DMR staff will play an advisory and support role in the proposed project by recruiting and training the vessels for the project. Staff will be trained by CFRF staff on data sampling procedures and will in turn train the vessel captains and crew on sampling protocols for the survey. They will also coordinate and set up each volunteer vessel with sampling equipment and be available to answer questions. ME DMR staff (Marine Resource Scientist I) will analyze the data produced from this project to evaluate spatial and seasonal trends in the black sea bass catch and will present this data to industry and appropriate management and technical working groups. Fourteen days a year of time will be spent by the Marine

Resource Scientist IVs overseeing and supporting this project by assisting in coordinating training and supervising the Marine Resource Scientist I with data analysis. The Marine Resource Scientist I will spend a week of their time a month within the year analyzing data and writing reports, coordinating and assisting with trainings for the vessels that are sampling, and coordinating with CFRF staff for data sharing.

B. Contracts: $45,835.00 ME DMR will provide a subaward to the Commercial Fisheries Research Foundation for this project so they can provide ME DMR the training, supplies, and support necessary for this sampling. Data collected from this project is automatically uploaded to CFRF's database and staff will also assist in sharing the data back to ME DMR for additional analysis. CFRF staff will also be responsible for submitting data to ACCSP following their current protocol for data submission with their Black Sea Bass Research Fleet.
C. Travel - $1,300.00 Travel to CFRF offices for an incoming Marine Resource Scientist I and a supervisor from ME DMR for two days of training on the sampling protocols, data collection application, database structure, and related considerations.
D. Indirect: $14,140.50 The Department of Marine Resources has an indirect cost rate of 34.3%; however, our Commissioner has authorized this proposal to use the lower rate of 30% (see attachment 1). These indirect funds are a necessity to help defray and offset the administrative costs associated with this project and the associated contracts.

Attachment 1: Negotiated Indirect Cost Agreement

Department of Marine Resources

INTEROFFICE MEMORANDUM

TO: FILE

FROM: PATRICK KELIHER, COMMISSIONER

SUBJECT: RATE USED FOR COST ALLOCATION

DATE: 6/6/2024

In accordance with OMB Circular A-87, the Department of Marine Resources has submitted to the U.S. Department of Commerce a departmental cost allocation plan for use during state fiscal year 2024 ending June 30, 2024. The indirect cost rate proposal is 33.70%. I am authorizing the use of the lesser rate of **30%** to be used during this period.

ACCSP Annual RFP
"Expanding the Commercial Fisheries Research Foundation's Black Sea Bass Research Fleet into the Gulf of Maine"
(March 1, 2025 – February 28, 2026

6/10/24

Patrick C. Keliher Date
Commissioner

The budget and justification for the contract/subaward with CFRF is below:

	Object Class Category	Proposal Cost
a	Personnel	
	- Executive Director (1% of time)	$ 1,600
	- Research Scientists (15% of time)	$ 10,635
	- Business Manager (1% of time)	$ 604
	Total CFRF Personnel Costs	$ 12,839
b	Fringe Benefits Proposed at 10% of Personnel Costs	$ 1,284
c	Travel	$ 1,500
d	Equipment	$ -
e	Supplies	
	- Research Supplies Tablets, waterproof cases, stylus, fish measuring boards (5 sets @$500 each)	$ 2,500
	- Office Supplies Database storage, meeting expenses, etc.	$ 250
	Total Supplies	$ 2,750
f	Contractual	
	- Programmer for On-Deck Data database	$ 500
	Total Contractual	$ 500
g	Construction	$ -
h	Fishing Vessels -5 vessels in fleet for 12 months	
	- Monthly sampling stipends - $600/month @50% sampling rate	$ 18,000
	- Training stipends - $250/vessel one time	$ 1,250
	Total F/V Stipends	$ 19,250
i	Total Direct Charges	$ 38,123
j	Indirect Charges Proposed at 20.23% of CFRF Direct Charges	$ 7,712
k	Total Proposal Costs	$ 45,835

CFRF subaward budget justification*:*

The total proposed budget requested by the Commercial Fisheries Research Foundation (CFRF) for all components of the work is $45,835 for 12 months. The proposed timeframe is March 1, 2025 to February 28, 2026. The proposed budget justification for all cost items includes the following:

a. Personnel: $12,839. This includes the wages for the following CFRF personnel for time spent working directly on the project:
    1. Executive Director – $1,600. D. Bethoney, CFRF Executive Director, will oversee the project's administration, team communication/coordination, field research, and

outreach aspects. He will also directly assist with reports, outreach material development, and communication of project progress and results to the team and fishing industry.
Proposed at 1.0% of time = $160,000 x 1% = $1,600

2. Research Scientists – $10,635. The CFRF Research Scientists will be the primary individuals responsible for the fleet organization, maintenance, and support, as well as data management, communication, and analysis. They will also support the Executive Director in project oversight tasks.
Proposed at 15% of time = $70,900 x 15% = $10,635.
3. Business Manager – $604. T. Winneg, CFRF Business Manager, will carry out all the finance-related aspects of the project, including research budget tracking, invoice processing, administrative support tasks, and purchasing supplies.
Proposed at 1.0% of time = $60,400 x 1.0% = $604

b. Fringe Benefits: $1,284. This includes a percentage of Personnel Costs for payroll taxes and worker's compensation insurance prorated in accordance with the percentage of salary paid from the program. Benefits are proposed at 10% of personnel costs based on 2023 benefits and historical analysis.

c. Travel: $1,500. Travel costs for two project staff to travel to Boothbay Harbor, Maine, to train and share results with industry and other project participants as needed. Costs include mileage (265 miles x $0.67 x 2 = $355), lodging ($325/night x 2 = $650), per diem ($59 x 2 days x 2 = $236) and incidentals ($259).

d. Equipment: $0.

e. Supplies: $2,750. This includes costs for project materials for field work, fleets, project meetings, outreach events, and other miscellaneous supplies.

1. Project Office Supplies $250. Costs to cover supplies for meetings and outreach materials, including mailings, binders, and posters. Proposed at $250.
2. Research Supplies $2,500. Costs of at-sea research supplies, including tablets, tablet cases, and fish measuring boards. Proposed total of 5 sets at $500 per set.

f. Contractual: $500. This includes the following costs:
1. Don Coxe Consulting $500. Costs to maintain or modify the On-Deck Data App.

g. Construction. $0. Not applicable.

h. Other Costs: $19,250. This includes the following costs:

1. Fishing Vessel Stipends $18,000. A fleet of 5 vessels will be utilized each month to obtain the proposed biological samples. The total stipend is computed at 50% due to fluctuations in vessel sampling associated with weather, vessel maintenance, and seasonal black sea bass distribution. The costs are proposed for 5 vessels for 12 months at $600 per month at a sampling rate of 50%. (5 vessels x 12 months x $600 x 50% = $18,000)

2. Fishing Vessel Training Stipends $1,250. Each vessel will receive a training stipend of $250.

i. Total Direct Charges: $38,123. This is the total direct charges for cost items a-h.

j. Indirect Charges: $7,712. Indirect general and administrative costs are calculated as 20.23% of the requested Total Direct Charges. Indirect general and administrative costs are used to cover costs associated with the general operations of the CFRF, including accounting services, legal services, maintenance of office space, liability insurance, payroll fees, phone/fax lines, internet service, board member participation, etc. The CFRF Indirect Cost Rate Agreement for FY2025 is 20.23% dated 5/6/24 based on FY2023 actuals.

k. Total Proposal Costs: $45,835.

Funding Transition Plan:

This proposal is for a one-year pilot study to pilot the commercial fishing industry-based Black Sea Bass Research Fleet approach to collect biological and fishery data on black sea bass in the Gulf of Maine. If successful, the project team will apply for additional funding to continue and expand data collection beyond the first year (pilot phase). Project staff from the Commercial Fisheries Research Foundation have previously been successful at piloting the Black Sea Bass Research Fleet in Southern New England and the Mid-Atlantic through ACCSP and securing maintenance funding through ACCSP to continue Black Sea Bass Research Fleet data collection for an additional six years (the maximum allowed through ACCSP). Since then, project staff have secured Congressionally Directed Spending funding to maintain the Black Sea Bass Research Fleet's data collection in Southern New England and the Mid-Atlantic for an additional five years.

Summary of Proposal For Ranking Purposes

Project Type: New

Primary Program Priority *(10 pts)**:*** Biological Sampling

Data delivery plan (2 pts): This project includes a data delivery plan through which CFRF will regularly share data with ACCSP, ME DMR, fishing industry participants, stock assessment scientists, and managers.

Project Quality Factors

Multi-Partner/Regional Impact (3 pts):

This proposal includes a partnership between the Maine Department of Marine Resources, the Rhode Island based Commercial Fisheries Research Foundation, and the Gulf of Maine pot/trap and hook and line fisheries. The results of the proposed project have regional impacts and broad applications, as black sea bass are expanding to inhabit and potentially be harvested from the majority of the US east coast. This project will test the benefit of expanding CFRF's Black Sea Bass Research Fleet to the Gulf of Maine as a way to gain a better understanding in the distributional shift in black sea bass populations. Current fishery-independent surveys that occur in Maine state waters have encountered black sea bass in low numbers, potentially due to the fact these surveys do not cover the habitats black sea bass prefer an/or do not overlap with the timing black sea bass are in coastal Maine waters. Furthermore, the social and economic implications of this work could be extensive, as project data will contribute to the improvement of the northern Atlantic black sea bass stock assessment and management.

Contains Funding Transition Plan (4 pts):

This proposal contains a funding transition plan to evaluate the success of the pilot project and, if deemed appropriate, apply for long-term funding to continue data collection.

In-Kind Contribution (2 pts):

This proposal includes 38% in kind contribution which equates to points.

Improvement in Data Quality/Quantity/Timeliness (4 pts):

This project will fill data gaps for black sea bass, which are ranked as a high-priority species with inadequate biological sampling by ACCSP. The project will increase fishery-dependent data for the northern stock of black sea bass as a whole as well as specifically increase data in the Gulf of Maine which is currently under sampled for black sea bass. Data will be available for stock assessment and management efforts in near real-time.

Potential Secondary Module as a By-Product (3 pts):

Catch and Effort: This project will start collecting black sea bass catch data in the Gulf of Maine by two industries: lobster pot and hook-and-line. This project will provide insight into the potential availability and catch of legal sized black sea bass by these industries.

Impact on Stock Assessment (3 pts):

Biological data from the Commercial Fisheries Research Foundation's Black Sea Bass Research Fleet was included in the 2023 Research Track Stock Assessment and is currently being included in the 2024 Management Track Stock Assessment for northern black sea bass (NEFSC 2023). The data is used in the assessment model to inform discards-at-length and catch-at-age estimates. As the Research Fleet is now a vetted input for the stock assessment, all biological data collected in this pilot project will be shared with stock assessment scientists moving forward to be directly included in the stock assessment. Research Fleet data is also being evaluated to contribute to a fishery-dependent index of abundance for northern black sea bass, which could be included in future assessments.

Other factors

Innovative (3 pts):

This project will utilize the innovative fishing-industry based Research Fleet approach, which is a demonstrated cost and time-efficient method to collect large amounts of fishery-dependent data for under sampled species and species undergoing rapid changes, such as black sea bass (Heimann *et al.,* 2023). The data from this project will help determine if current fishery-independent surveys are accurately representative of the presence of black sea bass in the Gulf of Maine through comparison of catches from this project to the current surveys ongoing in Maine.

Properly Prepared (1 pt):

This proposal follows the guidelines provided in the ACCSP Funding Decision Document.

Merit (3 pts): The pilot project we propose here would fill a high priority data gap using the already established CFRF Black Sea Bass Research Fleet. This collaboration between CFRF and ME DMR would promote sustainable management of this key indicator species and provide baseline data and framework for potential expansion of this program. ME DMR is always looking to efficiently fill data gaps in support of robust fisheries management.

References

Heimann, T., Verkamp, H., McNamee, J. and Bethoney, N.D. 2023. Mobilizing the fishing industry to address data gaps created by shifting species distribution. Frontiers in Marine Science, 10, p.1043676.

Northeast Fisheries Science Center (NEFSC). 2023. Report of the Black Sea Bass (*Centropristis striata*) Research Track Stock Assessment Working Group. https://apps-nefsc.fisheries.noaa.gov/saw/sasi.php

Rebecca Peters
Maine Department of Marine Resources
rebecca.j.peters@maine.gov

Related Experience

Marine Resource Scientist IV October 2023
Maine Department of Marine Resources, West Boothbay Harbor, ME

- Director for the Division of Ecology and the Environment within the Bureau of Marine Science that oversees research programs surrounding offshore wind, highly migratory species, the ME-NH Inshore Trawl Survey, Maine Coastal Mapping Initiative, halibut, and technology advancements for programs within DMR.

Marine Resource Scientist II March 2018-October 2023
Maine Department of Marine Resources, West Boothbay Harbor, ME

- Groundfish Biologist and lead scientist of the Maine-New Hampshire Inshore Trawl Survey

NOAA Sea Grant Knauss Fellow February 2017–January 2018
NOAA Fisheries Office of Science and Technology

- Served as the habitat and ecosystem science coordinator for NOAA Fisheries Office of Science and Technology's Habitat Science program as a NOAA Sea Grant Knauss Fellow
- Updated NOAA Fisheries' Habitat Assessment Improvement Plan to align goals with Ecosystem Based Management, supported the Ecosystem Science and Management Working Group of the NOAA Science Advisory Board, and coordinated a workshop and report to develop recommendations to improve NOAA Fisheries' ability to conduct benthic habitat mapping on fishery survey vessels
- Managed the FY18 Habitat Information for Stock Assessments call for proposals

Research Assistant June 2014 – January 2017
University of Maryland Eastern Shore

- Developed and conducted a research project to assess habitat preference and potential site fidelity of juvenile black sea bass in the Maryland Coastal Bays for completion of a master's degree Thesis titled: "Investigations into the ecology of juvenile black sea bass, *Centropristis striata,* in the Maryland coastal bays"
- Examined spatial and temporal distribution in abundance of black sea bass in the Maryland juvenile finfish trawl survey from 1989-2013
- Supervised two interns during completion of research projects

Education

M.S. Marine, Estuarine, and Environmental Science December 2016
University of Maryland Eastern Shore, Princess Anne, MD

- Thesis title: "Investigations into the ecology of juvenile black sea bass, *Centropristis striata,* in the Maryland coastal bays"

B.S. Biology December 2012
Old Dominion University, Norfolk, VA

Selected Publications and Technical Memos

- Waller, J., Bartlett, J., Bates, E., Bray, H., Brown, M. , Cieri, M., Clark, C., DeVoe,, W. Donahue, B., Frechette, D., Glon, H., Hunter, M., Huntsberger, C., Kanwit, K., Ledwin, S., Lewis, B., **Peters, R**, Reardon, K., Russell, R., Smith, M., Uraneck, C., Watts, R., Wilson, C. 2023. Reflecting on the recent history of coastal Maine fisheries and marine resource monitoring: the

value of collaborative research, changing ecosystems, and thoughts on preparing for the future. ICES Journal of Marine Science. https://doi.org/10.1093/icesjms/fsad134

- LaFreniere, B.R., **Peters, R.,** Donahue, B., McBride, R., Mohan, J.A. 2023. What the Hake? Correlating Environmental Factors with Hake Abundance in the Gulf of Maine. Journal of Northwest Fishery Science. In review.
- Chapman, E.J., Byron, C.J., Lasley-Rasher, R., Lipsky, C., Stevens, J.R., **Peters, R**. 2020. Effects of climate change on coastal ecosystem food webs: implications for aquaculture. Marine Environmental Research. 162. https://doi.org/10.1016/j.marenvres.2020.105103.
- **Peters, R.**, A.R. Marshak, M.M. Brady, S.K. Brown, K. Osgood, C. Greene, V. Guida, M. Johnson, T. Kellison, R. McConnaughey, T. Noji, M. Parke, C. Rooper, W. Wakefield, and M. Yoklavich. 2018. Habitat Science is a Fundamental in an Ecosystem-Based Fisheries Management Framework: An Update to the Marine Fisheries Habitat Assessment Improvement Plan. U.S. Dept. of Commerce, NOAA. NOAA Technical Memorandum NMFS-F/SPO-181, 29p.
- **Peters, R.** and P. Chigbu. 2017. Spatial and Temporal Patterns of Abundance of Juvenile Black Sea Bass (*Centropristis striata*) in the Maryland Coastal Bays. Fishery Bulletin. 115(4): 504-516. Doi: 10.7755/FB.115.4.7

Selected Presentations

- **Peters, R**. E. Bates, J. Waller, and C. Guenther (2023, August). "Who's eating juvenile lobsters?": An evaluation of lobster predation in the Gulf of Maine using stomach content analysis. 153rd American Fisheries Society Annual Meeting, Grand Rapids, MI.
- Marshak, A.M., S.K. Brown, and **R. Peters.** (2017, August). Habitat Science is an Essential Element of Ecosystem-Based Fisheries Management. 147th American Fisheries Society Annual Meeting, Tampa, FL.
- **Peters, R.** and P. Chigbu (2016, February). Temporal Variation in Juvenile and Young-of-the-Year Black Sea Bass Abundance in the Maryland Coastal Bays. Ocean Sciences Meeting, New Orleans, LA.

Boards and Committees

- NERACOOS Board – December 2023-present
- Maine Climate Council Coastal and Marine Working Group Staff, 2019-present
- ASMFC NEAMAP Operations Committee, Vice chair, April 2018-present
- ASMFC NEAMAP Survey Technical Committee, April 2018-present
- NEFMC Groundfish PDT, March 2019-present

Awards and Fellowships

- 2017 NOAA Sea Grant John A. Knauss Marine Policy Fellowship
- American Fisheries Society Tidewater Chapter Eileen Setzler-Hamilton Memorial Scholarship (April 2016)
- NSF CREST-CISCEP Graduate Research Assistantship (2014-2016)

Jesica Waller
Maine Department of Marine Resources
(207) 350-6440
Jesica.d.waller@maine.gov

PROFILE:

- Knowledge and oversight of the State of Maine's programs to research, monitor, and compile data from commercial and recreational coastal marine fisheries. This includes coordination of research plans across programs and with external research partners.
- Knowledgeable of Maine's fishing industries and how they operate.
- Knowledgeable about state and federal funding structures to support this work.

EDUCATION:

B.S. Marine and Freshwater Biology, University of New Hampshire, Durham, NH 2009
M.S. Marine Biology, University of Maine, Orono, ME 2016

EMPLOYMENT EXPERIENCE:

July 2022 – Present **Marine Resource Scientist IV**
Maine Department of Marine Resources
West Boothbay Harbor, ME

- Division Director for the Division of Biological Monitoring and Assessment
- Oversee fishery monitoring and research for commercially important marine species
- Lead research around emerging fisheries and climate related topics
- Supervise a staff of 35 MEDMR researchers and maintain external collaborations
- Hire, train, and supervise research staff and students supported by MEDMR programs
- Write research proposals to federal agencies to obtain funding for MEDMR programs
- Coordinate the drafting and submission of all federal grant reporting requirements
- Conduct research and analyses, and write and review reports on timely research questions
- Work with diverse stakeholders to coordinate research in support of MEDMR priorities
- Represent MEDMR on state, regional, and federal research panels
- Advise senior staff on issues ranging from new research findings to funding opportunities

March 2018 – July 2022 **Marine Resource Scientist III**
Maine Department of Marine Resources
West Boothbay Harbor, ME

- Lead question-based lobster research to support the management of the Maine lobster fishery
- Build research collaborations, submit proposals for funding and author research publications
- Co-develop the MEDMR wet lab and serve as the point person for biosecurity
- Represent MEDMR at regional meetings, research conferences, and the Maine Climate Council
- Coordinated the MEDMR Lobster Research Collaborative and organized quarterly meetings

Jan. 2017 – March 2018 **Research Technician**
Bigelow Laboratory for Ocean Sciences
East Boothbay Harbor, ME

- Designed and performed laboratory and field experiments for grant funded projects
- Contributed to authorship of peer-reviewed publications and federal/state grant proposals
- Led field and lab-based data collection for multiple projects with no supervision
- Supervised and developed research projects for summer undergraduate interns

Sept. 2014 – Dec. 2016 Graduate Student and Canadian American Center Fellow
University of Maine (UMaine), Darling Marine Center
Walpole, ME

- Thesis title: Linking Rising pCO_2 and Temperature to the Larval Development, Physiology and Gene Expression of the American Lobster (*Homarus americanus*)
- Completed all thesis research and coursework and secured fellowship funding annually

Selected Publications

1. **Waller, J.,** Bartlett, J., Bates, E., Bray, H., Brown, M., Cieri, M., ... & Wilson, C. (2023). Reflecting on the recent history of coastal Maine fisheries and marine resource monitoring: the value of collaborative research, changing ecosystems, and thoughts on preparing for the future. *ICES Journal of Marine Science*, *80*(8), 2074-2086.
2. Ellertson, A. A., **Waller, J. D.,** Pugh, T. L., & Bethoney, N. D. (2022). Differences in the size at maturity of female American lobsters (*Homarus americanus*) from offshore Southern New England and eastern Georges Bank, USA. *Fisheries Research*, *250*, 106276.
3. McClenachan, L., Record, N. R., & **Waller, J. D**. (2022). How do human actions affect fisheries? Differences in perceptions between fishers and scientists in the Maine lobster fishery. *FACETS, 7*(1), 174-193.
4. **Waller, J. D**., Reardon, K. M., Caron, S. E., Jenner, B. P., Summers, E. L., & Wilson, C. J. (2021). A comparison of the size at maturity of female American lobsters (*Homarus americanus*) over three decades and across coastal areas of the Gulf of Maine using ovarian staging. *ICES Journal of Marine Science*, *78*(4), 1267-1277.
5. **Waller, J.D**., Reardon, K.M., Caron, S.E., Masters, H.M., Summers, E.L. & Wilson, C.J. (2019). Decrease in size at maturity of female American lobsters *Homarus americanus* (H. Milne Edwards, 1837) (Decapoda: Nephropidae) over a 50-year period in Maine, USA. *Journal of Crustacean Biology*, *39*(4), 509-519.
6. **Waller, J. D.,** Wahle, R. A., McVeigh, H., & Fields, D. M. (2017). Linking rising pCO_2 and temperature to the larval development and physiology of the American lobster (*Homarus americanus*). *ICES Journal of Marine Science*, *74*(4), 1210-1219.

Synergistic Activities

2021-present *Steering Committee Member,* Maine Ocean and Coastal Acidification Partnership
2021-present *Advisory Committee Member*, Dalhousie University (PhD student, M. Rampual)
2021-present *Reviewer*, *Journal of Crustacean Biology*
2019-present *Agency support,* Maine Climate Council, Coastal and Marine Working Group
2019-present *Reviewer*, *Canadian Journal of Fisheries and Aquatic Sciences*
2018-2022 *Coordinator*, Maine Department of Marine Resources Lobster Research Collaborative
2017-present *Reviewer*, *ICES Journal of Marine Science*

Corrin Flora
Maine Department of Marine Resources
corrin.flora@maine.gov

RELATED EXPERIENCE

Marine Resources Management Coordinator – *Maine Department of Marine Resources, Augusta, ME* **February 2024 – Present**

- Provide policy guidance to department staff, plan and facilitate meetings, public outreach, creating documents, communicating with a wide range of stakeholders and division management.
- Attend and participate in Atlantic States Marine Fisheries Commission and federal council interjurisdictional management meetings, work groups, committees, and teams as needed. Write reports, compliance, plans, and comments. Review and comment on management and rule documents.
- Manage state ground fish permit bank through cooperation with Maine sectors and NOAA fisheries.

Fisheries Management Plan Coordinator - *North Carolina Division of Marine Fisheries, Morehead City, NC* **June 2020 – February 2024**

- Provide leadership and policy guidance throughout the division fishery management plan (FMP) process; including planning and facilitating meetings, public outreach, creating documents, communicating with a wide range of stakeholders and division management, and decision making.
- Develop and ensure FMP schedules and timelines are maintained following internal FMP guidelines. Communicate with staff to facilitate tasks, anticipate problems, and recommend solutions. This includes providing alternative suggestions to how to meet deadlines.
- Hold a monthly virtual meeting to keep DMF staff informed on the status of FMPs.
- Coordinate and participate in Director's Review Team, advisory committees, cross-sectional programs, FMP schedule, strategic planning, meetings, public engagement, and biologist training.
- Serve on committees and workgroups in absence or support of Section Chief.

Biologist I - *North Carolina Division of Marine Fisheries, Elizabeth City, NC* **JUNE 2015 - JUNE 2020**

- Lead biologist for Atlantic Menhaden, Blue Crab, and Invasive Species.
- Member of The Gulf and South Atlantic Regional Panel on Aquatic Invasive Species, Atlantic State Marine Fisheries Commission technical committees, the NC Aquatic Nuisance Species Plan Development Team, and Plan Development Teams.
- Program lead for fisheries-independent and fisheries-dependent surveys
- Member of several division biological review teams; including gear, life history, and commercial fisheries.
- Field work conducting fish/crab house sampling; onboard sampling using water quality monitoring equipment, acoustic monitoring and water quality sondes, trawls, and gillnets; trailering and operating small vessels; and tagging fish. Support fishery data collection.
- Analyze and summarize data for reports, stock assessments, and FMPs using SAS, SQL, Microsoft Excel, PowerPoint, and Word. Using multivariate analysis and modeling to assist in data analysis.

Biological Science Laboratory Technician - *USDA ARS, Stoneville, MS* **JUNE 2013 - JUNE 2015**

- Prepare and maintain fish culture tanks used in research projects through all catfish life stages. This includes light plumbing, biological security, proper cleaning, feeding, monitoring fish health, anesthetizing fish, euthanizing fish, and proper animal handling.
- Coordinate and implement experimental setup, breakdown, and data collection/maintenance.

- Assist in necropsies, biopsies, tissue sampling, sample preparations, and morphological, biochemical, histological, and physiological measurements or analysis.
- Calibrate, perform maintenance, and properly operate laboratory equipment; including spectrophotometers, ion analyzers, osmometers, centrifuges, freezers, and incubators.

Biologist: Vessel Call-in Coordinator - *Integrated Statistics, Falmouth, MA* **JUNE 2006 - JUNE 2011**

- NOAA Fisheries Northeast Fisheries Science Center Industry Funded Scallop Observer Program Vessel Call-In Coordinator. Review, catalog, and select coverage of declared scallop trips through randomized selection process for fair, equitable, and representative coverage. Monitor coverage and compliance across various areas and permit types. Communicate with service providers and the office of law enforcement as needed.
- Prepare outreach materials
- Attend New England Fisheries Management Council, Scallop Committee, and Scallop Plan Development Team meetings as needed. Provide guidance on sea scallop management plans.
- Participate in at sea surveys and commercial scallop trips.

Commercial Fisheries Observer - *AIS inc, New Bedford, MA* **MARCH 2004 - MARCH 2005**

- Accompany commercial fishing operations on 1 to 14 day trips. Record information on vessel, gear, catch/discard information, species identification, measurements, and biological samples.
- Record incidental takes of marine mammals, sea turtles, and sea birds.

EDUCATION

M.S. Wildlife, Fisheries, and Aquaculture, Mississippi State University, Mississippi State, MS - *2013*
B.S. Marine Science, Southampton College Long Island University, Southampton, NY - 2003

SELECTED PAPERS

- Anstead, KA, K Drew, D Chagaris, A Schueller, JE McNamee, A Buchheister, G Nesslage, JH Uphoff Jr, MJ Wilberg, A Sharov, MJ Dean, J Brust, M Celestino, S Madsen, S Murray, M Appelman, JC Ballenger, J Brito, E Cosby, C Craig, C Flora, K Gottschall, RJ Latour, E Leonard, R Mroch, J Newhard, D Orner, C Swanson, J Tinsman, E Houde, TJ Miller, H Townsend. The Path to an ecosystem approach for forage fish management: A case study of Atlantic menhaden. Frontiers in Marine Science, 8 (2021):491.
- Peterson, BC, C Flora, M Wood, BG Bosworth, S Quiniou, TE Greenway, TS Byars, DJ Wise. Vaccination of full-sib channel catfish families against enteric septicemia of catfish with an oral live attenuated Edwardsiella ictalurid vaccine. Journal of the World Aquaculture Society. 47(2). (2016)
- Baker, BH, R Kröger, JD Prevost, T Pierce, JJ Ramirez Avila, JM Prince Czarnecki, D Faust, C Flora. A field scale investigation of nutrient and sediment reduction efficiencies of a low-technology best management practice: low-grade weirs. Ecological Engineering, 91 (2016):240-248.
- Flora C., Kröger K. Use of vegetated drainage ditches and low-grade weirs for aquaculture effluent mitigation: I. Nutrients Aquaculture Engineering 60 (2014) 56-62
- Flora C., Kröger K. Use of vegetated drainage ditches and low-grade weirs for aquaculture effluent mitigation: II. Suspended Sediment Aquaculture Engineering 60 (2014) 68-72
- Kröger R., Prevost D., Littlejohn T., Henderson J., Pierce S., Flora C., Poganski B. Evidence towards sediment accumulation characteristics of slotted pipes as best management practices on agricultural landscapes. Ecological Engineering 51 (2013) 249-255

Hannah J. Verkamp

Commercial Fisheries Research Foundation
hverkamp@cfrfoundation.org
(401) 515-4892

Education

Master of Science, Marine Science. University of New England, Biddeford, ME

Bachelor of Science, Biological Sciences, *summa cum laude*. University of Arkansas, Fayetteville, AR.

Relevant Work Experience

Senior Research Associate February 22, 2024 – Present
Commercial Fisheries Research Foundation
61B East Farm Rd Kingston, RI 02881

- Leading the foundation's research on black sea bass and supervising research biologists
- Developing, managing, and evolving all phases of fisheries research projects
- Managing outreach activities for all of the organization's research projects, including tracking deliverables and reporting to funding agencies
- Expanding and improving the organization's outreach program to reach broader audiences and include new Diversity, Equity, and Inclusion initiatives
- Continuing duties described for the Research Biologist position below

Research Biologist February 21, 2021 – February 21, 2024
Commercial Fisheries Research Foundation
61B East Farm Rd Kingston, RI 02881

- Collaborated with internal and external stakeholders, including scientists, fishing industry members, and fisheries management professionals, to develop and lead research projects
- Collected fishery, biological, and environmental data at-sea and on-land
- Reviewed data and performed quality control/quality assurance checks
- Used statistical programs such as R, SQL, and Excel to manage and analyze data and produce publication-quality figures and tables
- Led meetings and workshops with fishery stakeholders, including fishermen, state and federal agencies, fishery managers, and other academic and nonprofit institutions
- Reported findings and managing deliverables for research projects
- Wrote grant proposals, reports, and scientific publications
- Communicated audience-appropriate scientific, technical, and programmatic information orally and in written format to a variety of audiences

Selected Publications

Verkamp HJ, Heimann T, McNamee J, Jones A, and Bethoney ND. (2023). An Overview of the Commercial Fisheries Research Foundation and Rhode Island Department of Environmental Management Black Sea Bass Research Fleet: A Working Paper for the 2022 Black Sea Bass Research Track Stock Assessment. Report of the Black Sea Bass (*Centropristis striata*) Research Track Stock Assessment Working Group.

Heimann T, McNamee J, **Verkamp HJ**, Bethoney ND. (2023). Mobilizing the Fishing Industry to Address Data Gaps Created by Shifting Species Distribution. *Frontiers in Marine Science,* 10, https://doi.org/10.3389/fmars.2023.1043676

Verkamp HJ, Nooij J, Helt W, Ruddock K, Gerber Williams A, McManus MC, Bethoney ND. (2022). Scoping Bay Scallop Restoration in Rhode Island: A Synthesis of Knowledge and Recommendations for Future Efforts. *Journal of Shellfish Research*, 41(2): 153-171, https://doi.org/10.2983/035.041.0201

Verkamp HJ, Hammerschlag N, Quinlan J, Langan JA, and Sulikwoski JA. (2022). Preliminary investigation of reproductive hormone profiles in the blacktip shark (Carcharhinus limbatus), a placental viviparous species, in southern Florida. *Marine and Freshwater Research*, 73(4), 8pp. doi.org/10.1071/MF21235

Verkamp HJ, Skomal G, Winton M, and Sulikowski JA. (2021) Using reproductive hormone concentrations from the muscle of white sharks (*Carcharodon carcharias*) to evaluate life stage and potential habitat use in the coastal waters of Cape Cod, Massachusetts. *Endangered Species Research*, 44: 231-236 doi.org/10.3354/esr01109

Selected Presentations

Verkamp, HJ, McNamee, J, and Bethoney ND. (2024). Empowering fishermen to fill data gaps for a rapidly changing fishery: The Black Sea Bass Research Fleet. World Fisheries Congress. Seattle, WA. Poster.

Verkamp HJ, Huntsberger C, Bethoney ND. (2023). Augmenting an offshore wind farm monitoring survey to incorporate biological condition monitoring. Annual Meeting of the American Fisheries Society. Grand Rapids, MI. Poster.

Verkamp HJ, Heimann T, McNamee J, Bethoney ND. (2021). Using a fishery-dependent research fleet approach to characterize the composition of black sea bass (*Centropristis striata*) discards in the Southern New England and Mid-Atlantic fishery. Annual Meeting of the American Fisheries Society. Baltimore, MD. Oral.

Verkamp HJ, Skomal G, Winton M, Sulikowski JA. (2019) First observations of reproductive hormone concentrations in white shark (*Carcharodon carcharias*) skeletal muscle tissue. Joint Meeting of Ichthyologists and Herpetologists. Snowbird, UT. Oral.

Dr. NAIFF DAVID BETHONEY
Executive Director
Commercial Fisheries Research Foundation
P.O. Box 278
Saunderstown, RI
401-515-4662, dbethoney@cfrfoundation.org

EDUCATION:

University of Massachusetts at Dartmouth School for Marine Science and Technology
PhD Dissertation: Understanding and avoiding River herring and American shad bycatch in the Atlantic herring and mackerel mid-water trawl fisheries.
Cum. GPA: 3.92 PhD Received 2013

MA Thesis: Association between diet and epizootic shell disease in the American lobster (*Homarus americanus*) around Martha's Vineyard
Cum. GPA: 3.93 M.S. Received 2010

Colby College - Waterville, ME
Major: Biology with Concentration in Environmental Science
Cum. GPA: 3.41, Cum Laude B.A. Received 2008

RECENT WORK EXPERIENCE:

- Commercial Fisheries Research Foundation Spring 2020-Presesent

Executive Director: Responsible for overseeing foundation business manager, scientific staff, interns, and consultants to carry out all tasks associated with ongoing projects and general administration. In addition, responsible for pursuing new partnerships and projects, including proposal development and submission, under the advisement of the foundation Board of Directors. Served on New England Fishery Management Council's Sea Scallop Survey Working Group and serves as a Responsible Offshore Science Alliance research advisor and on the Rhode Island Marine Fisheries Council.

- UMASS-Dartmouth School for Marine Science and Technology Fall 2008-Spring 2020

Research Assistant Professor, Fall 2014-Spring 2020: All responsibilities of research associate position related to drop camera and herring work with the ability to be lead principal investigator on research proposals and serve on student committees.

Research Associate, Summer 2013-Summer 2014: All responsibilities of research assistant position described below with management and development responsibilities for scallop drop camera and groundfish video surveys. Management responsibilities include equipment purchasing and maintenance and oversight of all technical operations and student involvement.

Research Assistant, Summer 2010- Spring 2013: Major responsibilities included coordinating River Herring bycatch avoidance program, assisting the Massachusetts Division of Marine Fisheries port side sampling program, and scallop drop camera survey at-sea data collection and analysis.

Graduate Research Assistant, Fall 2008-2010: Assisted with American lobster research including lobster husbandry, measuring and photographing lobsters, collecting larvae, and setting up housing apparatuses.

SCIENTIFIC JOURNAL PUBLICATIONS (LAST 3 YEARS):

1. Huntsberger CJ, Shank B, McManus MC, Ellertson AE, Bethoney ND. 2024. Industry reported biological data informs population demographics and commercial fleet heterogeneity for American lobster (Homarus americanus). Fisheries Research. 273. DOI: 10.1016/j.fishres.2024.10695

2. Arnott SA, Long MP, Ellertson AE, Bethoney ND. 2023. American lobster and Jonah crab populations inside and outside the Northeast Canyons and Seamounts Marine National Monument, USA. Marine and Coastal Fisheries 15(5). DOI: 10.1002/mcf2.10266.

3. Olsen NA, Bahr F, Bethoney ND, Mercer AM, Gawarkiewicz G. 2023. Integrating fishers' knowledge with oceanographic observations to understand changing ocean conditions in the Northeast United States. Frontiers in Marine Science. 10:1144178.

4. Heimann T, Verkamp HJ, McNamee J, Bethoney ND. 2023 Mobilizing the fishing industry to address data gaps created by shifting species distribution. Frontiers in Marine Science. 10:1043676.

5. Verkamp HJ, Nooj J, Helt W, Ruddick K, Gerber-Williams A, McManus MC, Bethoney ND. 2022. Scoping bay scallop restoration in Rhode Island: a synthesis of knowledge and recommendations for future efforts. Journal of Shellfish Research 41(2):153–171

6. Ellertson AE, Waller JD, Pugh TL, Bethoney ND. Differences in the size at maturity of female American lobsters (Homarus americanus) from offshore Southern New England and eastern Georges Bank, USA. 2022. Fisheries Research. DOI: 106276

GRANTS RECEIVED AS A PRINCIPAL INVESTIGATOR (LAST YEAR):

1. "Exploring the creation of a new seafood market segment that would enhance the resiliency of small-scale commercial fishing industry in Rhode Island — March 2024
   Awarded from: University of Rhode Island
   Value: $28,387
2. "Mechanical jigs for resilience of sustainable fishing to wind farm development" — January 2024
   Awarded from: New York State Energy Research and Development Authority
   Value: $354,337
3. "Research Agreement" (Squid jigging research) — January 2024
   Awarded from: Park City Wind LLC
   Value: $50,000
4. "Research Agreement" (Squid jigging research) — January 2024
   Awarded from: Commonwealth Wind LLC
   Value: $50,000
5. "FY 2024: Advancing Fishery Dependent Data Collection for Black Sea Bass (Centropristis striata) in the Southern New England and Mid-Atlantic Region Utilizing Modern Technology and a Fishing Vessel Research Fleet Approach" — January 2024
   Awarded from: Rhode Island Department of Environmental Management
   Value: $43,635
6. "Monitoring Technologies for Ghost Gear and Ecosystem Biodiversity" — December 2023
   Awarded from: University of Rhode Island
   Value: $515,000
7. "Determining the dose- and range-dependent impacts of windfarm noise on stress in the American lobster" — September 2023
   Awarded from: Woods Hole Oceanographic Institution
   Value: $19,820
8. "Fishermen on the frontlines of addressing modern ocean problems" — September 2023
   Awarded from: National Oceanic and Atmospheric Administration
   Value: $500,000
9. "Fostering the development of automatic squid jigging" — September 2023
   Awarded from: University of Rhode Island
   Value: $29,621
10. "Reducing small scallop and sand dollar catch through dredge bag modifications" — June 2023
    Awarded from: National Oceanic and Atmospheric Administration
    Value: $171,493
11. "Establishing the Research Fleet approach in the Atlantic sea scallop fishery" — June 2023
    Awarded from: National Oceanic and Atmospheric Administration
    Value: $204,666
12. "SRW01 – Trawl Survey" — June 2023
    Awarded from: Sunrise Wind LLC
    Value: $508,110
13. "REV01 – Trawl Survey" — June 2023
    Awarded from: Revolution Wind LLC
    Value: $508,110
14. "REV01 – Ventless Trap Fisheries Monitoring" — June 2023
    Awarded from: Revolution Wind LLC
    Value: $831,993
15. "Exploring the feasibility of a Common Spider Crab (*Libinia emarginata*) fishery" — May 2023
    Awarded from: Rhode Island Sea Grant
    Value: $5,000

Atlantic Coastal Cooperative Statistics Program
1050 N. Highland Street, Suite 200A-N | Arlington, VA 22201
703.842.0780 | 703.842.0779 (fax) | www.accsp.org

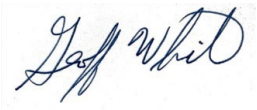
June 17, 2024

To the members of the Operations and Advisory Committees:

The FY2025 Administrative Budget contains a few changes to the core request primarily driven by increases in costs for fringe benefits and travel and modernization of some technical approaches to meet the demand for increased data flow and reduce technical debt. ACCSP leadership continues to make concerted efforts to maximize the potential of the administrative budget by finding additional sources of funding and exploring opportunities to gain efficiencies, which is evidenced by the IRA funds ($367,822) which were secured to offset the cost of modernizing the ACCSP technological infrastructure. Additionally, the ASMFC has again decreased its overhead rate from 11.56% to 10.32%. These combined efforts have resulted in a minimal increase in the Administrative Budget compared to FY2024.

Attachment I of the FY2025 Administrative Budget request, the 2024 ASMFC Strategic Plan (Goal 3), provides an overview of the high-level tasks and milestones expected for the coming year.

Sincerely,



Geoff White

ACCSP Director

Funding Proposal
FY25 ACCSP Administrative Budget

Applicant Name:	Atlantic States Marine Fisheries Commission
Project Title:	Administrative Support to the Atlantic Coastal Cooperative Statistics Program
Principal Investigator:	Geoff White, Director, ACCSP
Requested Award Amount:	$2,353,179
Request Type:	Maintenance/Administrative
Requested Award Period:	March 1, 2025 through February 28, 2026

A. Goals

The Atlantic Coastal Cooperative Statistics Program (ACCSP) is a state-federal cooperative partnership between 23 entities responsible for fisheries management, and fisheries data collection on the Atlantic Coast: the 15 Atlantic coast states and the District of Columbia, two federal fisheries agencies (Commerce's NOAA Fisheries and Interior's U.S. Fish and Wildlife Service), three regional fisheries management councils (New England, Mid-Atlantic, and South Atlantic), the Potomac River Fisheries Commission, and the Atlantic States Marine Fisheries Commission (ASMFC). Partner agencies are listed in the original ACCSP Memorandum of Understanding.

The Program was established in 1995 to design, implement, and conduct marine fisheries statistics data collection programs and to integrate those data into a single data management system that will meet the needs of fishery managers, scientists, and the general public.

By establishing and maintaining data collection standards and providing a data management system that incorporates state and federal data, ACCSP will ensure that the best available statistics can be used for fisheries management.

B. Objectives

1. Manage and expand a fully integrated data set that represents the best available fisheries-dependent data;
2. Continue working with the program partners to improve fisheries data collection and management in accordance with the evolving ACCSP standards within the confines of limited funds;

3. Explore the allocation of existing Program funds and work with partners to pursue additional funding;
4. Maintain strong executive leadership and collaborative involvement among partners at all committee levels;
5. Monitor and improve the usefulness of products and services provided by the ACCSP;
6. Collaborate with program partners in their funding processes by providing outreach materials and other support to demonstrate the value of ACCSP products and the importance of maintaining base support for fishery-dependent data collection programs to state partners and their executive and legislative branches as well as to all other partner agencies; and,
7. Support nationwide systems as defined in the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

C. Need

Various state and federal fishery management agencies on the Atlantic coast collect data on the status and trends of specific fish populations and the fisheries that utilize these resources; however, it is often difficult to develop sound recommendations to fisheries managers due to inconsistencies in the way data are collected and managed. The various data sets often cannot be integrated to provide accurate information at the state, regional, or coast-wide level. In addition, the disparate manner in which these data are collected and managed places duplicative burdens on fishermen and dealers reporting to multiple state and federal agencies and regions. Due to rapidly changing stock conditions, within-season regulatory changes and catch quotas have become common fishery management strategies. Timely and accurate harvest information for both recreational and commercial fisheries is required to determine the need for and effects of these management measures.

The Atlantic Coastal Fisheries Cooperative Management Act of 1993 mandated a cooperative state-federal program for the conservation of Atlantic coastal fisheries. Section 804 of the Act requires the Secretaries of Commerce and the Interior to develop a program to support state fisheries programs and those of the ASMFC, including improvements in statistics programs. Since the mid-1990s, the ASMFC has provided administrative support for this coordinated effort to improve data collection and management activities.

In 1995 the states, the ASMFC, and the federal fishery management agencies on the Atlantic coast entered into a Memorandum of Understanding (MOU) to develop and implement a cooperative state-federal statistics program that would meet the management needs of all participating agencies. All program partners signed the MOU for the ACCSP at the Commission's 54th Annual Meeting in Charleston, SC. Following signing, an Operations Plan was developed to outline the specific tasks and timetables required to develop and initiate implementation of this program. In October of 2016, an updated MOU was approved that made the ACCSP a program of the ASMFC. This governance change integrates the long-term and annual planning processes with those already in existence for the ASMFC and conform to policy as set by the ACCSP Coordinating Council.

D. Results and Benefits

The ACCSP developed and adopted 1999, 2004 and 2012 versions of the Program Design (now renamed Atlantic Coast Fisheries Data Collection Standards), which document the standards and protocols for collection and management of commercial, recreational, and for-hire fisheries statistics. Program partners developed and approved minimum data elements for collection of catch, effort, biological, social, and economic statistics. The ACCSP also developed standard codes and formats to ensure consistency of all data collected under the Program. These standards require periodic review and revision as the needs of fisheries managers and the state of the art of fisheries science change.

In 2000, the first version of the Data Warehouse was made available to the program partners. Since then, it has grown to encompass almost a 70-year time series of fisheries-dependent catch and effort data. Loading of biological data has begun. These data are constantly reviewed and updated as needed.

In 2004, the first version of the Standard Atlantic Fisheries Information System (SAFIS) eDR (electronic dealer reporting) was deployed, followed in 2008, by eTRIPS (electronic trip reporting). This system is used to collect data from commercial and recreational fishermen and dealers and is now deployed from Maine to Georgia. SAFIS is an ongoing and evolving system, requiring support, review, and revision.

The ACCSP will continue to reduce duplication of effort by dealers and fishermen, make more efficient use of limited funds, promote education of resource users, and provide a more complete information base for formulating management policies, strategies, and tactics for shared resources. An integrated multi-agency program using standard protocols for reporting compatible information will lead to more efficient and cost-effective use of current federally and state funded data collection and management programs. The ACCSP will reduce the burden on the fishing industry to provide information in multiple formats to multiple agencies, in alignment with the coastwide One Stop Reporting initiative, and will provide more accurate and timely information to achieve optimum public benefits from the use of fishery resources along the Atlantic coast. The ACCSP will ensure the timely dissemination of accurate data on commercial and recreational fisheries for use in stock assessments and fisheries management through a comprehensive and easily accessible data management system.

E. Approach

The ACCSP is managed collaboratively by committee: the Coordinating Council, composed of high-level fisheries policy makers from all the program partners, is the governing body; the Operations Committee provides guidance in standards setting and funding priorities. An Advisory Committee provides industry input into the process. A number of other technical committees provide input into various aspects of the process.

Program planning builds on basic principles related to the goals stated in the ACCSP MOU:

- Development of data collection standards and the implementation of data collection programs will be done cooperatively, across jurisdictional lines;
- Consistent coast-wide data collection standards will be implemented by all program partners that include data on all fishing activities -- commercial, recreational and for-hire fisheries;
- Once achieved, data collection improvements will be maintained;
- These data will be loaded and maintained in a central data repository and provided to data users through a user-friendly query system;
- Program planning will be done collaboratively, by consensus;
- The program will be responsive and accountable to partner and end-user needs; and
- Focus on activities that yield maximum benefit.

Goal 3 of the ASMFC Strategic Plan (Attachment I) provides high-level activities to be conducted by ACCSP staff and committees under the FY25 Administrative Budget. As a program of the ASMFC, administrative support of ACCSP activities is funded through indirect charges of all ACCSP awards, including the Administrative Grant. Note that program activities and staff in support of the Marine Recreational Information Program are separately funded and therefore not included in this plan.

The ACCSP initially developed common standards collaboratively, by consensus, then began to work with program partners to implement the standards, according to a commonly agreed upon priority. All ACCSP technical committees, except for the Advisory Committee which is composed of industry and recreational representatives, are comprised of managers and staff of the partner agencies and set policy by consensus. Only the Coordinating Council votes directly on motions.

The standards, known as the Atlantic Coast Fisheries Data Collection Standards, for data collection and management are developed and maintained by ACCSP Technical Committees, with review and oversight by the Operations Committee, and advice from the Advisory Committee. The ACCSP Coordinating Council makes policy level decisions to adopt the program standards. The full-time ACCSP staff coordinates all activities conducted by the ACCSP.

The Atlantic Coast Fisheries Data Collection Standards documents all completed standards and provides the basic framework for full implementation of the ACCSP by all program partners. The ACCSP is continuously evolving as technology and the needs of management and science change over time. Therefore, the *Standards* and supporting systems are always developing. Support for the implementation of ACCSP modules is provided by staff in various jurisdictions. To this end, funding is required to provide for full-time staff for all ACCSP activities, as well as for travel and meeting expenses.

The ACCSP Director, reporting to the Executive Director of the ASMFC, provides leadership for the Program, overall programmatic management and guidance, and is responsible for the day-to-day operations. The ACCSP Deputy Director supports the ACCSP Director on operation and development of the Program and is responsible for managing the competitive ACCSP funding

process, coordinating cross-team project management, and providing support for a wide range of Program activities. The ACCSP Program Assistant aids the ACCSP Director and ACCSP Deputy Director, provides staff support for program and technical committees by drafting, maintaining, and coordinating program documents, and publicizes the availability and benefits of the Program. The Data Team Leader provides guidance for data compilation and dissemination related activities. The Recreational Team Lead coordinates MRIP survey implementation and recreational and for-hire data standards. The Data Coordinators and Developers provide programming services and system support required to develop and fine-tune the data management systems, assist users as they access the system and provide quality management and control. The Data Coordinators also complete custom data requests, QA/QC existing data, maintain data feeds, and directly participate in data intensive activities such as a stock assessment data workshops. The ACCSP Software & IT Manager manages the information systems infrastructure and security and coordinates the development and management of ACCSP data collection systems. The Software Team staff provides expert consultation to partners as they implement new reporting, and licensing/permitting systems. The Software Team will continue to support development of SAFIS.

ACCSP staff will follow Goal 3 of the ASMFC 2024 Strategic Plan during FY25, in consultation with all partners. Specific tasks to be accomplished during the period include initiation and maintenance of Partner data feeds from the commercial, recreational, and biological modules; finalize the redesign of SAFIS eDR (dealer reporting); maintenance of Federal Information Security Management Act procedures; and support of other partner projects by providing technical expertise as necessary.

The ASMFC has basic responsibility for the logistics of all committee meetings which support the development and ongoing operations of the ACCSP, including: the ACCSP Coordinating Council, the ACCSP Operations Committee, the Advisory Committee, the Recreational Technical Committee, the Commercial Technical Committee, the Information Systems Committee, the Biological Review Panel, the Bycatch Prioritization Committee, the Standard Codes Committee, and the SciFish Advisory Panel. Full-time ACCSP personnel staff these committees for planning of work, providing minutes and other documents, and other follow-up.

The ACCSP has helped foster an improved atmosphere of cooperation among its partners. The Program has succeeded in establishing coast-wide fisheries data standards that all program partners have agreed to adopt. Data collection and management systems will be developed and deployed and maintained as the standards and Partner needs evolve. Program partners remain engaged in the process, and the program has made substantial progress towards its goals.

1. Geographic Location: Atlantic Coast (Maine through Florida)

2. Milestone Schedule: See Goal 3 of the ASMFC 2024 Strategic Plan (Attachment I)

This is a continuation from previous projects. Table 1 contains the base administrative budget amounts by year since implementation began in 1999.

Table 1. Administrative funding for ACCSP from 2000-2023

Year	Funding	Number of Staff
2000	$681,451	3
2001	$1,054,466	5
2002	$1,178,677	6
2003	$1,302,768	7
2004	$1,298,319	8
2005	$1,409,545	8
2006	$1,380,598	8
2007	$1,489,189	8
2008	$1,447,620	9
2009	$1,527,996	9
2010	$1,509,899	9
2011	$1,530,699	9
2012	$1,509,555	9
2013	$1,582,780	9
2014	$1,718,447	9.5
2015	$1,731,666	9.5
2016	$1,623,360	9.5
2017	$1,855,113	9.5
2018	$1,854,249	9.5
2019	$1,816,503	9.5
2020	$2,012,744	11
2021	$2,069,244	12
2022	$2,224,272	13
2023	$2,211,126	13
2024	$2,260,327	13

3. Cost Summary: The ACCSP requests $2,133,049 for administrative support, committee travel and systems operations during FY25. The addition of the 10.32% indirect rate raises the request to $2,353,179. The increase in request from FY24 reflects an increase in staff salaries and funding requested for travel due balanced with decreases in ASMFC indirect. Significant increases in Equipment and Supplies are not necessary due to the IRA funds secured by ACCSP staff.

The funds used for the ACCSP shall be accounted for separately from all other ASMFC funds.

4. Personnel

Program personnel funded through this grant, except the Recreational Team Lead, are dedicated 100% to the ACCSP and are full-time employees of the Atlantic States Marine Fisheries Commission. Note that personnel associated with the MRIP state conduct and 85% of the Recreational Team Leader are funded under separate authority and not accounted for in this document. Fringe benefits which include health care, vision, dental, annual, and sick leave are calculated at 29%. ASMFC salaries are kept confidential, thus only totals are displayed. Additionally, an agreement has been put in place with NMFS Highly Migratory Species (HMS) to partially fund the Information Systems Specialist responsible for maintaining HMS data feeds.

- ACCSP Director - Geoff White
- ACCSP Deputy Director – Julie DeFilippi Simpson
- Program Assistant – Marisa Powell
- ACCSP Software & IT Manager – Edward Martino
- Recreational Team Lead (15%) – Alex DiJohnson
- Software Developer – Jamal Oudiden
- Software Developer – Daniel Mestawat
- Software Developer – Kranthi Kumar Palla
- Data Team Lead – Michael Opiekun
- Data Analyst - Jennifer Ni
- Senior Data Coordinator – Joseph Myers
- Senior Data Coordinator – Heather Konell
- Data Coordinator – Anna-Mai Christmas-Svajdlenka
- Data Coordinator – Skye Thomas

Salaries and Wages		
Total Salary	$	1,436,414
Benefits @29%	$	416,560
Total Costs	$	1,852,974

5. Travel

Travel is broken down into two general categories; committee meetings and staff travel. Given shift back to having in-person meetings and supplementing with online meetings, this year's request increases the ask for committee travel. In addition to staff travel to support committee meetings, staff travel is needed for implementation planning, data collection activities, outreach efforts, and information system development meetings with partners.

The Program funds fares to and from the meeting site, per diem according to Office of Personnel and Management guidelines and facilities costs for the meeting itself. (The daily rate per meeting

includes cost of airfare or mileage, lodging, meals, and other travel related expenses.) Reimbursable participants include state fisheries directors and biologists, state and university scientists, law enforcement personnel and citizen advisors from Maine through Florida. Meetings will be held in various locations on the Eastern Seaboard, including but not limited to: Annapolis, MD; Norfolk, VA; Charleston, SC; Portland, ME; Alexandria, VA; Providence, RI; Tampa, FL; Washington, D.C.

The travel budget is based on an ASMFC average estimated $325 per day multiplied by meetings multiplied by days multiplied by non-federal membership plus staff.

Committee Travel	**Meetings**	**Days**	**Membership**	**Total**	**Staff**	**Total**	**Grand Total**
Biological Review panel	1	0	15	$0	1	$0	$0
Bycatch Prioritization	1	0	15	$0	1	$0	$0
Commercial Technical Committee	1	2	15	$9,750	1	$650	$10,400
Coordinating Council (with ASMFC)	2	0.5	12	$3,900	2	$650	$4,550
Operations and Advisory Committees	1	2.5	20	$16,250	2	$1,625	$17,875
Recreational Technical	1	1	15	$4,875	1	$325	$5,200
Information Systems Committee	1	1	15	$4,875	1	$325	$5,200
Total Committees				$39,650		$3,575	$43,225
Staff Travel							
Partner Coordination	3	2	2	$3,900			
Data Support (Stock Assessment etc)	1	5	2	$3,250			
IT/SAFIS Support	2	1	1	$650			
Outreach or Partner Training	4	1	2	$2,600			
GulfFIN Coordination	2	1.5	2	$1,950			
Staff Training	2	4	5	$13,000			
Total Staff Travel				$25,350			
Grand Total							$68,575

Attachment II provides the FY24 schedule of the funding cycle and calendar of meetings, which serves as a tentative schedule for FY25.

6. Supplies

Supply costs include supplies not covered by the ASMFC indirect. This includes ACCSP specific materials for outreach, smaller information systems items such as network switches and cables.

Supplies	
Misc Hardware (cables, network switches, etc)	$4,600
Backup Tapes	$1,000
Total	$5,600

7. Equipment

ACCSP maintains several large server systems and related hardware in support of the Data Warehouse, website, SAFIS, and administrative functions. These systems previously have had a 5-year life cycle after which they require upgrade or replacement. While ACCSP has historically decreased budget and extended life of servers, there is now a need to shorten refresh cycle to 3-years. This will allow for more capable hardware to meet increasing data flow needs as well as improve performance and support, results in less technical debt.

Included in the costs are normal life cycle replacements of laptop systems, assuming replacement of three (3) systems annually. Costs are based upon current market surveys and an estimate of our needs. In FY25, we will require replacement of one server and several staff computers.

Equipment	
Infrastructure Replacement of one server	$ 18,000
Desktop/Laptop Systems	$ 6,000
Total	**$ 24,000**

8. Other Costs

Hardware and software support are supplied by several different vendors and includes costs associated with licensing and maintenance fees (such as *Oracle* licensing).

The Program maintains a high-speed internet connection and associated infrastructure in support of the server systems. The primary internet connection is covered by ASMFC. The second connection, using an entirely different technology and provider provides redundancy to the primary connection in case of failure. The system is configured to automatically fail over in the event of a failure of the primary internet connection. A previously maintained ACCSP funded connection dedicated to the NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO) to provide full time secure connectivity requested by the Region has been replaced with a VPN

connection through NOAA's OCIO office. Coordination of ACCSP with the OCIO has resulted in a permanent decrease in costs in this area by about $10,000.

Outside vendors include Hewlett Packard for systems hardware and software support; Oracle for database management systems support; DLT Solutions and Trident Solutions for hardware support. All pricing is based on the GSA schedule.

Software maintenance and development workload at times exceeds staff's resources. Contract services will be utilized to provide services that staff may be unable to perform.

E-Reporting Support

Funds are requested for electronic reporting outreach and support activities. Interest among state partners and harvesters is continually rising and a steady stream of new users are adopting the system where agencies will accept electronic reports though SAFIS. SAFIS eTrips in both the mobile and on-line versions are likely to be the top applications used by commercial harvesters in the Southeast as voluntary electronic reporting for commercial harvesters is rolled out. This is especially true as eTRIPS is the only application on the east coast that is considered compliant with the One Stop Reporting (OSR) requirements. In addition, most trips will be reported to the SAFIS system (via API) regardless of the tool selected.

Funds requested include both costs associated with initial deployment and ongoing support. Initial startup costs include, but are not limited to, in-person and virtual training workshops for harvesters and partner agency personnel and published training guides and videos that will be available via the ACCSP website. ACCSP continues to contract for help desk support for SAFIS which includes 24/7 helpdesk support, a toll-free number to contact support personnel, and a helpdesk ticketing program designed to keep track of all requests and provide feedback to the Program. The ACCSP Director and ASMFC Executive Director have secured external funding to support the help desk and FISMA costs in FY2025.

Other Expenses	
Software Support	$65,000
Hardware Support	$11,000
Communications/Internet Connectivity	$12,500
Outreach Materials	$3,400
Software Development	$90,000
Help Desk Support	$0
Total	**$181,900**

Budget Summary

Budget Summary	**2025**
Personnel	$1,436,414
Fringe Benefits	$416,560
Travel	$68,575
Equipment	$24,000
Supplies	$5,600
Other	$181,900
Total Program	**$2,133,049**
ASMFC Overhead (10.32%)	**$220,131**
Total Proposal	**$2,353,180**

Resources actively sought to support ACCSP activities in addition to the Administrative Grant

2024-2025 Support	**Coverage**	**Funding Expected**
IRA proposal (FIS) (**New for FY25**)	Modernization of ACCSP Technological Infrastructure	$367,822
HMS	Partial Data Analyst	$40,000
NOAA Fisheries Office of Science and Technology	ACCSP SAFIS Help Desk and FISMA Support	$215,000
MRIP	State Conduct of MRIP APAIS, FHTS ME-GA, and additional surveys in some states (LPIS in ME, Catch Cards in MD & NC, and LPBS in NC). Includes Recreational Team Staff (3).	Total Grant: $5,912,000 ACCSP: $540.305

ATLANTIC STATES MARINE FISHERIES COMMISSION

Five-Year Strategic Plan 2024-2028

The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value.

Theodore Roosevelt

Introduction

Each state has a fundamental responsibility to safeguard the public trust with respect to its natural resources. Fishery managers are faced with many challenges in carrying out that responsibility. Living marine resources inhabit ecosystems that cross state and federal jurisdictions. Thus, no state, by itself, can effectively protect the interests of its citizens. Each state must work with its sister states and the federal government to conserve and manage natural resources.

Beginning in the late 1930s, the 15 Atlantic coastal states from Maine to Florida took steps to develop cooperative mechanisms to define and achieve their mutual interests in coastal fisheries. The most notable of these was their commitment to form the Atlantic States Marine Fisheries Commission (Commission) in 1942, and to work together through the Commission to promote the conservation and management of shared marine fishery resources. Over the years, the Commission has remained an effective forum for fishery managers to pursue concerted management actions. Through the Commission, states cooperate in a broad range of programs including interstate fisheries management, fisheries science, fishery-dependent and fishery-independent data collection and management, habitat conservation, and law enforcement.

Congress has long recognized the critical role of the states and the need to support their mutual efforts. Most notably, it enacted the Atlantic Coastal Fisheries Cooperative Management Act (Atlantic Coastal Act) in 1993, which built on the success of the Atlantic Striped Bass Conservation Act of 1984. Acknowledging that no single governmental entity has exclusive management authority for Atlantic coastal fishery resources, the Atlantic Coastal Act recognizes the states' responsibility for cooperative fisheries management through the Commission. The Atlantic Coastal Act charges all Atlantic states with implementing coastal fishery management plans that will safeguard the future of Atlantic coastal fisheries in the interest of both fishermen and the nation.

Accepting these challenges and maintaining their mutual commitment to success, the Atlantic coastal states have adopted this five-year Strategic Plan. The states recognize circumstances today make the work of the Commission more important than ever before. The Strategic Plan articulates the mission, vision, goals, and objectives needed to accomplish the Commission's mission. It serves as the basis for annual action planning, whereby Commissioners identify the highest priority issues and activities to be addressed in the upcoming year. With 27 species/species complexes currently managed by the Commission, finite staff time, Commissioner time and funding, as well as a myriad of other factors impacting marine resources (e.g., changing ocean conditions, protected species interactions, offshore energy, and aquaculture), Commissioners recognize the absolute need to prioritize activities, dedicating staff time and resources where they are needed most and addressing less pressing issues as resources allow. Efforts will be made to balance the competing needs of stability/predictability in fisheries management and the necessity for adaptability to respond to changing fishery and environmental conditions. A key to prioritizing issues and maximizing

efficiencies will be working closely with the three East Coast Regional Fishery Management Councils, NOAA Fisheries, US Fish and Wildlife Service and US Geological Survey.

Mission

The Commission's mission, as stated in its 1942 Compact, is:

> *To promote the better utilization of the fisheries, marine, shell and anadromous, of the Atlantic seaboard by the development of a joint program for the promotion and protection of such fisheries, and by the prevention of physical waste of the fisheries from any cause.*

The mission grounds the Commission in history. It reminds every one of the Commission's sense of purpose that has been in place for over 82 years. The constantly changing physical, political, social, and economic environments led the Commission to restate the mission in more modern terms:

> *To promote cooperative management of marine, shell and diadromous fisheries of the Atlantic coast of the United States by the protection and enhancement of such fisheries, and by the avoidance of physical waste of the fisheries from any cause.*

The mission and nature of the Commission as a mutual interstate body incorporate several guiding principles. They include:

- States are sovereign entities, each having its own laws and responsibilities for managing fishery resources within its jurisdiction
- States serve the broad public interest and represent the common good
- Multi-state resource management is complex and dependent upon cooperative efforts by all states involved
- The Commission provides a critical sounding board on issues requiring cross-jurisdictional action, coordinating cooperation, and collaboration among the states and federal government, including NOAA Fisheries, US Fish and Wildlife Service, and US Geological Survey.

Vision

The long-term vision of the Commission is:

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Values

The Commission and its member states have adopted the following values to guide its operations and activities. These values affirm the Commission's commitment to sustainable fisheries management for the benefit of all fisheries participants and coastal communities. They also acknowledge the growing importance of managing fisheries in a more holistic and adaptive way, seeking solutions to cross-cutting resource issues that lead to long-term ecological and socioeconomic sustainability.

- Effective stewardship of marine resources through strong partnerships
- Decisions based on sound science
- Long-term ecological sustainability
- Transparency and accountability in all actions
- Timely response to new information through adaptive management
- Balancing resource conservation with the economic success of coastal communities
- Efficient use of time and fiscal resources
- Work cooperatively with honesty, integrity, and fairness

Driving Forces

The Commission and its actions are influenced by a multitude of factors. These factors are constantly evolving and will most likely change over the time period of this Strategic Plan. However, the most pressing factors affecting the Commission today are climate-induced changes to the ocean environment, fisheries, and coastal communities; resource allocation; the quality and quantity of scientific information; competing ocean uses; a growing need to address ecosystem functions; and interactions between fisheries and protected species. The Strategic Plan, through its goals and broad objectives, will seek to address each of these issues over the next five years.

Climate-Induced Changes

Changes in ocean temperature, currents, acidification, and sea level rise are occurring rapidly, affecting nearly every facet of fisheries resources and management at the state, interstate, and federal levels. Potential impacts to marine species include degraded water quality, altered prey and habitat availability, susceptibility to disease, changing migration patterns, and changes to spawning and reproductive potential. It is often difficult for fisheries stock assessments and management to keep pace with changes in distribution and productivity of fishery stocks. Several Commission species, such as northern shrimp, American lobster, Atlantic cobia, Atlantic croaker, Atlantic striped bass, Spanish mackerel, black sea bass, and summer flounder are already responding to changes in the ocean. In the case of northern shrimp and American lobster, warming ocean waters have created inhospitable environments for reproduction and survivability in some areas. For cobia, black sea bass, and summer flounder, changing ocean conditions have contributed to altered species distributions, with some species expanding their ranges and others moving into deeper and/or more northern waters to stay within preferred temperature ranges. Where shifts are occurring, the

Commission may need to reconsider state-by-state allocation schemes and make adjustments to our fishery management plans (FMPs). For other species depleted due to factors other than fishing mortality (e.g., habitat degradation and availability, predation), the states will need to explore steps to aid in species recovery. And, if a stock's viability is compromised, Commission resources and efforts should be shifted to other species that can be rebuilt or sustainably maintained.

Since 2021, the Commission and other marine fishery management organizations along the U.S. East Coast have been exploring governance and management issues related to climate change and fishery stock distributions. This effort recognizes the need to plan for how fishery management organizations and coastal communities can best adapt to environmental changes in a thoughtful and deliberate way. Over the span of this Strategic Plan and beyond, the Commission and other East Coast marine fishery management organizations will be prioritizing actions around three overarching themes of cross-jurisdictional governance; managing under increased uncertainty; and data sources and partnerships to plan for possible future outcomes.

Allocation

Resource allocation among the states and between various user groups will continue to be an important issue over the next five years. Many of the Commission FMPs divvy up the available harvestable resource through various types of allocation schemes, such as by state, region, season, or gear type. The changing distribution of many species has further complicated the issue of resource allocation with traditional allocation schemes being challenged and a finite amount of fishery resources to be shared. Discussion may be difficult and divisive, with some states (and their stakeholders) wanting to maintain their historic (traditional) allocations, while others are seeking a greater share of the resource given increased abundance and availability in their waters. States will need to seek innovative ways to reallocate species so that collectively all states feel their needs are met. What will be required to successfully navigate these discussions and decisions is the commitment of the states to work through the issues with honesty, integrity, and fairness, seeking outcomes that balance the needs of the states and their stakeholders with the ever-changing realities of shifting resource abundance and availability.

Science as the Foundation

Accurate and timely scientific information form the basis of the Commission's fisheries management decision-making. Continued investments in the collection and management of fishery-dependent and -independent data remain a high priority for the Commission and its member states. The challenge will be to maintain and expand data collection efforts in the face of shrinking state and federal budgets. Past and current investments by state, regional and federal partners have established the Atlantic Coastal Cooperative Statistics Program (ACCSP) as the principal source of marine fishery statistics for the Atlantic coast. State and regional fishery-independent data collection programs, in combination with fishery statistics, provide the scientific foundation for stock assessments. Many data collection programs will continue to be strained by budget restrictions, scientists' workload capacities, and competing priorities. The Commission remains committed to pursuing long-term support for research surveys and

monitoring programs that are critical to informing management decisions and resource sustainability.

Ecosystem Functions

Nationally, there has been a growing demand for fisheries managers to address broader ecosystem functions such as predator-prey interactions and environmental factors during their fisheries management planning. Ecosystem science has improved in recent years, though the challenges of comprehensive data collection continue. While the majority of the Commission's species are managed and assessed on a single species basis, there have been significant advancements in the development and use of ecological reference points for Atlantic menhaden management. Horseshoe crabs of Delaware Bay origin are also managed in an ecosystem context to account for the forage needs of migratory shorebirds. The Commission remains committed to seeking ecological sustainability over the long-term through continuing its work on multispecies assessment modeling and the development of ecosystem-based reference points in its fisheries management planning process.

Competing Ocean Uses

Marine spatial planning has become an increasingly popular method of balancing the growing demands on valuable ocean resources. More specifically, the competing interests of commercial and recreational fishing, offshore energy development, aquaculture, marine transportation, offshore oil exploration and drilling, military needs, and habitat restoration are all components that must be integrated into successful ocean use policies. The Commission has always emphasized cooperative management with our federal partners; however, the states' authorities in their marine jurisdictions must be preserved and respected. The Commission will continue to prioritize the successful operation of its fisheries, but it will be imperative to work closely with federal, state, and local governments on emerging ocean use conflicts as they diversify into the future.

Protected Species

Like coastal fishery resources, protected species, such as marine mammals, sea turtles, and listed and candidate fish species, traverse both state and federal waters. The protections afforded these species under the Marine Mammal Protection Act and Endangered Species Act can play a significant role in the management and prosecution of Atlantic coastal fisheries. The Commission and the states have a long history of supporting our federal partners to minimize interactions with and bycatch of marine mammals and sea turtles. The listing of Atlantic sturgeon under the Endangered Species Act has added a whole new level of complexity in the ability of the Commission and its member states to carry out their stewardship responsibilities for this important diadromous species. The species spends the majority of its life in state waters and depend on estuarine and riverine habitat for their survival. Listing has the potential to jeopardize the states' ability to effectively monitor and assess stock condition, as well as impact fisheries that may encounter listed species. It is incumbent upon the Commission and its federal partners to work jointly to assess stock health, identify threats, and implement effective rebuilding programs for listed and candidate species.

More recently, the depleted status of the Northern right whale population and the potential impacts to this population by entanglement in fishing gear, particularly lobster and crab gear, has heighted concern for both whales and the lobster industry.

Increased Cooperation and Collaboration among the States and between the States and Our Federal Partners

Demands for ecosystem-based fisheries management, competing and often conflicting ocean uses, and legislative mandates to protect marine mammals and other protected species further complicate fisheries management and require quality scientific information to guide management decisions. Federal agencies have a long track record of providing scientific support to the Commission and collaborations recently expanded in some areas. However, there is a developing trend of reduced support for fundamental data collection and assessment support. Year to year static funding results in decreased scientific support due to inflationary cost increases. There is a growing concern among fishery managers that some "control" over fisheries decisions and status has been diminished due to political intervention and our inability to effect climate changes and other environmental factors that impact marine resources. Fisheries management has never been more complex or politically charged. State members are pulled between what is best for their stakeholders versus what is best for the resource and the states as a whole.

While the issues may seem daunting, they are not insurmountable. In order for the Commission to be successful, the states must recommit to their collective vision of "Sustainable and Cooperative Management of Atlantic Coastal Fisheries," recognizing that their strength lies in working together to address the fisheries issues that lie ahead. Given today's political and environmental realities, the need for cooperation among the states has never been more important. It is also critical the states and their federal partners seek to strengthen their cooperation and working relationships, providing for efficient and effective fisheries management across all agencies. No one state or federal agency has the resources, authority, or ability to do it alone.

GOALS & OBJECTIVES

The Commission will pursue the following eight goals and their related strategies during the five-year planning period from 2024 through 2028. It will pursue these goals through specific objectives, targets, and milestones outlined in an annual Action Plan, which is adopted each year at the Commission's Annual Meeting to guide the subsequent year's activities. Throughout the year, the Commission and its staff will monitor progress in meeting the Commission's goals, and evaluate the effectiveness of the strategies. While committed to the objectives included in this plan, the Commission is ready to adopt additional objectives to take advantage of new opportunities and address emerging issues as they arise.

Goal 1 – Rebuild, maintain, fairly allocate, and promote sustainable Atlantic coastal fisheries

Goal 1 focuses on the responsibility of the states to conserve and manage Atlantic coastal fishery resources for sustainable use. Commission members will advocate decisions to achieve the long-term benefits of conservation, while balancing the socioeconomic interests and needs of coastal communities. Inherent in this is the recognition that healthy and vibrant resources benefit stakeholders. The states are committed to proactive management, with a focus on integrating ecosystem services, socioeconomic impacts, habitat issues, bycatch and discard reduction measures, and protected species interactions into well-defined fishery management plans. Fishery management plans will also address fair allocation of fishery resources among the states. Understanding climate change and its impact on fishery productivity and distribution is an elevated priority. Successful management under climate change will depend not only on adjusting management strategies to be more adaptable and flexible, but also in reevaluating and revising, as necessary, the underlying conservation goals and objectives of fishery management plans. Changing climate and ocean conditions can impact fish stocks, fish habitats, and interactions between species and fisheries. The Commission will strive to proactively consider ecosystem level impacts when making management decisions to take a more holistic consideration of issues. Improving cooperation and coordination with federal partners and stakeholders can streamline efficiency, transparency and, ultimately, success. In the next five years, the Commission is committed to ending overfishing and working to rebuild overfished Atlantic coast fish stocks, while promoting sustainable harvest of and access to rebuilt fisheries. Where possible, the Commission will seek to aid in the rebuilding of depleted stocks, whose recovery is hindered by factors other than fishing pressure.

Annual action planning will be guided by the following objectives:

- Manage interstate resources that provide for productive, sustainable fisheries using sound science
- Strengthen state and federal partnerships to improve comprehensive management of shared fishery resources
- Create management frameworks that are nimble, adaptable, and robust to climate change
- Practice efficient, transparent, and accountable management processes
- Evaluate progress towards rebuilding fisheries
- Promote sustainable harvest of and access to rebuilt fisheries
- Strengthen interactions and input among stakeholders, technical, advisory, and management groups
- Develop criteria for prioritizing management actions for species that are depleted due to factors other than fishing mortality
- Include climate change considerations in our management strategies

Goal 2 – Provide robust, actionable science to inform management decisions

Sustainable management of fisheries relies on accurate and timely scientific advice. The Commission strives to produce robust, actionable science through a technically rigorous, independently peer-reviewed stock assessment process. Assessments are developed using a broad suite of fishery-independent surveys and fishery-dependent monitoring, as well as research products developed, in cooperation with the fishing industry, by a broad network of fisheries scientists at state, federal, and academic institutions along the coast. This goal encompasses the development of novel and innovative scientific research, modern assessment methodology, and enhancement of the states' stock assessment capabilities. It provides for the administration, coordination, and expansion of collaborative research and data collection programs. Achieving the goal will ensure robust science is available as the foundation for the Commission's evaluation of stock status and adaptive management actions.

Annual action planning will be guided by the following objectives:

- Proactively address research priorities through cooperative state and regional data collection programs; strengthen stakeholder involvement in collaborative research projects
- Explore the use of emerging technologies to improve fishery-independent surveys, monitoring, and the timeliness of scientific products
- Provide training to enhance the expertise and participation of state and staff scientists in conducting stock assessments
- Streamline assessment data assimilation within individual states, and among states and the Commission
- Conduct stock assessments based on comprehensive data sources and rigorous technical analysis; deliver direct, concise scientific advice in order to achieve clear endpoints in the assessment process; generate indicators/rapid assessments for all stocks
- Balance requests from fisheries management with finite assessment workload capacity
- Support the development and utilization of industry-based surveys and other cooperative research opportunities.
- Utilize ecosystem and climate science products to inform fisheries management decisions, including projected shifts with quota allocation implications
    - (Action): Integrate estuarine/state waters and federal waters environmental data for use in stock assessments
- Communicate with stakeholders to ensure scientific advice and on-the-water observations are consistent
- Characterize the risk and certainty associated with the scientific advice provided to decision-makers
- Explore the use of management strategy evaluations to inform management decisions

Goal 3 – Produce dependable and timely marine fishery statistics for Atlantic coast fisheries

Effective management depends on quality fishery-dependent data to inform stock assessments and fisheries management decisions. Goal 3 focuses on providing timely, accurate catch, effort, and biological data on Atlantic coast recreational, for-hire, and commercial fisheries to support fisheries management.

This goal seeks to accomplish this through the activities of the Atlantic Coastal Cooperative Statistics Program (ACCSP), a cooperative state-federal program that designs, implements, and conducts marine fisheries statistics data collection programs and integrates those data into data management systems that will meet the needs of fishery managers, scientists, and fishermen. ACCSP partners include the 15 Atlantic coast state fishery agencies, the three Atlantic Coast Fishery Management Councils, the Potomac River Fisheries Commission, NOAA Fisheries, the US Fish and Wildlife Service, and the US Geological Survey.

Annual action planning will be guided by the following objectives:

- Focus on activities that maximize benefits, are responsive and accountable to partner and end-user needs, and are based on available resources
- Develop, implement, and maintain coastwide data standards through cooperation with all program partners
- Provide electronic applications that efficiently align partner data collection
- Integrate and provide access to partner data via a coastwide repository
- Facilitate fisheries data access through an on-line, user-friendly system while protecting confidentiality
- Support data systems modernization and integration

Goal 4 – Protect and enhance fish habitat and ecosystem health through partnerships and education

Goal 4 aims to conserve and improve coastal, marine, and riverine habitat to enhance the benefits of sustainable Atlantic coastal fisheries and resilient coastal communities in the face of changing ecosystems. Habitat loss and degradation have been identified as significant factors affecting the long-term sustainability and productivity of our nation's fisheries. The Commission's Habitat Program develops objectives, sets priorities, and produces tools to guide fisheries habitat conservation efforts directed towards ecosystem-based management.

The challenge for the Commission and its state members is maintaining fish habitat under limited regulatory authority for habitat protection or enhancement. Therefore, the Commission will work cooperatively with state, federal, and stakeholder partnerships to achieve this goal. Much of the work to address habitat is conducted through the Commission's Habitat and Artificial Reef Committees. In order to identify fish habitats of concern for Commission managed species, each year the Habitat Committee reviews existing reference documents for

Commission-managed species to identify gaps or updates needed to describe important habitat types and review and revise species habitat factsheets. The Habitat Committee also publishes an annual issue of the *Habitat Hotline Atlantic*, highlighting topical issues that affect all the states.

The Commission and its Habitat Program endorses the National Fish Habitat Partnership, and will continue to work cooperatively with the partnership to improve aquatic habitat along the Atlantic coast. Since 2008, the Commission has invested considerable resources, as both a partner and administrative home, to the Atlantic Coastal Fish Habitat Partnership (ACFHP), a coastwide collaborative effort to accelerate the conservation and restoration of habitat for native Atlantic coastal, estuarine-dependent, and diadromous fishes. As part of this goal, the Commission will continue to provide support for ACFHP, under the direction of the National Fish Habitat Partnership Board.

Annual action planning will be guided by the following objectives:

- Identify fish habitats of concerns through fisheries management programs and partnerships
- Educate Commissioners, stakeholders, and the general public about the importance of habitat to healthy fisheries and ecosystems
- Better integrate habitat information and data into fishery management plans and stock assessments
- Engage local, state, and regional governments in mutually beneficial habitat protection and enhancement programs
- Foster partnerships with management agencies, researchers, and habitat stakeholders to leverage scientific, regulatory, political, and financial support
- Work with ACFHP to foster partnerships with like-minded organizations at local levels to further common habitat goals

Goal 5 – Promote compliance with fishery management plans to ensure sustainable use of Atlantic coast resources

Fisheries managers, law enforcement personnel, and stakeholders have a shared responsibility to promote compliance with fisheries management measures. Activities under this goal seek to increase and improve compliance with fishery management plans. This requires the successful coordination of both management and enforcement activities among state and federal agencies. Commission members recognize that adequate and consistent enforcement of fisheries rules is required to keep pace with increasingly complex management activity and emerging technologies. Achieving the goal will improve the effectiveness of the Commission's fishery management plans.

Annual action planning will be guided by the following objectives:

- Develop practical compliance requirements that foster stakeholder buy-in
- Evaluate the enforceability of management measures and the effectiveness of law enforcement programs
- Promote coordination and expand existing partnerships with state and federal natural resource law enforcement agencies
- Enhance stakeholder awareness of management measures through education and outreach
- Use emerging communication platforms to deliver real time information regarding regulations and the outcomes of law enforcement investigations

Goal 6 – Strengthen stakeholder and public support for the Commission

Stakeholder and public acceptance of Commission decisions are critical to our ultimate success. For the Commission to be effective, these groups must have a clear understanding of our mission, vision, and decision-making processes. The goal seeks to do so through expanded outreach and education efforts about Commission programs, decision-making processes, and its management successes and challenges. It aims to engage stakeholders in the process of fisheries management, and promote the activities and accomplishments of the Commission. Achieving the goal will increase stakeholder participation, understanding, and acceptance of Commission activities.

Annual action planning will be guided by the following objectives:

- Increase public understanding and support of activities through expanded outreach at the local, state, and federal levels
- Develop proactive communication to directly address issues of public concern
- Clearly define Commission processes to facilitate stakeholder participation, as well as transparency and accountability
- Strengthen national, regional, and local media relations to increase coverage of Commission actions
- Use new technologies and communication platforms to more fully engage the broader public in the Commission's activities and actions

Goal 7 – Advance Commission and member states' priorities through a proactive legislative policy agenda

Although states are positioned to achieve many of the national goals for marine fisheries through cooperative efforts, state fisheries interests are often underrepresented at the national level. This is due, in part, to the fact that policy formulation is often disconnected from the processes that provide the support, organization, and resources necessary to implement the policies. The capabilities and input of the states are an important aspect of developing national fisheries policy, and the goal seeks to increase the states' role in national policy formulation. Additionally, the goal emphasizes the importance of achieving

management goals consistent with productive commercial and recreational fisheries and healthy ecosystems.

The Commission recognizes the need to work with Congress in all phases of policy formulation. Several important fishery-related laws may be reauthorized over the next couple of years (i.e., Atlantic Coastal Act, Magnuson-Stevens Fishery Conservation and Management Act, Interjurisdictional Fisheries Act, Atlantic Striped Bass Conservation Act, and Anadromous Fish Conservation Act). The Commission needs to proactively engage with reauthorization efforts, this includes advocating for increased funding from sources such as Sportfish Restoration Trust Fund and the Atlantic Coastal Act. The Commission will be vigilant in advancing the states' interests to Congress as these laws are reauthorized and other fishery-related pieces of legislation are considered.

Annual action planning will be guided by the following objectives:

- Increase the Commission's profile and support in the US Congress by developing relationships between Members and their staff and Commissioners, the Executive Director, and Commission staff
- Maintain or increase long-term funding for Commission programs through the federal appropriations process and other available sources. This includes funding for non-federal surveys and to support our partnerships with outside organizations such as US Geological Survey
- Engage Congress on fishery-related legislation affecting the Atlantic coast
- Promote member states' collective interests at the regional and national levels
- Promote economic benefits of the Commission's actions (return on investment)

Goal 8 – Ensure the fiscal stability & efficient administration of the Commission

Goal 8 focuses on ensuring the business affairs of the Commission are managed effectively and efficiently, including workload balancing through the development of annual action plans to support the Commission's management process. It also highlights the need for the Commission to efficiently manage its resources. The goal promotes the efficient use of legal advice to proactively review policies and react to litigation as necessary. It also promotes human resource policies that attract talented and committed individuals to conduct the work of the Commission. The goal highlights the need for the Commission as an organization to continually expand its skill set through training and educational opportunities. It calls for Commissioners and Commission staff to maintain and increase the institutional knowledge of the Commission through periods of transition. Achieving this goal will build core strengths, enabling the Commission to respond to increasingly difficult and complex fisheries management issues.

Annual action planning will be guided by the following objectives:

- Conservatively manage the Commission's operations and budgets to ensure fiscal stability

- Utilize new information technology to improve meeting and workload efficiencies, and enhance communications
- Refine strategies to recruit professional staff, and enhance growth and learning opportunities for Commission and state personnel
- Fully engage new Commissioners in the Commission process and document institutional knowledge
- Utilize legal advice on new management strategies and policies, and respond to litigation as necessary

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This list includes dates for fiscal year 2024, including ACCSP committee meetings, relevant dates of the funding cycle, as well as meetings or conferences ACCSP typically attends or which may be of interest to our partners. If you have any questions or comments on this calendar, please do not hesitate to contact the ACCSP staff at info@accsp.org.

Jan 23- Jan 25:	ASMFC Meeting – Arlington, VA
Jan 30- Feb 1:	NEFMC Meeting – Portsmouth, NH
Jan 31:	2023 FHTS Training– Webinar
Feb 6:	Biological Review Panel Annual Meeting – Webinar
Feb 7:	Bycatch Prioritization Committee Annual Meeting –Webinar
Feb 6-7:	MAFMC Council Meeting- Arlington, VA
Feb 13-14:	APAIS North Atlantic Training- Providence, RI
Feb 27-28:	APAIS South Atlantic Training- Raleigh, NC
Mar 1:	Start of ACCSP FY24
Mar 4-8:	SAFMC Meeting – Jekyll Island, GA
Mar 6:	Commercial Technical Committee Annual Meeting – Webinar
Mar 7:	Information Systems Committee Annual Meeting – Webinar
Mar 20-21:	Recreational Technical Committee Meeting – Crystal City, VA
Apr 1:	Operations and Advisory Committees Spring Meeting – Webinar
Apr 9-10:	MAFMC Meeting – Atlantic City
Apr 16-18:	NEFMC Meeting – Mystic, CT
Apr 29-May2:	ASMFC/Coordinating Council Meeting – Arlington, VA
May 6:	ACCSP issues request for proposals
Jun 4-6:	MAFMC Meeting – Riverhead, NY
Jun 10-14:	SAFMC Meeting – Daytona Beach Shores, FL
Jun 17:	Initial proposals are due
Jun 24:	Initial proposals are distributed to Operations and Advisory Committees
Jun 25-27:	NEFMC Meeting – Freeport, ME
July 5:	Any initial written comments on proposals due
Week of Jul 8:	Review of initial proposals by Operations and Advisory Committees – Webinar
July 17:	If applicable, any revised written comments due
Week of Jul 22:	Feedback submitted to principal investigators
Aug 5 -Aug 8:	ASMFC Meeting – Arlington, VA
Aug 12-15:	MAFMC Meeting – Philadelphia, PA

Aug 19:	Revised proposals due
Aug 26:	Revised proposals distributed to Operations and Advisory Committees
Week of Sep 2:	Ranking exercise for Advisors and Operations Members – Webinar
Sep 16-20:	SAFMC Meeting – Charleston, SC
Sep 24-25:	Annual Advisors/Operations Committee Joint Meeting (in-person; location TBD)
Sep 24-26:	NEFMC Meeting – Plymouth, MA
Oct 8-10:	MAFMC Meeting – New York, NY
Oct 21-24:	ASMFC Annual Meeting/Coordinating Council Meeting – Annapolis, MD
Dec 2-6:	SAFMC Meeting – Wrightsville Beach, NC
Dec 3-6:	NEFMC Meeting – Newport, RI
Dec 9-12:	MAFMC Meeting – Annapolis, MD

Geoff White

ACCSP Director

EXECUTIVE COMPETENCIES

- Committed to excellence and accountability
- Empowering leadership and inclusive management style
- Leveraging technology and cooperative approach
- Belief in holistic and integrated solutions
- Passion for strategic vision
- Project design and oversight
- Financial responsibility and accountability
- Effective communicator, writer and presenter
- Proven ACCSP ambassador

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SELECTED ACHIEVEMENTS

- Supported reduced fishery reporting burden through One Stop Reporting.
- Improved efficiency of APAIS data collection by integrating tablet data capture, Oracle database, SAS processing and delivery.
- Extended state conduct of MRIP FHTS and LPS with integrated web tools.
- Developed budget and managed over $4.5M annual funding for multiple MRIP surveys through ACCSP and 13 State Partners
- Initiated development of comprehensive for-hire data collection methods.
- Developed and implemented the MRIP APAIS Atlantic state conduct transition
- Conceived and implemented changes to improve availability of ACCSP data

EMPLOYMENT EXPERIENCE

***Director, ACCSP* 2019 – Present**
Responsible for ACCSP strategic direction through the Coordinating Council, and management of ongoing projects. Represent ASMFC and Atlantic states on data related topics in regional and national meetings.

***Recreational Program Manager ACCSP* 2015 – 2019**
Responsible for ACCSP's recreational fishery data standards and implementing state conduct of MRIP APAIS and FHTS surveys. Developed coastwide budgets, data collection, processing, and delivery systems. Managed local staff and guided partner staff in survey completion. Represented ACCSP and Atlantic states on MRIP Regional Council and at national meetings.

***Data Team Lead / Systems Admin ACCSP* 2008 – 2015**
Provided data team leadership and subject expertise for ACCSP data projects and priorities. Engineered transition to state conduct of MRIP APAIS. Responsible for ACCSP information systems maintenance including network, servers, oracle databases, and 2010 office relocation.

***Systems Admin -ACCSP* 2004–2008**
Responisble for the ACCSP's IT infrastructure. Provided subject expertise for partner data access, data translations, and development of web-based recreational and commercial queries.

Fisheries Specialist -ASMFC 1998–2004
Coordinated SEAMAP SA, staffed development of two multi-species assessment models, designed and implemented the Lobster Assessment Database, coordinated fisheries research programs and stock assessment reviews supporting fisheries management.

***Marine Scientist -VIMS* 1996–1998**
Estimated fishing mortality of tautog in Virginia waters. Project results accepted as Virginia's fishery status in the ASMFC Tautog FMP.

MANAGEMENT EXPERIENCE

- Managed multiple concurrent projects and contracts to extend ACCSP capabilities.
- Contributing member of MRIP Regional Implementation Council & MRIP NAS reviews.
- Extended development of the MRIP survey state conduct through leadership of three local staff and 160 remote partner staff.
- Coached RecTech Committee development of Atlantic Recreational Implementation Plan.
- Supported Cooperative agreement funding and management, including proposal writing, information gathering, contract oversight, and report submission.
- Demonstrated ability to bring together diverse groups on issues by coordinating and facilitating workshops.

FISHERIES EXPERIENCE

- Deep understanding of the ACCSP mission, activities, and partners gained over 24 years of working in consensus-driven environment of Atlantic coast fisheries management
- Adept at balancing state and federal partner needs in the development of coastwide data standards, data entry and query tools for recreational and commercial fisheries data
- Proven ability to understand fisheries stock assessment data needs

IT EXPERIENCE

Software Development – Strategic priorities for SAFIS capabilities. Managed and programmed projects to create Data Warehouse end user queries, APAIS web interface, APAIS Tablet application, API data transmission and FHTS CATI.

Oracle DBA – Managed 10 DB instances supporting coastwide standardization of fisheries data collection and dissemination.

Systems Administrator– Performed or directed data center implementation and support including network security & system availability.

EDUCATION & AWARDS

- B.S. Dickinson College
- M.S. Virginia Institute of Marine Science
- ASMFC Stock Assessment Training I-III
- Oracle PL/SQL, DB Administration, Windows & Linux Server Administration
- Project Management & Leadership Training
- ASMFC Employee of the Qtr 2003, 2011
- ASMFC Directors Meritorious Service 2017
- ASMFC Science & Technical Excellence 2019
- Eagle Scout, Boy Scouts of America

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Guide for Ranking Proposals
FY2025 Edition

INTRODUCTION

Each year, the Atlantic Coastal Cooperative Statistics Program (Program) distributes a Funding Decision Document outlining the priorities for the coming fiscal year. These priorities are reviewed by the Coordinating Council each spring before the request for proposals is distributed. The Funding Decision Document is available to all ACCSP grant applicants.

We cannot assume that all proposals will meet the guidelines set forth by the document. This is precisely why we need a diverse set of eyes to review the proposals so we can distribute the funds in accordance with Program guidelines.

PHILOSOPHY

What is most important to remember as a proposal ranker is that you are consistent when reviewing the proposals. Many people have different viewpoints as to what would receive a high score. For instance, someone might think it is worth 10 points if a proposal states that it will collect all minimum data elements of catch and effort, whereas, someone else might view a proposal that collects all minimum data elements as worthy of 7 points, which would leave room if another proposal went above and beyond with an innovative data verification program.

It is entirely up to you how you view these proposals. We realize each proposal ranker is coming from a different perspective and we look forward to gathering a diverse set of rankings for each proposal. The most important aspect to ranking proposals is to remain consistent from proposal to proposal.

CATEGORIES FOR RANKING

For FY2025, there are three categories used to rank the project proposals:
1) *Primary Program Priority*;
2) *Project Quality Factors*; and
3) *Other Factors*.

SCORING

The factors of each category carry a different weight. For instance, when ranking these proposals, the score of the primary module given to the proposal is given a weight of 3 (the score given is multiplied by 3). The funding transition plan, improvement in data quality/quantity/timeliness, and impact on stock assessments criteria are given a weight of 2 (the score given is multiplied by 2). Finally, the data delivery plan, multiple partners, in-kind contribution, potential secondary module, merit, and properly prepared criteria are all given a weight of 1 (the score given is multiplied by 1). Review the Ranking Criteria Spreadsheet and the multiplier that is applied to each factor.

PRIMARY PROGRAM PRIORITY

Projects must be rated on how well the data being collected by the project fit the current Atlantic Coast Fisheries Data Collection Standards. You will rate only one module in addition to whether the proposal contains a data delivery plan. If a secondary one is recognized, it will be considered during the *Project Quality Factors*. The highest possible score for this section (PRIMARY PROGRAM PRIORITY) is 32. The score of this category is 46% of the total score of the project.

A. *Catch and Effort* – ACCSP is principally seeking to collect catch and effort data in FY2025. If a proposal description states that it will primarily collect catch and effort data, the proposal may score a maximum of 10 points.

How does a proposal receive the maximum 10 points? The ACCSP standard for commercial catch and effort statistics is mandatory, trip-level reporting of all commercial harvested marine species, with fishermen and/or dealers required to report standardized data elements for each trip by the tenth of the following month.

The ACCSP standard for recreational catch and effort statistics are covered in more detail in the current Atlantic Coast Fisheries Data Collection Standards. Something you may want to consider when ranking proposals is whether all data elements outlined in the Atlantic Coast Fisheries Data Collection Standards. To determine scoring for this factor, consider the following:
1) If they collect the minimum data elements would the proposal be ranked a 5 and thus for all additional information it would lead up to the highest possible score – a 10?
2) Is the data collection method they used (1 ticket vs. 2 ticket) a determining factor on the final score given in this category?
3) Also, is data validation a consideration for this ranking?

B. *Biological Sampling* – A second primary priority for ACCSP for FY2025 is the collection of biological data. If a proposal description states that it will primarily collect biological data, the proposal may score a maximum of 10 points.

How does a proposal receive the maximum 10 points? The FY2025 Biological Matrix identifies the top quartile of all species ranked by the Atlantic States Marine Fisheries Commission, regional councils, NOAA Fisheries, and the states. The top quartile species are grouped by average priority and biological sampling adequacy. The proposals should be given a high ranking if data are collected on species with high average priority and inadequate adequacy (*black sea bass, cobia, and Spanish mackerel*). A mid-level score would be given to those proposals that have a low average priority and inadequate sampling (*American eel, American lobster, American shad, Atlantic halibut, Atlantic menhaden, bluefin tuna, blueline tilefish, finetooth shark, gag grouper, gray triggerfish, red grouper, river herring, snowy grouper, and tilefish)* or high average priority and adequate sampling (*none*). A low-level score would go to those species that have a low average priority and are adequately sampled (*red snapper, shortfin mako shark, spiny dogfish, and vermillion snapper*).

C. *Bycatch/Species Interaction* - A third priority for ACCSP for FY2025 is the collection of bycatch data. If a proposal description states that it will primarily collect bycatch data, the proposal may score a maximum of 6 points.

How does a proposal receive the maximum 6 points? The FY2025 Bycatch Matrix identifies the top quartile of all fisheries fleets ranked by the Atlantic States Marine Fisheries Commission, regional councils, NOAA Fisheries, and the states. The bycatch matrix was recently revised to fleet-based

approach with 2021 being the first year the new matrix is being used. The top fleets are ranked by scoring protected species interactions, amount of regulatory discards, amount of non-regulatory discards, significant changes in management in the past 36 months, total number of trips, and total landings. The fleets in the top quartile of the matrix for FY2025 ranked from highest to lowest include: Mid-Atlantic gillnet, New England American lobster pots, Mid-Atlantic American lobster pots, South Atlantic Shrimp Trawl, South Atlantic Shrimp Deepwater Trawl, New England otter trawl, Mid-Atlantic pound net, pelagic H&L fleet (North), snapper grouper H&L fleet, New England gillnet, New England extra-large mesh gillnet, , Mid-Atlantic small-mesh otter trawl (bottom), Mid-Atlantic large-mesh otter trawl (bottom), Mid-Atlantic Fish Pots and Traps, South Atlantic Large Mesh Gillnet, HMS pelagic longline (Southeastern, Atlantic, and Gulf of Mexico), Mid-Atlantic dredge other, New England crab pots, HMS shark bottom long line (Southeastern, Atlantic, and Gulf of Mexico). Points should be given according to how the fleet was ranked in top quartile with the most points going towards a proposal studying the fleet with the highest ranking.

The Definition of bycatch as defined in the Atlantic Coast Fisheries Data Collection Standards includes:
a. Fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch and release fishery management program. From Magnuson-Stevens Fishery Conservation and Management Act.

b. Discarded catch of any living marine resource plus retained incidental catch and unobserved mortality due to a direct encounter with fishing gear. From NOAA Fisheries Service (used for its National Bycatch Strategy and bycatch reduction efforts).

D. *Social and Economic* – Another important priority in FY2025 is the collection of social and economic data. If a proposal description states that it will primarily collect social and economic data, the proposal may score a maximum of 4 points.

How does a proposal receive the maximum 4 points? Priorities for commercial social and economic data collection were compiled by the Committee on Economic and Social Science. Additionally, there is a list of data elements found in the Atlantic Coast Fisheries Data Collection Standards you may want to consider as a proposal ranker. The ACCSP has established standards for social and economic data collection in recreational and for-hire finfish fisheries. Our standard is voluntary surveys of finfish fisheries conducted at least every three years.

E. *Data Delivery Plan* – All proposals are expected to submit data collected through a proposal to the ACCSP. A proposal may therefore receive up to an additional 2 points if the proposal clearly identifies a plan for submitting collected data to ACCSP. When considering how many points a proposal should receive, consider the method of data transmission and frequency of submission to ACCSP.

PROJECT QUALITY FACTORS (Partners, Funding and Data):
A. *Multi-Partner Regional impact including broad applications* (PARTNERS*)* - To determine scoring for this factor (a score of 0-5) consider the following:

1) Does this project involve one or multiple partners?
2) Does this project collect data from one or multiple partners?
3) What is the timeline for benefiting from the data?
4) Does this project have a narrow or broad scope of work?

The highest possible score for the above section (PARTNERS) is a 5. The score of this category is 7% of the total score of the project.

B. *Contains funding transition plan/Defined end point* (FUNDING) - To determine scoring for this factor (a score of 0-4) consider the following:

1) How long has the project been receiving funds from ACCSP or other sources?
2) Does the project have an end point or continue year after year?
3) If the project continues does this project explain how new funds will be applied in coming years?
4) Is there a transition plan?

C. *In-kind contribution* (FUNDING) – To determine scoring for this factor (a score of 0-4) consider the following:

1) Is the partner adding funds as well as ACCSP?
2) At what level is the partner applying additional funds?
3) Is it at a level that is acceptable for the ACCSP standards?

The highest possible score for the above section (FUNDING) is a 12. The score of this category is 17% of the total score of the project.

D. *Improvement in data quality/quantity/timeliness* (DATA) - To determine scoring for this factor (a score of 0-4) consider the following:

1) At what rate can this project provide data to the ACCSP Data Warehouse?
2) Are the data collected from this project a higher pedigree than in previous years?
3) Does this project include innovative ways to collect data?
4) Does this project outline a clear and timely mechanism for sharing data to ACCSP?

E. *Potential secondary module as a by-product (In program priority order)* (DATA) – In determining what (if any) score to give for a proposal that addresses a secondary module as a byproduct consider the following, if the secondary module is:

1) Catch and effort data receives a score of 3;
2) Biological data receives a score of 3;
3) Bycatch data receives a score of 3; and
4) Social and economic data receives a score of 1.

F. *Impact on stock assessment* (DATA) – To determine scoring for this factor (a score of 0-3) consider the following:

1) Does this project collect data from a species that has a stock assessment in the next few years?
2) Does this project collect data that can be organized in a fashion suitable for the ACCSP Data Warehouse that can be used for a stock assessment when needed?

The highest possible score for the above section (DATA) is 17. The score of this category is 24% of the total score of the project.

OTHER FACTORS

A. *Properly Prepared* – To determine scoring for this factor (a score of -1-1) consider the following:

1) Does the proposal follow the guidelines of the Funding Decision Document?
2) Does this proposal follow the directions of the guidelines set forth by the request for proposals?

B. *Merit* – To determine the scoring for this factor (a score of 0-3) consider the subjective worthiness of the proposal to receive funding.
The highest possible score for the above section (OTHER FACTORS) is a 4. The score of this category is 6% of the total score of the project.

If you have any additional questions, it is best to consult with the Operations Committee member from your state, agency or organization. Committee lists can be found at here.

Thank you for your hard work and dedication in reviewing the proposals!

GLOSSARY OF TERMS COMMONLY FOUND IN PROPOSALS
Access sites: Areas where fishermen fish from shore. Or access sites can be defined as the place fishermen board or leave a boat to go fishing.

Bank: A stretch of rising land at the edge of a body of water not washed by high water, which could be rocks or an overhanging cliff.

Beach: A level stretch of pebbles, bedrock shore, or sand beside a body of water (often washed by high water).

Breachway: Shore along a connecting channel.

Breakwaters: An offshore structure used to protect a harbor or beach from the forces of waves.

Bridge: A structure carrying a pathway or roadway over a body of water.

Bulkhead (as known as seawall): A retaining wall along a waterfront.

Bycatch (2 accepted definitions):
a. Fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch and release fishery management program. *From Magnuson-Stevens Fishery Conservation and Management Act*

b. Discarded catch of any living marine resource plus retained incidental catch and unobserved mortality due to a direct encounter with fishing gear. *From NOAA Fisheries Service (used for its National Bycatch Strategy and bycatch reduction efforts)*

Catch: The total number, weight, or other measure of marine resources (fish, invertebrates, or others) which are captured and retained, released, or discarded.
Advisory Committee: Finfish, shellfish, and protected species that are captured, whether retained, released, or discarded.

Discarded or released catch: The portions of the catch that is not retained (i.e., discarded or released at sea dead or alive) and includes incidental take of protected species.

Advisory Committee: Recommends deleting the definition above and replacing it with:

Economic, social, and cultural discard: Finfish and shellfish that are the target of a fishery, but which are not retained because they are undesirable size, sex, or quality, or for other economic, social, or cultural reasons.
Regulatory discard: Finfish, shellfish, and protected species harvested in a fishery which fishermen are required by regulation to discard.

Immediate use catch: Use of the retained catch for food or bait before the end of the trip.

Landed catch: The total number, weight, or other measure of all marine resources (fish, invertebrates, others) captured, brought to shore and retained at the end of a trip. This includes catch that is discarded or not sold after being landed. This type of catch is indicated by disposition codes.
Advisory Committee:
Landed Catch: Finfish, shellfish, and protected that are captured, brought to shore and retained at the end of a trip.

Causeway: An elevated or raised way across wet ground or water.

Charterboat: *Trip Definition* - Any trip of a vessel-for hire engaged in recreational fishing (VHERF) that is hired on a per trip basis. For survey purposes, and possible alternative definitions, information should be gathered on: a) number of anglers (refers to all marine recreational resource users); b) size of boat; and c) where fishing occurred. *Boat Definition* - A charterboat is any VHERF that typically is hired on a per trip basis.

Commercial and recreational fisherman: For statistical purposes only, anyone who sells or barters any portion of the catch from a trip is a commercial fisherman for that trip, and any marine resources that are sold or bartered are considered a commercial product. All other fishermen and catches are considered recreational. Commercial trips with effort but no catch are still commercial trips and should be reported.

Commercial dealer: A seafood dealer is defined as any person or entity other than the final consumer, who purchases, ships, consigns, transfers, transports, barters, accepts (maintains) or packs any marine fishery products received from marine resource harvesters or marine aquaculturists. Any marine fishery products landed in any state must be reported by a dealer or a marine resource harvester acting as dealer in that state. Any marine resource harvester or aquaculturist who sells, consigns, transfers, or barters marine fishery products to anyone other than a dealer would himself be acting as a dealer and would therefore be responsible for reporting as a dealer. This definition is provided for purposes of statistical gathering only.

Docks: Structure built out over water and supported by pillars/anchors with long-term docking facilities for boats.

Exclusive Economic Zone (EEZ): Offshore waters 3-200 miles on Atlantic coast. For the Gulf coast it is 9-200 miles from the shoreline.

Effort: Estimated number of fishing trips taken by an individual (recreationally).

Entanglements: A condition in which any part of a protected species is tangled, wrapped and snared, hooked, or otherwise attached to fishing gear.

Fisheries-dependent: Information collected directly from the commercial, for-hire, and recreational fisheries.

Fisheries-independent: Information gathered independent of the fisheries through direct or indirect sampling of the stocks.

Fishing guide: A person hired by a recreational fisherman to aid in fishing activities.

Fishing trip: A period of time over which fishing occurs. The time spent fishing includes configuring, deploying, and retrieving gear, clearing animals from the gear, and storing, releasing or discarding catch. When watercraft are used, a fishing trip also includes the time spent traveling to and from fishing areas or locales and ends when the vessel offloads product at sea or returns to the shore. When fishing from shore or man-made structures, a fishing trip may include travel between different fishing sites within a 24-hour period.
Commercial Trip: Any trip where the retained catch is or would be sold or bartered. This includes trips with effort but no catch.

For-hire Trip: Any shore or vessel trip whose participants are engaged in a marine resources recreational activity that is contracted for a fee.

Recreational Trip: Any trip for the purpose of recreation from which none of the catch is sold or bartered. This includes trips with effort but no catch.

Split Trip: A split trip is any angler trip in which a portion of the landings are sold commercially and a portion of the landings are retained for personal use.

Gear: Anything used to catch marine resources.

Gear configuration: Materials, construction, measure (e.g., mesh size, length of gear), and deployment of gear.

Guided beach trip: Any shore-based trip where a guide is hired or provided.

Guided fishing trip: A fishing trip on which a fishing guide is hired to provide services directly related to fishing activities.

Headboat: *Trip* - Any trip of a VHERF that is hired on a per person basis. For survey purposes, and possible alternative definitions information should be gathered on: a) number of anglers (refers to all marine recreational resource users); b) size of boat; and c) where fishing occurred. *Boat* - A headboat is any VHERF that typically is hired on a per person basis.

Inland: Waterbodies less than zero miles from the shoreline. Also, includes waterbodies found inside the boundaries for territorial waters.

Intercept survey: On-site interviews which gather data from fishermen during or upon completion of their fishing trip at access sites.

International: Offshore waters greater than 200 miles from the shore line

Integrated Taxonomic Information System (ITIS): A taxonomic database for terrestrial and aquatic plants and animals. The product of a partnership of federal agencies collaborating with systemists in the federal, state and private sectors to provide scientifically credible taxonomic information.

Jetties: A kind of wall, usually made of rocks, built into the water to restrain currents or protect a harbor.

Metadata: Metadata are corollary or descriptive information, both numeric and non-numeric, which may qualify or explain primary data.

Mode of fishing: The method by which a recreational fishing trip is taken, e.g. private/rental boat, shore, or for-hire.

Multi-trip fisheries: Multiple trip fisheries are characterized by a large number of relatively short duration trips employing the same type of gear, (e.g. lobster pots), and resulting in catch of the same species (e.g. lobster), or relatively few species

Non-consumptive use: Any activity related to marine resources where no take of marine resources is attempted. Examples include photographing wildlife in natural or managed areas, SCUBA diving to view jewfish, whale watching, etc.

Observer: A trained agent (employee, contractor, grantee, etc.) of any ACCSP partner acting as an unbiased data collector observing fishing operations on fishing vessels at sea.

Other fishing modes: Any other non-boat fishing.

Piers: Structure built out over water and supported by pillars without long-term docking facilities for boats.

Person: Any individual, corporation, partnership, association or other entity, or any federal, state, local, or foreign government or any entity of such governments, including regional fishery management councils.

Port agent/sampler: A trained agent (e.g., employee, contractor, grantee, etc.) of any partner acting as an unbiased data collector, collecting data after the completion of a fishing trip.

Post stratification: Summarization of data into strata different from strata design used during data collection.

Price: The dollar amount per landed unit (e.g. pounds, bushels) of a given species (or species landing condition and market category).

Private access sites: Privately owned riparian land with dock/shoreline, waterfront residential developments, or marinas inaccessible to intercept sampling.

Private boat: *Trip* - Any boat trip for which no fee is paid for use of the boat. *Boat* - Any boat for which no fee is paid for use of the boat.

Protected species: Any organism listed under the MMPA, ESA, or the Migratory Bird Treaty or any state protected species legislation. The term protected species can include protected finfish species (e.g., Atlantic salmon, shortnose sturgeon), invertebrates (e.g., Queen conch), sea birds, and plants (e.g., sea oats).

Protected species interactions: Any interaction with a fishery, which results in the harassment, harm, or death of individuals of a species.

Public: Any user of non-confidential information.

Rental boat: *Trip* - A trip on a boat that is rented or leased. No captain or crew is hired. *Boat* - A boat that is rented or leased. No captain or crew is hired.

Retained catch: The number or weight of marine resources caught and kept for immediate use (e.g., bait, food) or for landing.

State territorial seas: Inshore 0-3 miles on Atlantic coast. Gulf coast is 0-9 miles from the shoreline.

Strandings: A marine mammal or sea turtle where: 1) the specimen is dead and/or moribund on the beach or shore or in a coastal waterway or EEZ, or 2) the specimen is alive and is on the beach or shore and is unable to return to the water under its own power, or 3) the specimen is in the EEZ or a coastal waterway where the water is so shallow and/or inhospitable that the specimen is unable to return to its natural habitat under its own power.

Stratification: The process of dividing a population into two or more non-overlapping comprehensive subpopulations, called strata, for the purpose of conducting independent surveys of these subpopulations.

Stratum: An identifiable sub-population of a population that is being sampled.

Team Fish: The cooperative harvesting of the resource by a group of fishermen. These fishermen may be formally organized in a sector or coop. Cooperation may take many forms (information-sharing on the location of the stocks, rationalization of the group's fleet, coordinate access to fishing grounds to avoid congestion and gear conflicts, search for lost gear, etc.), but in most cases the main objective is to increase the profits of the whole group.

Trip (see **fishing trip**): A trip is shore to shore by gear/area combination, or in the case of transfers at sea, an offloading at sea is a trip.

Trip duration: *Recreational Trip Duration:* A day of fishing measured in hours fished for the shore mode and dock-to-dock duration for the private/rental boat mode. *For-hire Trip Duration:* Dock-to-dock duration measured in hours fished

Unique Identifier for commercial fisheries: The unique identifier for commercial fisheries trip data is the trip start, the vessel identifier, and trip number when a vessel is involved; the trip start, the

individual identifier, and the tip number when a vessel is not involved. Reporting of the unique identifier is required of both commercial fishermen and dealer on all submitted reports.

Unique identifier for recreational fisheries: The unique identifier for recreational trip data is the date of return, the sampler number, the record number, and the individual.

Value: The total landed dollar amount of a given species (or species landing condition and market category). Example: 100 pounds of lobster at a price of $3.50 per pound will have a value of $350.

Vessel directory frame: A list of known vessels operating in a particular fishery, which can be used to sample that fishery.

Waterbodies: Bodies of waters used for defining areas fished and identified by standard codes.

Atlantic States Marine Fisheries Commission

Horseshoe Crab Management Board

October 21, 2023
3:00 – 5:00 p.m.

Draft Agenda

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

1.	Welcome/Call to Order *(J. Davis)*	3:00 p.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from April 2024	3:00 p.m.
3.	Public Comment	3:05 p.m.
4.	Consider Stakeholder Workshop Report on Delaware Bay Management Objectives *(K. Weaver)* **Possible Action**	3:15 p.m.
5.	Set 2025 Delaware Bay Bait Harvest Specifications **Final Action** • Review Horseshoe Crab and Red Knot Abundance Estimates and Model Results from the Adaptive Resource Management Framework *(J. Sweka)* • Set 2025 Specifications *(C. Starks)*	4:00 p.m.
6.	Consider Approval of Fishery Management Plan Review and State Compliance for 2023 Fishing Year *(C. Starks)* **Action**	4:45 p.m.
7.	Elect Vice-Chair **Action**	4:55 p.m.
8.	Other Business/Adjourn	5:00 p.m.

The meeting will be held at The Westin Annapolis (100 Westgate Circle, Annapolis, Maryland; 888.627.8994) and via webinar; click here for details

MEETING OVERVIEW

Horseshoe Crab Management Board
October 21, 2024
3:00 – 5:00 p.m.

Chair: Justin Davis (CT) Assumed Chairmanship: 02/24	Technical Committee Chair: Ethan Simpson (VA)	Law Enforcement Committee Rep: Nick Couch (DE)_
Vice Chair: Vacant	Advisory Panel Chair: Brett Hoffmeister (MA)	Previous Board Meeting: April 30, 2024
Voting Members: MA, RI, CT, NY, NJ, PA, DE, MD, DC, PRFC, VA, NC, SC, GA, FL, NMFS, USFWS (16 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from April 2024

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

4. Update on Horseshoe Crab Management Objectives Workshop (3:15-4:00 p.m.) Possible Action

Background

- As part of its ongoing discussions regarding how best to manage Delaware Bay-origin horseshoe crabs and in response to the 2023 Stakeholder Survey, a Horseshoe Crab Management Objectives Workshop was held in July 2024. The Workshop included a small group of managers, scientists, and stakeholders. The purpose of the workshop was to increase understanding of stakeholder perspectives and interests, current horseshoe crab modeling, and concerns, alternatives, and areas of common ground for HSC management.
- A report on the workshop discussions and recommendations was developed for the Board's consideration **(Briefing Materials)**.

Presentations

- Management Objectives Workshop Report by K. Weaver

Board actions for consideration at this meeting

- Consider implementing workshop recommendations for next steps

5. Set 2025 Delaware Bay Harvest Specifications (4:00-4:45) Final Action

Background

- In September 2024, the Delaware Bay Ecosystem TC (DBETC) and Adaptive Resource Management (ARM) Subcommittee met to review results of the horseshoe crab and red knot population abundance surveys in the Delaware Bay region **(Briefing Materials).**
- The ARM model was run using three fishery-independent surveys for horseshoe crabs, various sources of horseshoe crab removals, and the estimated population of red knots to provide a recommendation for harvest specifications for Delaware Bay states in 2025 **(Briefing Materials).**

Presentations

- Horseshoe Crab and Red Knot Abundance Estimates and 2024 ARM Model Results by J. Sweka

Board actions for consideration at this meeting

- Consider ARM harvest recommendations and set 2025 specifications for states in the Delaware Bay region

6. Consider Approval of Fishery Management Plan Review and State Compliance for the 2022 Fishing Year (4:45-4:55 p.m.) Action

Background

- State Compliance Reports were due July 1, 2024.
- The Plan Review Team reviewed each state report and compiled the annual FMP Review **(Briefing Materials).**
- South Carolina, Georgia, and Florida have requested and meet the requirements of *de minimis* status.

Presentations

- FMP Review of the 2023 Fishing Year by C. Starks

Board actions for consideration at this meeting

- Accept FMP Review and State Compliance Reports for the 2023 Fishing Year
- Approve de minimis requests

7. Elect Vice-Chair (4:55-5:00 p.m.) Action

Background

- The vice chair seat is empty since Justin Davis has assumed the role of chair.

Board actions for consideration at this meeting

- Elect Vice-Chair

8. Other Business/Adjourn (5:00 p.m.)

Horseshoe Crab

Activity level: Low

Committee Overlap Score: Low

Committee Task List

- TC – July 1st: Annual compliance reports due
- ARM & DBETC – Fall: Annual ARM model to set Delaware Bay specifications, review red knot and VT trawl survey results

TC Members: Katie Rodrigue (RI, Chair), Jeff Brunson (SC), Derek Perry (MA), Kelli Mosca (CT), Jennifer Lander (NY), Danielle Dyson (NJ), Jordan Zimmerman (DE), Steve Doctor (MD), Ingrid Braun (PRFC), Ethan Simpson (VA), Jeffrey Dobbs (NC), Eddie Leonard (GA), Claire Crowley (FL), Chris Wright (NMFS), Joanna Burger (Rutgers), Wendy Walsh (USFWS), Kristen Anstead (ASMFC), Caitlin Starks (ASMFC)

Delaware Bay Ecosystem TC Members: Wendy Walsh (USFWS, Chair), Danielle Dyson (NJ), Katherine Christie (DE), Jordan Zimmerman (DE), Steve Doctor (MD), Ethan Simpson (VA), Sarah Karpanty (VA Tech), Jim Fraser (VA Tech), Francesco Ferretti (VA Tech), Wendy Walsh (USFWS), Kristen Anstead (ASMFC), Caitlin Starks (ASMFC)

ARM Subcommittee Members: John Sweka (USFWS, Chair), Danielle Dyson (NJ), Katherine Christie (DE), Margaret Conroy (DE), Steve Doctor (MD), Sarah Karpanty (VA Tech), Wendy Walsh (USFWS), Conor McGowan (USGS/Auburn), David Smith (USGS), Jim Lyons (USGS, ARM Vice Chair), Jim Nichols (USGS), Kristen Anstead (ASMFC), Caitlin Starks (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

HORSESHOE CRAB MANAGEMENT BOARD

The Westin Crystal City
Arlington, Virgina
Hybrid Meeting

April 30, 2024

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

TABLE OF CONTENTS

INDEX OF MOTIONS

1. **Move to approve Agenda** by consent (Page 1).

2. **Move to approve Proceedings of October 16, 2023** by consent (Page 1).

3. **Move to accept the 2024 Horseshoe Crab Assessment Update for management use** (Page 10). Motion by Shanna Madsen; second by Conor McManus. Motion passes by unanimous consent (Page 10).

4. **Motion to adjourn** by consent (Page 18).

ATTENDANCE

Board Members

Dan McKiernan, MA (AA)
Raymond Kane, MA (GA)
Sarah Ferrara, MA, proxy for Rep. Peake (LA)
Conor McManus, RI, proxy for J. McNamee (AA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Justin Davis, CT (AA)
Bill Hyatt, CT (GA)
Marty Gary, NY (AA)
Scott Curatolo-Wagemann, NY, proxy for E. Hasbrouck (GA)
Jesse Hornstein, NY, proxy for Sen. Kaminsky (LA)
Joe Cimino, NJ (AA)
Jeff Kaelin, NJ (GA)
Adam Nowalsky, NY, proxy for Sen. Gopal (LA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Mike Luisi, MD, proxy for L. Fegley (AA Acting)
Russell Dize, MD (GA)
Shanna Madsen, VA, proxy for J. Green (AA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Chad Thomas, NC, proxy for Rep. Wray (LA)
Ben Dyar, SC, proxy for B. Keppler (AA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Jeffrey Renchen, FL, proxy for J. McCawley (AA)
Gary Jennings, FL (GA)
Ron Owens, PRFC
Chris Wright, NMFS
Rick Jacobson, US FWS

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

Ex-Officio Members

Brett Hoffmeister, Advisory Panel Chair
John Sweka, ARM Subcommittee Chair

Staff

Bob Beal
Toni Kerns
Tina Berger
Madeline Musante
Kristen Anstead
Katie Drew
Jeff Kipp
Jainita Patel
Tracey Bauer
James Boyle
Caitlin Stark
Chelsea Tuohy
Emilie Franke
Trevor Scheffel

Guests

Thad Altman, Florida House of Representatives
Mike Armstrong, MA DMF
Pat Augustine
Linda Barry, NJ DEP
Kendra Beaver, Save The Bay
Mel Bell
John Bello, Virginia Saltwater Sportfishing Assn
Colleen Bouffard, CT DEEP
Michael Bowen, Cornell University
Jeff Brunson, SC DNR
Jeffrey Brust, NJ DFW
Darlene Carpenter
Nicole Caudell, MD DNR
Michael Celestino, NJ DEP
Haley Clinton, NC DEQ
Margaret Conroy, DE DNREC
Danielle Contrada, FL FWC
James Cooper
Claire Crowley McIntyre, FL FWC
Caitlyn Czajkowski
Tanya Darden, SC DNR MRRI
Conor Davis, NJ DEP
Steve Doctor, MD DNR
Danielle Dyson, NJ DEP
Julie Evans, East Hampton Town Fisheries Advisory Cmte.
Delaney Farrell, FL FWC
Wenley Ferguson, Save The Bay
Anthony Friedrich, ASGA
Matthew Gates
Lewis Gillingham, VMRC
Angela Giuliano, MD DNR

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

Guests (Continued)

Laura Graziano, Jenkinson's Aquarium
Berlynna Heres, FL FWC
Harry Hornick, MD DNR
Derrek Hughes, NY DEC
Todd Janeski, VCU
Rachel Kalisperis, South Carolina Aquarium
TJ Karbowski, Rock & Roll Charters
Amy Karlnoski, NYS Assembly
Blaik Keppler, SC (AA)
Kris Kuhn
Robert LaCava, MD DNR
Jennifer Lander, NYS DEC
Christina Lecker, Fujifilm Wako Chemicals USA
Ben Levitan, Earthjustice
Susan Linder
John Maniscalco, NYS DEC
Victoria Melendez, FL FWC
Nichola Meserve, MA DMF
David Meservey
Steve Meyers
Chris Moore, Chesapeake Bay Foundation
Thomas Newman, North Carolina Fisheries Assn.
Scott Olszewski, RI DEM
Marina Owens, FL FWC
Danielle Palmer, NOAA
Cheri Patterson, NH (AA)
Derek Perry, MA DMF
Jill Ramsey, VMRC
Allen Reneau, Fujifilm Wako Chemicals USA
Sefatia Romeo Theken, MA DFG
James Rosato
Daniel Sasson, SC DNR
Chris Scott, NYS DEC
Ethan Simpson, VMRC
Somers Smott, VMRC
Renee St. Amand, CT DEEP
Benjie Swan
Yoshihiro Takasuga, Fujifilm Wako Chemicals USA
Kristen Thiebault, MA DMF
Laura Tomlinson, MA DMF
Kelly Whitmore, MA DMR
Kristoffer Whitney
Angel Willey, MD DNR
Travis Williams, NC DEQ
Steven Witthuhn, NY MRAC
Daniel Zapf, NC DEQ
Jordan Zimmerman, DE DNREC
Renee Zobel, NH FGD

The Horseshoe Crab Management Board of the Atlantic States Marine Fisheries Commission convened in the Jefferson Ballroom of the Westin Crystal City Hotel, Arlington, Virginia, a hybrid meeting, in-person and webinar; Tuesday, April 30, 2024, and was called to order at 3:00 p.m. by Chair Justin Davis.

CALL TO ORDER

CHAIR JUSTIN DAVIS: I'm going to go ahead and call to order this meeting of the Horseshoe Crab Management Board. My name is Justin Davis; I'm the Administrative Commissioner from Connecticut, and I have the pleasure of taking over as the Chair of this Board starting at this meeting. First order of business, I'll thank our outgoing chair, John Clark, for his excellent leadership of this Board over the last couple years, I think everyone would agree was pretty eventful for this Board.

I thank John for taking care of all that, so that we'll have relative peace and quiet for the next few years.

APPROVAL OF AGENDA

CHAIR DAVIS: As our first item on the agenda today, Approval of the Agenda. Does anyone have any additions or suggested changes to the agenda? Caitlin is reminding me that I have a change to the agenda that I'm supposed to tell everybody about.

We will not be electing a Vice-Chair today at today's Board meeting. That last item on the agenda is no longer on the agenda. Any other changes to the agenda? Okay, not seeing any, we'll consider the agenda approved by consent with that one change.

APPROVAL OF PROCEEDINGS

CHAIR DAVIS: Next item on the agenda is Approval of the Proceedings from the last meeting of this Board in October, 2023. Any suggested changes, additions, omissions from those meeting minutes? Okay, not seeing any hands, we'll consider the proceedings from the October, 2023 meeting approved by consent.

PUBLIC COMMENT

CHAIR DAVIS: Moving right along, next item on the agenda, Public Comment. As a reminder, this would be public comment on any items that are not on the agenda for today's Board meeting. Okay, I'm being told we didn't have anybody signed up for public comment. I see one hand in the back of the room. Sir, if you would like to go ahead and come up to the public microphone there on the corner.

MR. BRETT HOFFMEISTER: Great, thank you very much. My name is Brett Hoffmeister, I am the LAL Production Manager at Associates of Cape Cod. I just wanted to thank you for allowing me to comment today. It was in 1816 that Sir Walter Scott penned the phrase, "It is not the fish you are buying, but it's men's lives."

He couldn't have known just how relevant that statement would be over 200 years later. I cannot imagine he would have thought it relevant to the humble horseshoe crab either. But here we are. Human lives are now intertwined with those of the horseshoe crab on which we depend on for endotoxin testing. Testing that is so critical to our healthcare that is required by law in the U.S., 2024 marks 50 years of Associates of Cape Cod doing business. Our founder was the first to license LAL with the USFDA. Since then, LAL has functionally replaced the rabbit pyrogen test, it was viewed as the gold standard around the world for endotoxin testing.

We provide products, support, services to pharmaceutical and medical device manufacturers globally. We also provide clinical testing products and testing services for patients from or who are at risk of invasive fungal infections. This vital assay is used millions of times annually across the globe, to help ensure the safety of life saving, life enhancing medical devices, implants, hardware, IV fluid, drugs, vaccines and antibiotics.

This assay is so critical to our healthcare system that it is pretty safe to say that nearly every human being that you will meet in your entire life benefited from the products and services that this industry

provides. The LAL test will be needed for many years to come, even as new technologies enter the market.

There are only four companies in the U.S. that are licensed to make LAL. Our facilities are scattered along the east coast of the U.S. We work closely with state and coastal fisheries managers, fishers, dealers, and regulatory agencies to provide the products and services so critical to an industry that not only extends human life, but helps to maintain and increase the quality of life for countless people around the world.

Our medical use of these animals is a low impact activity that is essential to our global healthcare system. It is amazing that LAL has a hundred percent safety record. It has never failed us when used correctly. It is within that context I would like to comment on the recent efforts to limit or prohibit collection of horseshoe crabs that defers business of LAL manufacturing.

While Associates of Cape Cod shares the concerns of many regarding conservation of these remarkable animals, it is vital to recognizes the role they play in human health. Conservation measures are working and data demonstrates the horseshoe crab populations are robust and healthy. Overall, fisheries related mortality over the past 15 or 20 years has been on a steady decline, and in many areas, populations appear to be growing substantially.

The well meaning for many efforts to list the horseshoe crabs as endangered or other means that will limit access to these animals, is reckless, and potentially dangerous, as it could limit the ability of the LAL industry to supply this essential assay to the companies that are required to test for endotoxins. This could have far-reaching and longstanding impacts on the healthcare system.

Alternative assays have been available for many years, and new products have recently been brought to market. Without a doubt they will have a role to play in the future. But allowing proper vetting takes time. Calls to ban fishing for crabs and force the use of alternatives are misconstrued and flawed approach that needlessly places at risk the people who are in need of medical intervention.

Simply put, there are no shortcuts around the barriers of the regulatory landscape, and this exists solely to protect human life. The political purses surrounding this fishery ignores the efforts of scientists and fisheries managers who have been tasked with managing our fisheries. Similarly, efforts are producing hundreds and in some cases thousands of electronically filled out letters and petitions to sway decision makers and adopting an agenda potentially undermines the system's that are put in place and been developed to allow experts, like you, to make decisions based on fact, science and data.

It is my hope and expectation that we can allow experts in a particular field to do their job and manage, regulate, or otherwise utilize the authority we have placed on their shoulders, unencumbered by misinformation, agendas and group sourcing. This goes for wildlife managers, fisheries managers, regulators, and those who contribute to human healthcare, management and safety. The impact of the decisions and the work that you do cannot be taken lightly, for indeed, it is not just fish you are selling.

CHAIR DAVIS: Brett, can I just ask that you wrap it up. We're over the three minutes.

MR. HOFFMEISTER: I'm done, thank you very much.

CHAIR DAVIS: Thank you for your comment. Any other public comment before we move on?

CONSIDER 2024 HORSESHOE CRAB STOCK ASSESSMENT UPDATE

CHAIR DAVIS: Okay, we're going to go ahead and move on to our next item on the agenda, which will be a presentation of the 2024 Horseshoe Crab Stock Assessment Update by Katie Rodrigue.

MS. KATHERINE RODRIGUE: To begin, I just want to go over the stock assessment schedule for

horseshoe crab. The last coastwide assessment was the 2019 Benchmark Assessment, and the Peer Review Panel recommended a benchmark every 10 years with an update every 5, so now in 2024 we've completed the 5-year update assessment.

The next coastwide assessment will be the benchmark in 2029. There was also a revision the Delaware Bay ARM framework in 2022. The stock assessment update was developed by the SAS and approved by the TC, and it is a product of both committees. Here you can see that membership. There was no TC Chair or Vice-Chair for this update.

But going forward, we'll have Ethan Simpson from VMRC as Chair, and Ingrid Braun from PRFC as Vice-Chair. First, I'll go through the fishery dependent data. This is bait harvest coastwide from 1998 to 2022. The gray line on this figure is the coastwide bait harvest, and then the stacked bar charts underneath is showing the breakdown by sex.

The dotted orange line represents the coastwide quota. Since the 2019 benchmark, coastwide landings decrease in 2020 due to the COVID 19 pandemic, but then increased again in 2021 and 2022, the level similar to the recent year's preceding 2020. Landings have remained well below the coastwide quota since the implementation in 2000.

This is bait landings by management regions, so stock status is determined by four management regions for horseshoe crabs, there is the northeast region, the New York Region, Delaware Bay Region and the Southeast. These are based on tagging and genetic studies management and data availability. The assessment does recognize that there may be embayment specific populations or other nuances to these groupings. The majority of bait landings are harvested from the Delaware Bay region and are predominantly males, due to the harvest restrictions in the ARM framework. Historically the New York Region has had the next highest bait landings, but in recent years that has been the Northeast Region. Since 2004 ASMFC has required states to monitor the biomedical use of horseshoe crabs, and that is to determine the source of the crabs, track their total harvest, characterize pre and post bleeding mortality. In recent years sex data is also being provided.

The black line on this figure is showing the total number of crabs that are collected for the biomedical industry, and then the gray line is the number of crabs that were actually bled. The stacked bar chart below shows the breakdown of bled crabs by sex, and from a metanalysis of bleeding studies in the benchmark assessment, a mortality rate of 15 percent is applied to the number of bled crabs, to estimate the bleeding mortality.

That is added to the number of crabs that are actually observed during the biomedical process, to estimate total mortality from the biomed industry. That is shown on the orange line in this figure. The estimated mortality from the biomedical industry in 2022 was just under 146,000 crabs, which is the highest in the time series.

Dead discards are also provided from the Northeast Fisheries Science Center's Northeast Fisheries Observer Program. For horseshoe crab those discard estimates come specifically from Delaware Bay Region only, and that is due to the limited data on horseshoe crabs in the Observer Program, and also for its use in the Catch Survey Model.

While the methods used are the same from the benchmark, there was some improved data filtering from the 2022 ARM Revision, and so this is representing that update and analysis. The estimated number of dead horseshoe crabs is variable through time, with the highest values in 2016 and 2021, and the lowest in 2022.

Next, I'll move on to the fishery independent data and our indices of relative abundance. During the 2019 benchmark the SAS explored both nominal and standardized indices, and due to the high number of zeros in the data, used the Delta Distribution for the mean and variance for all indices. But in 2022, the Peer Review noted that fixed station surveys should be standardized, and so for this update any fixed station surveys, those

indices were standardized, while the others used the delta mean.

I'll just briefly go through indices for each region from north to south. Here are the Northeast Region indices, on the upper left is the Massachusetts Trawl Survey north of Cape Cod. On the upper right the Massachusetts Trawl south of Cape Cod, and then on the bottom is the Rhode Island Trawl survey. For many surveys there are some data gaps due to reduced sampling during COVID, and this was the case in 2020 for the Massachusetts indices.

Spearman rank correlation coefficients were estimated between the indices within each region to see how these surveys are correlated with each other, and in the Northeast the Rhode Island index is negatively correlated with both Massachusetts indices, but the comparisons were not significant. Now moving on to the New York Region. Their indices are derived from five surveys. On the top left is the Connecticut/Long Island Sound Trawl Survey, on the upper right the New York/Peconic Trawl Survey, and on the bottom the Western Long Island Sound Seine Survey, with Jamaica Bay on the left and the Little Neck and Manhasset Bay is on the right. Again, there are some data gaps in these surveys in 2020 due to COVID. Then finally, the last survey for the New York Region is the New York Region of the NEAMAP Survey.

Again, we looked at correlation comparisons between the surveys. For the New York Region, all were positively correlated with 4 of the 10 being significant, and those are circled in red. Next on the left is the Delaware Bay Region. There are 14 indices for this region. First is the Delaware Bay Region of the NEAMAP Survey on the left, and Maryland Coastal Bay Survey on the right.

The New Jersey Ocean Trawl Survey has four different indices from the survey. On the top is the spring, with females on the left and males on the right, and on the bottom the fall survey. Again, females on the left and males on the right. No sampling was conducted in 2020 and 2021.

Next is the Delaware Bay Adult Trawl Survey, which is also separated out by sex and season, again with the spring survey on the top, fall survey on the bottom, and females on the left and males on the right there. Finally, the Virginia Tech Trawl Survey. This is separated out by sex and maturity stage. On the top here we have the newly mature crabs with females on the left and males on the right.

Then the bottom mature individuals, females on the left, males on the right. The data gap in the middle of the time series is due to a lack of funding for the survey during that time. For Delaware Bay there are 28 of the 91 comparisons were significant and positively correlated, and this is mostly between the Delaware Adult Trawl Survey, the New Jersey Ocean Trawl and the Virginia Tech Trawl Surveys, all of which are used in the Catch Survey Analysis and the ARM Framework.

Just those indices from the ARM framework were subset, and of those 28 comparisons 12 were significant and positively correlated. Lastly, the Southeast Region. On the upper left we've got the North Carolina Estuary and Gillnet Survey, on the upper right the South Carolina Crustacean Research and Monitoring Survey, which has since then renamed to the Estuarine Trawl Survey, but we're maintaining the old name here to be consistent with the benchmark, and that will be changed in the next assessment.

On the bottom left is the South Carolina Trammel Net Survey, and the bottom right the South Carolina section of the NEAMAP Survey. Both of these are marked with red stars, and that is to indicate that these surveys underwent changes in their sampling design in recent years. Trends post 2019 should be interpreted with caution, because we don' t know if those trends are representing true trends in abundance, or it it's more of an artifact of the change in the sampling design.

Typically, we would stop a time series if survey methods changed, so this is something that the SAS will revisit in the next benchmark assessment. Then the Georgia/Florida Region of the SEAMAP Survey on the left, again also subject to the sampling

design changes, and then finally on the right is the Georgia Trawl Survey. For the Southeast, 4 of the 15 comparisons were significant. Most were positive, but one was negative, and that was between the Georgia/Florida Region of the SEAMAP Survey and the South Carolina Crustacean Research and Monitoring Survey. Next, I'll go through the tagging analysis. This data comes from the U.S. Fish and Wildlife Service's Horseshoe Crab tagging database, which also provides regional recapture rates.

This allows for mark-recapture analysis to derive survival estimates for each region. I do just want to note that the tagging analysis regions are slightly different from the management region, so you can see those on the screen. In this table, shows the survival estimates from that model, both with the 2019 benchmark and the 2024 update.

The highest survival rates were in Delaware Bay, and the lowest in the Southeast Region. All regions saw a decline in survival since the benchmark, with the exception of the Coastal New York/New Jersey Region. But though there was a decrease in survival for most regions, the error rate also increased quite a bit.

You can see the really wide confidence intervals in the 2024 update. This decrease in survival may be due to reduced tagging efforts in recent years, which I will show in more detail in a little bit. Then just to visually show between a benchmark and the update assessment estimates, those super wide confidence intervals.

With the exception of the Southeast, the update and benchmark confidence intervals full overlap. Just to illustrate the change in tagging effort. On the top table here is the number of tag releases, and the bottom the number of recaptures. The last three columns are how they deviate from the average within the last three years of the assessment.

You can see there was a decrease in both releases and recaptures in 2020, with some regions still remaining below average tagging effort in 2021 and 2022. Again, New York/New Jersey had the smallest reduction in tagging effort during COVID, and they are also the only region that did not see a decrease in their survival rate.

Just to kind of recap, the reduction of crabs in 2020 coupled with reductions in recapture reports in 2020 and 2021, would likely cause a tagging model to underestimate survival rates. This is because the tagging models rely on consistent reporting rates to produce reliable estimates, and the model will account for these missing tag-recaptures as mortalities or emigrants from the population, which will in turn reduce survival estimates.

From the tagging analysis, the survival rate from Delaware Bay is used to estimate natural mortality for the Catch Survey Model, and in 2019 in the benchmark assessment, that rate was 0.274, and the 2022 ARM revision it was 0.3, and for this update 0.4. I also just want to note that the calculation from survival to mortality may be more appropriately characterized as total mortality, rather than natural mortality. That will be reconsidered in the next benchmark.

Next, I'll talk about the Catch Multiple Survey Analysis. This is updated annually, as part of the ARM framework, to support harvest specification setting in the Delaware Bay Region. Use of quantifiable sources of mortality to estimate male and female horseshoe crab populations, it was developed for the 2019 benchmark, specifically for female horseshoe crabs, and then updated in the 2022 ARM revision, and the male model is also developed as part of that. Just to note, because of the Delaware Bay specific biomed data is confidential, population estimates for horseshoe crabs were made using the coastwide biomedical data or no biomedical data, to provide those upper and lower bounds.

I won't go through the analysis in too much detail, because this same version through 2022 was already presented to the Board in detail during the October 2023 meeting, as part of the ARM framework. As a reminder, there is no management action from the coastwide assessment

that was based on this Catch Multiple Survey Analysis.

This is only used for management in the ARM framework. In 2022, the model estimated 16.1 to 16.2 million mature female horseshoe crabs in the Delaware Bay Region, and approximately 40.3 million mature male horseshoe crabs in 2022. Because of those data caveats that I spoke about with the tagging model for the 2024 update, the base run of the catch multiple survey analysis used the M of 0.3 from the 2022 ARM revision.

That is the gray line in these two figures here. But we did do a sensitivity run using the revised M of 0.4, and that is shown in the black line. Ultimately, the population estimates from each run varied pretty minimally, but in the sensitivity run, did result in slightly higher terminal year population estimates.

Next, I'll go over the ARIMAS, the Auto Regressive Integrated Moving Average Models. These are fit to the time series of horseshoe crab abundance indices that were shown before, and they estimate the probability that the terminal year in each index is less than certain reference points with 80 percent confidence intervals.

Those reference points are the lower quartile of the fitted index values, and also the 1998 for the index value. That year representing when harvest restrictions were implemented. Now I'll go through the results. Just to kind of orient you to this table here, the first column is the survey which the indices was derived from, and then I want to draw your attention to the columns with the percentages.

This fourth column here being the probability that the terminal year is below the 1998 reference point, and then in the third column from the right here, that is the probability that the terminal year was below the lower quartile reference point. Then the last two columns are the results of Mann-Kendall Test to detect trends in the data. That is since 2017, being the terminal year of the benchmark assessment, and also since 2012, which was the terminal year on the last update assessment. For the Northeast Region, there are mixed ARIMA model results.

For the Massachusetts Trawl Surveys they showed increasing of stable trends, with low probabilities of being less than either of those reference points, whereas the index from the Rhode Island Trawl Survey is showing a continued decrease, and has a high probability of being below both of those reference points. The New York Region has generally continued to show declining trends, which has been evident since the 2009 benchmark assessment. The Jamaica Bay, Little Neck and Manhasset Bay and Peconic Bay surveys all have high probabilities of the terminal year indices being below their 1998 reference points. But the Connecticut/Long Island Sound Survey has showed increasing trends since 2012, and the NEAMAP and the New York Peconic Trawl Surveys increased over the last 10 years.

The Delaware Bay Surveys generally all show increase in trends, and low probabilities of the terminal year being less than either or both reference points. This is the Virginia Tech Trawl Survey ARIMA results, and the only exception here is that the trawl survey for newly mature females has shown low abundance since 2019, and this has been discussed in the update report and also during previous Board meetings.

There are three possible hypotheses that have been discussed between SAS and TC members. The first being that there is a recruitment failure in recent years. But this seems the least likely hypothesis, because mature females have continued to increase, and there has not been a concurrent decrease in the newly mature male population.

The second hypothesis is a change the spatial distribution of newly mature females, which is resulting in lower catchability in the surveys or three, these individuals are being misclassified as mature individuals rather than newly mature. Both immature males and females are declining according to the Mann-Kendall Test, but have low probabilities of the terminal year value being less than the lower quartile reference point.

Finally for the Southeast, previous assessments have generally showed increasing or stable trends in abundance. But this update does indicate that there may now be some decline occurring. The South Carolina Trammel Net, Georgia Trawl and the Georgia/Florida portion of the SEAMAP Surveys showed declining trends in recent years, though the probabilities of being less than either the lower quartile in 1998 reference points are still low.

Then again, as previously stated, the trends in the Trammel Net Survey and the SEAMAP Survey should be interpreted with caution, due to the decreased sampling since 2020. As in the 2019 benchmark, stock status is based on the percentage of surveys having a greater than 50 percent probability of the terminal year fitted value being less than the 1998 reference point.

That is within each region and coastwide. Again, this 1998 reference point represents the point in time in which horseshoe crabs became actively managed by the ASMFC, and so status relative to this gives us some indication of the affects of management on the population. A region had poor status if greater than 66 percent of the surveys met these criteria, good if less than 33 percent of surveys met this, and then neutral if the status was between 34 and 65 percent of the surveys.

Here is the stock status over the last several assessments. The regional determinations effort that this update remains the same as in the 2019 benchmark, with the exception of the Delaware Bay Region, which improved from neutral to good status. The Northeast Region remains neutral, and New York remains poor, except for the 2019 benchmark, and the two hypotheses before then for the New York status is either one, that bait harvest remains at a level that is not sustainable in the New York Region, or the habitat has changed and simply cannot support the number of horseshoe crabs that it once did. Then again, although the status of the Southeast Region was determined to be good, this should be viewed with some caution, because it is only based on two surveys that extend back to 1998, one of which has showed recent declining trends, that being the South Carolina Trammel Net Survey, but again also subject to the sampling design changes.

Then the other surveys in the Southeast I would not use as part of stock status determination for the region, have shown some decreasing trends since 2012. But regardless, none of these surveys showed a high probability of the terminal year value being less than the reference points. Then lastly, the update assessment noted several research recommendations from the benchmark that have been either addressed or initiated.

That included collecting more information on horseshoe crab ecology and movement, as well as studies related to the biomedical industry. Then the use of the Catch Multiple Survey Analysis in the ARM Framework, and some additional recommendations from the 2024 update are addressing that reduced sampling in the Southern surveys.

Maintaining pre-pandemic levels of tagging effort, evaluating the use of Z instead of M, in the Catch Multiple Survey Analysis, and then reexamine the stock structure with more years of genetic and tagging data. With that I will be happy to take any questions.

CHAIR DAVIS: Okay, thank you, Katie, for that excellent presentation. I will look to the Board to see if there are any questions on the presentation on the stock assessment update. Mike Luisi.

MR. MICHAEL LUISI: Thank you, Katie, for the presentation. I wonder if you can clear something up for me. During your presentation you mentioned it a couple times, and you used the little red stars as a way to highlight areas to be, just taken with some caution. The first slide you mentioned that the surveys had changed.

Then I think later on you referred to, I believe it was in the Southeast, there just being low numbers of crabs being caught. Were they the same surveys where the methodologies have changed, and they're just catching low numbers? Just want to

make sure I'm clear as to where that focus should be on that area of concern, or at least where to focus on, as far as being cautious about the results.

MS. RODRIGUE: Sure, so I believe that is true for the South Carolina Trammel Net Survey, and so that underlined the sampling design changes that lowered the number of samples that are conducted, and also saw declining trends. The other surveys that I spoke on that are showing declining trend, I don't believe they were part of the surveys that underwent those changes. But they are also not included in the stock status determination, because they don't go back to 1998. I would have to look back at specifically those surveys to let you know.

MS. LUISI: Just a quick follow up, Mr. Chairman. If the SAS takes a look at those surveys. Right now, it's kind of like apples to oranges, maybe. Would we anticipate that they would be brought together in some way to cut through a recalibration? Just trying to understand kind of where it went askew. I realize that if the sate wasn't able to conduct the number of surveys and the methodology has changed slightly. I don't have any problem with that. It is just that at some point we will have to figure out how to compare one time series with the other. Just looking, I have another interest in why this would be something outside of horseshoe crabs. But I'm just trying to get your thoughts on, how do you bring those two things in line, if that's the objective of the SAS?

MS. RODRIGUE: I think that standardization could help to an extent, but it may be that the change is too drastic for that to help. I think that typically a time series would not be used if nothing has changed so drastically. But I might look to Kristen if she has any other input on that.

DR. KRISTEN ANSTEAD: Yes, you're correct, Katie, and I'll just add that this was the case. There was a New Jersey Surf Clam Survey, and we have it now as just a shortened time series that we had in the benchmark, and then stopped using it. In the case of the SEAMAP or the trammel, we might either consider that now two indices, because I'm not clear on if there is going to be a calibration to correct the later time series. It might end up being broken or stopped at a terminal year, but it's still used, only through 2019.

CHAIR DAVIS: Okay, next I have Bill Hyatt.

MR. WILLIAM HYATT: In the 2019 assessment, in this assessment then in your presentation today. You referred to the poor condition of the New York area Region population, and speculated that either bait harvest is excessive, or habitat carrying capacity has declined. I was just wondering if you've had any conversations amongst your group, if you were able to speculate as to what type of habitat conditions might contribute to such a decline with horseshoe crabs.

I'm asking that sort of from the perspective of recognizing that within at least the Long Island Sound Portion of their range, the crab population that has made it through some pretty harsh environmental conditions and habitat changes in the past just fine. I'm just kind of at a loss as to what habitat changes might have occurred in the last 15 to 20 years that might be driving this.

MS. RODRIGUE: I don't know that I have an answer for you specifically. I can try and get back to you about it, or if anybody else has comments that might help.

MR. HYATT: No, I would appreciate that, and understand, I'm just looking for some thoughts and speculation. I'm sure there isn't anything concrete or it would have been in the report, so thank you.

CHAIR DAVIS: Next I have Shanna Madsen.

MS. SHANNA MADSEN: My comments are related to Mike Luisi's. First of all, thank you, Katie for a wonderful presentation. I think my question is probably going to be more directed at ASMFC staff, but I find it concerning that the South Carolina Trammel Net Survey portion of SEAMAP has reduced sampling. I'm wondering if that is a permanent change, and if it is a permanent change, why that is happening and what other species might

be affected by this, because it is the first time I'm kind of seeing it come up. Thank you.

DR ANSTEAD: Yes, so there were a couple of things going on with the SEAMAP Survey, one was, one of the years there were some storms, and so that was a legitimate not being able to sample during the times they normally. It's also my understanding that SEAMAP has changed their seasons from three seasons to two seasons. I believe that is a permanent change from the previous three seasons, now two that kind of straddle the three. That is one reason why we're not going to be able to go back in time and make these consistent time series. I believe that is permanent.

CHAIR DAVIS: Next I have Conor McManus.

DR. CONOR McMANUS: Really nice presentation, Katie. I know that it is an update assessment, and TOR 1 specific to updating last assessments entities. I'm just kind of curious for food for thought on future assessments, if the group discussed other surveys that exist that are not currently used for individual regions that may also provide insight into relative abundance trends for horseshoe crab.

Just kind of curious if in your meetings there was discussions about other state surveys from other gear types or other seasons that might be of use, particularly in some of the stock units where there may be two, three indices currently being used. It's okay if the answer is, we didn't talk about it. But just kind of curious.

MS. RODRIGUE: Yes, and unfortunately that might be my answer, Conor. But yes, I don't know if Kristen again has anything to add to that.

DR. ANSTEAD: Yes, we didn't re-pole the states for like new data, because it's an update. But certainly, that is something we will do for the next benchmark, and I'm hopeful that there will be some other datasets that play out, especially in those regions that we have fewer.

CHAIR DAVIS: Next I have Ben Dyar.

MR. BEN DYAR: Yes, just to kind of give a little more clarification on some of those sampling methods and changes in South Carolina. The Trammel Net Survey went from monthly sampling down to two months out of every three months for each quarter, and that is just due to logistics. All the methods are the same, the methodologies did not change.

Gear, everything, it's still a random stratified sampling design, so it's just a change in those. Then the SEAMAP is unfortunately, due to funding. But with a new vessel coming online soon, hopefully they will still be standardized methodologies as well with the new gear type for the new vessel.

CHAIR DAVIS: Next on the list I have Dan McKiernan.

MR. DANIEL McKIERNAN: Yes, Katie, great presentation, and I'm not sure you're the person to ask this question, but I need to bring it to the Policy Board. Given the last couple of slides about recommended future studies. Do you folks ponder like where we could find some of that money, because the public interest in the species is just enormous, and yet you can't go to S-K for it or it's not a federally managed species.

It tends to be the poor child among our advantaged species. You don't even have to answer it, but I guess to my colleagues on the Board. I wonder if we can put our heads together to find funding sources for a lot of these questions that you've identified that will help us manage going forward.

MS. RODRIGUE: Thank you, and I will just say, at least in Rhode Island we do take advantage of the State Wildlife Grant for species like horseshoe crab that aren't covered by say the Sport Fish Restoration Fund. But in terms of all their funding sources, I'm not really sure.

DR. DAVIS: John, go ahead, John Clark.

MR. JOHN CLARK: Thank you for the presentation, Katie. Just curious, I know the issue with the primiparous and the Virginia Tech Trawl was kind of an oddity there. I know this went through 2022, the

assessment. Did you get 2023 data? Did that still continue where they are still not seeing primiparous females in the Virginia Tech Trawl for last year?

MS. RODRIGUE: I have not seen the 2023 data, so I'm not sure about that.

DR. ANSTEAD: John, we did hear from Virginia Tech after the 2023 season, and they did see primiparous this past year. We won't get that data for a couple more months, and I have just queried for all of the data to support the ARM that you will see in the fall. But there were primiparous again.

CHAIR DAVIS: Okay, I don't have anybody else on the list. Last call here for questions on the presentation. Any hands online? Okay, I think at this point, as a next step, we would want a motion to approve the stock assessment for management use. I'll look to the Board to see if anybody is inclined to make that motion. Shanna Madsen.

MS. MADSEN: **Move to accept the 2024 Horseshoe Crab Assessment Update for management use.**

CHAIR DAVIS: I'll look for a second. Conor McManus. Shanna, would you like to provide some rationale for the motion? Okay, you're going to pass, Conor, as the seconder of the motion?

DR. McMANUS: Just nice work and thank you, really good stuff.

CHAIR DAVIS: Okay, any discussion on the motion? Let's see if we can do this the easy way**. Are there any objections to the motion? Any abstentions for the record? Okay, seeing no hands the motion passes by unanimous consent.** I believe that concludes that item on the agenda. I'll look to Caitlin to see if I'm forgetting anything.

DISCUSS HORSESHOE CRAB BAIT DEMAND

CHAIR DAVIS: We're good, all right, so we'll move on to our next item on the agenda, which is a Discussion of Horseshoe Crab Bait Demand, and we're going to have a presentation from Caitlin Starks.

MS. CAITLIN STARKS: At the last Horseshoe Crab Board meeting there was a brief discussion about differences in state regulations concerning horseshoe crab bait harvest along the coast and how restrictions in some states might impact other states.

POSSIBLE IMPACT OF STATE HARVEST REGULATIONS ON BAIT DEMAND

MS. STARKS: The Board requested that staff gather some information from the states with horseshoe crab bait fisheries, as well as states with fisheries that use horseshoe crab as bait, to better understand these dynamics.

Some questions were sent out to the State Administrative Commissioners, and these were, what commercial pot fisheries in your state are using horseshoe crab as bait? Has a survey been conducted of the trap or pot fishermen in your state that use horseshoe crab as bait about their use and alternative bait, and are data for these fisheries collected that could reveal trends and effort? For example, number of active permits or traps fished or trap hauls.

If those data are being collected, what are the trends that are being seen? Then if the state bans or severely restricts the bait harvest of horseshoe crab, has it also considered restrictions on the use of horseshoe crab as bait by pot fishermen? Then lastly, does the state collect any data that would allow us to quantify the origin of horseshoe crab imported from other states, and how much?

I'll just go over the summary of responses that I received. First, the two pot fisheries that were identified as using horseshoe crab as bait are eel and whelk or conch. Most states have at least one of these fisheries, and as you can see at the bottom, there were some blanks where I'm missing some information.

Then as for the state survey, none of the states indicated that they've conducted their own surveys of the pot or trap fishermen in their states about their bait use. The only survey that has been

conducted relevant to this topic was the ASMFC survey on eel fishing practices in 2017, and that survey found that about 22 percent of the eelers that responded used horseshoe crab as bait.

Then some but not all of the states have data that can show trends in effort in the eel and whelk fisheries. Generally, the states have landings data as well as permit data, or number of participants. Then there are a few states like Connecticut, Delaware and Virginia that do have trip level effort data for eel and whelk.

Then in terms of the trends that these states have been seeing. Massachusetts reported that effort and landing in the whelk fishery have been declining. Connecticut indicated there has been low but steady effort for eel, while the whelk there show effort decline from the mid-2000s to mid-2010s, and then has stabilized at a lower level.

New York data don't show significant trends for eel, but for whelk the pot landings trips and number of fishers reporting landings have all increased since 2014. The number of permits also increased from 2000 to 2023 by 24 percent, but it has been declining since 2009. Then New Jersey indicated they have seen increases in the last couple years for both of these fisheries. Maryland has seen declines in both the number of eel potters and landings since 2012, but for whelk the number of potters decreased, while the whelk landing increased. Then in Delaware there has been a significant decrease in eel effort since the female horseshoe crab harvest ban. Then for whelk the number of participants has decreased, but soak days and landings have increased.

Then lastly, Virginia data show that there has been declining effort for the eel fishery, but a shift in the effort trends for whelk, where it increased and then was followed by a decrease in the more recent years of the time series. Regarding the question on whether states with bans or significantly restrictive regs for horseshoe crab harvest have also implemented restrictions on bait use; the answer is generally no.

None of the states have implemented or considered such measures at this point. Then the last question that was asked is whether the states collect any data that would show the quantity and origin of horseshoe crabs imported from other states. Again, the answer across the board here was generally that the states so not collect any such data. I know that was a quick summary, but I'm happy to take any questions.

CHAIR DAVIS: Thank you, Caitlin, I'll look to the Board to see if there are any questions. Dan McKiernan.

MR. McKIERNAN: Thank you, Caitlin, for compiling that. I know I brought that up at the last meeting, and I really appreciate you compiling all that information.

CHAIR DAVIS: Thank you, Dan. Any other members of the Board with questions or comments? Do we have any hands online? Okay, no hands online. Okay, if there are no further comments, we'll move along to our next item on the agenda.

ADAPTIVE RESOURCE MANAGEMENT SUBCOMMITTEE (ARM) REPORT

CHAIR DAVIS: Okay, so the next item on our agenda is a report from the Adaptive Resource Management Subcommittee. John Sweka.

DR. JOHN SWEKA: Just a little history about how we got here and the source of this presentation. The original Adaptive Resource Management Framework was adopted for management use back in 2012, and it began setting harvest levels for horseshoe crabs in the Delaware Bay region beginning in 2013.

From 2013 through 2022, the ARM Framework consistently recommended 500,000 males and 0 female harvest. The ARM Revision then was ultimately adopted in 2022, had many changes to the modeling. This was because we gained much, much, more data in the Delaware Bay specific both to horseshoe crabs and red knots, and our

methodologies for modeling both species greatly improved.

However, with the new ARM Revision there was potential for female harvest, and this created a lot of controversy among various stakeholder groups, and resulted in extensive public comment prior to the October 2022 and 2023 Board meetings. The Board decided then to still set female harvest at 0 after both of those meetings.

TECHNICAL RESPONSE TO EXTERNAL REVIEW OF ARM FRAMEWORK REVISION

DR. SWEKA: Earthjustice contracted outside experts to review the ARM Revision Report, and they supplied public comments in September, 2022, which contained the views and critique by Dr. Kevin Shoemaker of the University of Nevada, Reno, and Dr. Romauld Lipcius from VIMS. Then again in September, 2023, Earthjustice supplied more public comment, which contained an additional review and analyses by Dr. Shoemaker. During the Board meetings last October, the Board tasked the ARM Subcommittee with responding to the 2023 review by Dr. Shoemaker.

What I'll present today here are responses to six major topical criticisms by Dr. Shoemaker, from his 2023 review of the ARM Framework, and then also provide some brief responses to additional items that were contained in his 2022 review, as well as those from Dr. Lipcius from VIMS.

A much greater detail on my response is provided in the report, the ARM Subcommittee generated report. Jumping into it. Criticism 1, the major topic here was that estimates of red knot survival used in the ARM appear to be artificially inflated, resulting in falsely optimistic estimates of population resilience.

Well, there is high survival and long lifespan, which is commonly known for red knots and other shorebirds of similar size and similar life histories. Our estimates of survival are not out of the realm of possibility, and are similar to others. The survival rates that were used in the ARM are calculated from tagging data for red knots in the Delaware Bay, and are comparable to other public studies.

We critically reviewed the tagging information to represent the best available data and all of those caveats were addressed in the data in our survival estimates, and they are provided in our 2022 report. The analysis of the tagging data and its use in modeling was commended also by the Peer Review Panel.

One of the more specific claims in Dr. Shoemaker's review was that survival estimates are biased by individual misidentification of or flagged misreads. While the Delaware Bay misread error is probably between 0.38 percent and 4.5 percent. The way we figure this is there were records of 702 impossible flag observations. These are data entry errors, or data recording errors in the field, where a flag number was written down, but it never occurred when you go back to the historic data. That particular number was never actually applied to a bird.

Also, there was approximately 8,500 single observations of birds. In a given year, there always is a possibility that you misidentify the flag on a bird. We looked at those data and you can remove single observations of a bird within a season. Obviously, if you see a bird more than once, you are more confident that that flag reading is right.

However, some additional modeling by Anna Tucker showed that this level of possible error would have very minimal impact on our survival estimates. I'm moving on to Criticism 2, and that was the trawl-based indices of horseshoe crab abundance are inadequate for modeling the biotic interaction between red knots and horseshoe crabs.

While the inclusion of trawl surveys as indices of horseshoe crab abundance may be imperfect, but it is the best available science that we have, and it has been used for horseshoe crab stock assessment for a long time, and has gone through several independent peer reviews. Most of the criticisms that we received on the trawl surveys would also apply to egg densities or bird count data. All

surveys suffer from the same sorts of catchability problem.

There is also consensus among all the trawl surveys for an increasing trend in horseshoe crab abundance since 2010. It's not like we only have one survey that shows an increase, all of them are showing an increase. Ultimately, trawl surveys are the standard method of sampling for bottom dwelling organisms such as horseshoe crabs, and are used for many other species as well.

Within this criticism, we were criticized for not using a general linear model or a general additive model in calculating indices of abundance for horseshoe crab. While the Delaware Trawl Survey actually does use a GLM approach, and this is because it is fixed station survey, and this was pointed out during the peer review of the ARM Revision.

We went back and changed it and recalculated that index. Also, the Virginia Tech Trawl Survey follows a stratified sampling design, and those sorts of things that would affect trawl catchability are taken into account by the sampling strata. Also, the New Jersey Trawl Survey, we had attempted to do a GLM standardization in the 2019 benchmark stock assessment, and found that it didn't really improve the data or the error on the data very much.

There has also been a lot of criticism for a lack of correlation between the trawl surveys. Well, it depends on what sort of correlation analysis you do, and at the end of the day each trawl survey still shows an increasing trend. It's the consensus among these trends that is important, not exactly how closely they match one another.

There is always going to be some mismatch, you know a trawl being in the right place at the right time gets crabs. I'll have more on this correlation criticism in the next point. Criticism 3 was that red knot survival is strongly sensitive to horseshoe crab egg density, indicating that persistent degradation of the horseshoe crab resource could have dire consequences for the red knot population.

Well, we've been criticized for not using egg density data. The egg density data were requested by the ARM Subcommittee, but they were never provided. Therefore, we couldn't consider them as a data input to the models. When we look at the egg density data, which was finally supplied in a publication by Smith et al in 2022, after we had finished up the ARM Revision.

We look at the trends in egg density data, and low and behold they are correlated with other data inputs from the years included in the ARM Model. Thus, we think even if we would have had the egg density data ahead of time, it's unlikely that they would result in any meaningful difference from current ARM Framework, in terms of harvest recommendations, because they showed similar trends.

Again, the Smith et al paper that documented the egg densities in recent years, showed general increasing trend in horseshoe crab eggs. They were very similar to the horseshoe crab abundance, and consistent with the findings of the ARM revision. Here we have the correlations of the egg density data that was extracted from Smith et al. The population estimates from the Catch Multiple Survey Analysis, the New Jersey Trawl, Delaware Trawl, and Virginia Tech Trawl, and here we have a correlation coefficient, and those that are circled are statistically significant at the 0.05 or 0.10 level. Also on this graph, we just compare our catch multiple survey analysis estimates of female horseshoe crab abundance with egg density data that we digitized from Figure 2 in Smith et al, 2022.

As you can see, both of them show interannual variations, some ups and downs, which could be due to sampling effects, or just random sampling error. But overall, there is an increasing trend over both time periods for the egg density data, as well as female crab abundance from the Catch Multiple Survey Analysis. Dr. Shoemaker also reanalyzed the egg density data from Smit et al, to try to account for differences in survey methodologies through time.

Once he reanalyzed those data, contrary to Smith et al, he found no increasing trend. Well, there is not

a whole lot we can say about this, because again, we weren't provided the egg density data. But it is interesting that Dr. Shoemaker reanalyzed their data to account for differences in survey methodology, which was one of the reasons why we've always been reluctant to use egg density data, because of the consistently changing survey methodologies through the years.

Dr. Shoemaker also conducted an analysis then to determine the effect of egg density on red knot survival, and he found that survival was positively correlated with egg density. But the methods that he described in his report weren't documented in great detail, and only included the New Jersey side of the Bay, so egg density and also bird data just from the New Jersey side.

It is somewhat questionable whether that analysis is applicable to the entire Bay. If Dr. Shoemaker's analyses are correct, we would have a positive relationship between egg density and red knot survival, but no trend in egg density. But all of our analyses and our Catch Multiple Survey Analysis shows an increasing trend in female abundance.

It begs the question, how do we then link harvest, which affects crab abundance, which then obviously crab abundance should affect egg density, not only red knot survival. How do we then model each one of those steps in the entire process? Unfortunately, Dr. Shoemaker in his criticisms and review doesn't propose a parameterized model to do so.

Moving on to Criticism 4, the ARM exaggerates evidence for an increasing trend in the number of females horseshoe crabs in the Delaware Bay. Well, the analyses that were provided in Dr. Shoemaker's report had some errors, including the use of incorrect data sub-setting for some of the indices that he was provided data, and applications of an analysis that we feel is inappropriate for the data. The trawl-based indices were early considered by the ARM modelers. Katie just presented them to you here today as part of our stock assessment update.

They represent the best available science for tracking horseshoe crab abundance, been through several peer reviews by this point. The goal of the ARM modelers is not to find an increasing trend, but to develop the data in the most statistically sound way possible, regardless of what the answer may be. When Dr. Shoemaker was provided the data, he reanalyzed the New Jersey Ocean Trawl Survey using a GLM approach. The ARM Subcommittee, we have no issue at all with using a GLM approach, and like I said, we attempted this during the 2019 benchmark assessment, but found that it didn't really improve the data much. As we collect more data, perhaps we can better derive the effect of covariates upon catchability, and a GLM would be more useful. As I said, however, Dr. Shoemaker subset the data in an inappropriate manner, and this was discovered in an initial review of his report by staff at New Jersey.

Dr. Shoemaker made a questionable analytical choice when conducting a trend analysis. Here on these figures the two figures on the left are from Dr. Shoemaker's trend analysis approach, where he fit a linear model to both his raw and also adjusted index values, adjusted using the general linear model.

Well, Dr. Shoemaker ran this trend analysis on the entire time series of the data, and obviously early on we did have a decrease in horseshoe crab abundance. You know the Delaware Trawl Survey went back to 1990, and there was a decline in abundance, and a decline up through 2000, and this was part of the reason it spurred on the development of the fisheries management plan for horseshoe crab.

What we have here is a time series of data from the three trawl surveys that shows a U shape. Well, if you fit a linear model to U-shaped time series, of course the slope is going to be close to zero over that entire time series. What should be done is either, you know you can see clearly in the surveys here that around 2010 is when we seem to hit a low point in abundance from all the surveys.

If we looked at just the information in the time series coming from 2010 with just a simple linear model from that point to the present. You know we have a significant increase in female crab. Another possible approach, if you wanted to look at the entire time series, would have been to use a segmented regression approach, and that would show you a decreasing trend, and then again even with the segmented regression approach, it turns out that around 2010 we have a change in the slope, where it changed from decreasing to an increasing trend.

Looking at Criticism 5, this focused on our red knot model, and it's the integrated population model used for estimating red knot population parameters is overparameterized and likely yields spurious results. Dr. Shoemaker's criticism of the red knot model is really unsubstantiated, and misrepresents the models used in the ARM Framework.

Much like the trawl surveys, I mean red knot data are imperfect, but they are the best available data that we have. They are also subject to catchability issues or detection error from one year to the next or from one trip to another to another out in the field. Dr. Shoemaker assumes that too many parameters will produce incorrect results, when the relationship between overparameterization and bias models is really more nuance than that.

I would like to remind everybody, the Integrated Population Model that was used for red knots is actually three different models all put together, and each one of them feed into one another. You know first we have a life cycle model; this is your typical stage structured model that advances juveniles to recruits to adults, and those adults then produce these juveniles. Typical sort of model used in all population biology. We also have the open robust model, which is used to estimate survival from the tagging data on the bird, and a state space model, which accounts for the observed counts and those aerial surveys and ground count surveys of birds from one year to the next. If all three of these models are essentially ran simultaneously, and they feed into one another in the estimation of those vital parameters, such as survival and recruitment for red knot. This is something I think Dr. Shoemaker failed to recognize is that structural linkage between the sub models. His claims for overparameterization may be valid for traditional applications of singular models, but it is much more nuanced for an integrated population model.

At least at this point in time there is no hard and fast rules as to what overparameterization may be. One thing you always keep in mind is that overparameterization does not necessarily mean biased results. Under-parameterization can too. The next criticism is that the Integrated Population Model exhibits poor fit to the available data.

In this critique, Dr. Shoemaker provided some conflicting arguments from the use of goodness and fit test to the red knot model. Goodness and fit test applied to the red knot model indicated poor fit in one model component, but the proportion of the model including the survival probability did not fail that goodness of fit test.

There are certainly some more details than that in the report if you would like to read them. Moving on to Criticism 7 through 11. These were a few major topical things that we as the ARM Subcommittee thought we should bring forward to the Board, and these are from the 2020 reviews by Dr. Shoemaker and Dr. Lipcius, and some additional items from a supplemental section in Dr. Shoemaker's 2023 report.

On Criticism Number 7, this is a big one in the first comments we got from Dr. Shoemaker and Earthjustice. This is the estimate of mean horseshoe crab recruitment and propagation of error within the horseshoe crab population dynamics model is inappropriate. Do you remember, we had those years of Virginia Tech Survey when it did not operate. Admittedly, those years of our estimates of recruitment coming from our Catch Multiple Survey Analysis, those are poor years.

But the estimate of mean horseshoe crab recruitment used by our Subcommittee is still really the most biologically realistic. If mean recruitment

were lower, as Dr. Shoemaker suggests, then as we project our population forward, the current population estimate of horseshoe crabs will be well, well above any predicted "carrying capacity" of the Delaware Bay, and certainly we expect the crab population to decline due to that carrying capacity.

Now Dr Shoemaker's proposed method for air propagation is something that is worth considering by the ARM Subcommittee in the next revision of the ARM. But when we make some comparisons between his population projections and those of our current models, they are nearly identical, and this was shown in this slide.

The graphs on the left are from Dr. Shoemaker's 2020 review, where he recalculated the Catch Multiple Survey Analysis, used his method for air propagation, and it's more of a Bayesian model and predicted that forward. Then on the right are predictions from our current ARM model for horseshoe crab. The top graphs are under a situation of no female harvest ever, and also a 210,000 female harvest, you know the maximum allowable. If you just did that and held that constant each year. As you can see, I tried to scale these graphs as best I could, so that the scales match up, and essentially, for all of the concern over our air propagation and mean recruitment, in the end the projections from both Dr. Shoemaker's model and that of the ARM Subcommittee are essentially the same, you know the same number of multiparous and primiparous crabs, so the N and the R.

The next criticism was that the ARM model would not predict a decline in red knot under a total collapse of the horseshoe crab population, and that is evidence that the model is fatally flawed. Well, Dr. Shoemaker is incorrect that the ARM model would not predict a decline in red knot if the horseshoe crab population collapsed.

His assertion that red knots would continue to increase in the absence of horseshoe crabs is just mathematically impossible in the model. Red knot survival in our model is a function of the log of female crab abundance. Obviously as survival declines to zero as crab abundance decreases. Also, we should keep in mind that a complete collapse of a horseshoe crab population is a sensationalized and extreme scenario.

If that should happen, nobody would argue either at the ARM Subcommittee level, the TC level or this management board, that if our abundance of horseshoe crabs would dip to low levels that are lower than what we've seen or used to build our models, you know we wouldn't advocate for additional harvest of horseshoe crabs.

You know certainly, we're trying to make predictions on a model based on data that is well outside the range of a model. Criticism 9 deals with demographic data that indicate a declining horseshoe crab population. These comments came from Dr. Lipcius with VIMS in the 2022 comment.

During his comment, one of the things he looked at was this declining size of mature horseshoe crabs in the Virginia Tech Trawl Survey. That decline started in 2008. He used that as an argument that it could indicate overfishing is occurring. Now we certainly agree that in a typical finfish fishery, if you have declining mean size at age, that is indicative of overfishing, because a fishery will select for faster growing individuals, and those faster growing individuals are plucked out of the fishery the sooner, and then therefore your mean length at age would decline.

However, application of that rule of thumb to horseshoe crabs is a bit uncertain, because horseshoe crabs will grow, have a terminal molt, and then stop growing afterwards. It's pretty uncertain whether you can apply that same general rule of overfishing to the species like horseshoe crabs.

Now along with that declining size at age, the smaller the horseshoe crab size the fewer eggs you would expect to be laid by that crab. Dr. Lipcius assumed that we would also have declining recruitment or egg deposition in recruitment. But assuming the natural mortality is not changed, and we've seen the increase in abundance of horseshoe

crab, abundance of horseshoe crabs could not have increased if egg deposition and hatch also had not increased over that same time period.

Recent low estimates of the other thing is recent low estimates of female newly mature crabs, as seen in the Virginia Tech Survey. We've discussed this problem over the past few Board meetings, Katie mentioned it earlier. Again, male newly mature crabs did not decrease over the same time period. Although it really doesn't seem that overfishing is occurring with horseshoe crabs in the Delaware Bay, and we have no evidence to suggest that. Criticism 10 was specific to the bird population model again, and that is that there is an incorrect specification of the "pi" parameter in the red knot IPM model.

The "pi" parameter is the probability of being present in Delaware Bay in the occasion t of year j. Is the bird present or not as the Integrated Population Model is looking at, you know different time periods within a year, could the birds be present or not in Delaware Bay? This is a criticism that does warrant some further consideration by the ARM Workgroup.

We should look into this a bit further, and our folks that were experts in bird modeling are considering this in any future revisions. Finally, the last criticism is that there is an overrepresentation of Mispillion Harbor in red knot resighting data. While use of data from Mispillion Harbor does not result in bias inferences, it is very true that the bulk of red knots are seen in Mispillion Harbor.

But when we start to look at the number of birds and the proportion of birds that are seen just in Mispillion versus other sites, this really is not like it's overwhelming or the overwhelming amount of data comes solely from Mispillion Harbor. As we can see here, this is the proportion of birds that are seen in Mispillion Harbor only, other non-Mispillion Harbor sights and then sighted at both Mispillion and other sights.

You can see they are almost the same across the board, and it varies a bit from year to year. It's not like data from one site is overwhelming the model. Just to conclude our rebuttal to a lot of the comments we've received. You know continued scientific review is always welcome. That is how science progresses, so we welcome that. The ARM Revision really represented some great advances in our understanding of population dynamics for both species, and methods to optimize the harvest.

The ARM Subcommittee, we are left wondering, with all the advances we made in our modeling, why was the original ARM not criticized nearly as much, and we can't help but ask, is the real problem with the final answer and not necessarily the data methods or the process? The benefit of the ARM Framework is the ability to make decisions with imperfect data. That is why we went down the Adaptive Management Route from the beginning, way back in 2008.

We strived to design a modeling framework with routine monitoring to allow rapid learning. This is a critical feature that wasn't addressed by Dr. Shoemaker in his reviews. You know our models are based on the data that we get from routine modeling. Easily updated, and easily changed from year to year as more data is added.
A lot of the criticisms really stem from the belief that there had to be a strong relationship between horseshoe crab, egg density, horseshoe crab abundance, and red knot survival. Dr. Shoemaker postulated that the collection of additional data may show the relationship between horseshoe crab abundance and red knot survival could either disappear or become negative with a collection as we move forward. He states in his '22 review, this outcome would pose an existential problem for the ARM Framework, decoupling the two-species framework and rendering the red knot model unusable in the context of management. Our question then is, well, would we not expect the relationship between horseshoe crab abundance and red knot survival to disappear if horseshoe crab abundance were high enough, such that it did not limit red knot survival.

That is something we should expect would happen. There is no question that Dr. Shoemaker is very

knowledgeable in quantitative ecology, however, his criticisms focused on specific model components of why each might be wrong. He doesn't provide any recommendations for how to then take all of these individual pieces that he added comments to, and put them back into place and bring them all together again in one unifying decision-making framework.

He also failed to recognizes how uncertainty is handled in the optimization, the approximate dynamic programming. We found it very interesting that throughout all of the comments we received that there were no criticisms about the approximate dynamic programming, no criticism about the utility functions for horseshoe crabs or red knots, and no criticisms about ultimately the Harvest Policy Function that are solved for, and that is really what tells you how many crabs you can harvest, given the number of birds or horseshoe crabs.

There will always be some room for improvement in the ARM Framework, and it is designed to do exactly that through the double-loop learning process. Every few years we add more data. We go back, we rerun our models, rerun the optimization, tweak our models as need be. The critique by Dr. Shoemaker and Earthjustice failed to really make any real recommendations for improvement on that front.

The ARM Subcommittee stands firm in our belief that our work currently provides the best approach to addressing the problem statement, if that problem statement is still valid today. At this point I certainly, myself and the ARM Subcommittee, we really thank the Board for allowing us this opportunity to respond publicly to a lot of the criticism that we received. Thank you.

CHAIR DAVIS: Thank you, John for that excellent presentation, and on behalf of the Board I want to thank the ARM Subcommittee for putting together such a thorough and thoughtful response to the external criticisms of the ARM Revision. It is obvious a tremendous amount of work went into that report, but certainly a worthwhile effort. At this point, I'll look to the Board to see if there are any questions or comments on John's presentation or the report. Bill Hyatt.

MR. HYATT: John, thank you, and I'll echo what Justin just said that to you and all your team that was a tremendous amount of work, tremendous report, and I think it's going to be useful to us as Board members on many fronts. I have a question, and I hope it is not an eye roller. I hope I didn't miss something.

But in the report, itself, I believe there is a research recommendation in the text to examine the horseshoe crab abundance egg density estimates, to begin to establish that longer chain that you were talking about. I guess I'm wondering, is the data that is being collected currently, provided you have access to all the data. Is the data that is being collected currently sufficient to begin that process, or is there additional data that needs to be collected and additional work that needs to be done, just to get it started?

DR. SWEKA: That is a difficult one to answer. I think the egg collection data has gotten better in New Jersey through the years, you know at least with what we have been given in the final report for publication. I mean it does sound better than it was. If you remember back in 2013, that was when Delaware was questioning whether or not they needed to collect egg density data anymore.

You know at that point in time it seemed, you know the methodologies seemed to constantly be changing, and when asked whether or not they should collect it, the TC and the SAS, that no, we don't need to, because the methodologies are constantly changing. Since then, I think it has improved. Is it adequate enough? Well, I guess we would have to see it to really know.

CHAIR DAVIS: John Clark.

MR. CLARK: Thank you, John, and the Committee. This is phenomenal. It is great that it is out, and of course the problem is that the damage was done over a year ago, when all this came out and I still

see the Shoemaker criticisms in newspaper articles and of course we're still seeing a lot of push from some of the more extreme groups to ban horseshoe crab harvesting total. I still don't understand the connection between male horseshoe crabs and eggs on the beach.

One of the criticisms, I mean Bill brought up the egg density, and that keeps coming up, and yet we have this great data showing that as the population of females is increased, obviously it is not a limitation here. I don't see how they cannot make the connection between the horseshoe crabs and greater egg density out there.

It just seems to be something that just keeps coming up. As you said, the egg density study was terminated on the Delaware side, and it is not something we look forward to, but that question just stays out there. We've heard from some NGOs that are asking us for permits to do their own egg density work and all.

It's obviously a concern, I mean there just doesn't seem to be, when people that have agendas out there want to do this work, it's just a little off-putting to us. Phenomenal work, but don't know if it is really going to cure the problem. But I hope this does get the type of publicity it should get from the many criticisms that we've seen about the ARM since the ARM came out.

CHAIR DAVIS: I have Mike Luisi next on the list.

MR. LUISI: Thank you, John, for your presentation. I just wanted to make a general comment. As someone who has dedicated the past 25 years in a natural resource management career, I find a lot of comfort in what just happened between the report, the work to develop a response in a very articulate way, in a professional way, to confront the critics that we often get to the survey work that we do, the results that we put forth, the modeling exercises that we go through. I'm often challenged, as well as my colleagues in Maryland about when the results are what the stakeholders are looking for, they are often challenging the work that we do. I was actually, I wanted more. I wanted there to be more criticisms. It was the first time in a while I've been disappointed that one of his presentations wasn't getting to wrapping up. But I thought you did an excellent job, and I think that the work that, I would love to give you credit, Mr. Chairman, but I think maybe this might have been John's work as a former Chair, working to allow the ARM Subcommittee to put forth this report in the way that they did.

I hope we can use this as a process in the future, not just for horseshoe crabs but for other species, when we as a management board are criticized about the work we're doing. We have some of the world's greatest scientists working right with us every day, and I just found it refreshing, and I hope that we can take this in and consider using this type of process down the road when we have other hurdles that we have to get over. Thank you.

CHAIR DAVIS: Next I have Rick Jacobson.

MR. RICK JACOBSON: John, I want to echo what everyone else said, fantastic work on your part and on the work of the entire Subcommittee. The ARM Model is really a remarkable step forward, so thank you for that. I actually have two questions, and the first question hearkens back to your response to Criticism Number 4.

If I understood your description correctly, there is actually a recognition of a changing trend in horseshoe crab abundance based on the survey data that that occurs before 2010, and that that occurs after 2010, a shift from declining abundance to increasing abundance. I wonder if there is anything in particular you can point to that would suggest that inflection point, and where there was a change.

What was forcing that change or causing that change? Then the second question builds on Mr. Hyatt's question earlier about egg abundance data. If we were to start anew. You know we make substantial investments today in the various survey techniques for adults and immature horseshoe crabs.

If we were to reinvest those dollars in some way, with a very structured and thoughtful approach to egg abundance surveys, where we had confidence in the data that was being collected. Is there any reason to think that we would be further ahead reinvesting in that direction, or would we be further ahead staying with our investments, looking at immature and mature horseshoe crabs?

DR. SWEKA: Thanks, Rick. To your first question, why the change in 2010. You know it really makes sense when you think about the life history of horseshoe crab. They don't mature until they are 9. 1-0 years old, and the first FMP came online in 1998, you know by the time the harvest was curtailed greatly after that.

It would really take a good decade, and we said this all along, even from early on in the horseshoe crab management. It's going to take a while to see an effect. After 10 years, you started to get all of the age classes that were protected and had less fishing pressure on them, they all matured. It made perfect sense that around 2010 is why we would see the increase. You know I think the Commission should be proud, you know this is certainly an example where management has worked, you know decreased harvest. We kind of knew as scientists it is going to take a while to see a change, and eventually it did change and we can detect that. As far s the egg abundance, certainly we've never been opposed to using egg density data, it is very difficult to use, because not only do you have year to year variations, you've got day to day, you know beach variation.

Could another survey be developed and consistent methodology be put forth to develop a good egg density survey that we're all confident in? Yes, I think we can. I think it would be expensive, you know take a great deal of effort on people's part, not only collecting the samples, but then processing the samples and enumerating eggs in a core sample of eggs or a core sample of sand.

Is it worth doing? You know that is something I think we could discuss more on the SAS or the ARM Subcommittee. You know we do have the empirical relationship between horseshoe crab abundance and survival now. By adding the step of eggs into our model, I mean it is going to increase some uncertainty.

Even if we could find a good relationship between crab numbers and egg density, that is still one more step and a bit more uncertainty that we add into our model. Those confidence intervals on the population may get bigger. Yes, I'm not sure if it's really, really worth it. I don't know, we might have to do another exercise where we look at what is known as the evaluation of perfect information, you know would it really change a decision if we had that additional step in there, you know an exercise we could do?

CHAIR DAVIS: Next I have Rob Lafrance.

MR. ROBERT LAFRANCE: I think that was a really great explanation of the egg density. That was kind of the way I was going, in terms of the question. One of the things I think happened, when you think about red knots, that is what they are looking at, but that is the egg density issue. I really appreciate what you said, in terms of understanding it.

Is it your sense though that the protocols are actually getting better? Are we getting any better consistency in how we would look at it, or is that still something that needs additional work before we could come up with something that may be used for management?

DR. SWEKA: I think it needs more critical review. Like I said, we see what is in their latest publication, and that sounds good, but we haven't seen the real data. If the generators of the egg density data would conform to typical processes within ASMFC, to provide data when a stock assessment starts, just like every other entity. We get information from the state, from academia, from other federal agencies. You know we would certainly treat them the same with the same critical rigor, but also the same fairness.

CHAIR DAVIS: Shanna Madsen.

MS. MADSEN: Thank you, Dr. Sweka and Dr. Anstead and the rest of the ARM Team. I can see the amount of work that this represents, and I, like Mr. Luisi, think that this was a really important step, and something that was needed to be done. It's really important when we're criticized scientifically that we are allowed the space to respond scientifically as well. I appreciated seeing that. This isn't really a question, but more of a comment. I think that it would behoove us to have this on the management website for horseshoe crabs, maybe go out as a press release or something along those lines, because again, this sort of information really needs to get out there. These are the legs that we stand on, and I think that needs to be out.

CHAIR DAVIS: Thanks for that, Shanna, and I'm sure there can be some follow-on conversations after the meeting deciding the best way to publicize this report. I agree. I have exhausted the list of hands I have on this topic, and I don't believe we have anybody online, so I'll just issue one last call for questions or comments on this topic before we move on. Not seeing anyone, thank you, John.

UPDATE ON HORSESHOE CRAB MANAGEMENT OBJECTIVES WORKSHOP

CHAIR DAVIS: We'll move on to our final scheduled bit of business on the agenda today, which is an Update on the Horseshoe Crab Management Objective Workshop from Caitlin.

MS. STARKS: Sorry, I was trying to get out of this. But the first week update where we are with this workshop. We've sent out invitations to a list of participants that cover the stakeholder groups with an interest in horseshoe crab management in the Delaware Bay. We have participants who are shorebird biologists, horseshoe crab biologists, state managers, representatives of environmental organizations, and bird advocacy organizations as well, as well as some biomedical representatives.

I think this will be a really good group to get all of their heads together and have some productive discussion. The workshop has been scheduled for July, mid-July, 15th and 16th. The location is still to be determined, but we are aiming for the Delaware/Maryland coast area, to try to make it more assessable for some of the folks coming from those coastal areas that this fishery takes place in.

That is our next step is to hold that workshop, and then coming out of that workshop we won't have quite enough time to get a report back to the Board in August, so the expectation is that we will have a report, including recommendations from that group, and things for the Board to consider for future management at the October meeting.

In case I didn't mention it previously, we have contracted with Dr. Kristina Weaver, who helped with the Menhaden Workshop in Virginia, and came highly recommended, and so we have full faith in her abilities to help us get at some of these difficult questions about horseshoe carab management.

CHAIR DAVIS: Dan McKiernan.

MR. McKIERNAN: Quick question, Caitlin. Will there be an opportunity for folks from other states to listen in to the conversation?

MS. TONI KERNS: Dan, we're going to try to. But I'm not going to make a promise just yet.
MS. STARKS: The workshop will be open to the public, if folks want to attend and listen in, in person.

ADJOURNMENT

CHAIR DAVIS: Okay, any other questions on the Horseshoe Crab Management Objectives Workshop? Okay, not seeing any hands, that brings us to the end of our scheduled agenda today. I'll ask if there is any other business to come before this Board. Not seeing any hands; this Board stands adjourned.

(Whereupon the meeting adjourned at 4:30 p.m. on Tuesday, April 30, 2024.)

Report on the July 2024

Horseshoe Crab Management Objectives Workshop

Prepared by

Atlantic States Marine Fisheries Commission (ASMFC) Staff
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Prepared for

ASMFC Horseshoe Crab Management Board

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I. Acknowledgements

Funding for the Horseshoe Crab Management Workshop was provided by the Atlantic States Marine Fisheries Commission (ASMFC). Toni Kerns, Caitlin Starks, and James Boyle led ASMFC staff efforts to design the workshop, communicate with stakeholders, and develop this report. They were assisted in these efforts by public policy mediator Kristina Weaver (Weaver Strategies LLC), who consulted on process design, facilitated the workshop, and assisted with developing the report. Shanna Madsen (Virginia Marine Resource Commission [MRC]), Joe Cimino (New Jersey Department of Environmental Protection [DEP]), John Clark (Delaware Department of Natural Resources and Environmental Control [DNREC]), and Michael Luisi (Maryland Department of Natural Resources [DNR]) provided guidance on process design. Delaware DNREC provided facility space to conduct the meeting at the Lewes Field Office.

We are grateful for the assistance of Kristina Weaver, PhD, of Weaver Strategies LLC, who served as the workshop's impartial facilitator. Bringing more than 15 years of experience as an environmental mediator and professional facilitator, including a career with the Institute for Engagement & Negotiation at the University of Virginia, Dr. Weaver had previously facilitated a workshop with similar objectives around menhaden management convened in 2023 by the Virginia Institute for Marine Science. In addition to working closely with the ASMFC convening team, Dr. Weaver conducted stakeholder interviews to solicit input on workshop design.

We especially thank all workshop participants for contributing to candid, collegial, and productive dialogue that generated many insights and several areas of common ground. We also thank members of the public who attended and made comments in person, as well as members of the public who observed the live feed and submitted comments.

Workshop Participants

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II. Executive Summary

Horseshoe crab is an important resource in the Delaware Bay region, where multiple stakeholder groups and members of the public have expressed perspectives regarding how the resource should be used and managed. One critical issue of contention is the extent to which the horseshoe crab population abundance and harvest levels are directly linked to the population health of red knot shorebirds (at the species level).

In response to significant stakeholder input following a 2021 revision of its Adaptive Resource Modeling (ARM) Framework for horseshoe crab modeling and regulation, the ASMFC convened professionally facilitated multi-stakeholder workshop aimed at fostering open, deep, and productive dialogue in Lewes, Delaware on July 15 and 16, 2024. The workshop convened stakeholders representing environmental NGO, fishing, biomedical, bird and horseshoe crab scientists, and management perspectives. The workshop adopted a consensus building process designed to surface core issues and concerns, gauge existing areas of common ground, and probe the extent to which new areas of agreement could be developed. Among the more important findings of the workshop were three fundamental areas where common ground was achieved:

- A consensus that there has been an increase in the horseshoe crab population in the Delaware Bay since 2010.

- Universal disapproval with the idea of using a harvest control rule regulatory framework, and an implicit affirmation of a preference for the Adaptive Resource Management Framework (ARM) as the most appropriate modeling and regulatory paradigm.

- A consensus agreement that the ASMFC should continue running the ARM but pause female harvest while several additional recommendations are considered and implemented, including: an investment in better science communication to build understanding among stakeholder groups and to educate the public about all existing channels for input; additional and focused stakeholder outreach to garner “essential concerns” (especially from members of the environmental NGO community that have registered significant disagreement with the ARM Revision); and a process to garner stakeholder input on refining the ARM reward and utility functions towards improving the model and strengthening its credibility.

Beyond these areas of consensus, additional comments, ideas, and proposals were shared and documented. In their closing remarks, participants affirmed that the workshop was highly productive and collaborative, and that important gains had been made around the stated meeting purposes (i.e., increasing understanding of stakeholder perspectives; increasing understanding of current modeling; and identifying concerns, alternatives, and areas of common ground for management). This report provides additional detail on background for the workshop and a summary of dialogue and consensus proposals. A more complete recording of input is included in Appendix 1, with workshop materials enclosed in Appendix 2.

III. Brief Background / Context

a) Horseshoe Crab Ecology, Fishery, and Management

Horseshoe crab, (*Limulus polyphemus*) is an important resource, with diverse values for coastal ecosystems, Atlantic coast fisheries, and human health. Horseshoe crabs play an important ecological role in the food web for migrating shorebirds. The Delaware Bay population of horseshoe crabs is the largest along the Atlantic coast, and this region is also the largest staging area for shorebirds in the Atlantic Flyway. Millions of migrating shorebirds stopover in the Delaware Bay region during their annual migration to feed and rebuild energy reserves prior to completing their journey northward. Horseshoe crab eggs, laid on beaches, are one of the most important food sources for these birds. In addition to their role as a food source for birds, horseshoe crabs provide bait for commercial American eel and conch fisheries along the coast. With their unique blood, horseshoe crabs are also an important resource for human health. Horseshoe crabs are collected by the biomedical industry to support the production Limulus Amoebocyte Lysate (LAL), a clotting agent that is used worldwide to detect of human pathogens in patients, drugs, and intravenous devices. The challenge of fisheries managers is to ensure that horseshoe crabs are managed to meet all these diverse needs, while conserving the resource for future generations.

b) ARM Framework Revision

ASMFC has maintained primary management authority for horseshoe crabs in state and federal waters since it adopted the Interstate Fishery Management Plan for Horseshoe Crabs (FMP) in 1998. Since 2012, the Delaware Bay population of horseshoe crabs has been managed under the ARM Framework[1] in recognition of its ecological role in the Delaware Bay. The Framework considers the abundance levels of horseshoe crabs and shorebirds in determining the optimal harvest level for the Delaware Bay states of New Jersey, Delaware, Maryland, and Virginia (east of the COLREGS) to achieve multi-species objectives for horseshoe crabs and red knots. It was developed with the guidance of the Horseshoe Crab and Shorebird Technical Committees, which defined management objectives and values associated with horseshoe crab harvest. Since 2013, the Horseshoe Crab Management Board (Board) has annually reviewed recommended harvest levels from the ARM model, and specified harvest levels for the following year in the four Delaware Bay states.

In 2021, a revision to the ARM Framework was completed. The revision updated and improved the ARM model with an additional decade of data on shorebirds and horseshoe crabs in the Delaware Bay region, and advancements in modeling software and techniques, including recommendations from the original peer review. Changes to the ARM Framework are described in detail in the 2021 Revision to the Adaptive Resource Management Framework and Peer Review Report. The ARM Framework Revision was evaluated by an independent peer review

[1] https://asmfc.org/uploads/file/2009DelawareBayARMReport.pdf

panel, which endorsed it as the best and most current scientific information for the management of Delaware Bay horseshoe crabs. Consequently, the Board adopted the revised ARM Framework for setting harvest specifications for the Delaware Bay region under Addendum VIII[2] in November 2022.

c) Stakeholder Survey

During the public comment period on Addendum VIII over 30,000 comments were submitted by the public opposing the adoption of the ARM Revision in large part due to the fact that the results of the revised model run for the 2023 fishing year allowed for a limited amount of female horseshoe crab by the bait fishery for the first time. In response to the widespread concern, the Board elected to implement zero female horseshoe crab harvest for the 2023 season, despite the ARM model output. Given the apparent differences in stakeholder opinions on female harvest, in 2023 the Board conducted a survey of stakeholders including bait harvesters and dealers, biomedical fishery and industry participants, and environmental groups to better understand their diverse perspectives and values, and whether changes to horseshoe crab management for the Delaware Bay region should be considered.

The results of the survey[3] confirmed that the various stakeholder groups hold divergent values and perspectives. Commercial industry participants indicated they still value the harvest of female horseshoe crabs, though it has not been permitted in the Delaware Bay region since 2012. Researchers and environmental groups tended to value the protection of female horseshoe crabs and the ecological role of horseshoe crabs as a food source for shorebirds over the fishery. Considering these conflicting values, the ASMFC held a stakeholder workshop in July 2024 with participants from all stakeholder groups to generate recommendations for Board consideration regarding horseshoe crab management in the Delaware Bay region.

IV. Summary of Dialogue and Key Findings

a) Overview of the Workshop Process

Following the substantial public input regarding the ARM Framework Revision, and the results of the survey described above, ASMFC recognized both an urgent need and timely opportunity for multi-stakeholder dialogue to explore potential future objectives and management approaches for the Delaware Bay horseshoe crab fishery. Working with an external facilitator (Weaver Strategies LLC, see below for additional information), ASMFC convening team refined the meeting purposes:

1. Increase understanding of various stakeholder perspectives and interests.
2. Increase understanding of current horseshoe crab modeling.
3. Identify concerns, alternatives, and areas of common ground for HSC management.

[2] https://asmfc.org/uploads/file/63d2e8afHSC_AddendumVIII_November2022.pdf
[3] https://asmfc.org/uploads/file/653932c4DB_HorseshoeCrab_ManagementSurveyReport.pdf

Stakeholder Groups Represented at the Workshop

The workshop included representation from the environmental NGO and advocacy communities, the biomedical industry, the fishing industry (including the harvest and biomedical dealer sectors), and biologists (including expertise in shorebirds and in horseshoe crabs). The workshop also included state managers from New Jersey, Delaware Maryland, and Virginia. ASMFC staff provided technical assistance. A list of stakeholders with affiliations is included in Appendix 2 of this report.

The workshop design was informed by insights from a subset of participants interviewed by the facilitator ahead of finalizing the agenda. Open-ended interviews were conducted with a member of the environmental NGO community, a member of the biomedical community, a horseshoe crab scientist, and a shorebird scientist. A member of the fishing community was also invited to participate but an interview was not successfully scheduled.

Dialogue Process

The workshop featured a presentation on the ARM Framework including a brief overview of the history of adaptive management of the species, a summary of known stakeholder perspectives, and an explanation of current modeling. Additional baseline knowledge and understanding was developed through an opportunity for each stakeholder community to share their primary concerns and perspectives. Prior to and during the workshop, participants were reminded to share not only their own perspectives but to do their best to represent their understanding of the broader stakeholder interests and concerns they represented.

The workshop facilitator introduced a consensus-building process aimed at encouraging participants to register their level of support for ideas along a three-scale gradient (where '3' indicates full support; '2' indicates support but with questions and concerns; and '1' indicates that one cannot support an idea given too many questions and concerns). Using this approach, participants with concerns were asked to share ideas that might shift their position towards support. As concrete ideas emerged through dialogue, the facilitator supported participants in developing proposals, consensus testing, openly sharing their questions and concerns, and working creatively towards refined ideas and solutions. Participants agreed (by consensus) to adopt this process as a strategy for focusing dialogue towards potential recommendations, with an understanding that this input *would not* be binding but *would be* weighed as valued input by the Board. Participants devoted the bulk of workshop time to revisiting core aspects of horseshoe crab management, testing for consensus, and developing new ideas (detailed below). The workshop agenda is included in Appendix 2.

Opportunities for Public Engagement with the Workshop

The workshop was open to members of the public, and several observed in person. At the end of each day, time was reserved for public comment (see Appendix 1 for summaries of comments). A live recording of the workshop was also broadcast for observing members of the public; despite best efforts to incorporate technology designed for better including remote

observers/listeners, there were technical difficulties with the acoustics of the space and several observers noted difficulty hearing all of the dialogue.

Overall, the Horseshoe Crab Management Workshop was highly collaborative and productive, with participants generally assessing, in their concluding remarks, that the three facets of the meeting's purpose were substantially advanced. Participants developed several recommendations around which to gauge and build consensus. Key areas are summarized below.

b) Consensus Proposals

As part of the consensus-building process, participants were guided to introduce proposed ideas/recommendations to the group and to then note their level of agreement using the previously described three tier gradient system. Where all participants registered a '3' or '2,' consensus was technically achieved, with a larger portion of '3s' indicating a stronger consensus. Where any participant registered a '1,' consensus was not technically achieved and participants were prompted to engage in further dialogue, time permitting, to try and address concerns through refined proposals. Please note that participants were not required to indicate their level of support for each proposal. In many cases, there were abstentions, particularly from scientists or managers who wanted to defer to the perspectives of other stakeholders.

Participants were also asked by ASMFC staff to consider three "reality testing" questions when developing ideas to propose for consensus testing:

(1) Does the idea shift us way from adaptive resource management and, if so, is that desired?
(2) Are there resources available to implement the idea?
(3) What information about the idea would help ASMFC make management decisions?

Consensus was achieved on five proposals/statements, as detailed below. Each statement is briefly explained and annotated with the number of participants who registered a '3' and '2' level of support. For all five of these, no participants registered a '1' (indicating cannot support, too many questions and concerns). Note that some of these statements are slightly elaborated for clarity relative to the documented versions developed with flip chart notetaking during the workshop.

- ***The horseshoe crab population has increased in the Delaware Bay since 2010.***

Participants used consensus to gauge the extent to which the group supported the above statement.

  - 11-12 participants registered a '3' (full support)
  - 2 participants registered a '2' (will support, but with some questions and concerns)

- ***ASMFC should conduct outreach to gather the 'essential concerns' of key stakeholders.***

Participants had considerable dialogue around the best way for ASMFC to gain a deeper understanding of the most significant concerns about the ARM, especially from some representatives of the environmental NGO community. Several ideas emerged and are more fully captured in Appendix 1. Participants were ultimately able to achieve consensus on the idea that there should be an outreach effort by the ASMFC to gather "essential concerns." The precise method and timing for this outreach is to be determined.

  - 8 participants registered a '3' (full support)
  - 2 participants registered a '2' (will support, but with some questions and concerns)

- ***Using current ASMFC processes, refine the ARM reward and utility functions with stakeholder input.***

Having affirmed a preference for adaptive management over other approaches, participants agreed the reward and utility functions component of the ARM framework represent relatively "low-hanging fruit" for concerned stakeholders to provide input to improve the model and, by extension, to strengthen its credibility. While the group considered a variety of stakeholder engagement process options, consensus was ultimately reached around the suggestion to use existing ASMFC channels.

  - 7 participants registered a '3' (full support)
  - 5 participants registered a '2' (will support, but with some questions and concerns)

- ***ASMFC should improve science communication about the ARM, including optimizing existing channels for engaging with the public.***

Participants frequently spoke to the difficulty of adequately explaining and understanding the science underpinning the ARM Framework and saw an important opportunity for the ASMFC to invest in science communications efforts. Related to this, there was an acknowledgement that existing channels for the public to engage with the ASMFC may not be fully understood or utilized, and could be better explained and disseminated.

  - 11 participants registered a '3' (full support)
  - 1 participant registered a '2' (will support, but with some questions and concerns)

- ***ASMFC should continue to run the ARM by default with a recommendation to pause female harvest in the meantime (i.e., while the other recommendations listed are implemented and stakeholder input is further considered).***

Participants considered a variety of alternatives to the ARM Framework, ultimately affirming a preference to continue running the ARM but with a need to pause female harvest while the above ideas are considered and implemented.

  - 11 participants registered a '3' (full support)
  - 2 participants registered a '2' (will support, but with some questions and concerns)

c) Proposals where Consensus was Tested but Not Reached

In working to identify and build areas of common ground, participants considered several ideas and proposals where consensus was not technically achieved. As part of the consensus-testing process, each participant registering a '1' was asked to explain their questions/concerns and offer any ideas that might shift them towards a '2' or '3', time permitting. For proposals where any participant indicated a '1' (even despite further dialogue on the idea), consensus was not achieved (see list below). In some cases, subsequent dialogue led to the consensus proposals listed above.

- ***Female harvest is appropriate under some circumstances.***

Participants used consensus to gauge the extent to which the group supported the above statement. Questions/concerns noted by the participants registering a '1' included not seeing a justification for female harvest, and that there are still too many questions about the impact of female horseshoe crab harvest given their role as a food source for red knots.

  - 11 participants registered a '3' (full support)
  - 2 participants registered a '2' (will support, but with some questions and concerns)
  - **2 participants registered a '1' (cannot support, too many questions and concerns).** Concerns shared included:
    - *The case for expanding to female harvest has not been adequately justified.*
    - *There are remaining concerns with the model itself.*
    - *An understanding that red knots need a "superabundance" of eggs that may exceed what would be deemed as a sustainable level for horseshoe crabs.*
    - *A desire to represent the interests of Audubon members who believe female horseshoe crabs should not be harvested until red knot are delisted or there is more robust evidence about the link between eggs and red knots. This participant acknowledged the challenge and opportunity may be largely about information sharing and improving the accessibility of existing scientific knowledge.*
    - *A concern that more time is needed to fully assess data about female horseshoe crab abundance and red knot population trends, and should exercise caution having only recently "turned a corner."*

- ***The ASMFC should revert to a Harvest Control Rule (and <u>not</u> use Adaptive Resource Management).***

Participants universally affirmed they did not support returning to the earlier modeling approach, thus implying a strong preference for adaptive management. It should be noted that while the earlier modeling approach was not intended as a harvest control rule, it would essentially function as such under realistic horseshoe crab and red knot population conditions.

  - 0 participants registered a '3' (full support)

- 0 participants registered a '2' (will support, but with some questions and concerns)
- **12 participants registered a '1' (cannot support, too many questions and concerns)**.
    - *Given the level of objection to the idea of a harvest control rule, dialogue advanced from this topic expediently without itemizing all concerns. It was clear that the group prefers to find a way to stay within an Adaptive Resource Management framework.*

- ***Pause running the ARM to focus on modeling for male-only harvest based in science.***

This idea was proposed as an alternative to devoting resources to run the ARM annually while not following the output around female harvest, which some viewed as a poor use of the modelers' time and resources.

- 1 participant registered a '3' (full support)
- 3 participants registered a '2' (will support, but with some questions and concerns)
- **7 participants registered a '1' (cannot support, too many questions and concerns).**
    - *This proposal was introduced by a participant who was concerned that running the ARM annually without following its outputs would amount to a waste of resources with negative impacts on the staff who administer the model, and that the proposal would be a preferred solution to doing that. While participants did not elaborate on their specific concerns, it was clear from this consensus test that there would not be agreement on advancing this idea and dialogue quickly moved beyond it.*

- ***Work on a conflict resolution process with NGOs.***

Some participants raised the concern that those environmental NGOs with the most significant objectives to the ARM revision were not present at the workshop, and that the ASMFC should devise a way to directly work through the most serious disagreements with the environmental NGO community. Ideas discussed for this concept ranged from face-to-face meetings, to listening sessions, to independent review of the ARM by a small group of (3-4) external experts.

- 7 participants registered a '3' (full support)
- 2 participants registered a '2' (will support, but with some questions and concerns)
- **3 participants registered a '1' (cannot support, too many questions and concerns).**
    - *The primary concerns shared were that it would be unfair for ASMFC to hold private meetings with some but not all stakeholder groups or communities, and that it would discredit and undermine the rigorous external peer review process in place to evaluate the science of the ARM Framework.*

- ***Pause the ARM via an ASMFC addendum while stakeholder engagement on reward and utility functions and conflict resolution with environmental NGOs are implemented.***

This proposal was an attempt to assemble several ideas that emerged through dialogue. When consensus was not achieved, focus shifted to teasing out areas of agreement towards developing the consensus-based proposals listed above.

  - 4 participants registered a '3' (full support)
  - 3 participants registered a '2' (will support, but with some questions and concerns)
  - **3 participants registered a '1' (cannot support, too many questions and concerns)**
    - *Participants who did not support this proposal expressed concerns about creating additional controversy and losing important information as a result of pausing the ARM, and that any pause should have a time limit.*

As time permitted, there was participant dialogue around all of the above proposals. Appendix 1 provides a more complete overview of the ideas and comments raised.

d) Recommended Next Steps

In developing consensus-based proposals, participants understood the recommendations would not be binding, neither in relation to participant adherence nor ASMFC adoption. Rather, workshop conveners emphasized that the meeting presented an opportunity to gauge where there could be areas of common ground, with an expectation that participant ideas would be seriously considered by the Horseshoe Crab Board. As was explained by ASMFC staff at multiple points, participants also understood that any further recommendations by the Board regarding the ARM would in turn be subject to public notice and opportunity to comment.

Beyond the proposal to continue running the ARM but pause female harvest for the time being, there are several recommendations the ASMFC could begin exploring and implementing using existing resources and avenues. In fact, consensus-based proposals reflect a sensitivity to resource constraints and the opportunity to optimize channels for engagement that are already available but may not be fully accessed. In light of these and other suggestions emerging from the workshop, three potential next steps for the Board to consider are described below.

1. **Initiate an addendum to establish a concrete interim solution (multi-year specifications)**

   While the workshop participants all agreed the ARM should continue to be run while additional recommendations are addressed, they expressed a desire for more certainty around harvest specifications. Specifically, the participants agreed it would be preferable to set female harvest quota to zero for the time needed to address other recommendations. An addendum that allows the Board to set specifications for multiple years at a time would provide greater predictability about future harvest levels, but

would not abandon use of the ARM Framework. An addendum could be developed and implemented before the Board needs to set harvest specifications in the fall of 2025.

2. **Begin a dialogue with key stakeholders to identify 'essential concerns'**
   Workshop participants discussed the need for ASMFC to gain a deeper understanding of the most significant concerns about the ARM, especially from some representatives of the environmental NGO community that were not participants. ASMFC could begin such a dialogue through a series of webinar meetings with key stakeholders, with the purpose of allowing concerns or questions about the ARM Framework data and models to be raised and addressed. This could build greater collective understanding of the ARM, provide ASMFC with a list of critical concerns regarding the ARM Framework, and allow proposals of alternative methods to be considered. It could also provide preliminary direction for the next step. Depending on the format of these meetings, additional resources could be needed.

3. **Initiate a process to develop alternative reward and utility functions with stakeholder engagement**
   Participants affirmed a preference for adaptive management over other approaches, but suggested the reward and utility functions component of the ARM Framework could be evaluated and modified to better address stakeholder concerns and values. The workshop discussions suggested that the process of reevaluating the reward and utility functions should engage stakeholders using existing ASMFC channels (e.g., committee meetings). It should be noted that this type of process will take time, similar to the 2021 ARM Framework Revision, and ultimately management action would be needed to implement any changes. Under the new process identified in Addendum VIII, the next ARM Framework revision would begin 2028 or 2029 but the Board can take action to start this process sooner. If this is pursued, additional resources would be needed including staff time. Depending on the timing of this process, other Commission assessments may need to be reprioritized.

Additional recommendations were developed at the workshop that could be considered as medium to longer-term goals. The first is to evaluate the Horseshoe Crab Advisory Panel (AP) to determine if it has adequate representation across stakeholder groups. This may require adding seats to the panel for non-traditional stakeholders (i.e., environmental NGOs). The states can work with ASMFC to review and modify AP membership as needed. The second is to take steps to improve science communication about the ARM, including optimizing existing channels for engaging with the public. Participants agreed that adequately explaining and understanding the science underpinning the ARM Framework is an ongoing challenge. They acknowledged the general public may not fully understand or utilize existing channels for engaging with the ASMFC, so this information needs to be better explained and disseminated. Working toward improving science communication on the ARM could be an opportunity to collaborate with key NGO stakeholders in developing outreach content and programs related to this topic and disseminating information to a wider audience. These stakeholders could provide valuable feedback on where improvements in communication could be made.

V. Appendix 1: Additional Comments and Ideas

The notes in Appendix 1 capture public comment and additional participant comments and ideas shared across the one and one-half days of dialogue. Notes on the dialogue were captured on flipcharts (by the facilitator) and via laptop recording (by ASMFC staff). Raw notes have been edited, re-organized, and consolidated for clarity. Some acronyms are used in these notes (e.g., "HSC" means "horseshoe crab). Bullets represent distinct comments by a participant; sub-bullets indicate direct follow-up comments in response to points made.

a) Public Comment

The notes below capture comments by members of the public who attended the workshop in person. Public comment was invited at the end of each day.

- Framing of Science vs. Politics - We are all looking for the best science and lack of answers drives a precautionary approach
- Stakeholder engagement suggestions:
    - Make information publicly available as quickly as possible and consider timing for input
    - A previous offer to field questions about registered concerns was not taken up
    - Technical committees do not allow for meaningful engagement
- There is a great deal we do not know about red knots
    - We have to govern horseshoe crabs with management tools that can be improved
    - Disagrees with not harvesting females; request that ASMFC not give up on the ARM
    - Cannot understand opposition to collection for Limulus amebocyte lysate (LAL) given the interests human health and lack of adequate replacement
    - Political avenues are wrong - decisions should be made in rooms like this
- Everyone here is an expert and if we listen to each other discuss facts in our area of expertise it would be easier to get past the idea of "misinformation"
    - Would love to see egg density data included in ARM
    - Fish also consume HSC eggs
    - What's the carrying capacity of the ecosystem?
- Education is very important. Some groups ignore the facts
    - Media coverage is upsetting; data are not placed in context
- Importance of public input in the process
    - Dialogue today advanced when it became more specific re: concerns
    - Take public comment seriously (i.e., 34,000 submitted comments)
    - Even technical comments were ignored initially by the Horseshoe Crab Board and the process was difficult for the public to engage in
    - Concerned about red knot decline and trajectory

b) Participant Hopes for the Workshop

These hopes were recorded during the initial round of introductions on Day 1. While closing comments were not recorded, participants largely affirmed that their hopes for the workshop had been substantially realized.

- Get along
- Get an idea of how much science we can put in this
- Increase understanding of the science
- "We'll see how this works out."
- Clarify misconceptions / misinformation
- Build relationships and consensus
- Find common ground
- Good science and strong protections for HSC
- Discuss what adaptive management mean
- Learn and gain understanding
- Consensus
- Feel heard
- Gain understanding
- Learn
- Hearing from everyone and finding a way forward
- Share perspectives and listen
- Increase common understanding about the ARM
- Consensus
- Come out with Objectives
- Better shared understanding of facts and science
- Support restoration and protection of both species

c) Fundamental Interests of Stakeholder Groups

Prior to shifting into consensus building, participants were asked to help refine the collective understanding of the ecosystem of issues and concerns across all stakeholder groups. Participants were reminded that they should speak not only about their own perspectives, but try to capture the concerns of the broader network of stakeholders they represented. Each cluster of stakeholders broke into small group discussion then reported back to the large group.

"Fundamental Interests" of Each Stakeholder Group (report back of small group discussion on key areas of concern)

Biomedical Community - Fundamental Interests

- We are collectors not harvesters
- Ubiquity and magnitude of LAL medical applications in terms of safety and success
- Human health
- Products, processes, procedures have evolved over time
- State legislatures getting involved – concern about the topic being taken away from scientists

- Misinformation – Is biomedical really a top risk for horseshoe crab?
- LAL regulation is very complex
- Health risks of synthetics currently – we are trying to get to synthetics but LAL remains the gold standard now

Red Knot Scientists - Fundamental Interests

- Recovering the red knot is a requirement of our work
- Best available science to optimize recovery resources
- Risk aversion given uncertainty - avoid overshoot
- Consensus would advance recovery
- Improve science communication across all data sets
- Link between horseshoe crab and red knot still valid - lots going on across life cycle
- Need consensus in collection methods for surveying horseshoe crab egg data

HSC Scientists - Fundamental Interests

- Questioning of scientific integrity of HSC scientists has been really difficult
- Scientists are NOT in "back pocket" of industry
- Context is very important. Especially in the media, there is a need to look at population size and mortality data together (not in isolation)
- Media spin has been a major problem
- Clarification on timing of the VT survey - spring / fall / summer

Managers - Fundamental Interests

- Strong reaction to ARM outcome was concerning because the ARM uses best available science and includes red knot considerations
- Fear of continued misinformation given that HSC is actually one of the better communicated models. Sense that no matter what comes out, misinformation will seek to overcome it
- No matter what, people won't be happy – polarization
- Alternative hypotheses for red knot trends seem to be unwelcome
- We manage on science, not "vibes"
- Is misinformation intentional bias or about education / misunderstanding?
- Best available science doesn't mean "great" science – err on abundance of caution
- Prefer to leave politics out of it BUT options become political and HSC is very politically charged
- Can't lose sight of human health
- Haven't harvested females since 2012, so what IS harming red knot?
- Wants to get out of a position of fear

Fishermen - Fundamental Interests

- HSC quotas are important
- Demand market fluctuates mainly on conch
- Females - it's not the commercial harvesters impacting them currently, but this used to be an important market

- Presence of females in harvest can help sell males too, even if there are limited numbers of females; "something is better than nothing"
- Issue of misinformation, not relying on best available science, overreacting
- Want to uncover the real problems for red knot
- Long term, generational view – a lot is invested over generations and fishermen take a generational perspective
- Regulation has been a battle through the lifetime of a fisherman, and is not always logical
- Faced with an argument that we "protect a dinosaur" given public perceptions
- Female is commercially 10X better than a male at market in terms of size and effectiveness
- 2022 ARM is good news and an improvement
- Younger generations haven't experienced female harvest
- Water quality supports good larvae recruitment on all levels. Plastics are a big issue we can all get behind
- Fishermen are stewards and keep good records

Environmental NGOs - Fundamental Interests

- Biological indicators are still very fragile re: red knot
- There is a very real link and we are in a crisis
- Does ARM adequately capture fluctuations?
- Why is there a need for female harvest?

d) Discussion of the 2022 ARM Objective Statement

Participants were prompted to consider the 2022 ARM Objective Statement and to discuss the extent to which it still reflected their interests and concerns.

2022 Statement: Manage harvest of horseshoe crabs in the Delaware Bay to maximize harvest but also to maintain ecosystem integrity, provide adequate stopover habitat for migrating shorebirds, and ensure that the abundance of HSCs is not limiting the red knot stopover population or slowing recovery.

- Note that the consensus reached in this room may be higher than what would be reached outside of this room
- Note that for biomedical the word to use is "collect" not "harvest"
- Could be strengthened with more specificity, measurability, inclusion of criteria
    - Conversely, more specific numbers could lead us back to a threshold approach and away from the ARM
- Need to clarify how limitation is defined and whether it's an appropriate measure
- Shorebird communities dislike "maximize harvest"
    - Optimal vs. Maximum?
    - Manage?
    - Add "sustainable"?

    - "Adaptive"? Element of time could signal the ability to incorporate data over time
- Replace "stopover habitat" with "food habitat"
- Edit to avoid use of "but"
- How to define "adequate"?
- Caution that wordsmithing could be perceived as "lipstick on a pig"
- Alternate verbiage:
    - "Provide sustainable harvest opportunity while also maintaining ecosystem integrity…"
    - "Accommodate sustainable harvest…"

*A participant then developed a **"strawman" Objective Statement revision**, in light of this input, and provided the revision to the facilitator ahead of Day 2. The workshop facilitator shared with the group that this had been provided and could be discussed. Ultimately the group did not have time to consider this revision given time constraints, but it is included here:*

"Through adaptive management based on best available science, optimize harvest of horseshoe crabs in the Delaware Bay Region to maintain ecosystem integrity, provide adequate food resources for migrating shorebirds, and ensure that the abundance of horseshoe crabs is not limiting the red knot stopover population or slowing recovery, while also accommodating sustainable harvest."

e) Additional Participant Comments

The facilitator and ASMFC staff worked to record participant comments, questions, concerns, and ideas across the 1.5 days of dialogue. While recording could not capture every comment at a transcript level, a robust list of issues that were surfaced is included here:

- It was a mistake not to include some of the NGOs with the greatest concerns at the workshop
- What is ASMFC's long-term plan?
- "Threatened with Extinction" is misinformation in the media and is frustrating; NGOs may have differences but are operating from an umbrella group that is spreading misinformation
- We need to celebrate successes also re: HSC population gains, hatchery operations
    - Hatcheries are not really successful
- HSC recovery has had a lag
    - There may be a lag for red knot too; other factors could be impacting the link
- Why was there such a strong response to the ARM?
    - Timing of ARM revisions came up against uncertainty in the field recently and raised questions about translation of datasets
    - Trust issues
- Question: Why does the NGO community call to ban any harvest?
    - Don't group all NGOs together
    - Issue of enforcement capacity

- Don't call views that disagree with you "misinformation"
- Bias on Managers' side as reaction to other extreme
- If ARM is best available science, then (a) why ignore it? (b) what signal does ignoring it send?
    - "best available" is not necessarily great but can become better
    - Ways to make science better?
- Difference between current ARM and "adaptive management"?
- Science, even if great, will always have uncertainty
- Board should be open to additional stakeholder input around functions
- Public is extremely risk averse given decline in red knot
- Science is also political
- Re-evaluate how model reflects public sentiment
- Need more communication with stakeholders on existing channels to provide input to ASMFC
- No reason to go away from the current modeling approach
    - Issue is female harvest
    - Need ability to be flexible
- If we don't harvest females for now, why run the ARM every year?
    - Don't run ARM until a future point?
    - Find a model for male harvest?
- ARM incorporates uncertainty already and is revised over time
    - Male only harvest could be a large number if based in science
    - Reward and Utility Function is where stakeholder input is most valuable (i.e., economic value of females, probability of red knot extinction)
- Give ARM time and see how it goes
- Re: Utility and Reward Functions, new ARM doesn't have a real option for no female harvest
    - Are we more concerned when red knot are high or low? Issues with abundance
    - Incorporate switch somehow
- Watermen perspective re: "following the science" - Trust
- Proposed female harvest would be so small couldn't detect effect
- You can't just turn the ARM off - inputs will be lost in reality
- Could be outcry with either option - "which do you want to defend"
- Can current ARM be adjusted so no females is an option?
    - Unclear
    - Could re-weight Reward Function
- No one wants to back away from "best available science" including the environmental community
- Useful from a Scientist perspective: Task ARM subcommittee with identifying alternative Reward and Utility Functions for stakeholder consideration through a consensus process

VI. Appendix 2: Workshop Materials

The following pages include these workshop materials:

- Workshop Agenda
- Slide Deck – Presentation on “Adaptive Resource Management (ARM) Framework Overview”
- Terminology Handout

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **Horseshoe Crab Management Board**

FROM: **Delaware Bay Ecosystem Technical Committee and Adaptive Resource Management Subcommittee**

DATE: **September 23, 2024**

RE: **Delaware Bay Horseshoe Crab Harvest Recommendation for 2025**

This memo describes the 2025 harvest recommendation for Delaware Bay Region horseshoe crabs using the methods from the Adaptive Resource Management (ARM) Framework (ASMFC 2022a). Since 2013, the horseshoe crab bait fisheries in the Delaware Bay Region (New Jersey, Delaware, Maryland, and Virginia) have been managed under the ARM Framework to set harvest levels with consideration of the needs of migratory shorebirds. The ARM was developed jointly by the Commission, US Fish and Wildlife Service, and US Geological Survey in recognition of the importance of horseshoe crab eggs to migratory shorebirds stopping over in the Delaware Bay Region. In particular, horseshoe crab eggs are an important food source for the *rufa* red knot, which is listed as threatened under the Endangered Species Act.

Under Addendum VIII (ASMFC 2022b), the 2022 ARM Revision is used to annually produce bait harvest recommendations for male and female horseshoe crabs of Delaware Bay-origin based on the abundance of horseshoe crabs and red knots. The maximum number of male and female horseshoe crabs the ARM Framework can recommend is 500,000 males and 210,000 females.

1. Objective Statement

Manage harvest of horseshoe crabs in the Delaware Bay to maximize harvest but also to maintain ecosystem integrity, provide adequate stopover habitat for migrating shorebirds, and ensure that the abundance of horseshoe crabs is not limiting the red knot stopover population or slowing recovery.

2. Population estimates

Red knot abundance estimates used to make harvest recommendations under the ARM Revision are based on mark-resight total stopover population estimates (Figure 1; Lyons 2024). The 2024 red knot population estimate was 46,127 (95% CI: 39,286 – 57,799), an increase from the 2023 estimate. However, to align the red knot population estimates with the horseshoe crab population estimates, the 2023 red knot population estimate of 39,361 (95% CI: 33,724 -47,556) was used in making harvest recommendations for the 2025 harvest season.

In the ARM Revision, all quantifiable sources of mortality (i.e., bait harvest, coastwide biomedical mortality, and commercial dead discards; Figure 2 - Figure 3) were used in the catch multiple survey analysis (CMSA) to estimate male and female horseshoe crab population estimates. The Virginia Tech (VT) Trawl Survey estimates are used in the CMSA along with the New Jersey Ocean Trawl and the Delaware Fish and Wildlife Adult Trawl Surveys (ASMFC 2022a; Jiao et al. 2024; Figure 4 -Figure 5).

Since 2019, the VT Trawl Survey has recorded very low numbers or zero newly mature female horseshoe crabs. Newly mature males have not shown the same decline. Horseshoe crabs are estimated in the Delaware Bay using a two-stage model (the catch multiple survey analysis) which requires estimates of newly mature and mature horseshoe crabs by sex from the VT Trawl Survey. The model cannot run with a zero data point for newly mature horseshoe crabs. For the last two years, the modeling team, in discussion with the Delaware Bay Ecosystem Technical Committee (DBETC) and ARM Subcommittee, has been reproportioning the *mature* female horseshoe crab numbers into newly mature and mature female horseshoe crabs using a ~20% ratio of newly mature to mature horseshoe crabs based on previous years of data from the VT and Delaware Adult Trawl Surveys. Following the Horseshoe Crab Stakeholder Workshop in July 2024 and through discussions with the VT Trawl team, it was determined that newly mature females are being misclassified during sampling as *immature*, not mature. Simply, due to increased population numbers in the coastal Delaware Bay Region, the crew of the VT Trawl Survey have been overwhelmed with the large numbers of horseshoe crabs in the tows during the sampling season. As a result, the sampling of non-mature females (those that could be immature or newly mature) to determine if eggs are present (indicating that they are newly mature) has been inconsistently applied between tows. Distinguishing the stages in male horseshoe crabs is straight-forward compared to female horseshoe crabs. Therefore, the modeling team should reconsider the method for calculating newly mature female horseshoe crabs for use in the model.

To re-calculate newly mature females for 2019-2023, the modeling team proposed using a linear regression of newly mature males and females where females were lagged by one year to acknowledge that newly mature males are typically 9-years-old and newly mature females are 10-years-old. There was a strong positive relationship between these two population estimates (Figure 6), so the linear regression method can predict newly mature female population estimates for the years of 2019-2023 when newly mature female horseshoe crabs were not sampled as rigorously in the survey. The DBETC and ARM committees agreed with using the new method this year, while recognizing that the priority is return to using the VT Trawl data as provided when sampling issues have been resolved. However, for the Board's awareness, a correction will need to be made again next year when making 2026 harvest recommendations because the VT Trawl Survey estimated 0 newly mature females in the fall of 2023.

No adjustments had to be made for the male horseshoe crab model.

Using the adjusted newly mature female populations methods in the CMSA model, there were approximately 30.4 million (95% CI: 22.0-41.9) mature male and 16.6 million (95% CI: 13.0-21.1) mature female horseshoe crabs in the Delaware Bay Region in 2023 (Figure 7 - Figure 8).

3. Harvest Recommendation

Harvest recommendations for the 2025 fishing year made using the ARM Revision are based on CMSA estimates of horseshoe crab abundance and the red knot mark-resight abundance estimates. ARM harvest recommendations are based on a continuous scale rather than the discrete harvest packages in the previous ARM Framework. Therefore, a harvest number up to the maximum allowable harvest could be recommended, not just the fixed harvest packages. Harvest of females is decoupled from the harvest of males so that each is determined separately. The maximum possible harvests for both females and males are maintained from the previous ARM Framework at 210,000 and 500,000, respectively.

The annual recommendation of allowable Delaware Bay horseshoe crab harvest is based on current state of the system (abundances of both species in the previous calendar year) and the optimal harvest policy functions from the ARM Revision. Annual estimates of horseshoe crab and red knot abundances are used as input to the harvest policy functions, which then output the optimal horseshoe crab harvest

to be implemented. As per Addendum VIII, if the optimal recommended harvest is less than the maximum, it is rounded down to the nearest 25,000 crabs to uphold biomedical data confidentiality.

The harvest recommendation for 2025 based on the ARM Framework is 175,000 female and 500,000 male horseshoe crabs.

4. Quota Allocation

Allocation of allowable harvest was conducted in accordance with the methodology in Addendum VIII (Table 1). Note that the total quotas for Maryland and Virginia are capped under Addendum VIII based on the female harvest recommendation.

Table 1. Delaware Bay-origin and total horseshoe crab quota for 2025 by state. Virginia total quota only refers to the amount that can be harvested east of the COLREGS line.

State	Delaware Bay-Origin Quota		Total Quota	
	Male	Female	Male	Female
Delaware	173,014	60,555	173,014	60,555
New Jersey	173,014	60,555	173,014	60,555
Maryland	132,865	46,503	126,410	44,243
Virginia	21,107	7,387	40,667	20,331
TOTAL	500,000	175,000	513,106	185,684

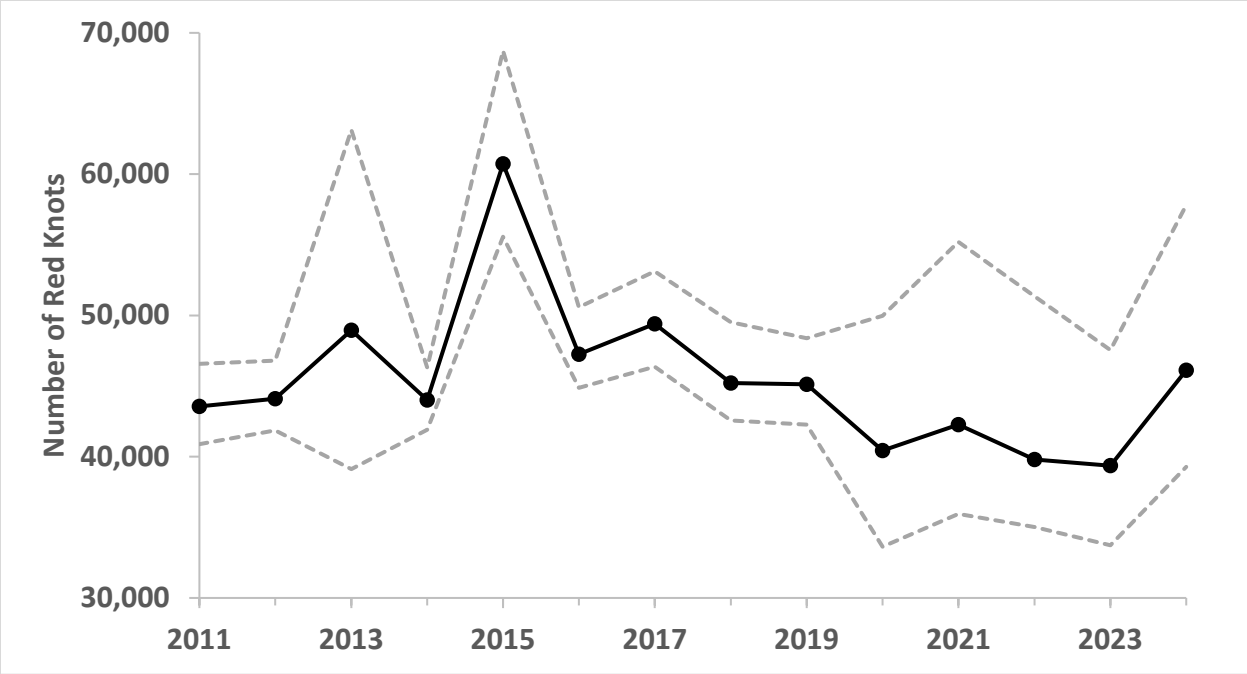

Figure 1. Mark-resight abundance estimates for the red knot stopover population with 95% confidence intervals, 2011-2024.

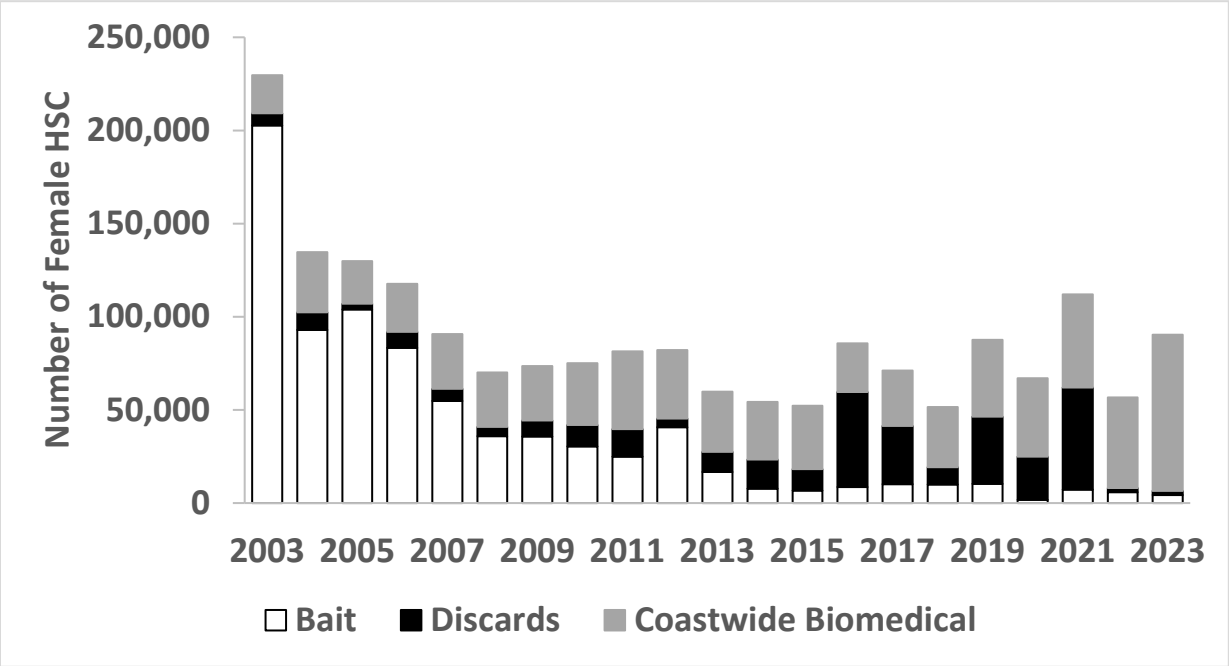

Figure 2. Total female horseshoe crab harvest by source in the Delaware Bay, 2003-2023.

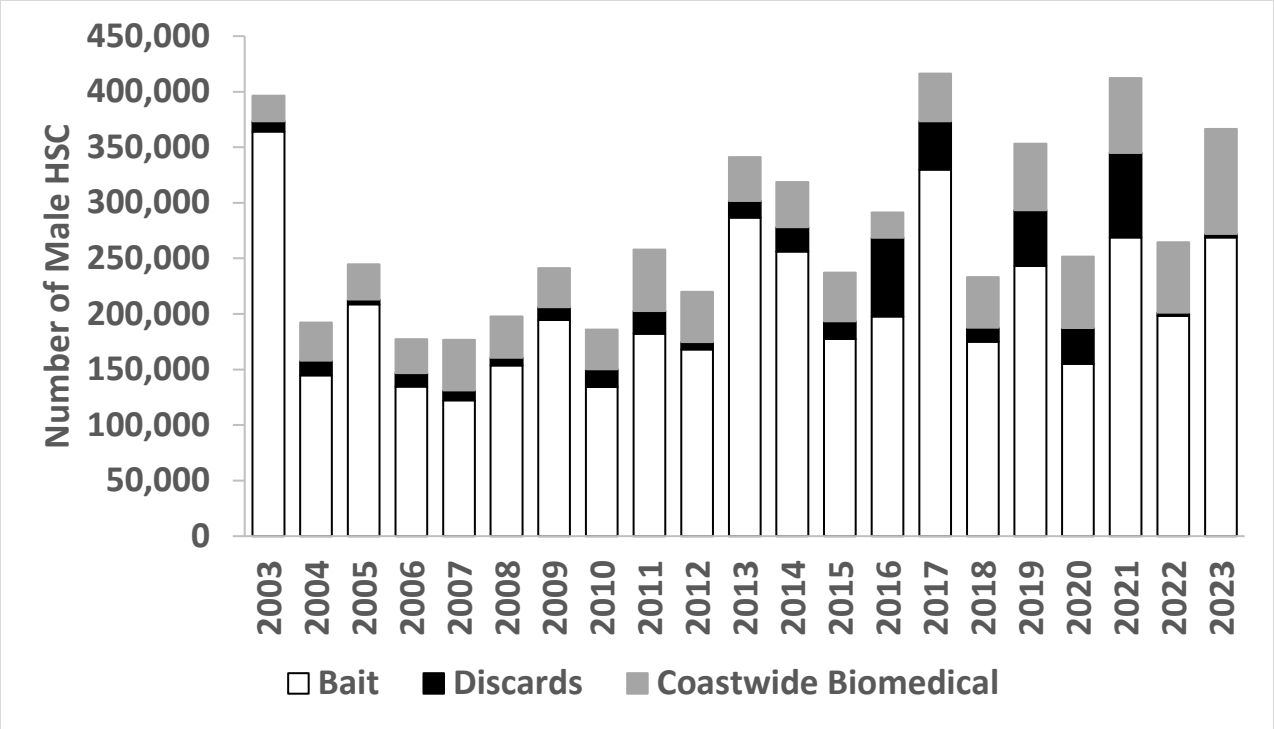

Figure 3. Total male horseshoe crab harvest by source in the Delaware Bay, 2003-2023.

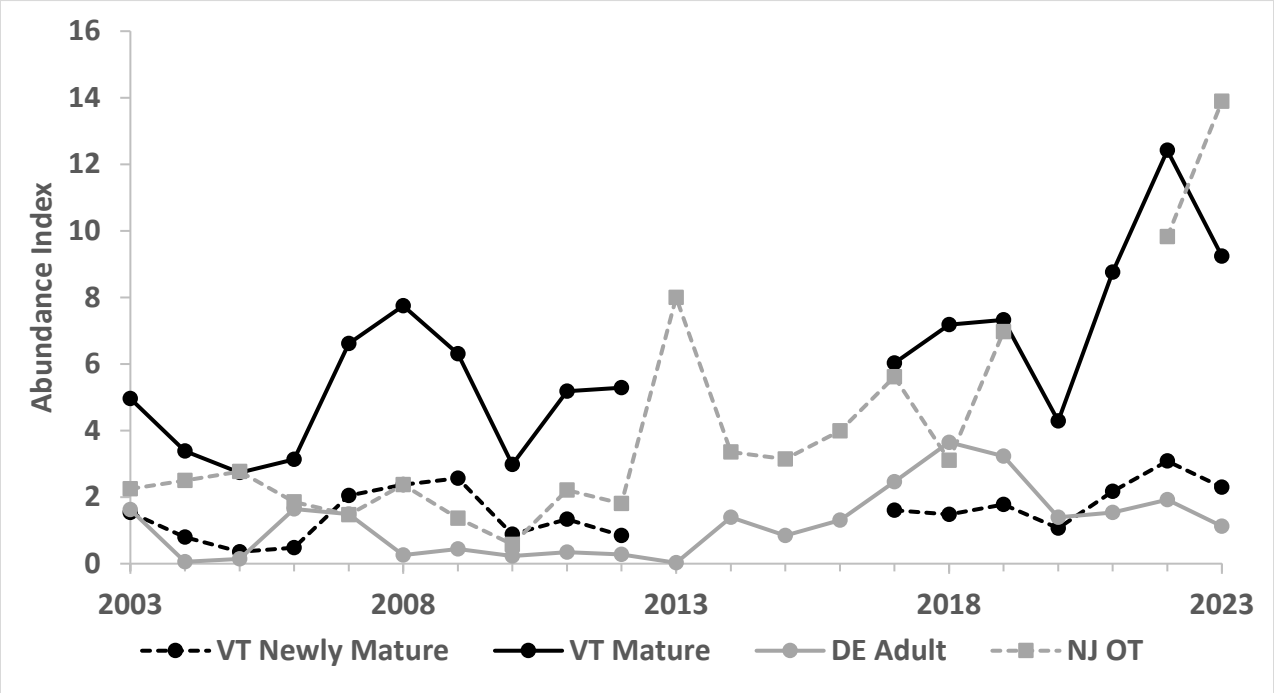

Figure 4. Female horseshoe crab abundance indices used in the CMSA. The Virginia Tech (VT) indices are in millions of newly mature and mature crabs while the Delaware Adult (DE Adult) and New Jersey Ocean Trawl (NJ OT) are in catch-per-tow.

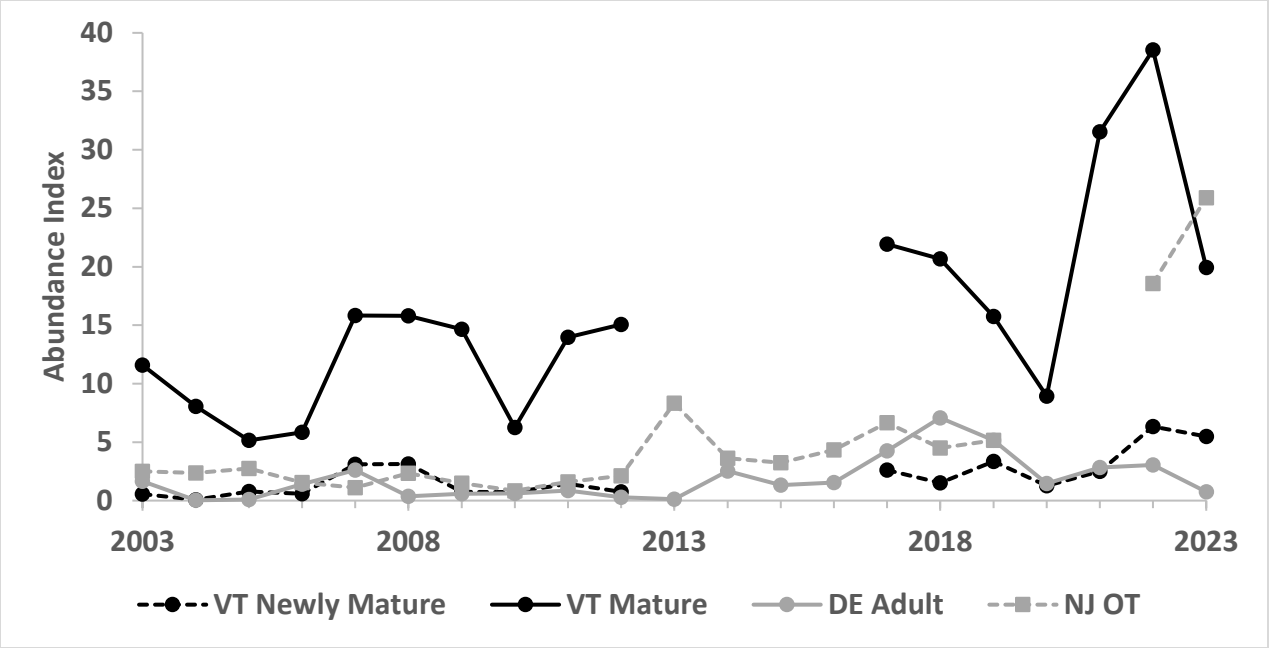

Figure 5. Male horseshoe crab abundance indices used in the CMSA. The Virginia Tech (VT) indices are in millions of newly mature and mature crabs while the Delaware Adult (DE Adult) and New Jersey Ocean Trawl (NJ OT) are in catch-per-tow.

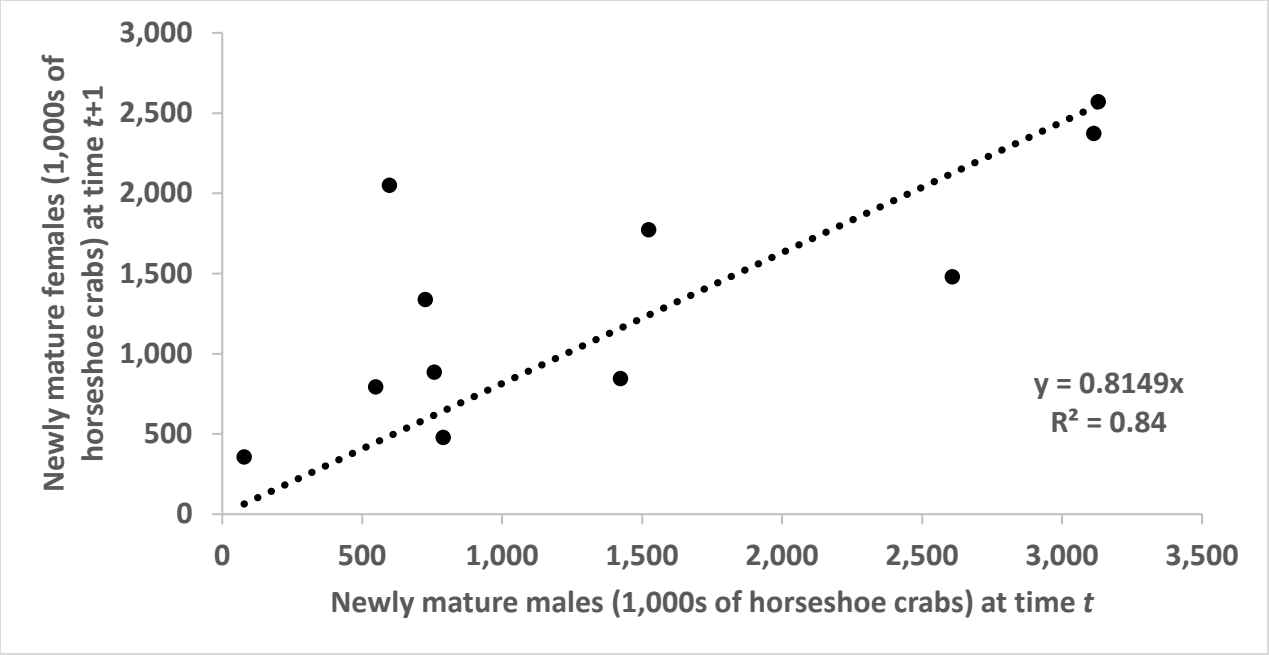

Figure 6. Linear regression between the population estimates of newly mature male to female horseshoe crabs, 2002-2018. The intercept has been fixed at 0.

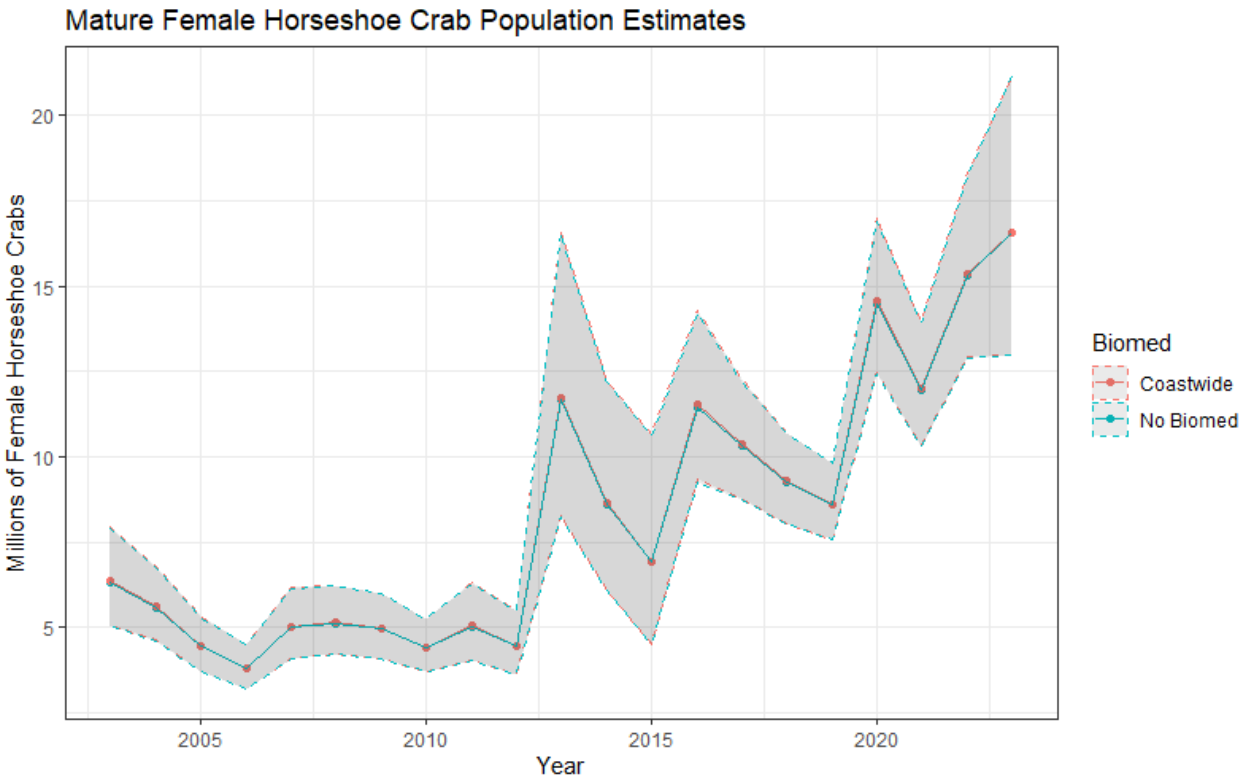

Figure 7. Population estimates from the CMSA for mature female horseshoe crabs with 95% confidence intervals. Delaware Bay biomedical data is confidential so population estimates using coastwide and zero biomedical data provide upper and lower bounds, although there is very little difference between the two and the time series overlap on the figures.

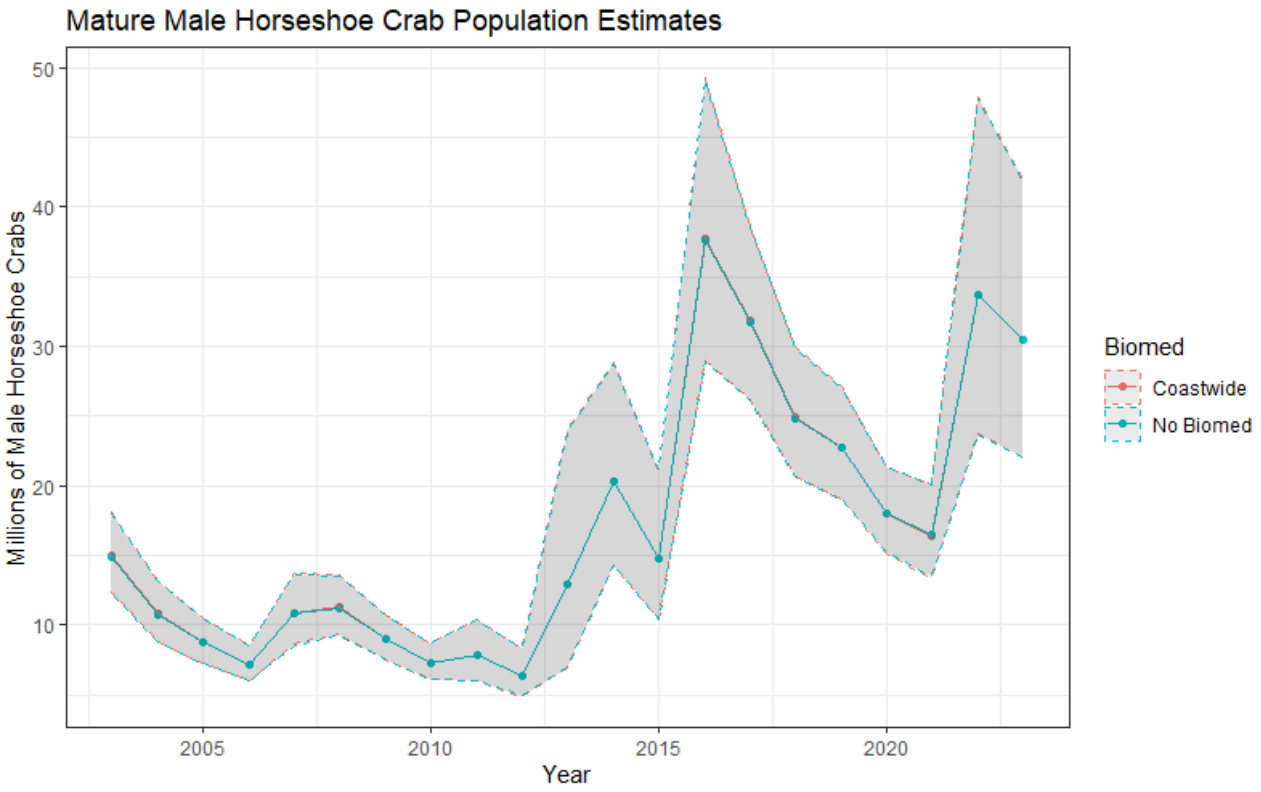

Figure 8. Population estimates from the CMSA for male horseshoe crabs with 95% confidence intervals. Delaware Bay biomedical data is confidential so population estimates using coastwide and zero biomedical data provide upper and lower bounds, although there is very little difference between the two and the time series overlap on the figures.

5. References

ASMFC. 2022a. Revision to the Framework for Adaptive Management of Horseshoe Crab Harvest in the Delaware Bay Inclusive of Red Knot Conservation and Peer Review Report. Arlington, VA. 302 pp.

ASMFC. 2022b. Addendum VIII to the Fishery Management Plan for Horseshoe Crab. Washington D.C. 12pp.

Lyons, J.E. 2024. Red Knot Stopover Population Size and Migration Ecology at Delaware Bay, USA, 2024. Memorandum to the Delaware Bay ARM Working Group. U.S. Geological Survey Patuxent Wildlife Research Center, Laurel, Maryland. 18 pp.

Jiao, Y., F. Ferretti, and E. Hallerman. 2024. Results of the 2023 Horseshoe Crab Trawl Survey: Report to the Atlantic States Marine Fisheries Commission Horseshoe Crab and Delaware Bay Ecology Technical Committees. 30 pp.

Results of the 2023 Horseshoe Crab Trawl Survey:

Report to the Atlantic States Marine Fisheries Commission Horseshoe Crab and Delaware Bay Ecology Technical Committees

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27 Aug 2024

Abstract

Annual analyses of the population dynamics of key demographic groups are essential for appropriate management of the mid-Atlantic horseshoe crab (*Limulus polyphemus*) fishery. We conducted a trawl survey along the coast of the Delaware Bay area (DBA, Virginia to New Jersey), quantified mean catch per 15-minute tow, and compared the relative abundance of demographic groups with those of prior years. Due to time constraints, no trawls were performed in the lower Delaware Bay this year. Mean catch-per-tow across all demographic groups was similar to last year's analysis, except for the newly mature males, which were relatively high in the previous two years of surveys. Mean stratified catch-per-tow across all demographic groups remains highly variable, although mature females show a positive trend over the study period. Newly mature males also have an increasing trend in recent years, although their relative abundance was low in 2023. Prosomal widths of all demographic groups, except immature individuals, show decreasing trends over the time-series in the DBA. Our findings will be used to parameterize the Adaptive Resource Management model used to set annual harvest levels for horseshoe crabs.

Introduction

To effectively manage the mid-Atlantic horseshoe crab (*Limulus polyphemus*) fishery, accurate information on relative abundance levels and trends is needed. The Adaptive Resource Management (ARM) model (McGowan et al. 2011) adopted by the ASMFC requires annual, fishery-independent indices of newly mature recruit and adult abundances. The purpose of this project was to conduct a horseshoe crab trawl survey along the Mid-Atlantic coast in order to: (1) determine horseshoe crab relative abundance, (2) describe horseshoe crab population demographics, and (3) track inter-annual changes in horseshoe crab relative abundance and demographics. Here, we report our cumulative results through the fall 2023 trawl survey.

We have provided the ARM Subcommittee relative abundance estimates of horseshoe crabs in the Delaware Bay area (DBA) and lower Delaware Bay (LDB) surveys to inform the ARM model runs. Herein, we present the population estimates through the 2023 survey. Gear catchability has not been evaluated for these estimates, so they should be considered conservative.

Methods

The Virginia Polytechnic Institute and State University horseshoe crab trawl survey is traditionally conducted in two areas (Figure 1). The coastal DBA survey extended in the Atlantic Ocean from shore out to 22.2 km (12 nautical miles), and from 39º 20' N (Atlantic City, NJ) to 37º 40' N (slightly north of Wachapreague, VA). This area was previously sampled from 2002 to 2011, and again from 2016 to 2023. Due to time constraints, the LDB survey area, which extends from the Bay mouth to a line between Egg Island Point, New Jersey, and Kitts Hummock, Delaware, was not sampled this year. The LDB was previously sampled from 2010 to 2012 and 2016 to 2021. The surveys were conducted between 6 September to 30 October 2023.

The DBA survey area was stratified by distance from shore (0-3 nm, 3-12 nm) and bottom topography (trough, non-trough) as in previous years. The LDB survey area was stratified by bottom topography only, as in previous years. Sampling was conducted aboard a 16.8-m chartered commercial fishing vessel operated out of Ocean City, MD. We used a two-seam flounder trawl with an 18.3-m headrope and 24.4-m footrope, rigged with a Texas Sweep of 13-mm link chain and a tickler chain. The net body consisted of 15.2-cm (6-in) stretched mesh, and the bag consisted of 14.3-cm (5 5/8-in) stretched mesh. Tows were usually 15 minutes bottom time, but were occasionally shorter to avoid fishing gear (e.g., gill nets, crab and whelk pots) or vessel traffic. The start and end positions of each tow were recorded when the winches were stopped and when retrieval began, respectively. The bottom water temperature was recorded for each tow. We sampled 53 stations in the DBA survey. Two of these trawls were either shorter or longer in duration than average, one being a five-minute tow within our inshore/non-trough stratum and the other being a 25-minute trawl in the offshore/trough stratum. Both were included in our data analysis as no malfunctions were reported. Additionally, due to the high variance in CPUE and density of HSCs in each stratum (Figure 2), a larger sample size will help better explain variability.

Horseshoe crabs were culled from the catch, and either all individuals or a subsample were examined for prosomal width (PW, millimeters) and identified for sex and maturity. Maturity classifications were immature, newly mature (those that are capable of spawning but have not yet spawned), and mature (those that have previously spawned). Newly mature and mature males are morphologically distinct and are believed to be classifiable without error. However, some error is associated with distinguishing newly mature from immature females. Females that were not obviously mature (females with no rub marks) or immature (too small or soft-shelled) were probed with an awl to determine the presence or absence of eggs. Females with eggs but without rub marks were considered newly mature. Females with both eggs and rub marks were considered mature. Initial sorting classifications were presumed adult males (newly mature and mature), presumed adult females, and all immature. Up to 25 adult males, 25 adult females, and 50 immatures were retained for examination (sometimes catches were lower than these target sample sizes). The remainder were counted separately by classification and released. Characteristics of the examined subsamples were then extrapolated to the counted portions of the catch. According to a recent discussion with the vessel, in the last three years, not all subsampled ambiguous newly mature females were probed with an awl to test whether they had eggs. These tests occurred only when onboard logistic conditions allowed, i.e., when the crew had sufficient time between one tow and the next. When such a test could not be performed, we classified these cases as female immatures.

In each stratum, the mean catch per 15-minute tow and associated variance were calculated using two methods, i.e., either assuming a normal distribution model or a delta-lognormal distribution model (Pennington, 1983). Stratum mean and variance estimates were combined using formulas for a stratified random sampling design (Cochran, 1977). The approximate 95% confidence intervals were calculated

using the effective degrees of freedom (Cochran, 1977). Annual means were considered significantly different if 95% confidence limits did not overlap. Stratified means calculated using the delta-lognormal distribution model are not additive - i.e., means calculated for each demographic group do not sum to the mean calculated using all crabs. Means calculated using the normal-distribution model are additive, within rounding errors.

Annual size-frequency distributions, in intervals of 10-mm prosomal width, were calculated for each sex/maturity category by pooling size-frequency distributions of all stations (adjusted for tow duration if necessary) in a stratum in a year to determine the relative proportions for each size interval. Those proportions were then multiplied by the stratum mean catch-per-tow that year to produce a stratum size-frequency distribution. Stratum size-frequency distributions then were multiplied by the stratum weights and added in the same manner as calculating the stratified mean catch per tow. Areas under the distribution curves represent the stratified mean catch per tow at each size interval.

Within the DBA, excluding the one shorter trawl, the average tow distance for a 15-min tow was 1.06 kilometers at a speed of 4.25 KPH. No net-spread measurement device was used during sampling. Instead, the net-spread was calculated using the net-spread regression relationship, *net spread (S, in meters)/tow speed (C, in KPH)*, developed from previous trawl *surveys (S = 13.84 - 0.858 × C)*. From our combined 53 tows, the average net-spread was 10.19 meters.

For each tow, catch density (catch/km^2) was calculated from the product of tow distance (in km) and estimated net-spread (converted from meters to km), assuming that all fishing was done only by the net, and that there was no herding effect from the ground gear (sweeps):

$$\text{catch/km}^2 = \text{catch/[tow distance (km)} \times \text{net-spread (km)]}.$$

Within each stratum, the mean catch per square kilometer and associated variance were calculated assuming a normal-distribution model and a lognormal delta-distribution model. Stratum mean densities and variance estimates were combined to produce a stratified mean density ($\bar{X}_{st}$) using formulas for a stratified random sampling design as with the catch-per-tow estimates described above. Population totals were estimated by multiplying stratified mean density ($\bar{X}_{st}$) by survey area (DBA = 5127.1 km^2 ; LDB = 528.4 km^2):

$$\text{Population total} = \bar{X}_{st} \text{ x } (5127.1 \text{ or } 528.4 \text{ km}^2)$$

A model-based approach was also used to standardize the HSC CPUE using hurdle models (Wong, 2023). The hurdle model framework used in this study is a generalized linear model that models the probability of HSC observations and the observed positive counts using two separate models combined for each of the six HSC demographic groups. Such analysis aims to remove the catchability effect of external factors on our observed CPUE when estimating relative abundance. A Binomial distribution was used in the probability submodel, and a lognormal distribution was used for the positive counts submodel. The factors considered include year, latitude, longitude, depth strata (inshore, offshore), topography strata (trough, non-trough), average trawl depth, time of day, month, bottom temperature, bottom salinity, and distance from shore. Factors like month, time of day, and average depth had major effects on the observed CPUE of all demographic groups. Detailed analysis based on data by 2022 can be found in Wong (2023).

Results

<u>Delaware Bay Area</u>

For all demographic groups other than newly mature males, mean stratified catch-per-tow values have remained relatively consistent between 2016 and 2018. Since then, there has been a substantial increase in variation over the past four years among newly mature and mature individuals (Tables 1 and 2; Figure 3). The mean stratified catches-per-tow for mature males and females increased substantially. The number of newly mature females continued to be low; the number of newly mature males was much lower than in the past two years. Immature individuals decreased, but have been relatively stable since 2016. Newly mature females' relative abundance has been low since 2019, and none were caught this year.

There is a significant correlation between stratified mean catches of mature males and mature females ($r = 0.96$; $p < 0.001$; $T = 14.04$; $n = 18$) when considering all data since 2002. This is also true for immature males and females ($r = 0.99$; $p < 0.001$; $T = 33.42$; $n = 18$), but not for newly mature individuals. Previously, there was a significant positive correlation between newly mature individuals between 2002 – 2018. However, this correlation was lost with the addition of data from 2019 and 2022, likely due to the low number of newly mature females trawled in recent years compared to newly mature males.

Historically, the design-based approach has been used to estimate the stratified mean catches per 15-minute tow of horseshoe crabs in the coastal Delaware Bay area by demographic group (Hata and Hallerman 2017, 2019; Hallerman and Jiao 2020; Wong et al. 2022). Comparison between the design-based and model-based approaches shows that the standardized CPUE from a hurdle model with delta-lognormal distribution generally showed similar trends with variations to different degrees among different demographic groups (Figure S1, Table S1). The large increase in 2023 mature males and females estimated from the model-based approach is less apparent than in the design-based approach. There were two high tows in 2023, both in September and in non-trough strata, and most tows were in September, which tends to have a higher cate rate (Wong et al. 2022, and Figure S2).

Lower Delaware Bay

No samples were collected within Delaware Bay in 2022 and 2023 due to rising costs and limited time. Stratified mean catches of immature female and male crabs and newly mature female crabs in 2019 and 2020 were the lowest for the time series (Tables 3 and 4; Figure 4). The number of both males and females in all three maturity groups was low in 2020 and 2021. The mean catches of mature males are significantly correlated with the mean catches of mature females ($r = 0.919$; $T = 5.71$; $p = 0.001$; $n = 8$).

Size distributions

Like the results in last year's report, size-frequency distributions remained highly variable (Figure 5). There were no distinct modal groups simultaneously in both sexes other than in 2009 with immature individuals. However, this modal group did not continue into the following years and was not found within the previous year of sampling in the lower Delaware Bay (Figure 6).

We had previously reported that mean prosomal widths of crabs in the DBA survey displayed slight, but detectable, decreases over time (Table 5, Figure 7) (Hata and Hallerman 2017, 2019, Hallerman and Jiao 2020). This trend appears to have continued this year within the Delaware Bay area. The negative correlation between years and mean prosomal width of newly mature and mature individuals remained statistically significant. The LDB portion of the table has been retained for comparison, but has not changed from our previous analysis, as no new data were added. A similar trend is present within the LDB amongst newly mature females and mature individuals.

Sex ratios

Overall, mature males were generally twice as common as mature females throughout the sampling period. Sex ratios (M:F) from mean catch-per-tow within the DBA ranged from 1.72 in 2019 to 3.64 in 2016, with an average of 2.27 over the time series. Male-to-female sex ratios in newly mature individuals have been highly variable, ranging from 0.11 in 2003 to 47.7 in 2022, with a new overall average of 5.67 over the time series. This may reflect sampling effects, temporal variability in recruitment to the newly mature class relative to the survey period, or differences in year-class abundance because females are believed to mature a year later than males.

Compared to the coast, the lower Delaware Bay has had a much higher male-to-female sex ratio in mature individuals. These values for mature individuals have ranged from 2.60 in 2018 to 20.5 in 2020, with an average of 5.98. This relationship between the coast and bay has been historically similar for newly mature individuals, with a minimum of 0.45 in 2010 and a maximum of 6.10 in 2012. Excluding 2019 and 2020 — where newly mature males were caught, but no newly mature females — this led to an average of 3.09. The higher sex ratios within Delaware Bay may reflect a tendency for male horseshoe crabs to remain near the spawning beaches.

Population estimates

Annual population estimates of immature crabs in the DBA survey mirror trends observed in the catch-per-tow estimates and have been variable over time, with a large peak in 2009 (Tables 6 and 7). Compared to the previous year, the estimated mean population total decreased for mature individuals and newly mature males, while newly mature females and immature individuals increased. Assuming the normal distribution, the significance found in catch-per-tow estimates is mirrored in total population estimates. These mean total population estimates are similar to those seen since 2016 for immature individuals. Newly mature males and mature individuals appear to have a recent increasing trend, while newly mature females appear to show a recent decreasing trend. There is a significant correlation between population estimates for mature males and females and immature males and females, as observed in mean catches per tow reported above. There is no significant correlation among newly mature individuals in the DBA.

Without new data, population estimates for immature crabs in lower Delaware Bay in 2022 and 2023 are unavailable. The estimates in 2021 have been consistent with coastal estimates since the LDB survey began in 2010 (Tables 8 and 9). On average, 15.6% of the total number of immature females and 19.7% of immature males occurred within Delaware Bay, although the LDB sampling area comprises only 9.3% of the total combined area. In 2020, both immature and mature crabs occurring within the Bay were the lowest among the survey years. Over the whole time series, about 5% of the combined population of newly mature females occurred within the Bay, while 9% of newly mature males were in the Bay. In 2020, 0 and 0.2% of newly mature females and males, respectively, occurred within Delaware Bay, with the percentage of immature males being the lowest in the history of the survey. About 21% of mature females and 28% of mature males occurred within the Bay on average, with 0.3 and 5%, respectively, occurring within the Bay in 2020. Within the combined survey population, the sex ratio of mature males:females ranged from 2.24 to 4.07 between 2010 and 2020, and averaged 3.02, with a ratio of 2.93 in 2020.

Effects of the sampling period

Sampling in the Delaware Bay Area occurred primarily during September and October, with the last trawls occurring on October 30th. This time frame is similar to those in sampling years prior to 2019,

as trawls between 2019 and 2021 were performed earlier in August and September. Although the water temperature was lower than last year, it was similar to the higher average water temperature seen in the past six years compared to sampling prior to 2016 (Table 10; Figure 8). This more consistent temperature within the Delaware Bay is in contrast to the lower Delaware Bay, where the average water temperature is more directly inversely proportional to the ordinal date.

When comparing water temperature and the time of our sampling period, there appears to be a correlation within the DBA of mean catches-per-tow of immature males and females with both water temperature ($p = 0.021$, $p = 0.018$) and ordinal date ($p = 0.015$, $p = 0.012$) (Table 11). CPUE of newly mature females significantly correlates with ordinal date, and CPUE of mature females significantly correlates with water temperature.

Key Findings

1. Mean catch-per-tows of mature males and females are much higher than in the past, with high variances.
2. Mean catch-per-tow of immature male and female horseshoe crabs in the DBA have remained variable since 2002 and have no apparent trend.
3. Mean catch-per-tow of newly mature male horseshoe crabs in the DBA remained highly variable, and were relatively higher in 2016-2022, while newly mature females have remained relatively low since 2019.
4. Mean catch-per-tow of immature demographic groups in the DBA may be correlated with the ordinal date. Mean catch-per-tow of immature and mature individuals may be correlated with temperature.
5. Annual mean prosomal width appears to still be decreasing in mature and newly mature males and females in the DBA.

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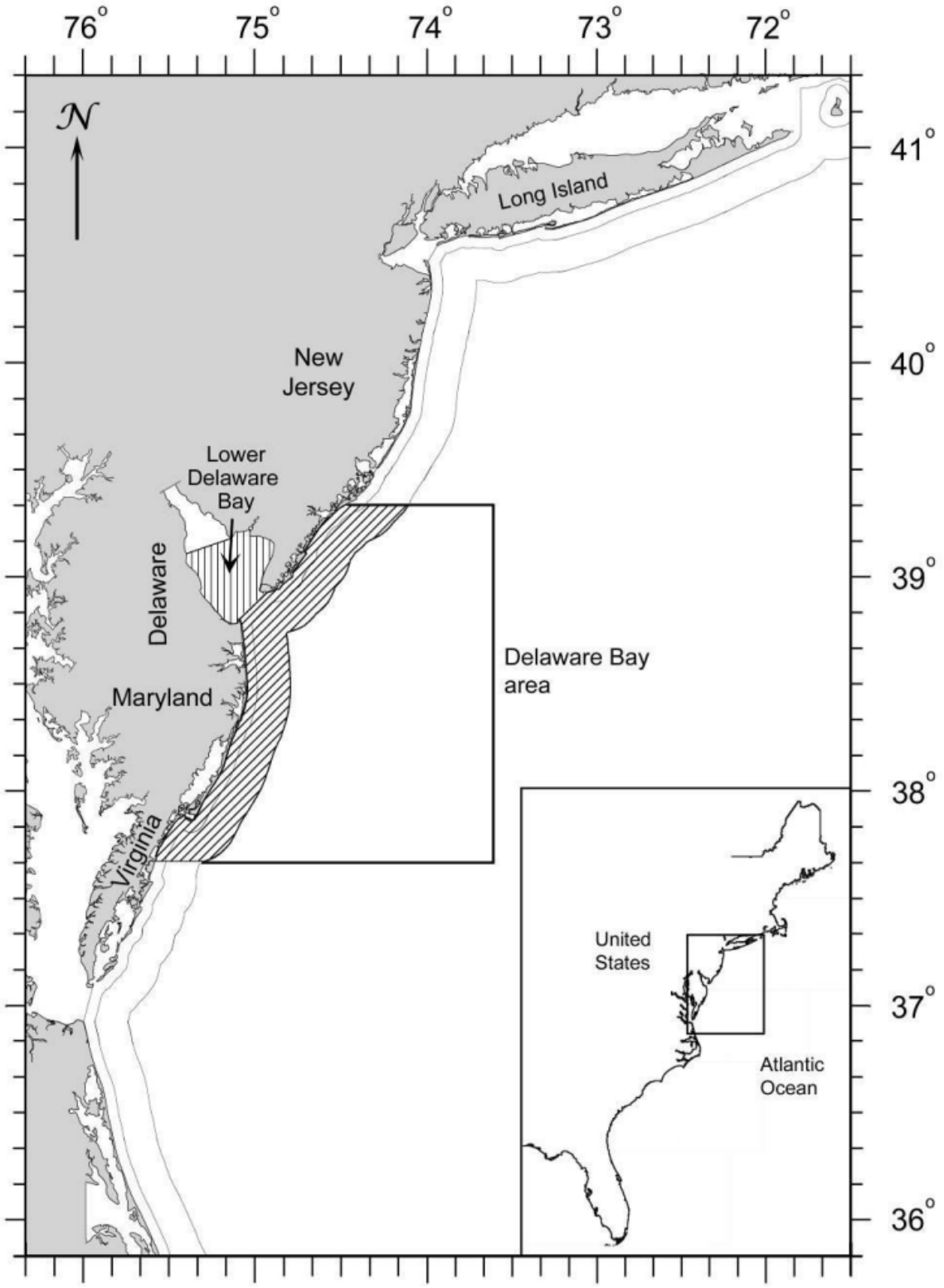

Figure 1. Fall 2023 horseshoe crab trawl survey sampling area. The coastal Delaware Bay area (DBA) and Lower Delaware Bay (LDB) survey areas are indicated. Mean catches between years were compared using stations within the shaded portions of the survey areas.

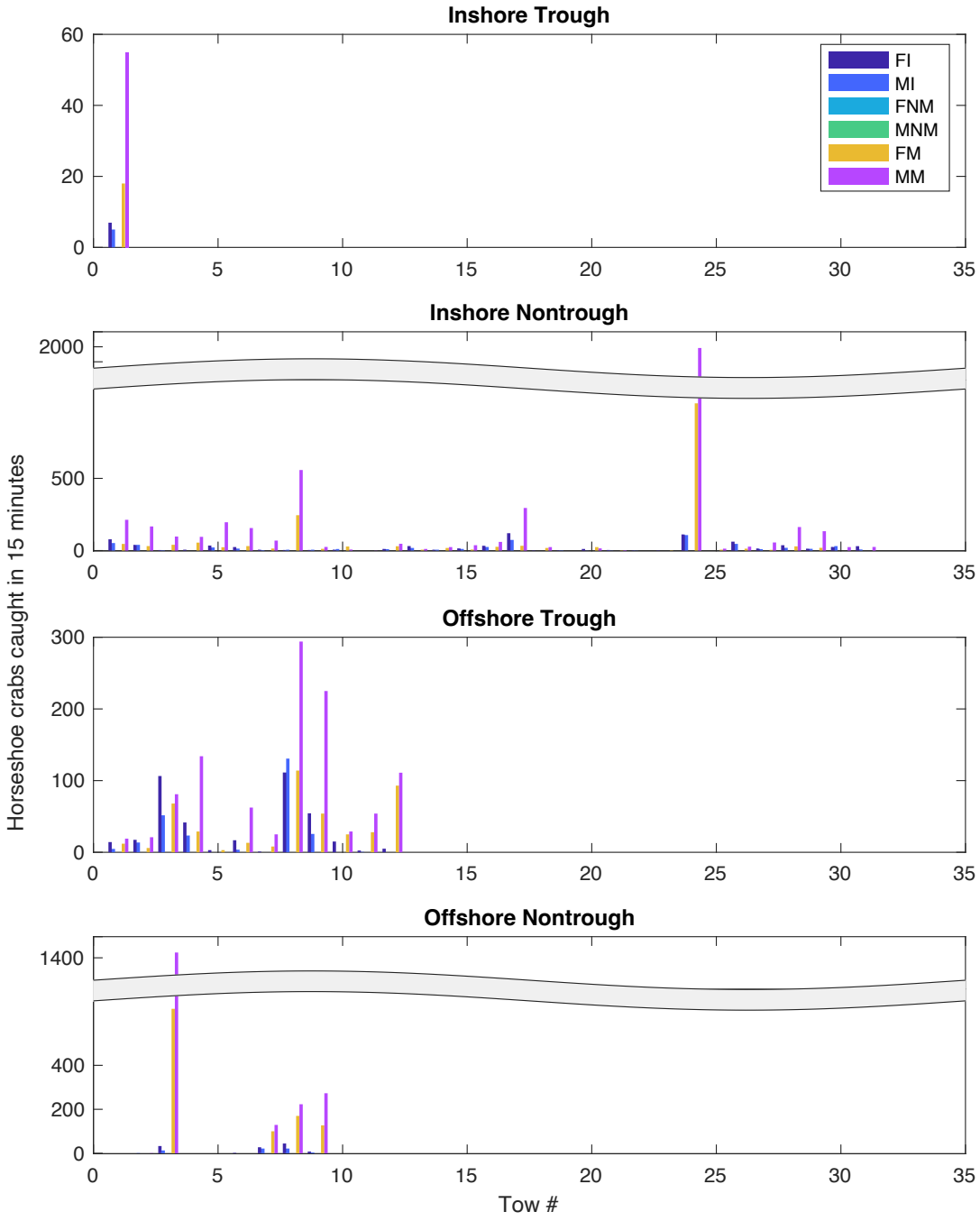

Figure 2. Plots showing high variability of relative abundances of horseshoe crabs of different demographic groups caught within the same strata in fifteen-minute tows in 2023.

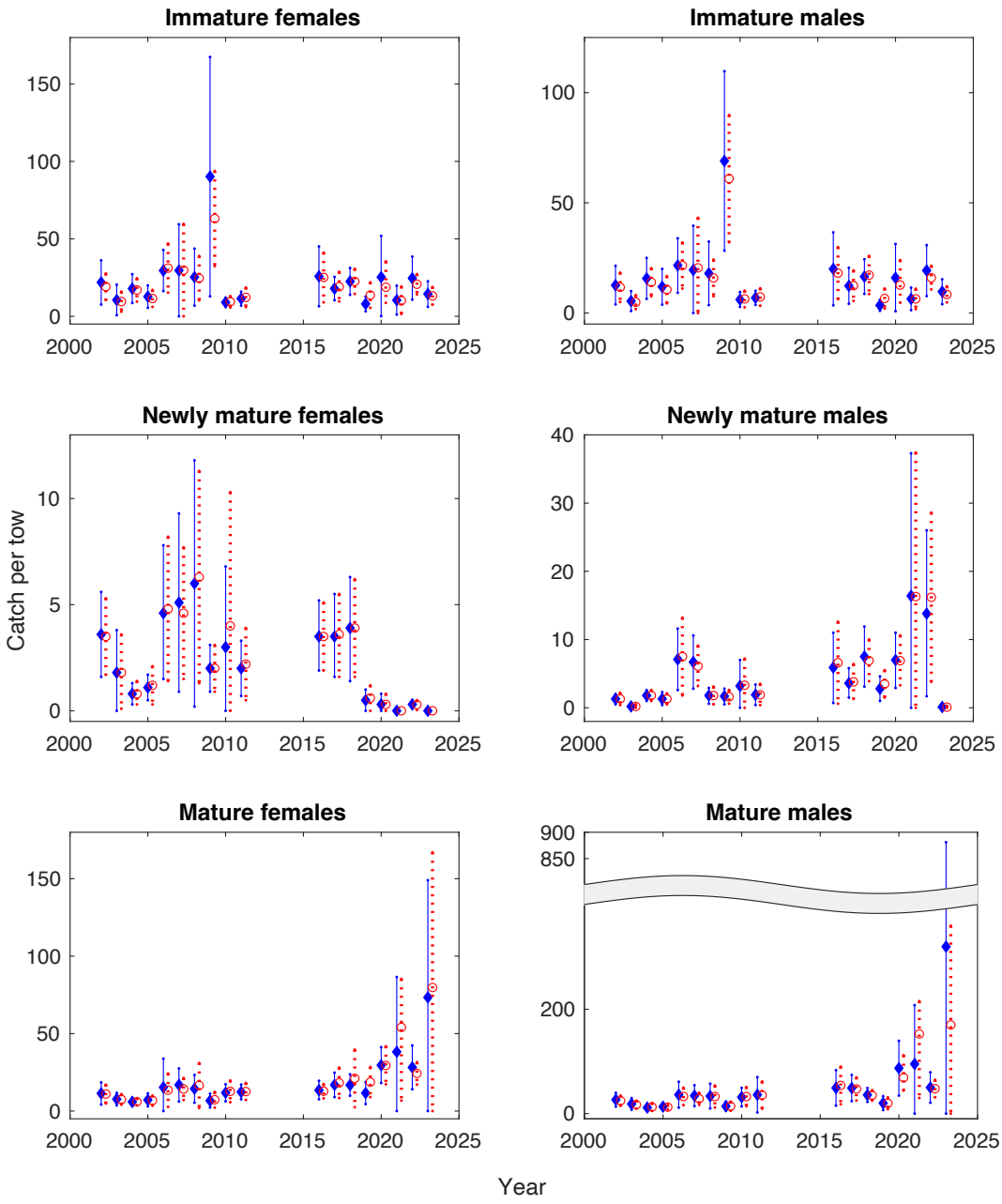

Figure 3. Plots of stratified mean catches per 15-minute tow of horseshoe crabs in the coastal **Delaware Bay area** survey by demographic group. Vertical lines indicate 95% confidence intervals. Solid blue symbols and lines indicate the **delta distribution** model. Open red symbols and dashed lines indicate the **normal distribution** model. Data are from Tables 1 and 2. Note the differences in the *y*-axis scales.

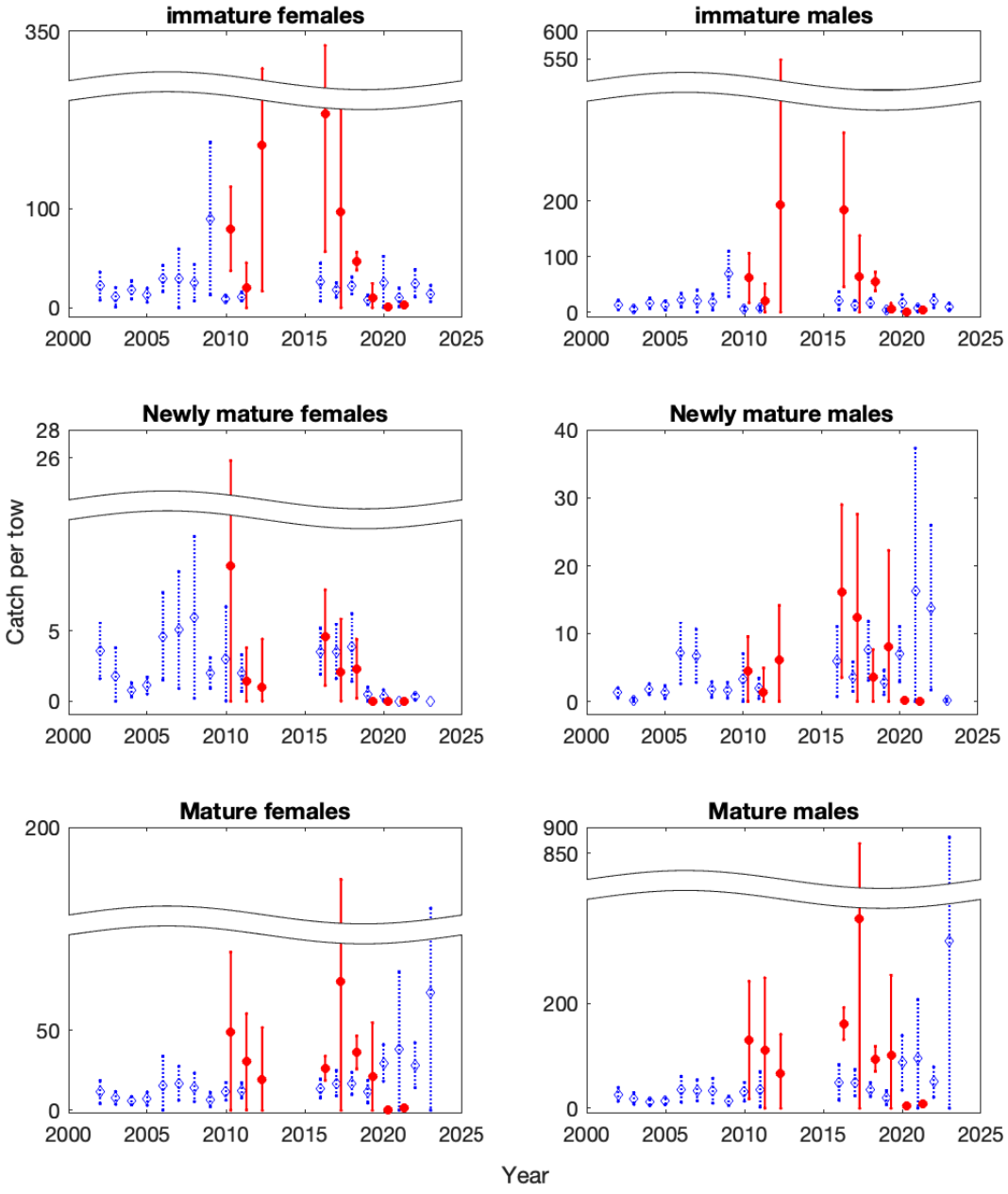

Figure 4. Plots of stratified mean catch per 15-minute tow of horseshoe crabs in the **lower Delaware Bay** survey by demographic group, with coastal **Delaware Bay area** survey means for comparison. Vertical lines indicate 95% confidence limits. Only the **delta distribution** model means are presented for clarity. Solid symbols and lines indicate **the lower Delaware Bay survey**. Open symbols and dashed lines indicate the coastal **Delaware Bay area** survey. Note differences in *y*-axis scales.

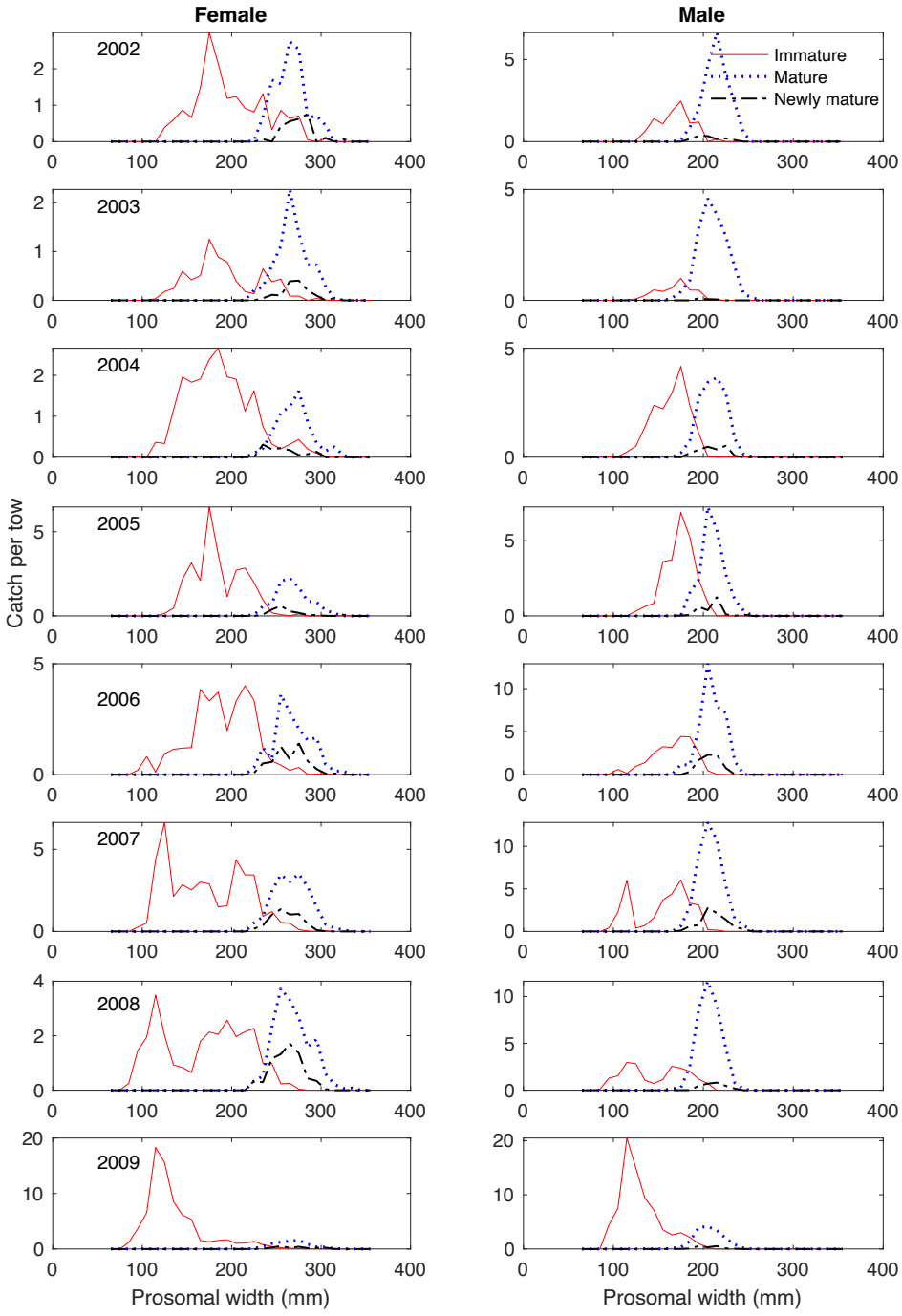

Figure 5. Size-frequency distributions of horseshoe crabs by demographic group and year in the coastal **Delaware Bay area** trawl survey. Relative frequencies are scaled to represent stratified mean catches in Table 1.

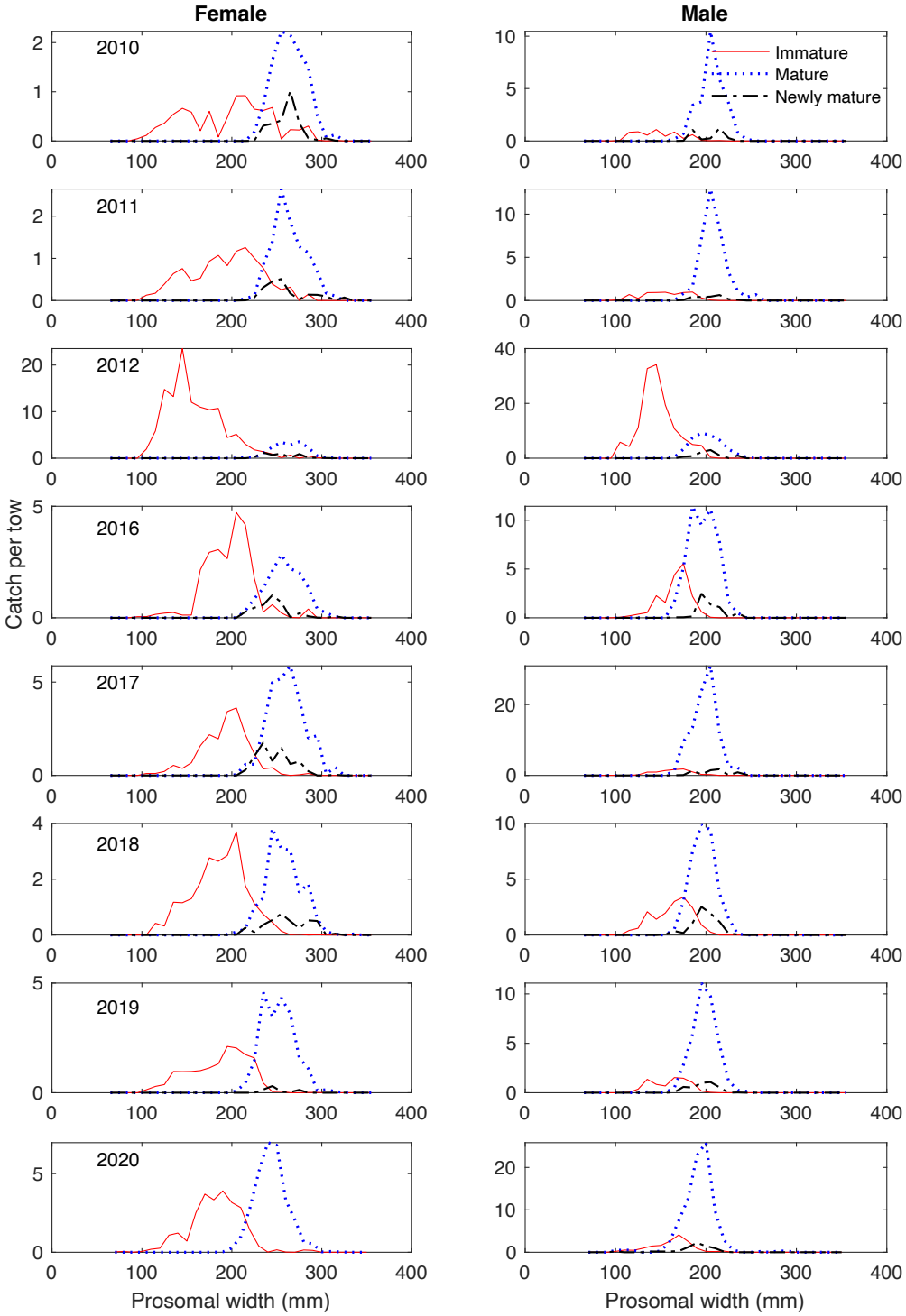

Figure 5. continued.

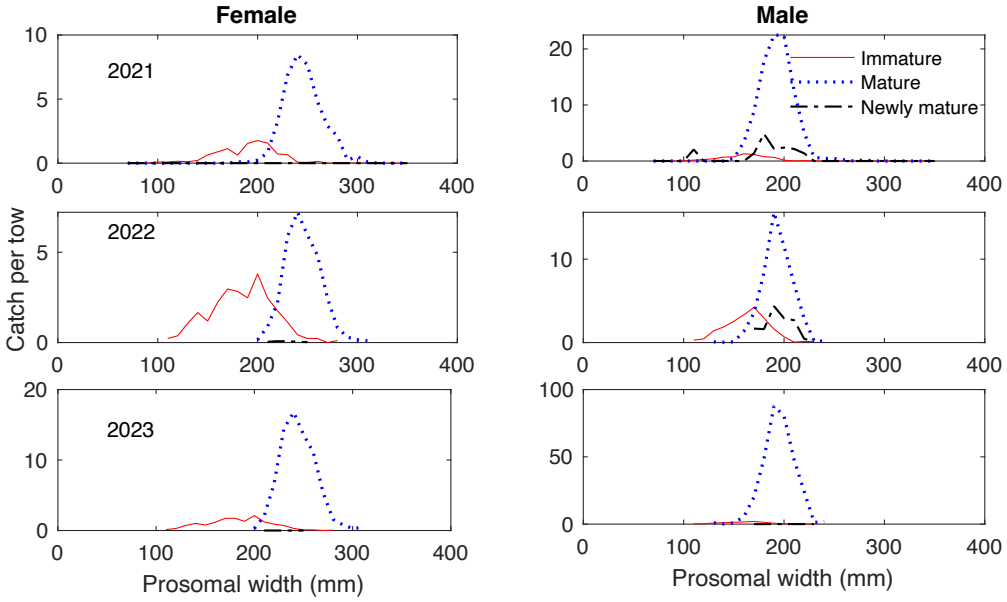

Figure 5. continued.

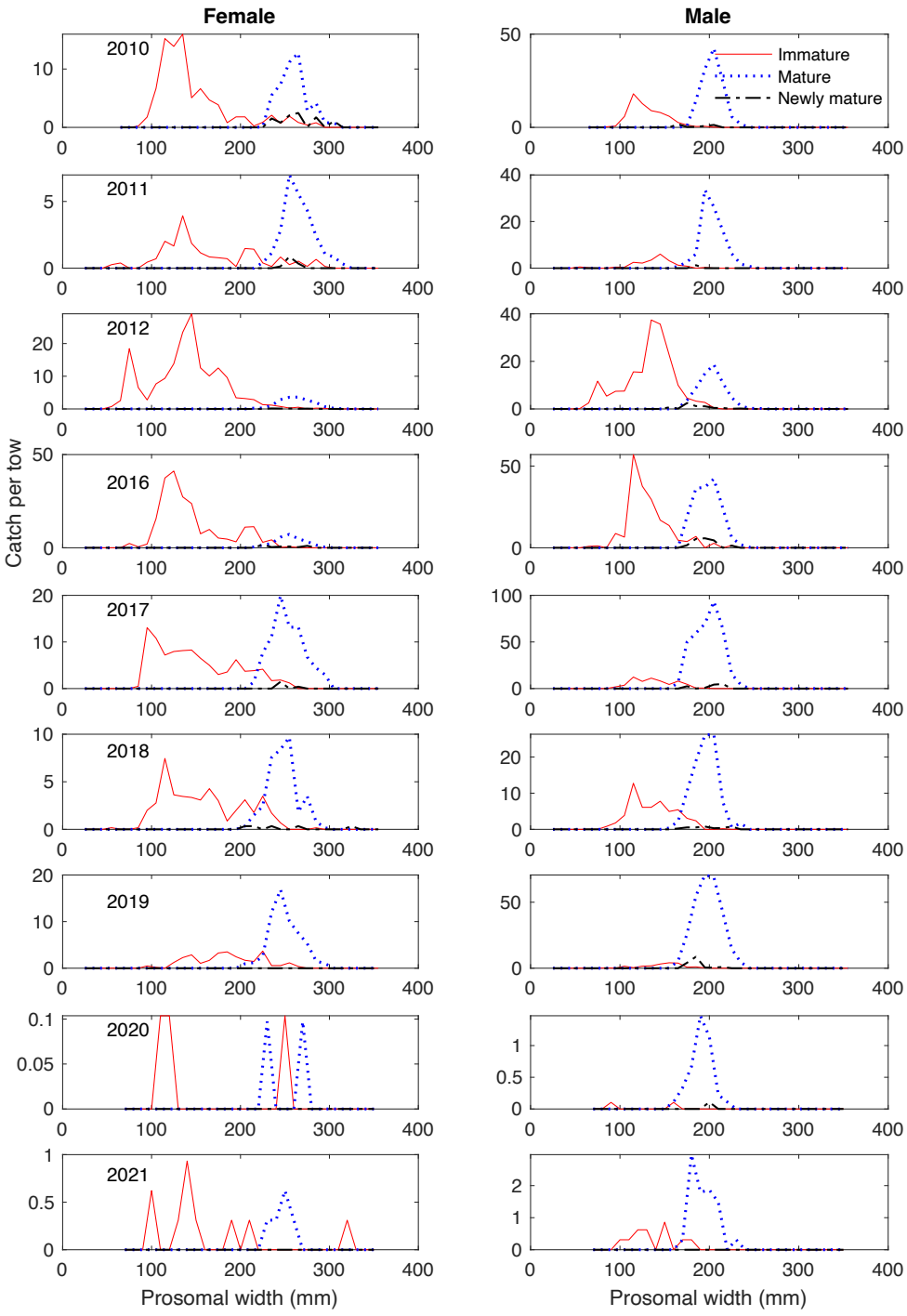

Figure 6. Relative size-frequency distributions of horseshoe crabs by demographic group and year in the **lower Delaware Bay** trawl survey. Relative frequencies are scaled to represent stratified mean catches in Table 3.

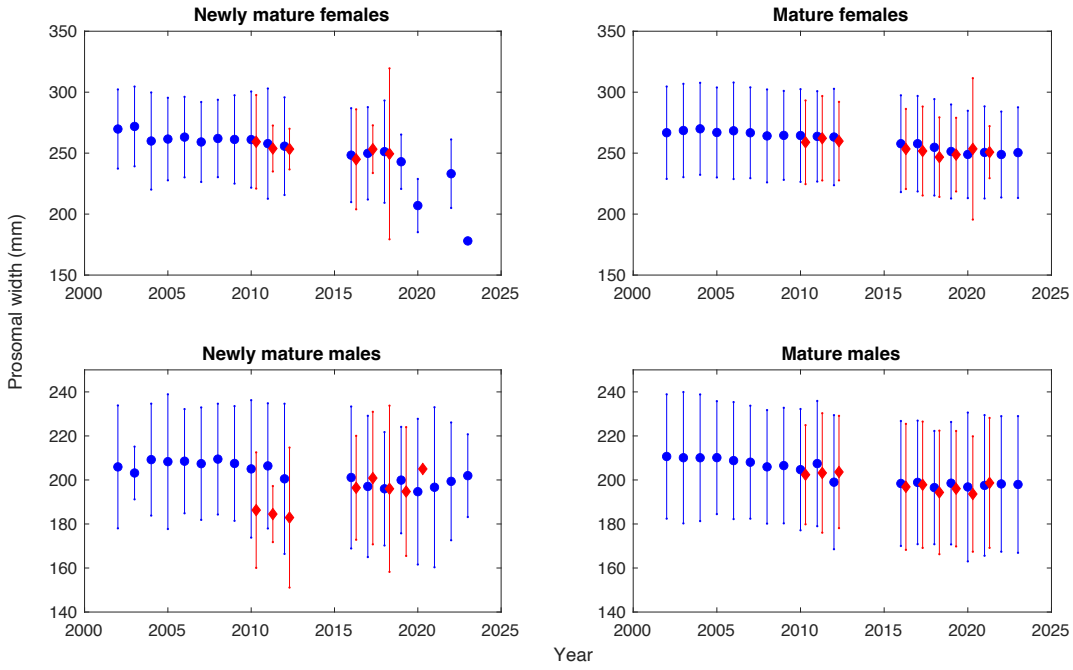

Figure 7. Mean prosomal widths (mm) (± 2 standard deviations) of mature and newly mature female and male horseshoe crabs in the Delaware Bay area (blue symbols and lines) and lower Delaware Bay (red symbols and lines) surveys.

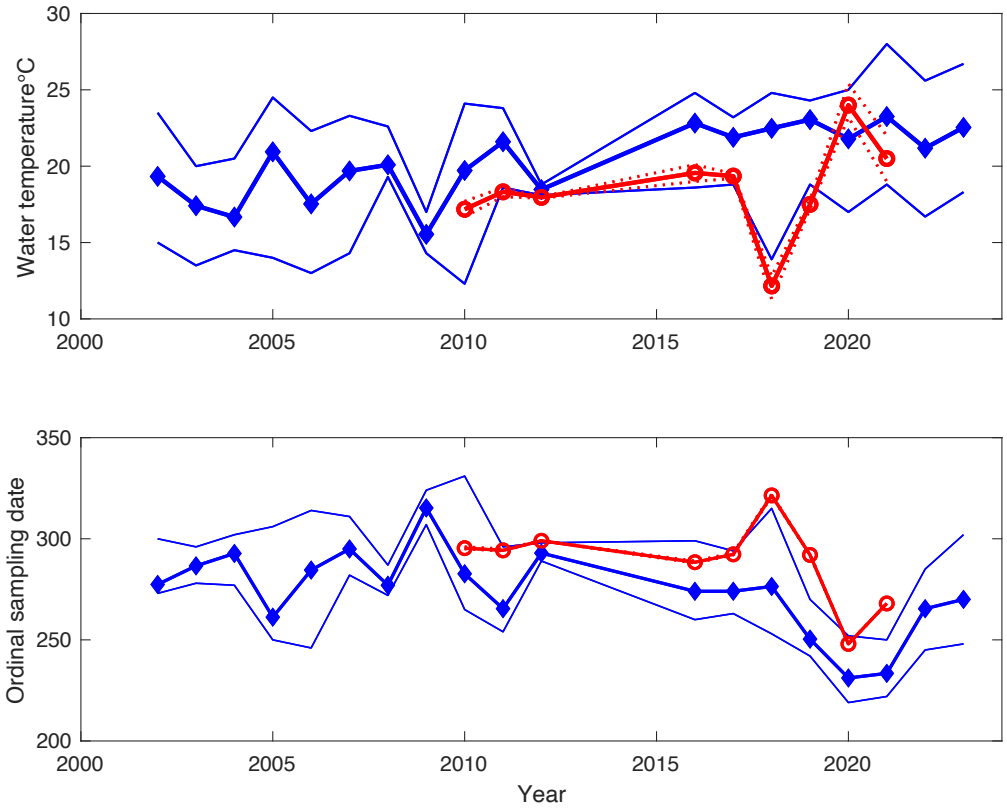

Figure 8. Plots of bottom water temperatures and ordinal sampling dates (days since 1 January) in the coastal Delaware Bay area and lower Delaware Bay trawl surveys. Solid symbols and blue lines indicate coastal Delaware Bay area. Open symbols and red lines indicate lower Delaware Bay. Points indicate mean values. Thinner lines indicate maximum and minimum values.

Table 1. Stratified mean catch-per-tow of horseshoe crabs in the coastal **Delaware Bay area** survey, 2002-2023, with the mean, standard deviation (sd), and coefficient of variation (CV), calculated using the **delta distribution** model by demographic group. Also included are the estimated upper and lower 95% confidence limits (UCL, LCL).

YEAR	MEAN	UCL	LCL	CV	SD	YEAR	MEAN	UCL	LCL	CV	SD
Immature Females						Immature Males					
2002	21.9	36.1	7.6	0.31	6.8	2002	12.6	21.4	3.9	0.33	4.2
2003	10.5	20.4	0.7	0.43	4.6	2003	5.4	9.9	0.9	0.39	2.1
2004	17.9	27.2	8.6	0.25	4.5	2004	15.7	25.0	6.4	0.29	4.5
2005	12.7	19.9	5.5	0.28	3.5	2005	11.9	20.0	3.8	0.33	3.9
2006	29.5	42.8	16.3	0.21	6.3	2006	21.6	33.9	9.2	0.25	5.4
2007	29.6	59.4	0.0	0.41	12.2	2007	19.5	39.6	0.0	0.42	8.2
2008	25.3	43.7	6.9	0.33	8.3	2008	18.0	32.4	3.6	0.35	6.3
2009	90.2	167.4	12.9	0.39	35.5	2009	69.0	109.7	28.3	0.29	19.8
2010	9.0	11.9	6.1	0.16	1.4	2010	6.1	9.5	2.8	0.27	1.6
2011	11.4	15.9	6.9	0.19	2.2	2011	6.9	10.1	3.7	0.23	1.6
2016	25.8	45.1	6.5	0.36	9.2	2016	20.0	36.6	3.5	0.39	7.9
2017	17.9	25.4	10.4	0.19	3.4	2017	12.3	20.5	4.2	0.27	3.3
2018	22.5	31.2	13.9	0.18	4.1	2018	16.5	24.4	8.7	0.22	3.7
2019	8.0	12.7	3.2	0.3	2.4	2019	3.5	6.0	1.0	0.35	1.2
2020	25.3	51.9	0.1	0.6	15.2	2020	16.0	31.3	0.8	0.56	9.1
2021	10.4	19.8	1.1	0.52	5.5	2021	6.4	11.5	1.3	0.46	3.0
2022	24.6	38.5	10.8	0.33	8.1	2022	19.3	30.8	7.7	0.36	6.9
2023	14.4	22.6	6.1	0.31	4.5	2023	9.7	15.3	4.0	0.32	3.1
Mature Females						Mature Males					
2002	11.4	18.5	4.2	0.3	3.4	2002	26.6	39.7	13.4	0.24	6.3
2003	7.7	11.7	3.7	0.25	1.9	2003	18.4	29.6	7.3	0.28	5.2
2004	5.9	8.6	3.3	0.21	1.3	2004	11.4	17.1	5.7	0.24	2.8
2005	7.2	11.4	3.0	0.27	2.0	2005	13.2	19.1	7.3	0.21	2.8
2006	15.3	33.8	0.0	0.44	6.7	2006	36.2	60.9	11.4	0.28	10.1
2007	16.9	27.5	6.2	0.3	5.1	2007	34.3	54.4	14.3	0.28	9.7
2008	14.4	23.3	5.4	0.29	4.2	2008	33.5	57.2	9.8	0.33	11.2
2009	6.7	11.2	2.3	0.32	2.1	2009	14.1	22.8	5.3	0.30	4.2
2010	11.8	17.3	6.3	0.22	2.6	2010	31.5	49.2	13.8	0.27	8.6
2011	12.3	17.1	7.6	0.18	2.2	2011	36.0	69.8	2.2	0.41	14.7
2016	13.5	19.5	7.6	0.21	2.9	2016	49.2	83.1	15.2	0.29	14.3
2017	16.9	24.8	9.0	0.23	3.9	2017	48.9	74.0	23.9	0.25	12.2
2018	16.8	23.7	9.9	0.2	3.3	2018	35.7	48.9	22.5	0.17	6.2
2019	11.6	18.7	4.5	0.3	3.5	2019	20.0	33.3	6.8	0.33	6.6
2020	29.6	41.2	18.1	0.23	6.9	2020	87.0	139.4	34.5	0.36	31.1
2021	38.2	86.5	0.0	0.72	27.4	2021	95.0	207.8	0.0	0.67	64.1
2022	28.2	42.3	14.1	0.29	8.3	2022	50.0	79.1	20.9	0.34	17.2
2023	73.4	149.0	0.0	0.56	41.3	2023	320.0	881.0	0.0	0.95	302.0
Newly Mature Females						Newly Mature Males					
2002	3.6	5.6	1.6	0.26	0.9	2002	1.3	2	0.5	0.28	0.4
2003	1.8	3.8	0.0	0.49	0.9	2003	0.2	0.5	0.0	0.84	0.2
2004	0.8	1.3	0.3	0.3	0.2	2004	1.8	2.6	1	0.21	0.4
2005	1.1	1.7	0.5	0.28	0.3	2005	1.3	2.3	0.4	0.33	0.4
2006	4.6	7.8	1.5	0.3	1.4	2006	7.1	11.6	2.6	0.36	2.7
2007	5.1	9.3	0.9	0.39	2.0	2007	6.7	10.6	2.8	0.28	1.9
2008	6.0	11.8	0.2	0.44	2.7	2008	1.8	2.9	0.6	0.32	0.6
2009	2.0	3.1	0.9	0.26	0.5	2009	1.7	2.8	0.5	0.34	0.6
2010	3.0	6.8	0.0	0.59	1.8	2010	3.2	7.0	0.0	0.55	1.8
2011	2.0	3.3	0.7	0.31	0.6	2011	1.9	3.4	0.4	0.37	0.7
2016	3.5	5.2	1.9	0.23	0.8	2016	5.9	11	0.7	0.42	2.5
2017	3.5	5.5	1.6	0.27	0.9	2017	3.6	5.8	1.5	0.29	1.0
2018	3.9	6.3	1.4	0.3	1.2	2018	7.5	11.9	3.1	0.27	2.1
2019	0.5	1.0	0.0	0.46	0.2	2019	2.8	4.6	1.0	0.32	0.9
2020	0.3	0.8	0.0	0.85	0.3	2020	7.0	11.0	2.9	0.35	2.4
2021	0.0	NA	NA	NA	NA	2021	16.4	37.3	0.0	0.69	11.3
2022	0.3	0.5	0.1	0.5	0.1	2022	13.8	26.0	1.7	0.52	7.2
2023	0.0	NA	NA	NA	NA	2023	0.1	0.3	0.0	0.76	0.1

Table 2. Stratified mean catch-per-tow of horseshoe crabs in the coastal **Delaware Bay area** survey, 2002-2023, with the mean, standard deviation (sd), and coefficient of variation (CV), calculated using the **normal distribution** model by demographic group. Also included are the estimated upper and lower 95% confidence limits (UCL, LCL).

YEAR	MEAN	UCL	LCL	CV	SD	YEAR	MEAN	UCL	LCL	CV	SD
Immature Females						Immature Males					
2002	19.1	27.6	10.5	0.22	4.1	2002	11.7	18.3	5.0	0.27	3.2
2003	9.5	15.9	3.0	0.32	3.1	2003	4.9	8.1	1.8	0.30	1.5
2004	17.0	24.5	9.5	0.21	3.6	2004	14.0	20.3	7.6	0.22	3.1
2005	11.5	17.0	6.1	0.23	2.6	2005	10.6	16.7	4.4	0.28	2.9
2006	31.1	46.9	15.3	0.24	7.5	2006	21.5	32.0	11.1	0.23	5.0
2007	29.8	59.6	0.0	0.41	12.2	2007	20.5	43.2	0.0	0.45	9.3
2008	24.6	38.9	10.3	0.27	6.6	2008	15.9	24.2	7.6	0.24	3.8
2009	63.1	93.8	32.4	0.24	14.9	2009	61.0	89.8	32.1	0.23	14.0
2010	9.4	13.0	5.7	0.19	1.8	2010	6.4	10.1	2.6	0.29	1.8
2011	12.2	18.5	6.0	0.25	3.0	2011	7.3	11.2	3.3	0.26	1.9
2016	25.1	41.1	9.0	0.31	7.7	2016	18.1	29.9	6.3	0.31	5.7
2017	19.1	28.7	9.6	0.24	4.6	2017	12.4	19.3	5.5	0.26	3.3
2018	22.5	30.6	14.5	0.17	3.8	2018	17.2	25.9	8.6	0.24	4.1
2019	13.7	21.9	5.5	0.3	4.1	2019	6.6	11.1	2.0	0.34	2.2
2020	18.8	35.4	8.7	0.32	6.0	2020	12.7	24.0	4.7	0.37	4.8
2021	10.1	19.2	1.5	0.50	5.1	2021	6.4	11.0	1.8	0.42	2.7
2022	20.7	27.2	14.2	0.18	3.8	2022	16.0	21.4	10.7	0.20	3.2
2023	13.2	18.9	7.5	0.24	3.2	2023	8.4	12.1	4.8	0.25	2.1
Mature Females						Mature Males					
2002	11.0	17.0	4.9	0.26	2.8	2002	24.6	34.4	14.8	0.19	4.7
2003	7.5	10.9	4.1	0.22	1.6	2003	17.0	24.7	9.4	0.21	3.6
2004	6.0	8.3	3.7	0.19	1.1	2004	12.6	20.2	5.1	0.29	3.6
2005	6.8	10.0	3.5	0.22	1.5	2005	12.3	16.7	7.8	0.17	2.1
2006	13.5	24.2	2.7	0.31	4.2	2006	32.8	49.5	16.1	0.22	7.4
2007	14.2	21.3	7.1	0.24	3.4	2007	28.4	39.9	16.8	0.20	5.6
2008	16.5	31.0	2.0	0.41	6.8	2008	32.7	53.7	11.7	0.31	10.0
2009	7.3	12.3	2.2	0.33	2.4	2009	14.2	22.9	5.5	0.29	4.1
2010	12.7	19.7	5.7	0.26	3.3	2010	32.5	50.9	14.1	0.27	8.8
2011	12.6	18.1	7.2	0.2	2.6	2011	35.4	61.4	9.5	0.32	11.5
2016	12.8	17.4	8.2	0.17	2.2	2016	53.9	90.0	17.8	0.30	16.2
2017	18.2	28.0	8.4	0.26	4.8	2017	47.2	69.3	25.1	0.23	10.8
2018	21.1	39.6	2.5	0.41	8.7	2018	34.9	44.9	24.9	0.14	4.8
2019	18.7	28.4	9.0	0.26	4.8	2019	19.7	31.0	8.4	0.28	5.6
2020	29.4	41.8	17.3	0.25	7.2	2020	68.8	111.7	44.1	0.21	14.7
2021	54.0	85.3	6.8	0.50	26.8	2021	152.6	215.5	30.0	0.46	69.7
2022	24.3	31.5	17.1	0.18	4.3	2022	47.8	64.7	31.0	0.21	9.9
2023	79.8	167.0	0.0	0.59	47.2	2023	170.0	360.0	0.0	0.60	102.0
Newly Mature Females						Newly Mature Males					
2002	3.5	5.3	1.7	0.24	0.9	2002	1.3	2.2	0.4	0.31	0.4
2003	1.8	3.6	0.1	0.45	0.8	2003	0.2	0.5	0.0	0.84	0.2
2004	0.8	1.4	0.3	0.33	0.3	2004	1.8	2.6	1.0	0.21	0.4
2005	1.2	2.1	0.3	0.35	0.4	2005	1.3	2.1	0.5	0.29	0.4
2006	4.8	8.2	1.4	0.33	1.6	2006	7.5	13.2	1.8	0.36	2.7
2007	4.6	7.7	1.5	0.32	1.5	2007	6.1	9.1	3.2	0.23	1.4
2008	6.3	11.3	1.3	0.37	2.3	2008	1.8	3.1	0.5	0.34	0.6
2009	2.0	3.1	0.9	0.26	0.5	2009	1.6	2.6	0.6	0.30	0.5
2010	4.0	10.3	0.0	0.74	3.0	2010	3.3	7.2	0.0	0.56	1.9
2011	2.2	3.9	0.5	0.38	0.8	2011	1.9	3.5	0.4	0.38	0.7
2016	3.5	5.1	1.9	0.22	0.8	2016	6.6	12.6	0.6	0.43	2.9
2017	3.6	5.5	1.6	0.27	1.0	2017	3.8	6.4	1.3	0.32	1.2
2018	3.9	6.2	1.6	0.28	1.1	2018	6.9	10.0	3.9	0.21	1.5
2019	0.6	1.2	0.0	0.48	0.3	2019	3.5	5.5	1.5	0.29	1.0
2020	0.3	0.8	0.0	0.84	0.3	2020	6.9	10.6	3.3	0.31	2.1
2021	0.0	NA	NA	NA	0.0	2021	16.3	37.4	0.0	0.69	11.3
2022	0.3	0.5	0.04	0.46	0.1	2022	16.2	28.6	3.8	0.45	7.2
2023	0.0	NA	NA	NA	NA	2023	0.1	0.3	0.0	0.76	0.1

Table 3. Stratified mean catch–per-tow of horseshoe crabs in the **lower Delaware Bay** survey area in 2010-2023, with the mean, standard deviation (sd), and coefficient of variation (CV), calculated using the **delta distribution** model, by demographic group. Also included are the estimated upper and lower 95% confidence limits (UCL, LCL).

YEAR	MEAN	UCL	LCL	CV	SD	YEAR	MEAN	UCL	LCL	CV	SD
Immature Females						Immature Males					
2010	79.7	122.2	37.3	0.21	16.5	2010	61.2	105.5	16.9	0.30	18.1
2011	19.7	45.2	0.0	0.47	9.2	2011	20.2	50.7	0.0	0.55	11.0
2012	164.3	311.8	16.9	0.32	53.1	2012	192.6	548.4	0.0	0.43	82.7
2016	196	335.5	56.6	0.29	57.0	2016	184.2	322.9	45.5	0.32	58.7
2017	96.7	210.0	0.0	0.46	44.1	2017	62.9	137.6	0.0	0.46	29.0
2018	47.2	56.2	38.1	0.08	3.8	2018	55.1	71.8	38.4	0.12	6.8
2019	9.5	24.3	0.0	0.60	5.7	2019	5.7	15.8	0.0	0.70	4.0
2020	0.3	0.8	0.0	0.97	0.3	2020	0.2	0.6	0	0.97	0.2
2021	3.1	NA	NA	0.99	3.1	2021	3.3	NA	NA	0.78	2.6
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2023	NA	NA	NA	NA	NA
Mature Females						Mature Males					
2010	48.8	98.9	0.0	0.4	19.5	2010	130.3	242.6	18.1	0.34	43.7
2011	30.3	60.4	0.2	0.36	10.8	2011	110.2	249	0.0	0.45	50.0
2012	19.1	51.6	0.0	0.4	7.6	2012	66.8	141.1	0.0	0.35	23.3
2016	26.3	33.9	18.7	0.12	3.2	2016	161.7	192.5	131.0	0.08	13.3
2017	80.6	167.1	0.0	0.39	31.1	2017	362.7	868.5	0.0	0.50	182.2
2018	36.2	46.6	25.8	0.12	4.3	2018	94.3	117.9	70.7	0.11	10.0
2019	20.8	54.7	0.0	0.63	13.2	2019	100.4	254	0.0	0.59	59.7
2020	0.2	0.5	0.0	0.97	0.2	2020	4.1	8.8	0.0	0.67	2.7
2021	1.6	NA	NA	0.99	1.5	2021	8.7	NA	NA	0.72	6.3
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2023	NA	NA	NA	NA	NA
Newly Mature Females						Newly Mature Males					
2010	9.7	25.8	0.0	0.64	6.2	2010	4.4	9.5	0.0	0.46	2.0
2011	1.4	3.8	0.0	0.58	0.8	2011	1.4	4.9	0.0	0.94	1.3
2012	1.0	4.4	0.0	0.76	0.8	2012	6.1	14.2	0.0	0.48	2.9
2016	4.6	8.0	1.1	0.31	1.4	2016	16.2	29.0	3.5	0.3	5.0
2017	2.1	5.9	0.0	0.65	1.4	2017	12.4	27.6	0.0	0.44	5.4
2018	2.3	4.4	0.2	0.35	0.8	2018	3.6	7.6	0.0	0.44	1.6
2019	0	0	0	NA	0	2019	8.0	22.3	0.0	0.7	5.6
2020	0	0	0	NA	0	2020	0.1	0.3	0.0	0.97	0.1
2021	0	NA	NA	NA	0	2021	0.0	NA	NA	NA	0.0
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2023	NA	NA	NA	NA	NA

Table 4. Stratified mean catch-per-tow of horseshoe crabs in **the lower Delaware Bay** survey area in 2010-2023, with the mean, standard deviation (sd), and coefficient of variation (CV), calculated using the **normal distribution** model by demographic group. Also included are the estimated upper and lower 95% confidence limits (UCL, LCL).

YEAR	MEAN	UCL	LCL	CV	SD	YEAR	MEAN	UCL	LCL	CV	SD
Immature Females						Immature Males					
2010	79.5	116.5	42.6	0.19	15.1	2010	60.4	95.7	25.1	0.25	15.3
2011	21.3	54.2	0.0	0.55	11.8	2011	21.5	57.2	0.0	0.60	12.9
2012	165.5	287.6	43.4	0.30	49.9	2012	183.9	360.1	7.8	0.34	63.4
2016	186.5	284.7	88.3	0.22	40.1	2016	167.9	249.7	86.0	0.21	34.6
2017	90.8	176.0	5.6	0.37	33.2	2017	58.2	109	7.5	0.36	20.7
2018	47.1	55.6	38.6	0.08	3.6	2018	54.9	69.6	40.2	0.11	6.2
2019	16.0	30.4	1.5	0.35	5.6	2019	10.7	21.7	0.0	0.40	4.3
2020	0.3	0.8	0.0	0.97	0.3	2020	0.2	0.6	0.0	0.97	0.2
2021	3.1	NA	NA	NA	NA	2021	3.3	NA	NA	NA	NA
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2023	NA	NA	NA	NA	NA
Mature Females						Mature Males					
2010	49.1	99.8	0.0	0.40	19.7	2010	128.0	227.9	28.2	0.3	38.9
2011	28.6	49.9	7.4	0.27	7.7	2011	100.3	187.7	13.0	0.31	31.5
2012	18.7	46.2	0.0	0.34	6.4	2012	65.3	111.7	18.8	0.28	18.1
2016	26.2	33.4	19.0	0.11	3.0	2016	161.8	192.4	131.1	0.08	13.3
2017	80.5	165	0.0	0.38	30.4	2017	303.4	531.7	75.2	0.27	82.2
2018	36.2	47.2	25.1	0.12	4.3	2018	94.7	120.3	69.0	0.11	10.8
2019	29.3	54.8	3.8	0.34	9.9	2019	49.9	90	9.9	0.31	15.6
2020	0.2	0.5	0.0	0.97	0.2	2020	4.1	8.8	0.0	0.67	2.7
2021	1.6	NA	NA	NA	NA	2021	8.7	NA	NA	NA	NA
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2023	NA	NA	NA	NA	NA
Newly Mature Females						Newly Mature Males					
2010	9.6	24.9	0.0	0.62	5.9	2010	4.3	9.1	0.0	0.43	1.9
2011	1.4	3.8	0.0	0.58	0.8	2011	1.4	4.9	0.0	0.94	1.3
2012	1.0	4.4	0.0	0.76	0.8	2012	6.1	14.1	0.0	0.47	2.9
2016	4.5	8.0	1.1	0.3	1.3	2016	16	27.2	4.9	0.27	4.3
2017	2.1	5.9	0.0	0.65	1.4	2017	12.4	25.7	0.0	0.42	5.2
2018	2.3	4.3	0.3	0.34	0.8	2018	3.6	7.6	0.0	0.44	1.6
2019	0.0	0.0	0.0	NA	0.0	2019	8.5	22.9	0.0	0.66	5.6
2020	0.0	0.0	0.0	NA	0.0	2020	0.1	0.3	0.0	0.97	0.1
2021	0.0	NA	NA	NA	0.0	2021	0.0	NA	NA	NA	0.0
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2023	NA	NA	NA	NA	NA

Table 5. Results of correlation analyses of mean prosomal width (mm) and survey year for mature and newly mature males and females from the Delaware Bay area and lower Delaware Bay surveys. Statistics presented are number of years included: *n*; *T-score*; probability, *p*; and correlation coefficient, *r*. A negative correlation coefficient indicates a decreasing regression slope.

Maturity Group	**n**	**T**	**p**	**r**
Delaware Bay Area 2002 - 2023				**p**
Mature females	19	-15.40	<0.001	-0.966
Newly mature females	19	-5.21	0.001	-0.793
Mature males	19	-11.74	<0.001	-0.943
Newly mature males	19	-5.63	<0.001	-0. 807
Lower Delaware Bay 2010 - 2021				
Mature females	9	-6.78	<0.001	-0.932
Newly mature females	9	-3.98	0.016	-0.894
Mature males	9	-6.32	<0.001	-0.922
Newly mature males	9	2.28	0.063	0.681

Table 6. Estimated population (in thousands) of horseshoe crabs in the coastal **Delaware Bay area** survey, 2002-2023, with the mean, standard deviation (sd), and coefficient of variation (CV), calculated using the **delta distribution model** by demographic group. Also included are the estimated upper and lower 95% confidence limits (UCL, LCL).

YEAR	MEAN	UCL	LCL	CV	SD	YEAR	MEAN	UCL	LCL	CV	SD
Immature Females						Immature Males					
2002	9470	15665	3275	0.31	2936	2002	5483	9284	1683	0.33	1809
2003	4585	8848	321	0.43	1972	2003	2303	4217	390	0.39	898
2004	7774	11770	3778	0.25	1944	2004	6810	10895	2725	0.29	1975
2005	5630	8856	2404	0.28	1576	2005	5260	8839	1681	0.33	1736
2006	12928	18691	7164	0.21	2715	2006	9327	14554	4100	0.24	2238
2007	13684	27486	0	0.41	5610	2007	8966	18246	0	0.42	3766
2008	10933	18650	3216	0.32	3499	2008	7841	13917	1766	0.35	2744
2009	39032	72868	5197	0.39	15222	2009	29864	47269	12460	0.28	8362
2010	3954	5220	2688	0.16	633	2010	2686	4144	1229	0.26	698
2011	4965	6945	2985	0.2	993	2011	3092	4547	1637	0.23	711
2016	11699	20462	2935	0.36	4212	2016	9102	16649	1555	0.39	3550
2017	7505	10708	4302	0.19	1426	2017	5091	8465	1717	0.27	1375
2018	10173	14285	6061	0.19	1933	2018	7507	11173	3842	0.23	1727
2019	3397	5516	1279	0.31	1053	2019	1487	2614	360	0.38	565
2020	9475	19779	0	0.65	6159	2020	5925	11967	0	0.61	3614
2021	4174	7947	400	0.53	2218	2021	2574	4634	513	0.47	1199
2022	9930	15493	4366	0.33	3282	2022	7652	12192	3112	0.35	2686
2023	8228	14206	2250	0.39	3238	2023	5313	8835	1792	0.36	1910
Mature Females						Mature Males					
2002	4959	8084	1834	0.3	1488	2002	11584	17335	5834	0.24	2780
2003	3379	5160	1599	0.25	845	2003	8069	13029	3110	0.29	2340
2004	2735	4043	1426	0.23	629	2004	5150	7788	2511	0.25	1288
2005	3138	4942	1333	0.27	847	2005	5844	8461	3228	0.22	1286
2006	6611	14330	0	0.42	2777	2006	15825	26060	5589	0.27	4273
2007	7746	12704	2789	0.31	2401	2007	15795	25104	6487	0.28	4423
2008	6311	10202	2419	0.29	1830	2008	14647	24995	4299	0.33	4834
2009	2975	4971	979	0.32	952	2009	6240	10197	2283	0.3	1872
2010	5178	7616	2740	0.23	1191	2010	13963	21910	6015	0.28	3910
2011	5290	7282	3297	0.18	952	2011	15060	29000	1120	0.4	6024
2016	6024	8635	3413	0.21	1265	2016	21941	37216	6665	0.29	6363
2017	7185	10525	3844	0.23	1653	2017	20664	31208	10119	0.25	5166
2018	7326	10520	4131	0.21	1538	2018	15749	21880	9619	0.18	2835
2019	5110	8454	1767	0.32	1635	2019	8924	15202	2646	0.35	3108
2020	10803	15359	6247	0.25	2706	2020	31546	51050	12042	0.36	11583
2021	15498	35873	0	0.75	11,568	2021	38538	85949	0	0.7	26925
2022	11421	17179	5662	0.30	3380	2022	19921	31447	8395	0.34	6806
2023	59866	138341	0	0.71	42480	2023	245346	716731	0	1.03	253925
Newly Mature Females						Newly Mature Males					
2002	1537	2400	675	0.26	400	2002	548	869	227	0.28	153
2003	794	1633	0	0.49	389	2003	78	221	0	0.84	66
2004	358	575	141	0.29	104	2004	789	1127	451	0.21	166
2005	479	753	206	0.27	129	2005	597	1002	191	0.33	197
2006	2051	3509	594	0.31	636	2006	3113	5113	1113	0.31	965
2007	2373	4339	408	0.4	949	2007	3129	4972	1287	0.28	876
2008	2571	4984	158	0.43	1106	2008	757	1254	261	0.31	235
2009	885	1361	410	0.26	230	2009	725	1240	210	0.34	247
2010	1338	2990	0	0.59	789	2010	1422	3070	0	0.55	782
2011	845	1360	331	0.3	254	2011	749	1335	164	0.36	270
2016	1608	2357	860	0.23	370	2016	2608	4884	331	0.42	1095
2017	1480	2274	687	0.26	385	2017	1523	2392	654	0.28	426
2018	1773	2923	622	0.31	550	2018	3341	5367	1316	0.29	969
2019	242	472	12	0.47	114	2019	1271	2154	389	0.34	437
2020	133	330	0	0.87	117	2020	2492	4030	953	0.37	914
2021	0	NA	NA	NA	NA	2021	6333	14328	0	0.68	4309
2022	115	207	23	0.46	53	2022	5487	10293	681	0.52	2,835
2023	0	NA	NA	NA	NA	2023	55	131	0	0.77	42

Table 7. Estimated population (in thousands) of horseshoe crabs in the coastal **Delaware Bay area** survey, 2002-2023, with the mean, standard deviation (sd), and coefficient of variation (CV), calculated using the **normal distribution** model by demographic group. Also included are the estimated upper and lower 95% confidence limits (UCL, LCL).

YEAR	MEAN	UCL	LCL	CV	SD	YEAR	MEAN	UCL	LCL	CV	SD
Immature Females						Immature Males					
2002	8222	11875	4568	0.21	1727	2002	5076	7998	2155	0.28	1421
2003	4089	6860	1317	0.32	1308	2003	2114	3462	766	0.3	634
2004	7376	10616	4135	0.21	1549	2004	6033	8786	3281	0.22	1327
2005	5104	7521	2687	0.23	1174	2005	4673	7414	1932	0.28	1308
2006	13714	20988	6439	0.25	3429	2006	9378	13971	4786	0.23	2157
2007	13692	27335	48	0.41	5614	2007	9350	19735	0	0.45	4208
2008	10595	16578	4612	0.26	2755	2008	6897	10443	3350	0.23	1586
2009	27375	40519	14232	0.23	6296	2009	26435	38730	14140	0.23	6080
2010	4102	5706	2497	0.19	779	2010	2781	4423	1139	0.29	806
2011	5426	8433	2420	0.27	1465	2011	3301	5219	1382	0.28	924
2016	11292	18441	4144	0.3	3388	2016	8185	13512	2858	0.31	2537
2017	7948	11818	4077	0.23	1828	2017	5082	7829	2335	0.26	1321
2018	10115	13839	6391	0.18	1821	2018	7768	11653	3882	0.24	1864
2019	14855	15027	14682	0.33	4902	2019	66	236	0	1.27	84
2020	6832	10559	3106	0.32	2213	2020	4610	7540	1679	0.38	1740
2021	4053	7670	436	0.51	2064	2021	2548	4389	707	0.42	1074
2022	8328	11016	5639	0.19	1580	2022	6359	8461	4257	0.20	1243
2023	7702	12775	2629	0.36	2770	2023	4510	6819	2202	0.29	1296
Mature Females						Mature Males					
2002	4779	7431	2128	0.26	1243	2002	10711	14972	6450	0.19	2035
2003	3308	4851	1764	0.22	728	2003	7454	10827	4082	0.21	1565
2004	2767	3919	1615	0.20	553	2004	5586	8875	2297	0.28	1564
2005	2957	4323	1592	0.22	651	2005	5408	7322	3494	0.17	919
2006	5867	10517	1218	0.31	1819	2006	14461	21734	7188	0.23	3326
2007	6553	9864	3243	0.25	1638	2007	13100	18506	7694	0.20	2620
2008	7172	13336	1008	0.4	2869	2008	14244	23240	5247	0.30	4273
2009	3230	5523	936	0.33	1066	2009	6319	10255	2383	0.29	1833
2010	5588	8698	2478	0.26	1453	2010	14396	22600	6192	0.27	3887
2011	5388	7629	3147	0.20	1078	2011	14858	25890	3825	0.33	4903
2016	5735	7770	3700	0.17	975	2016	24017	40197	7837	0.30	7205
2017	7785	12033	3537	0.27	2102	2017	19985	29245	10724	0.23	4597
2018	9463	18463	464	0.44	4164	2018	15264	19849	10680	0.15	2290
2019	6420	6506	6334	0.32	2054	2019	11660	11824	11497	0.37	4314
2020	10927	16014	5840	0.28	3021	2020	25200	34983	15416	0.23	5810
2021	21766	40665	2867	0.49	10750	2021	61879	109880	13877	0.45	27576
2022	9839	12836	6842	0.18	1770	2022	19032	25588	12475	0.20	3859
2023	69076	167547	29396	0.77	52,990	2023	148824	362850	0	0.77	115167
Newly Mature Females						Newly Mature Males					
2002	1509	2278	741	0.24	362	2002	561	925	196	0.31	174
2003	787	1547	26	0.45	354	2003	78	222	0	0.84	66
2004	367	613	120	0.32	117	2004	786	1120	452	0.20	157
2005	531	908	154	0.34	181	2005	580	927	233	0.29	168
2006	2122	3705	540	0.33	700	2006	3377	6076	678	0.38	1283
2007	2129	3584	674	0.33	703	2007	2841	4214	1468	0.23	653
2008	2697	4780	613	0.36	971	2008	776	1315	237	0.33	256
2009	883	1366	399	0.26	230	2009	708	1157	259	0.31	219
2010	1770	4532	0	0.74	1310	2010	1464	3180	0	0.56	820
2011	882	1495	269	0.34	300	2011	766	1343	190	0.36	276
2016	1583	2304	863	0.22	348	2016	2939	5588	290	0.43	1264
2017	0.00	NA	NA	NA	NA	2017	1590	2623	557	0.32	509
2018	1780	2866	695	0.29	516	2018	3064	4466	1663	0.22	674
2019	77	225	0	0.94	73	2019	112	267	0	0.68	77
2020	134	330	0	0.87	117	2020	2430	3676	1184	0.30	740
2021	0	NA	NA	NA	NA	2021	6308	14299	0	0.68	4307
2022	115	212	18	0.46	53	2022	6,370	11143	1597	0.44	2795
2023	0	NA	NA	NA	NA	2023	55	131	0	0.77	42

Table 8. Estimated population (in thousands) of horseshoe crabs in the **lower Delaware Bay** survey area in 2010-2023, with the mean, standard deviation (sd), and coefficient of variation (CV), calculated using the **delta distribution** model by demographic group. Also included are the estimated upper and lower 95% confidence limits (UCL, LCL).

YEAR	MEAN	UCL	LCL	CV	SD	YEAR	MEAN	UCL	LCL	CV	SD
Immature Females						Immature Males					
2010	3510	5199	1822	0.2	702	2010	2632	4476	788	0.29	763
2011	870	1931	0	0.44	383	2011	881	2160	0	0.52	458
2012	8021	15084	958	0.32	2567	2012	9381	21965	0	0.42	3940
2016	9046	15558	2534	0.29	2623	2016	8429	14813	2044	0.32	2697
2017	4536	10029	0	0.47	2132	2017	2920	6458	0	0.47	1372
2018	2211	2803	1619	0.1	221	2018	2597	3516	1678	0.15	390
2019	525	1278	0	0.56	294	2019	308	816	0	0.64	197
2020	12	33	0	0.97	12	2020	8	22	0	0.97	8
2021	130	NA	NA	0.99	129	2021	140	NA	NA	0.78	109
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
Mature Females						Mature Males					
2010	2117	4260	0	0.39	826	2010	5657	10247	1067	0.32	1810
2011	1348	2599	96	0.33	445	2011	4829	10570	0	0.43	2076
2012	938	2522	0	0.39	366	2012	3263	6864	0	0.35	1142
2016	1274	1710	837	0.15	191	2016	7735	9709	5761	0.1	774
2017	3674	7501	0	0.38	1396	2017	16794	40517	0	0.51	8565
2018	1771	2588	953	0.18	319	2018	4616	6600	2631	0.18	831
2019	1148	3011	0	0.63	723	2019	5746	14583	0	0.6	3448
2020	7	19	0	0.97	7	2020	152	332	0	0.68	103
2021	65	NA	NA	0.99	64	2021	365	NA	NA	0.72	262
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
Newly Mature Females						Newly Mature Males					
2010	414	1087	0	0.63	261	2010	187	409	0	0.46	86
2011	65	170	0	0.58	38	2011	58	208	0	0.94	55
2012	50	214	0	0.76	38	2012	301	710	0	0.49	147
2016	206	357	55	0.3	62	2016	727	1268	186	0.29	211
2017	88	249	0	0.66	58	2017	542	1100	0	0.40	217
2018	115	220	9	0.36	41	2018	148	290	7	0.40	59
2019	0	0	0	NA	0	2019	361	1022	0	0.71	257
2020	0	0	0	NA	0	2020	4	11	0	0.97	4
2021	0	NA	NA	NA	NA	2021	0	NA	NA	NA	NA
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA

Table 9. Estimated population (in thousands) of horseshoe crabs in the **lower Delaware Bay** survey area in 2010-2023, with the mean, standard deviation (sd), and coefficient of variation (CV), calculated using the **normal distribution** model by demographic group. Also included are the estimated upper and lower 95% confidence limits (UCL, LCL).

YEAR	MEAN	UCL	LCL	CV	SD	YEAR	MEAN	UCL	LCL	CV	SD
Immature Females						Immature Males					
2010	3503	5155	1851	0.18	631	2010	2588	4056	1120	0.24	621
2011	938	2311	0	0.53	497	2011	935	2437	0	0.58	542
2012	8125	14222	2027	0.31	2519	2012	9023	17690	356	0.35	3158
2016	8618	13190	4046	0.22	1896	2016	7725	11638	3812	0.21	1622
2017	4325	8829	0	0.41	1773	2017	2731	5408	53	0.38	1038
2018	2209	2780	1638	0.10	221	2018	2595	3529	1661	0.15	389
2019	852	868	836	0.01	9	2019	566	566	566	0.00	0
2020	12	33	0	0.97	12	2020	8	22	0	0.97	8
2021	130	NA	NA	0	0	2021	140	NA	NA	0.00	0
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2023	NA	NA	NA	NA	NA
Mature Females						Mature Males					
2010	2124	4340	0	0.41	871	2010	5600	9916	1285	0.30	1680
2011	1290	2239	340	0.27	348	2011	4479	8332	625	0.31	1388
2012	915	2242	0	0.34	311	2012	3188	5456	921	0.28	893
2016	1264	1647	880	0.13	164	2016	7727	9570	5883	0.10	773
2017	3654	7307	2	0.36	1315	2017	13805	23702	3908	0.26	3589
2018	1782	2666	898	0.19	339	2018	4647	6901	2393	0.19	883
2019	1932	1948	1916	0	0	2019	8356	8356	8356	0.00	0
2020	7	19	0	0.97	7	2020	152	332	0	0.68	103
2021	65	NA	NA	0	0	2021	365	NA	NA	0.00	0
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2023	NA	NA	NA	NA	NA
Newly Mature Females						Newly Mature Males					
2010	418	1097	0	0.63	263	2010	185	391	0	0.43	80
2011	65	170	0	0.58	38	2011	58	208	0	0.94	55
2012	50	214	0	0.76	38	2012	302	719	0	0.50	151
2016	205	355	55	0.28	57	2016	716	1176	256	0.25	179
2017	88	249	0	0.66	58	2017	541	1090	0	0.40	216
2018	114	226	3	0.35	40	2018	149	296	1	0.41	61
2019	0	0	0	NA	0	2019	401	408	394	0.00	3
2020	0	0	0	NA	0	2020	4	11	0	0.97	4
2021	0	NA	NA	NA	NA	2021	0	NA	NA	NA	NA
2022	NA	NA	NA	NA	NA	2022	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	2023	NA	NA	NA	NA	NA

Table 10. Mean, minimum (min), and maximum (max) bottom water temperature (C°) and ordinal sampling date (numerical calendar date from 1 January) for survey collections in the Delaware Bay area and Lower Delaware Bay. For reference, 1 September is ordinal date 243 in non-leap years.

	Water Temperature			Ordinal Date		
	mean	max	min	mean	max	min
Delaware Bay Area						
2002	19.33	15	23.5	277.41	273	300
2003	17.41	13.5	20	286.60	278	296
2004	16.67	14.5	20.5	292.74	277	302
2005	20.94	14	24.5	261.23	250	306
2006	17.53	13	22.3	284.53	246	314
2007	19.69	14.3	23.3	294.96	282	311
2008	20.09	19.3	22.6	277.02	272	287
2009	15.54	14.3	17	315.24	307	324
2010	19.72	12.3	24.1	282.68	265	331
2011	21.60	18.6	23.8	265.44	254	296
2012	18.47	18.1	18.8	292.92	289	298
2016	22.82	18.6	24.8	274.02	260	299
2017	21.89	18.8	23.2	274.05	263	294
2018	22.48	13.9	24.8	276.41	253	315
2019	23.05	18.8	24.3	250.38	242	270
2020	21.79	17	25	231.15	219	252
2021	23.25	18.8	28	233.44	222	250
2022	21.18	16.7	25.6	265.42	245	285
2023	22.54	18.3	26.7	270.02	248	302
Lower Delaware Bay						
2010	17.18	16.7	17.7	295.36	295	296
2011	18.32	18	18.6	294.27	294	295
2012	17.96	17.9	18	299.00	299	299
2016	19.56	19	20.1	288.40	288	289
2017	19.35	19.2	19.5	292.30	292	293
2018	12.16	11.3	12.8	321.44	321	322
2019	17.50	17.2	17.8	292.00	292	292
2020	24.00	23.2	25.4	248.00	248	248
2021	20.50	19	22	268.00	268	268
2022	NA	NA	NA	NA	NA	NA
2023	NA	NA	NA	NA	NA	NA

Table 11. Correlations between annual mean catches-per-tow of horseshoe crabs with mean bottom water temperature and ordinal sampling date in the Delaware Bay area survey and the lower Delaware Bay survey, by demographic group. The Delaware Bay area surveys included 15 years, and the lower Delaware Bay surveys included 8 years. Statistics presented include correlation coefficient, *r*; *T-score*; and probability, *p*. Data are from Tables 1, 3, and 10.

	Water Temperature			**Ordinal Date**		
Delaware Bay Area 2002 - 2023	***r***	***T***	***p***	***r***	***T***	***p***
Immature females	-0.540	-2.56	0.021	0.563	2.72	0.015
Immature males	-0.547	-2.61	0.018	0.577	2.83	0.012
Mature females	0.479	2.18	0.044	-0.397	-1.73	0.103
Mature males	0.397	1.73	0.103	-0.265	-1.10	0.288
Newly mature females	-0.222	0.91	0.377	0.498	2.29	0.036
Newly mature males	0.370	1.59	0.130	-0.451	-2.02	0.060
Lower Delaware Bay 2010 - 2021						
Immature females	-0.116	-0.31	0.767	0.346	0.98	0.362
Immature males	-0.154	-0.41	0.692	0.36	1.02	0.341
Mature females	-0.371	-1.06	0.325	0.537	1.69	0.136
Mature males	-0.153	-0.41	0.694	0.37	1.05	0.327
Newly mature females	-0.273	-0.75	0.477	0.318	0.89	0.405
Newly mature males	-0.086	-0.23	0.826	0.303	0.84	0.428

Appendix:

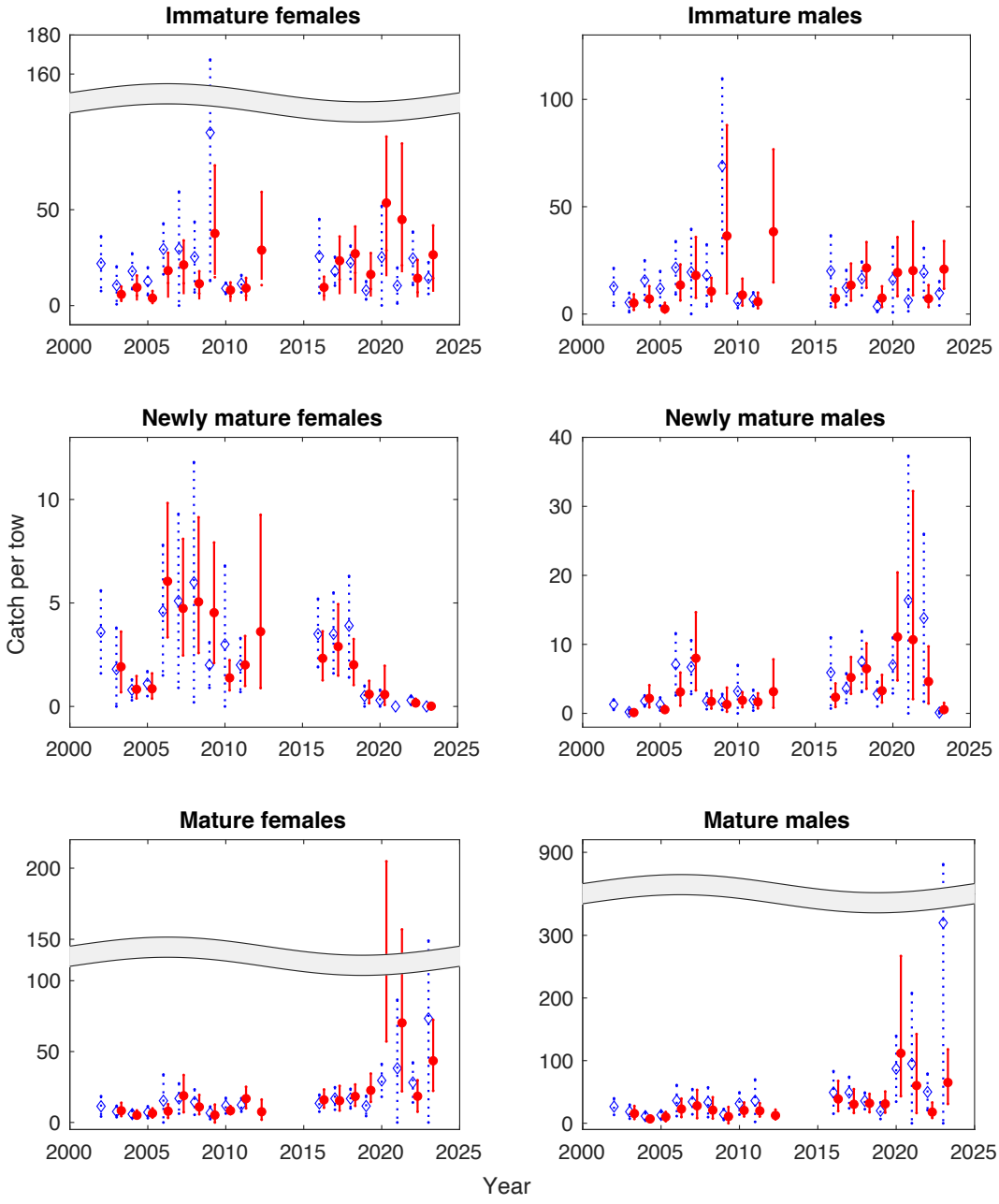

Figure S1. Plots of stratified mean catches per 15-minute tow of horseshoe crabs in the coastal **Delaware Bay area** survey by demographic group, compared with the standardized CPUE from a delta-lognormal model. Vertical lines indicate 95% confidence intervals. Open blue symbols and lines indicate the **delta distribution** model. Solid red symbols and dashed lines indicate results from the **hurdle model with delta-lognormal distribution**.

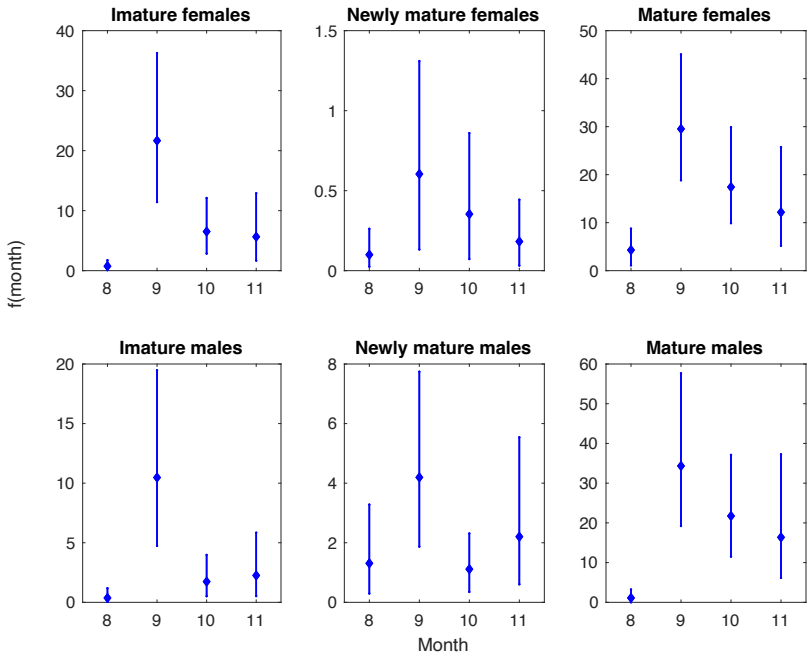

Figure S2: Effect of month on the relative abundance of horseshoe crab from the hurdle model with delta-lognormal distribution.

Table S1: Standardized CPUE (mean catches per 15-minute tow) of horseshoe crabs in the coastal Delaware Bay area from the model-based approach, i.e., hurdle models with delta-lognormal distribution.

	FI				FN				FM			
Year	**Mean**	**Median**	**LCL**	**UCL**	**Mean**	**Median**	**LCL**	**UCL**	**Mean**	**Median**	**LCL**	**UCL**
2003	5.82	5.60	2.82	9.90	1.92	1.83	0.69	3.61	8.30	8.04	4.45	13.87
2004	9.48	9.18	5.25	15.69	0.83	0.80	0.39	1.47	5.08	4.81	2.80	8.50
2005	3.90	3.70	1.34	7.63	0.85	0.81	0.38	1.60	6.46	6.33	3.46	9.95
2006	18.24	17.61	11.77	27.54	6.05	5.90	3.34	9.83	7.96	7.84	3.19	12.87
2007	21.24	20.33	11.64	33.98	4.74	4.53	2.47	8.09	18.87	17.71	7.18	33.46
2008	11.42	11.12	6.32	17.91	5.05	4.84	2.58	9.14	10.96	10.52	5.77	19.42
2009	37.61	34.21	14.83	73.15	4.53	4.28	2.10	7.92	5.19	4.85	0.00	12.58
2010	8.07	7.95	4.76	12.07	1.38	1.32	0.78	2.24	8.34	8.22	5.84	11.54
2011	9.12	8.85	5.12	14.43	2.00	1.93	0.99	3.40	16.80	16.56	9.99	25.13
2012	28.92	26.64	10.68	59.25	3.61	3.29	0.89	9.26	7.56	7.18	1.93	16.15
2016	9.52	9.32	5.20	15.07	2.32	2.24	1.26	3.63	15.94	15.51	10.37	23.28
2017	23.38	22.73	13.64	36.02	2.90	2.88	1.49	4.94	15.37	14.99	8.36	25.77
2018	27.06	26.06	17.07	41.23	2.01	1.96	1.03	3.26	18.36	18.07	11.70	26.79
2019	16.26	15.89	8.61	27.38	0.59	0.54	0.15	1.24	22.66	22.14	14.54	34.46
2020	53.53	51.98	28.81	88.12	0.58	0.44	0.07	1.96	111.36	104.77	57.16	204.82
2021	44.86	42.02	21.00	84.50					70.27	62.86	21.99	156.92
2022	14.25	13.92	6.96	23.84	0.17	0.15	0.04	0.37	18.49	18.34	7.55	29.79
2023	26.55	25.94	14.29	41.80	0.01	0.01	0.00	0.04	43.52	42.49	22.29	72.45
	MI				**MN**				**MM**			
Year	**Mean**	**Median**	**LCL**	**UCL**	**Mean**	**Median**	**LCL**	**UCL**	**Mean**	**Median**	**LCL**	**UCL**
2003	5.14	4.92	1.90	9.19	0.11	0.09	0.01	0.29	15.52	15.11	6.78	27.56
2004	7.04	6.64	3.25	13.00	2.17	2.06	0.86	4.08	7.01	6.75	3.35	11.96
2005	2.42	2.25	0.69	5.24	0.54	0.49	0.17	1.09	10.13	9.85	3.24	18.02
2006	13.50	12.83	6.34	23.10	3.10	2.93	1.12	5.91	22.74	22.59	9.86	39.34
2007	18.00	16.90	7.55	35.86	7.98	7.54	3.34	14.65	27.92	27.25	8.08	53.26
2008	10.56	10.21	5.96	16.87	1.73	1.63	0.69	3.32	20.99	19.92	7.58	41.57
2009	36.38	31.13	9.60	88.01	1.29	1.02	0.24	3.73	10.67	10.26	0.00	25.97
2010	8.90	8.38	3.95	16.48	1.88	1.84	0.89	3.06	20.47	19.97	10.87	33.16
2011	5.75	5.56	2.67	9.98	1.66	1.57	0.71	2.91	19.82	19.15	10.75	32.08
2012	38.34	35.59	14.78	76.72	3.15	2.66	0.82	7.82	12.57	12.20	6.27	21.71
2016	7.31	7.09	3.14	11.85	2.34	2.23	0.92	4.34	38.74	36.22	19.39	67.57
2017	13.43	12.85	6.21	23.52	5.20	5.18	2.83	8.17	30.33	28.91	16.44	54.44
2018	21.46	20.69	12.22	33.52	6.47	6.35	3.56	10.16	31.90	31.83	17.65	46.93
2019	7.44	7.22	3.29	12.92	3.29	3.17	1.57	5.57	30.89	30.00	16.87	50.73
2020	19.38	18.28	8.29	35.83	11.08	10.74	4.77	20.42	111.69	99.11	43.22	266.93
2021	20.24	18.63	8.75	43.06	10.68	8.77	2.07	32.21	60.23	52.01	16.36	142.35
2022	7.16	6.75	3.21	13.49	4.61	4.17	1.42	9.70	17.85	16.88	8.51	33.12
2023	20.94	20.25	11.84	33.98	0.54	0.48	0.09	1.52	65.11	62.58	30.80	117.85

Red Knot Stopover Population Size and Migration Ecology at Delaware Bay, USA, 2024

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Abstract

Red Knots (*Calidris canutus rufa*) stop at Delaware Bay on the mid-Atlantic coast of North America during northward migration to feed on eggs of horseshoe crabs (*Limulus polyphemus*). Horseshoe crabs have been harvested for use as bait in eel (*Anguilla rostrata*) and whelk (*Busycon* sp.) fisheries since at least 1990. In the late 1990s and early 2000s, the number of Red Knots counted during aerial surveys at Delaware Bay declined, leading to conservation concern for Red Knots and shorebirds at Delaware Bay. In 2013, the Atlantic States Marine Fisheries Commission began using an Adaptive Resource Management (ARM) framework to manage the harvest of horseshoe crabs in the Delaware Bay region. The objective of the ARM framework is to manage sustainable harvest of Delaware Bay horseshoe crabs while maintaining ecosystem integrity and supporting Red Knot recovery with adequate stopover habitat. The ARM framework thus requires annual estimates of horseshoe crab population size and Red Knot stopover population size to recommend annual harvest quotas. We estimated the passage population of Red Knots at Delaware Bay in 2024 using a mark-recapture-resight investigation. We used a Bayesian analysis of a Jolly-Seber model, which accounts for turnover in the population and the probability of detection during surveys. The 2024 passage population size estimate was 46,127 (95% credible interval: 39,286–57,799), an increase from 2023 (39,361 [33,724–47,556]). Since 2019, the stopver population has fluctuated between approximately 39,000 and 46,000, and appears stable given the broad overlap in the confidence intervals of the annual population estimates. The 2024 Red Knot stopover population size estimate will inform decision making in the next horseshoe crab management cycle of the Atlantic States Marine Fisheries Commission.

1 Introduction

The northward migration of Red Knots (*Calidris canutus rufa*) in the mid-Atlantic region coincides with the onset of spawning of horseshoe crabs (*Limulus polyphemus*). Red Knots stop at Delaware Bay to feed on horseshoe crabs eggs, which are an important food resource for Red Knots and other shorebirds because they have a high energy content and are easily digestible (Karpanty et al. 2006, Haramis et al. 2007).

Horseshoe crabs have been harvested since at least 1990 for use as bait in American eel (*Anguilla rostrata*) and whelk (*Busycon* sp.) fisheries (Kreamer and Michels 2009). In the 1990s and early 2000s the estimated number of Red Knots counted at Delaware Bay during aerial surveys declined from ~50,000 to ~13,000 (Niles et al. 2008). The number of horseshoe crabs harvested began to increase around 1990, peaked in the late 1990s, and then declined in the early 2000s. Avian conservation biologists hypothesized that unregulated harvest of horseshoe crabs from Delaware Bay in the 1990s prevented sufficient refueling during stopover for successful migration to the breeding grounds, nesting, and survival for the remainder of the annual cycle (Baker et al. 2004, McGowan et al. 2011).

The Atlantic States Marine Fisheries Commission (ASMFC) has managed the horseshoe crabs in the Delaware Bay region since 1998 and in 2012 adopted an Adaptive Resource Management (ARM) framework, which explicitly incorporates shorebird objectives in horseshoe crab (hereafter "crab" or "crabs") harvest regulation (McGowan et al. 2015b). The ARM framework was designed to constrain the harvest so that the number of spawning crabs would not limit the number of Red Knots stopping at Delaware Bay during migration. To achieve multiple objectives simultaneously, the ARM framework requires an estimate each year of both the crab population and the Red Knot stopover population size to inform harvest recommendations (McGowan et al. 2015a). Therefore, we estimated the stopover population size in 2024, as we have each year since 2011, using mark-resight data on individually-marked birds and a Jolly-Seber model for open populations.

2 Methods

Red Knots have been individually marked at Delaware Bay and other locations in the Western Hemisphere (e.g., Argentina, Brazil, Canada, Chile) with engraved leg flags since 2003. Each leg flag is engraved with a unique, field-readable 3-character alphanumeric code (Clark et al. 2005). Mark-resight data (i.e., sight records of individually-marked birds and counts of marked and unmarked birds) were collected on the Delaware and New Jersey shores of Delaware Bay in 2024 according to the methods for mark-resight investigations of Red Knots at Delaware Bay (Lyons 2016). This protocol has been used at Delaware Bay since 2011.

Surveys to locate leg-flagged birds were conducted on 20 beaches (Appendix 1) in 2024 according to the sampling plan, i.e., every three days in May and early June (Table 1). During these resighting surveys, agency staff and volunteers surveyed the beach and recorded the field- readable alphanumeric combinations detected on leg-flagged birds.

As in previous years (Lyons 2023), all flag resightings were validated with physical capture and banding data available in the data repository at http://www.bandedbirds.org/. Resightings without a corresponding record of physical capture and banding (i.e., "misread" errors) were discarded and not included in the analysis. However, banding data from Argentina are not available for validation purposes in bandedbirds.org; therefore, all resightings of orange engraved flags were included in the analysis without validation using banding data. We also omitted resightings of 12 flagged individuals in 2024 whose flag codes were accidentally deployed in both New Jersey and South Carolina (Amanda Dey, New Jersey Division of Fish and Wildlife, pers. comm., 31 May 2017) because it is not possible to confirm individual identity in this case. Section 3 "Summary of Mark-resight Data Collected in 2024" describes

additional quality control procedures and the potential for other types of errors in the mark- resight dataset.

While searching for birds marked with engraved leg flags, observers also periodically used a scan sampling technique to count marked and unmarked birds in randomly selected portions of Red Knot flocks (Lyons 2016). As part of the scan sampling protocol to estimate the marked-unmarked ratio (Lyons 2016), observers checked a random sample of birds for marks (leg flags) and recorded 1) the number of individually-marked birds, and 2) the number of birds checked for marks in each sample.

To estimate stopover population size, we used the methods of Lyons et al. (2016) to analyze 1) the mark-resight data (flag codes), and 2) data from the scan samples of the marked-unmarked ratio. Lyons et al. (2016) relied on the "superpopulation" approach developed by Crosbie and Manly (1985) and Schwarz and Arnason (1996). The superpopulation is defined as the total number of birds present in the study area on at least one of the sampling occasions over the entire study, i.e., the total number of birds present in the study area at any time between the first and last sampling occasions (Nichols and Kaiser 1999). In this superpopulation approach, passage population size is estimated each year using the Jolly-Seber model for open populations, which accounts for the flow-through nature of migration areas and probability of detection during surveys.

In our analyses for Delaware Bay, the days of the migration season were aggregated into 3-day sampling periods (a total of 10 sample periods possible each season, Table 1). Data were aggregated to 3-day periods because this is the amount of time necessary to complete mark-resight surveys on all beaches in the study (a summary of the mark-resight data from 2023 is provided in Appendix 2).

With the mark-resight superpopulation approach, we first estimated the number of birds that were carrying leg flags, and then adjusted this number using the estimated proportion of the population with flags to account for unmarked birds. The estimated proportion with leg flags is thus an important statistic. We used the scan sample data (i.e., the counts of marked birds and the number checked for marks) and a binomial model to estimate the proportion of the population that is marked. To account for the random nature of arrival of marked birds at the study area and the addition of new marks during the season, we implemented the binomial model as a generalized linear mixed model with a random effect for the sampling period. More detailed methods are provided in Lyons et al. (2016) and Appendix 3.

3 Summary of Mark-resight and Marked Ratio Data Collected in 2024

3.1 Mark-resight encounter data

The 2024 Red Knot mark-resight dataset included a total of 1,413 individual birds that were recorded at least once during mark-resight surveys at Delaware Bay between 1 May and 6 June 2024; these birds were originally captured and banded with leg flags in five to seven different countries (Fig. 1). The number of individuals in 2024 was greater than 2023 (1,091) but similar to the number of individuals detected during 2020 – 2022 (1,546 – 1,591; Table 2).

The 10 sampling periods of this mark-resight study include 8 May to 6 June (Table 1). In 2024, there were sufficient data for analysis in only 7 of the 10 sampling periods. At the beginning of the season in 2024, there was very little data collected during 8 – 13 May (i.e., periods 1 and 2). At the end of the season,

there was little data available from 4 – 6 June (i.e., period 10), so this period was also discarded and not included in the 2024 analysis. It is not unusual to have sparse data from 4 – 6 June because most birds have departed Delaware Bay by this time in most years. After discarding periods 1, 2, and 10, there were 1,389 flagged individuals that were included in the 2024 analysis.

One assumption of the mark-resight approach is that individual identity of marked birds is recorded without error (see Lyons 2016 for discussion of all model assumptions). As noted above, some field-recording errors are evident when sight records are compared to physical capture record available from bandedbirds.org. Again, any engraved flag reported by observers that did not have a corresponding record of physical capture was omitted. Field observers submitted 2,396 resightings in 2024; 82 were not valid (i.e., no corresponding banding data), for an overall misread read of 3.4 %. These invalid resightings were removed before analysis, but a second type of "false positive" is still possible, i.e., false positive detection of flags that were deployed prior to 2024 but were not in fact present at Delaware Bay in 2024. It is not possible to identify this second type of false positive with banding data validation or other quality assurance/quality control methods (Tucker et al. 2019).

3.2 Marked ratio data ("scan samples" in Appendix 3)

In 2024, 495 marked ratio scan samples were collected: 334 and 161 samples in Delaware and New Jersey, respectively (Appendix 4). In 2020, 2021, 2022, and 2023, there were 734, 564, 541, and 504 marked-ratio scan samples collected, respectively.

In 2024, 5.8% of the stopover population carried engraved leg flags (95% CI: 4.3%–7.4%; Appendix 5 Fig. A5). This is lower than the percentage in 2023 (6.8% [95% CI: 5.9%–7.9%]) and continues a declining trend in the percentage of the population with leg flags. Historically, the percentage of the population that has leg flags has been close to 10% and was as high as 9.6% (95% CI: 8.8%–10.3%) in 2020 (Lyons 2020).

4 Summary of 2024 Migration

Approximately 25% of the stopover population was present during 14 – 16 May (Fig. 2a, period 3); these birds likely arrived during 8 – 13 May (periods 1 and 2), or even earlier, but there was not enough mark-resight data during 8 – 13 May for analysis. Another 30% of the stopover population arrived during 17 – 19 May (period 4, Fig. 2a). Thus, approximately 55% of the stopover population had arrived by approximately 18 May. The peak in arrivals was approximately 18 May, which is consistent with long-term pattern in the peak of arrival times (J. Lyons, personal observation, 2023-09-23).

Stopover departure probability is the probability that a bird present at Delaware Bay during sampling period *i* departs before sampling period *i* + 1. In 2024, departure probability was low (~7%) during 14 – 16 May (Fig. 2b). Departure probability increased and was closer to 30% during 17 – 22 May indicating turnover in the population beginning approximately 17 May. Departures peaked around 24 May, but then decreased during the next two sample periods, 26 – 28 May and 29 – 31 May. The decreasing departure probability at the end of the season is unusual because in most years, departures increase steadily after approximately 24 May (J. Lyons, personal observation, 2024-09-04).

Following Lyons et al. (2016), we used the Jolly-Seber model to estimate stopover duration. Stopover duration in 2024 was approximately 9.0 days (95% CI: 8.0, 10.0), which similar to 2023 (9.2 days [95% CI: 8.2 – 10.4 days]). The stopover duration in 2023 and 2024 was slightly lower than during 2019 – 2021, however, when stopovers ranged from 10.3 to 12.1 days (Lyons 2023). This method of estimating stopover duration provides a coarse measure in our Delaware Bay study, however, because it is derived from the estimated number of sampling periods (i.e., the time step in the mark-recapture model) that birds remained in the study area. Each sampling period in this analysis is 3 consecutive days in which the data are aggregated (Table 1). To estimate stopover duration in number of days at Delaware Bay with this method, we first estimate the number of sampling periods that each bird remained in the study area and then multiply this by 3 (the number of days in each period). The resolution of the stopover duration estimate is thus limited by the resolution of the sampling periods.

Probability of resighting in 2024 was constant for much of the season, remaining between 0.30 and 0.40 from about 15 – 27 May (Fig. 2c), before decreasing to about 0.06 at the end of the season.

5 Stopover Population Estimate

The passage population size estimate for 2024 was 46,127 (95% CI: 39,286 – 57,799; Table 3), which is an increase from 2023 (39,361 [95% CI: 33,724 – 47,556]). Since 2019, the stopver population has fluctuated between approximately 39,000 and 46,000, and appears stable given the broad overlap in the confidence intervals of the annual population estimates.

The time-specific stopover population estimate was approximately 13,600 at 15 May and increased to approximately 20,000 – 23,000 during about 18 – 24 May. The populaiton size estimates then decreased to about 10,000 during 27 May to 2 June. In many years, the population declines to ≤ 5,000 at the end of the season, so the number at the end of the season in 2024 was unusual. The estimate of the number of birds remaining at the season reflects late arrivals and low departure probability at the end of the season (Fig. 2a and 2b). The uncertainty in the estimates for number of birds remaining, and wide confidence intervals, reflect the low probability of resighting at the end of the season.

Acknowledgments

We thank the many volunteers in Delaware and New Jersey who collected mark-resight data in 2024. We are grateful to Katherine Christie (Delaware Division of Fish and Wildlife), Kathy Clark and Bill Pitts (New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered & Nongame Species Program), Stephanie Feigin (Wildlife Restoration Partnerships), Jeannine Parvin, Lena Usyk (bandedbirds.org), and numerous volunteers in Delaware and New Jersey for data entry and data management. Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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Table 1. Dates for mark-resight survey periods (3-day sampling occasions) for Red Knot (C. c. rufa) population analysis at Delaware Bay in 2024. The same sampling periods have been used at Delaware Bay since 2011. In 2024, there were few resightings of Red Knots in survey periods 1, 2, and 10; these periods were not used in the 2024 analysis because the data were insufficient.

Survey period	Dates	Survey period	Dates
1	8–10 May	6	23–25 May
2	11–13 May	7	26–28 May
3	14–16 May	8	29–31 May
4	17–19 May	9	1–3 June
5	20–22 May	10	4–6 June

Table 2. Number of leg-flagged Red Knot (C. c. rufa) detected at Delaware Bay from 2019–2023 by banding country (flag color). Flag colors were designated by country by the Pan American Shorebird Program (Howes et al. 2016). USA uses both light green and dark green leg flags.

	Leg-flagged individuals detected by year					
Banding country (flag color)	2019	2020	2021	2022	2023	2024
USA (light green)	2,368	1,255	1,292	1,281	843	991
USA (dark green)	351	161	118	118	141	294
Argentina/Uruguay (orange)	216	89	81	66	48	44
Canada (white)	156	52	78	62	41	69
Brazil/Paraguay (dark blue)	35	21	17	14	14	13
Chile (red)	10	9	5	5	4	2
Total	3,136	1,587	1,591	1,546	1,091	1,413

Table 3. Red Knot (C. c. rufa) stopover (passage) population estimate using mark-resight methods compared to a peak-count index using aerial- or ground-survey methods at Delaware Bay. The mark-resight estimate of stopover (passage) population, *N**, accounts for population turnover during migration. The peak-count index, a single count on a single day, does not account for turnover in the population. "AG" indicates a combination of aerial and ground counts used to formulate the peak-count index. CI = credible interval. The peak-count index is provided by NJ Department of Environmental Protection.

Year	Stopover population[a] (mark-resight *N**)	95% CI *N**	Peak-count index (aerial [A]; ground [G])
2011	43,570	(40,880 – 46,570)	12,804 (A)[b]
2012	44,100	(41,860 – 46,790)	25,458 (G)[c]
2013	48,955	(39,119 – 63,130)	25,596 (A)[d]
2014	44,010	(41,900 – 46,310)	24,980 (A)[c]
2015	60,727	(55,568 – 68,732)	24,890 (A)[c]
2016	47,254	(44,873 – 50,574)	21,128 (A)[b]
2017	49,405[e]	(46,368 – 53,109)	17,969 (A)[f]
2018	45,221	(42,568 – 49,508)	32,930 (A)[b]
2019	45,133	(42,269 – 48,393)	30,880 (A)[g]
2020	40,444	(33,627 – 49,966)	19,397 (G)[c]
2021	42,271	(35,948 – 55,210)	6,880 (AG)[h]
2022	39,800	(35,013 – 51,355)	12,114 (AG)[g]
2023	39,361	(33,724 – 47,556)	22,266 (G)[g]
2024	46,127	(39,286 – 57,799)	14,225 (A)[g]

[a] passage population estimate for entire season, including population turnover

[b] 23 May

[c] 24 May

[d] 28 May

[e] Data management procedures to reduce bias from recording errors in the field; data from observers with greater than average misread rate were not included in the analysis.

[f] 26 May

[g] 22 May

[h] 27 May

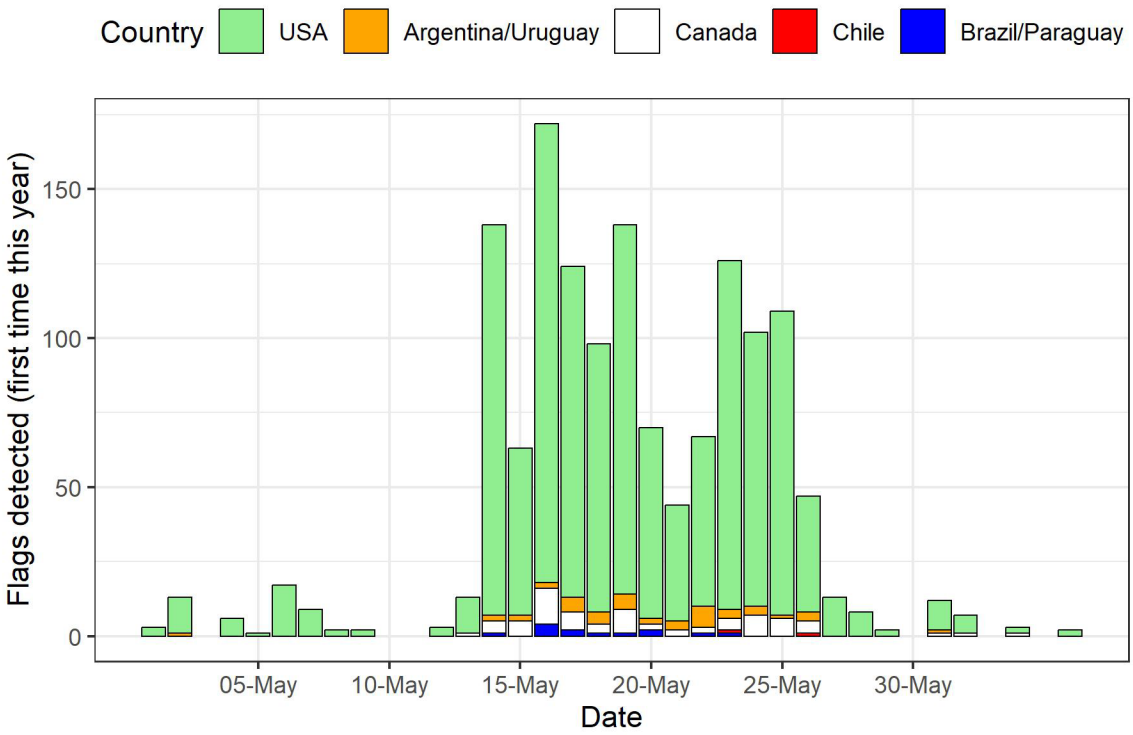

Figure 1 Number of birds detected for the first time (in 2024) by banding country (flag color). Colors correspond to leg-flag colors assigned to countrys in the Pan American Shorebird Program (Howes et al. 2016). USA includes both light and dark green flags.

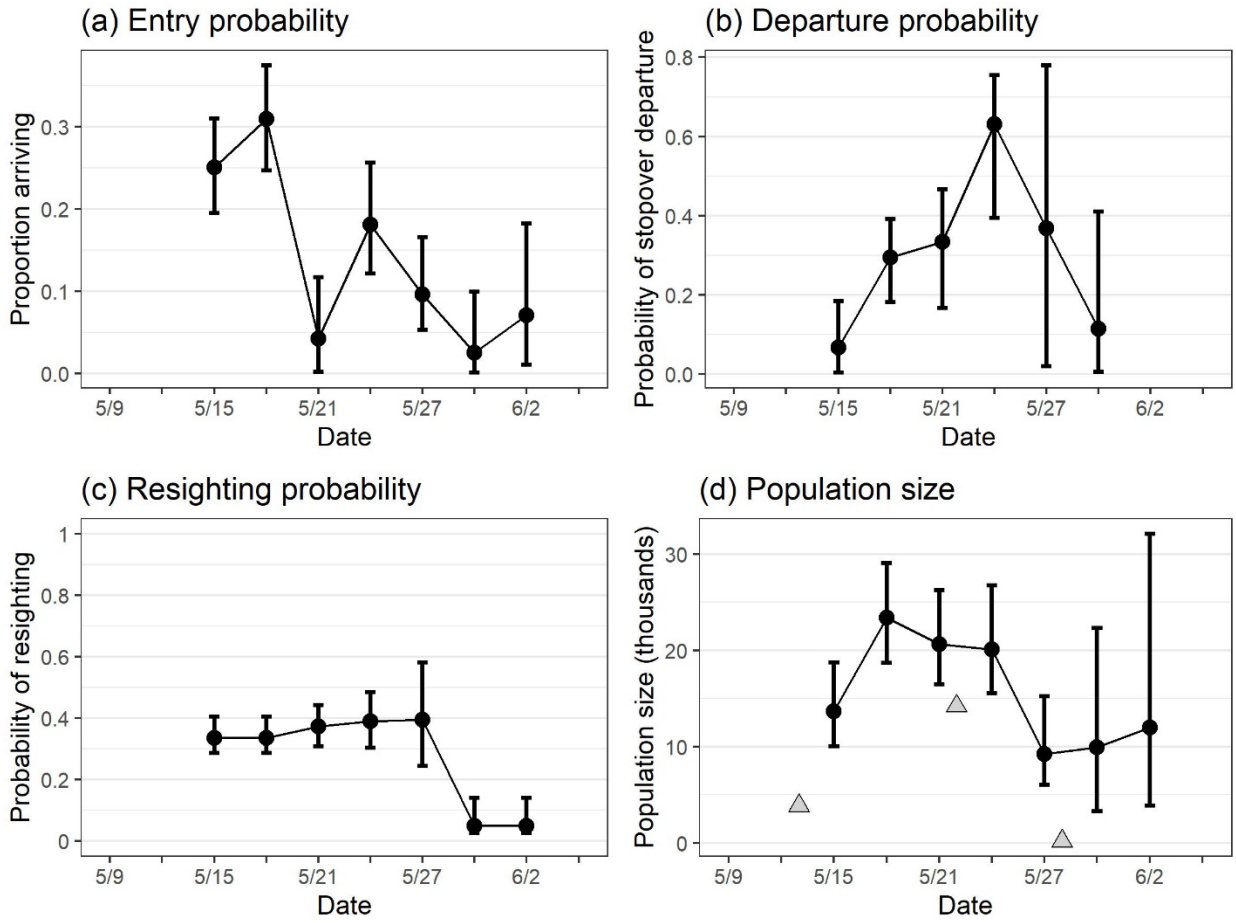

Figure 2 Estimated Jolly-Seber (JS) model parameters from a mark-resight study of Red Knots (C. c. rufa) at Delaware Bay in 2024: (a) proportion of stopover population arriving at Delaware Bay, (b) stopover departure probability, (c) probability of resighting, and (d) time-specific population size. Dates on the x-axis indicate the mid-point of 3-day sampling occasions (i.e., 3-day survey periods, Table 1). Triangles in (d) are aerial survey results provided by W. Pitts, NJ Department of Environmental Protection.

Appendix 1. Locations around Delaware Bay, USA, where mark-resight surveys were conducted to estimate Red Knot (*C. c. rufa*) stopover population size in 2023. DE = Delaware and NJ = New Jersey.

State	Beach	Longitude	Latitude
DE	Port Mahon	-75.4021	39.1831
DE	Pickering Beach	-75.4087	39.1377
DE	Kitts Hummock	-75.4048	39.1130
DE	Ted Harvey Wildlife Area	-75.4019	39.0864
DE	North Bowers	-75.3973	39.0630
DE	South Bowers	-75.3860	39.0498
DE	Brockenbridge	-75.3638	39.0359
DE	Mispillion	-75.3131	38.9519
DE	Slaughter Beach	-75.3146	38.9282
DE	Fowlers Beach	-75.2633	38.8766
DE	Prime Hook Beach	-75.2467	38.8604
NJ	Gandys/Money Island	-75.2417	39.2767
NJ	Fortescue	-75.1675	39.2233
NJ	North Reeds	-74.8908	39.1228
NJ	South Reeds	-74.8922	39.1138
NJ	Cooks	-74.8941	39.1082
NJ	Kimbles	-74.8948	39.1049
NJ	Bay Cove	-74.8965	39.1008
NJ	Pierces Point	-74.9013	39.0897
NJ	Villas and Norburys	-74.9298	39.0449

Appendix 2. Summary ("m-array") of Red Knot (C. c. rufa) mark-resight data from Delaware Bay, USA, 2023. NR = never resighted.

			Next resighted at sample						
Sample	Dates	Releases	4	5	6	7	8	9	NR
1	8-10 May	0							
2	11-13 May	0							
3	14-16 May	222	69	40	16	3	0	0	94
4	17-19 May	483		126	54	14	0	1	288
5	20-22 May	422			111	23	1	2	285
6	23-25 May	479				71	3	3	402
7	26-28 May	281					8	9	264
8	29-31 May	22						2	20
9	1-3 June	36							
10	4-6 June	0							

Appendix 3. Statistical Methods to Estimate Stopover Population Size of Red Knots (*C. c. rufa*) Using Mark-Resight Data and Counts of Marked Birds

We converted the observations of marked Red Knots into encounter histories, one for each bird, and analyzed the encounter histories with a Jolly-Seber (JS) model (Jolly 1965, Seber 1965, Crosbie and Manly 1985, Schwarz and Arnason 1996). The JS model includes parameters for recruitment (β), survival (ϕ), and capture (*p*) probabilities; in the context of a mark-resight study at a migration stopover site, these parameters are interpreted as probability of arrival to the study area, stopover persistence, and resighting, respectively. Stopover persistence is defined as the probability that a bird present at time *t* remains at the study area until time *t* + 1. The Crosbie and Manley (1985) and Schwarz and Arnason (1996) formulation of the JS model also includes a parameter for superpopulation size, which in our approach to mark-resight inferences for stopover populations is an estimate of the marked (leg-flagged) population size.

We chose to use 3-day periods, rather than days, as the sampling interval for the JS model given logistical constraints on complete sampling of the study area; multiple observations of the same individual in a given 3-day period were combined for analysis. A summary (m-array) of the mark-resight data is presented in Appendix 2.

We made inference from a fully-time dependent model; arrival, persistence, and resight probabilities were allowed to vary with sampling period [β_t ϕ_t p_t]. In this model, we set $p_1 = p_2$ and $p_{K-1} = p_K$ (where *K* is the number of samples) because not all parameters are estimable in the fully-time dependent model (Jolly 1965, Seber 1965, Crosbie and Manly 1985, Schwarz and Arnason 1996).

We followed the methods of Royle and Dorazio (2008) and Kéry and Schaub (2012, Chapter 10) to fit the JS model using the restricted occupancy formulation. Royle and Dorazio (2008) use a state-space formulation of the JS model with parameter-expanded data augmentation. For parameter-expanded data augmentation, we augmented the observed encounter histories with all-zero encounter histories (n = 2000) representing potential recruits that were not detected (Royle and Dorazio 2012). We followed Lyons et al. (2016) to combine the JS model with a binomial model for the counts of marked and unmarked birds in an integrated Bayesian analysis. Briefly, the counts of marked birds (m_s) in the scan samples are modeled as a binomial random variable:

$$m_s \sim Bin(C_s, \pi), \quad (1)$$

where m_s is the number of marked birds in scan sample *s*, C_s is the number of birds checked for marks in scan sample *s*, and π is the proportion of the population that is marked. Total stopover population size $\widehat{N^*}$ is estimated by

$$\widehat{N^*} = \widehat{M^*}/\hat{\pi} \quad (2)$$

where $\widehat{M^*}$ is the estimate of marked birds from the J-S model and $\hat{\pi}$ is the proportion of the population that is marked (from Eq. 1). Estimates of marked subpopulation sizes at each resighting occasion *t* $\left(\widehat{M_t^*}\right)$ are available as derived parameters in the analysis. We calculated an estimate of population size at each mark-resight sampling occasion $\widehat{N_t^*}$ using $\widehat{M_t^*}$ and $\hat{\pi}$ as in equation 2.

To better account for the random nature of the arrival of marked birds and addition of new marks during the season, we used a time-specific model for proportion with marks in place of equation 1 above:

$$m_{s,t} \sim Binomial(C_{s,t}, \pi_t) \quad (3)$$

$$for\ s\ in\ 1, \ldots, n_{samples}\ and\ t\ in\ 1, \ldots, n_{occasions}$$

$$logit(\pi_t) = \alpha + \delta_t$$

$$\delta_t \sim Normal(0, \sigma^2_{occasions})$$

where m_s is the number of marked birds in scan sample s, C_s is the number of birds checked for marks in scan sample s, δ_t is a random effect time of sample s, and π_t is the time-specific proportion of the population that is marked. Total stopover population size $\widehat{N^*}$ was estimated by summing time-specific arrivals of marked birds to the stopover (B_t) and expanding to include unmarked birds using estimates of proportion marked:

$$\widehat{N^*} = \sum \widehat{B_t} / \pi_t$$

Time-specific arrivals of marked birds are estimated from the Jolly-Seber model using $\widehat{B_t} = \widehat{\beta_t}\widehat{M^*}$ where $\widehat{M^*}$ is the estimate of the number of marked birds and $\widehat{\beta_t}$ is the fraction of the population arriving at time t.

Appendix 4. Marked-ratio scan samples of Red Knots (*C. c. rufa*).

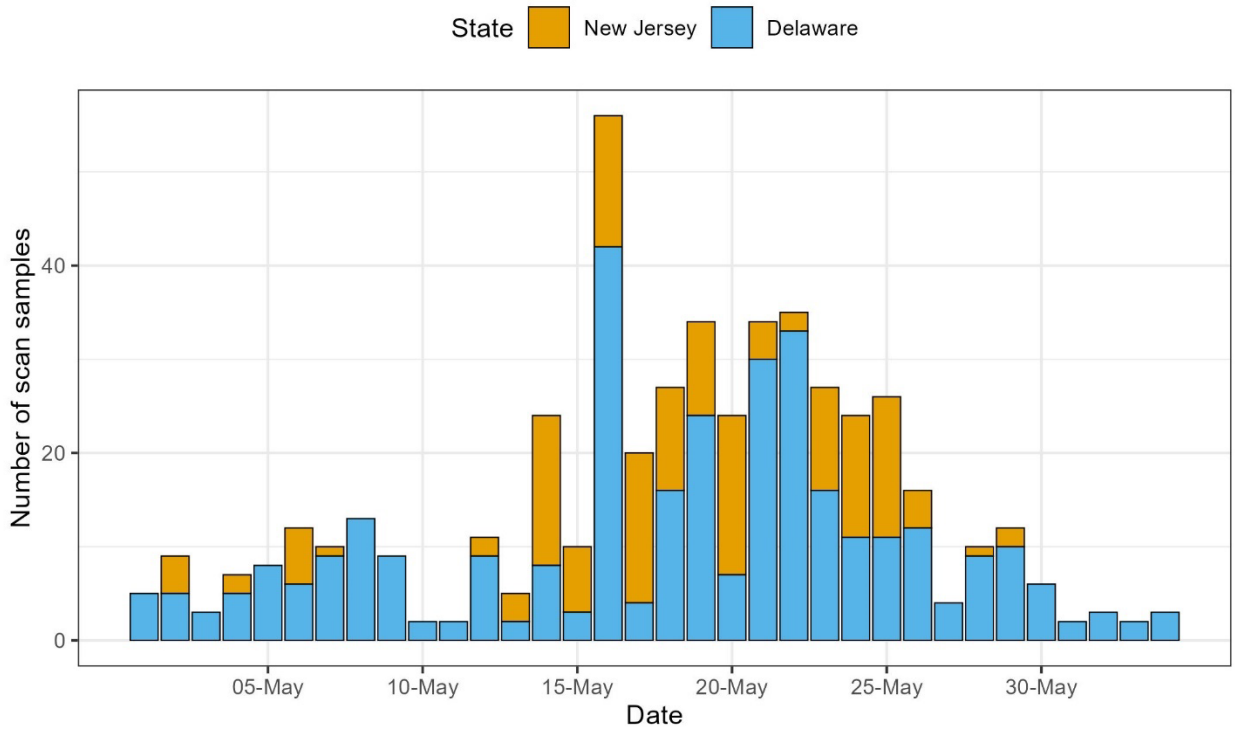

Figure A4. Number of Red Knot (*C. c. rufa*) marked-ratio scan samples (n = 495) collected in Delaware Bay in 2024 by field crews in Delaware (blue, n = 334 scan samples) and New Jersey (orange, n = 161 scan samples) and date.

Appendix 5. Marked proportion.

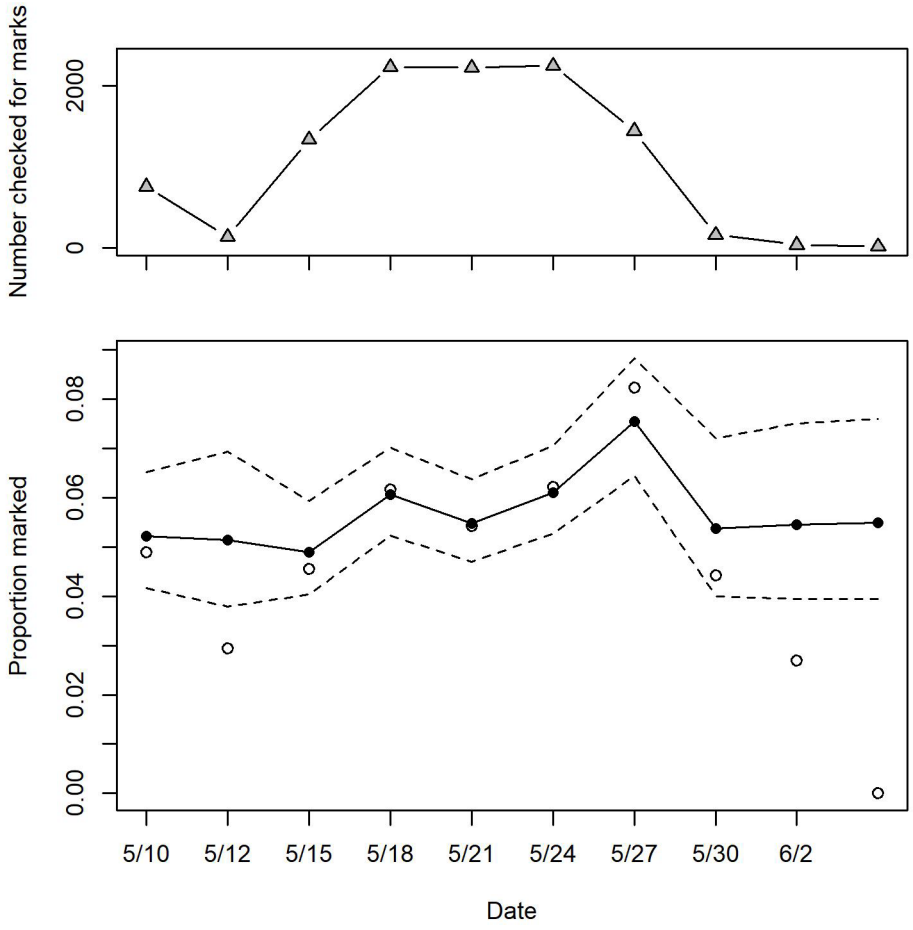

Figure A5. Estimated proportion of the Delaware Bay stopover population of Red Knots (*C. c. rufa*) carrying leg flags in 2024 (overall average and 95% credible interval: 0.058 [0.043, 0.074]). The marked proportion was estimated from marked-ratio scan samples for each 3-day sampling period (Table 1). The upper panel shows the sample size (number scanned, i.e., checked for marks) for each sample period. The bottom panel shows the estimated proportion marked for each sample occasion, which was estimated with the generalized linear mixed model described in Appendix 2. Solid and dashed lines are estimated median proportion marked and 95% credible interval, respectively; open circles show (number with marks/number scanned).

ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

HORSESHOE CRAB
(*Limulus polyphemus*)

2023 Fishing Year

Prepared by the Plan Review Team

October 2024

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Table of Contents

I. Status of the Fishery Management Plan

Date of FMP Approval:	December 1998
Amendments	None
Addenda	Addendum I (April 2000) Addendum II (May 2001) Addendum III (May 2004) Addendum IV (June 2006) Addendum V (September 2008) Addendum VI (August 2010) Addendum VII (February 2012)
Management Unit:	Entire coastwide distribution of the resource from the estuaries eastward to the inshore boundary of the EEZ
States with Declared Interest:	Massachusetts – Florida, Potomac River Fisheries Commission
Active Boards/Committees:	Horseshoe Crab Management Board, Advisory Panel, Technical Committee, and Plan Review Team; Delaware Bay Ecosystem Technical Committee; Adaptive Resource Management Subcommittee

Goals and Objectives

The Interstate Fishery Management Plan for Horseshoe Crabs (FMP) established the following goals and objectives.

2.0. Goals and Objectives

The goal of this Plan is to conserve and protect the horseshoe crab resource to maintain sustainable levels of spawning stock biomass to ensure its continued role in the ecology of the coastal ecosystem, while providing for continued use over time. Specifically, the goal includes management of horseshoe crab populations for continued use by:

1) *current and future generations of the fishing and non-fishing public (including the biomedical industry, scientific and educational research);*
2) *migrating shorebirds; and,*
3) *other dependent fish and wildlife, including federally listed (threatened) sea turtles.*

To achieve this goal, the following objectives must be met:

(a) prevent overfishing and establish a sustainable population;

(b) achieve compatible and equitable management measures among jurisdictions throughout the fishery management unit;

(c) establish the appropriate target mortality rates that prevent overfishing and maintain adequate spawning stocks to supply the needs of migratory shorebirds;
(d) coordinate and promote cooperative interstate research, monitoring, and law enforcement;
(e) identify and protect, to the extent practicable, critical habitats and environmental factors that limit long-term productivity of horseshoe crabs;
(f) adopt and promote standards of environmental quality necessary for the long-term maintenance and productivity of horseshoe crabs throughout their range; and,
(g) establish standards and procedures for implementing the Plan and criteria for determining compliance with Plan provisions.

Fishery Management Plan Summary

The framework for managing horseshoe crabs along the Atlantic coast was approved in October 1998 with the adoption of the Interstate Fishery Management Plan (FMP) for Horseshoe Crabs. The goal of this plan is to conserve and protect the horseshoe crab resource to maintain sustainable levels of spawning stock biomass to ensure its continued role in the ecology of coastal ecosystems while providing for continued use over time.

In 2000, the Horseshoe Crab Management Board approved Addendum I to the FMP. Addendum I established a state-by-state cap on horseshoe crab bait landings at 25 percent below the reference period landings (RPL's), and *de minimis* criteria for those states with a limited horseshoe crab fishery. Those states with more restrictive harvest levels (Maryland and New Jersey) were encouraged to maintain those restrictions to provide further protection to the Delaware Bay horseshoe crab population, recognizing its importance to migratory shorebirds. Addendum I also recommended that the National Marine Fisheries Service (NMFS) prohibit the harvest of horseshoe crabs in federal waters (3-200 miles offshore) within a 30 nautical mile radius of the mouth of Delaware Bay, as well as prohibit the transfer of horseshoe crabs in federal waters. A horseshoe crab reserve was established on March 7, 2001, by NMFS in the area recommended by ASMFC. This area is now known as the Carl N. Shuster Jr. Horseshoe Crab Reserve (Figure 1).

In 2001, the Horseshoe Crab Management Board approved Addendum II to the FMP. The purpose of Addendum II was to allow the voluntary transfer of harvest quotas between states to alleviate concerns over potential bait shortages on a biologically responsible basis. Voluntary quota transfers require Technical Committee review and Management Board approval.

In 2004, the Board approved Addendum III to the FMP. The addendum sought to further the conservation of horseshoe crab and migratory shorebird populations in and around the Delaware Bay. It reduced harvest quotas and implemented seasonal bait harvest closures in New Jersey, Delaware, and Maryland, and revised monitoring components for all jurisdictions.

Addendum IV was approved in 2006. It further limited bait harvest in New Jersey and Delaware to 100,000 crabs (male only) and required a delayed harvest in Maryland and Virginia.

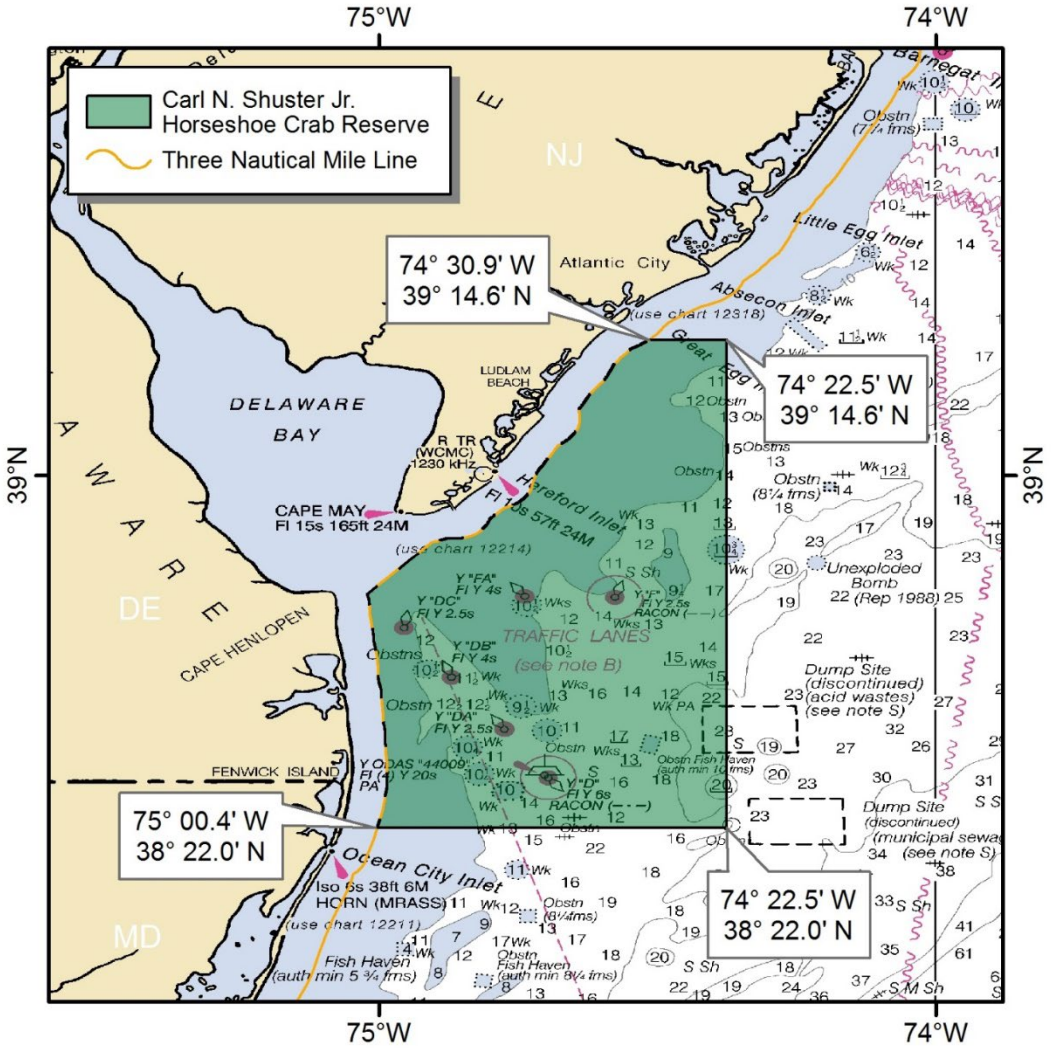

Figure 1. Carl N. Shuster Jr Horseshoe Crab Reserve.

Addendum V, adopted in 2008, extended the provisions of Addendum IV through October 31, 2010.

In early 2010, the Board initiated Draft Addendum VI to consider management options that would follow expiration of Addendum V. The Board voted in August 2010 to extend the Addendum V provisions, via Addendum VI, through April 30, 2013. The Board also chose to include language allowing them to replace Addendum VI with another Addendum during that time, in anticipation of implementing an Adaptive Resource Management (ARM) Framework.

The Board approved Addendum VII in February 2012. This addendum implemented an ARM framework for use during the 2013 fishing season and beyond. The framework considers the abundance levels of horseshoe crabs and shorebirds in determining the optimized bait harvest level for the Delaware Bay states of New Jersey, Delaware, Maryland, and Virginia (east of the COLREGS).

The ARM Framework underwent a revision process in 2021 to incorporate more available data and update the software platform. Several improvements were made to the ARM Framework during this revision. The ARM Revision improves the population models for horseshoe crabs and red knots by incorporating Delaware Bay region-specific data collected over the past few decades. Horseshoe crab population estimates from the Catch Multiple Survey Analysis (CMSA) model used in the 2019 Benchmark Stock Assessment were incorporated into the ARM Revision. Additionally, the ARM Revision includes more sources of horseshoe crab removals than the previous version, adding mortality in the biomedical industry and commercial discards from other fisheries. The maximum number of male and female horseshoe crabs the ARM Revision can recommend remains the same at 210,000 females and 500,000 males. However, harvest recommendations under the ARM Revision are now based on a continuous scale rather than the fixed harvest packages in the previous Framework. Also, the harvest of females is decoupled from the harvest of males so that each are determined separately. While additional data and model improvements are used in the ARM Revision, the conceptual model of horseshoe crab abundance influencing red knot survival and reproduction remains intact with the intent of ensuring the abundance of horseshoe crabs does not become a limiting factor in the population growth of red knots. The Board accepted the ARM Revision and Peer Review for management use in January 2022.

Addendum VIII was approved in November 2022. Addendum VIII adopts the changes to the ARM Framework as recommended in the peer-reviewed 2021 ARM Framework for use in setting annual specifications for horseshoe crabs of Delaware Bay-origin.

II. Status of the Stock and Assessment Advice

A benchmark stock assessment was completed and approved for management use in 2019[1]. This assessment was the first to successfully apply a stock assessment model to a component of the horseshoe crab stock. A Catch Multiple Survey Analysis (CMSA) model, a stage-based model that tracks progression of crab abundances from pre-recruits to full recruits to the fishery, was applied to female crabs in the Delaware (DE) Bay region (New Jersey-Virginia). This model estimated regional female crab abundance using relative abundance information from the Virginia Tech Benthic Trawl Survey, New Jersey Ocean Trawl Survey, and Delaware Adult Trawl Survey, and estimates of mortality including natural mortality, commercial bait harvest, commercial discard mortality, and mortality associated with biomedical use. While reference points were not approved to determine stock status, the CMSA population estimates were recommended as the best estimates for female horseshoe crab abundance in the DE Bay region.

[1] The 2019 benchmark stock assessment report is available at: http://www.asmfc.org/uploads/file/5cd5d6f1HSCAssessment_PeerReviewReport_May2019.pdf

Autoregressive Integrated Moving Average (ARIMA) models, similar to those used in previous assessments, were applied to all regions. ARIMA models were fit to fishery-independent survey indices trends of abundance in each of the regional horseshoe crab populations: Northeast (Massachusetts-Rhode Island), New York (Connecticut-New York), DE Bay, and Southeast (North Carolina-Florida). No definitions for overfishing or overfished status have been adopted by the Management Board. However, the assessment characterized the status of each regional and the coastwide population based on the percentage of surveys within a region (or coastwide) having a >50% probability of the terminal year being below the ARIMA reference point. The ARIMA reference point was the 1998 index for each survey. "Poor" status was defined as >66% of surveys meeting this criterion, "Good" status was defined as <33% of surveys, and "Neutral" status was defined as 34–65% of surveys.

An assessment update was completed in May 2024[2]. The updated CMSA model estimates were approximately 40 million mature male and 16 million mature female horseshoe crabs in the Delaware Bay region in 2022. The CMSA model results indicate that mature female horseshoe crabs have been steadily increasing in the region since the implementation of the initial ARM Framework in 2012. The ARIMA models used to determine stock status for the four regional and the coastwide horseshoe crab populations were also updated. The current stock status indicates that the Northeast region is in a neutral state and the New York region continues to be in a poor state, with three out of four surveys being below 1998 reference points. Based on the ARIMA results, the Delaware Bay, Southeast, and coastwide populations are in good condition, an improvement since the 2019 benchmark.

III. Status of the Fishery

Bait Fishery

For most states, the bait fishery is open year-round. However, because of seasonal horseshoe crab movements (to the beaches in the spring; deeper waters and offshore in the winter), the fishery operates at different times along the coast. New Jersey has prohibited commercial harvest of horseshoe crabs in state waters since 2006. State waters of Delaware are closed to horseshoe crab harvest and landing from January 1st through June 7th each year, and other state horseshoe crab fisheries are regulated with various season/area closures.

The total reported bait landings in 2023 totaled 738,789 crabs. This is well below the ASMFC coastwide quota of 1,591,730 crabs (Table 1, Figure 2) and represents a 29% increase from 2022 landings of 570,988 crabs. Landings increased in all states with commercial harvest.

[2] The 2024 stock assessment update can be found here: http://www.asmfc.org/uploads/file/663d0fcdHorseshoeCrabStockAssessmentUpdate_April2024.pdf

Reported coastwide landings since 1998 show more male than female horseshoe crabs were harvested annually. Several states presently have sex-specific restrictions in place which limit or ban the harvest of females. The American eel pot fishery prefers female horseshoe crabs as bait, while the whelk (conch) pot fishery is less dependent on females. States with greater than 5% of coastal landings are required to report sex for at least a portion of their bait harvest; for 2023 these states include Massachusetts, New York, Delaware, Maryland, and Virginia. Within these states, 64% of reported bait landings were male, 6% were female, and 29% were unclassified in 2023.

The hand, trawl, and dredge fisheries accounted for the majority of reported commercial horseshoe crab bait landings in 2023. Other gears that account for the remainder of the harvest include rakes, hoes, and tongs, fixed nets, and gill nets.

Table 1. Reported commercial horseshoe crab bait landings by jurisdiction. "C" indicates confidential landings.

	MA	RI	CT	NY	NJ*	DE*	MD*	PRFC	VA**	NC	SC	GA	FL	TOTAL
ASMFC Quota 2023	330,377	26,053	48,689	366,272	164,364	164,364	255,980	0	172,828	24,036	0	29,312	9,455	1,591,730
State Quota 2023	140,000	8,398	48,689	150,000	0	164,364	255,980	-	172,828	24,036	0	29,312	9,455	1,003,062
Landings by Year														
2015	117,611	7,867	19,632	145,324	0	151,262	27,494	0	102,235	24,839	0	0	264	596,528
2016	110,399	20,676	21,945	176,632	0	109,836	157,013	0	128,848	25,197	0	0	689	751,235
2019	172,664	C	17,588	167,181	0	164,225	145,907	0	151,727	13,463	0	0	0	832,755
2020	163,695	C	15,942	63,367	0	124,803	61,165	0	24,031	3,672	0	0	0	456,675
2021	156,013	1,706	17,492	97,860	0	172,927	181,044	0	112,497	2,145	0	0	C	741,684
2022	135,731	C	1,343	111,481	0	147,558	84,627	0	89,748	500	0	0	C	570,988
2023	139,746	2,314	3,297	130,658	0	168,208	186,466	0	107,166	934	0	0	C	738,789

*Male-only harvest

**Virginia harvest east of the COLREGS line is limited to 81,331 male-only crabs. Virginia harvest east of the COLREGS in 2023 was confidential.

Biomedical Use

The horseshoe crab is an important resource for research and manufacture of materials used for human health. In 2023 there were six companies along the Atlantic Coast that process horseshoe crab blood for use in manufacturing Limulus Amebocyte Lysate (LAL), and biomedical collections occurred in six states: Associates of Cape Cod (MA, RI); Charles River Laboratories (MA, SC, VA), FUJIFILM Wako (MD); Lonza (MD); Limuli Laboratories (NJ); and Martin Fish Company LLC (MD). Addendum III requires states where horseshoe crabs are collected for biomedical purposes to collect and report total collection numbers, crabs rejected, crabs bled (by sex) and to characterize mortality.

The Plan Review Team (PRT) annually calculates total coastwide collections and estimates mortality associated with biomedical use. In 2023, 1,113,644 crabs were collected coastwide solely for biomedical purposes[3] (Table 2). This represents a 22% increase from 2022. Of the total biomedical collections in 2023, males accounted for 52.9%, and females comprised 42.1%. Some crabs were rejected prior to bleeding due to mortality, injuries, slow movement, and size (mortality observed while crabs were going through the biomedical process is included under 'Observed Mortality' in Table 2). Approximately 2% of crabs collected solely for biomedical purposes were observed and reported as dead from the time of collection up to the point of release.

During the 2019 benchmark stock assessment, a meta-analysis of literature estimates was performed to estimate post-bleeding mortality of horseshoe crabs. Although many of these studies did not implement biomedical best practices, these values are the only available estimates of mortality experienced after bleeding. Based on the literature review, post-bleeding mortality is estimated at 15%. Tagging data was used in the assessment to compare survivorship between crabs that were and were not bled. These results indicated some decrease in short-term survivorship, but greater long-term survivorship for bled crabs. These results are likely attributable to the culling process used by biomedical facilities to select healthy crabs for bleeding.

Post-bleeding mortality, calculated as 15% of the number of bled biomedical-only crabs (not from the bait market), for 2023 was estimated to be 155,801 crabs. Total mortality (observed mortality plus post-bleeding mortality) of biomedical crabs for 2023 was estimated at 178,232 crabs. The total estimated mortality from biomedical collections represents approximately 19.4% of the 2023 total directed use mortality (917,021 crabs), which includes both total biomedical mortality and removals for bait.

In 2023, a work group appointed by the Board reviewed and updated the *Best Management Practices for Handling Horseshoe Crabs for Biomedical Purposes*[4]. The work group included technical committee and advisory panel members with expertise in horseshoe crab biology, ecology, and biomedical processing. The purpose of the BMPs is to recommend broadly

[3] This does not include bait crabs borrowed for bleeding and then returned to the bait market; these are counted against state bait quotas. The dual use of horseshoe crabs harvested for bait is encouraged as a conservation tool. Facilities that bleed horseshoe crabs to manufacture LAL can utilize crabs from the bait market in what is often referred to as the "rent a crab" program. Permitted bait harvesters and/or dealers can "rent" crabs caught for the bait industry to the bleeding facility; these crabs are returned to the bait vendor after bleeding. These crabs are caught under bait permits, are counted against the bait quota of the state of origin, and must comply with that state's regulations for bait harvest. The dual use of crabs in this program can reduce overall harvest, may decrease overall mortality, can provide the LAL manufacturers with an additional source of raw material, and may offer harvesters and dealers opportunity within this secondary market.

[4] Best Management Practices for Handling Horseshoe Crabs for Biomedical Purposes can be found here: https://asmfc.org/uploads/file/645bf065HSC_Biomedical_BMPs_2023.pdf

applicable industry standards that are expected to minimize mortality and injury of horseshoe crabs associated with the biomedical process.

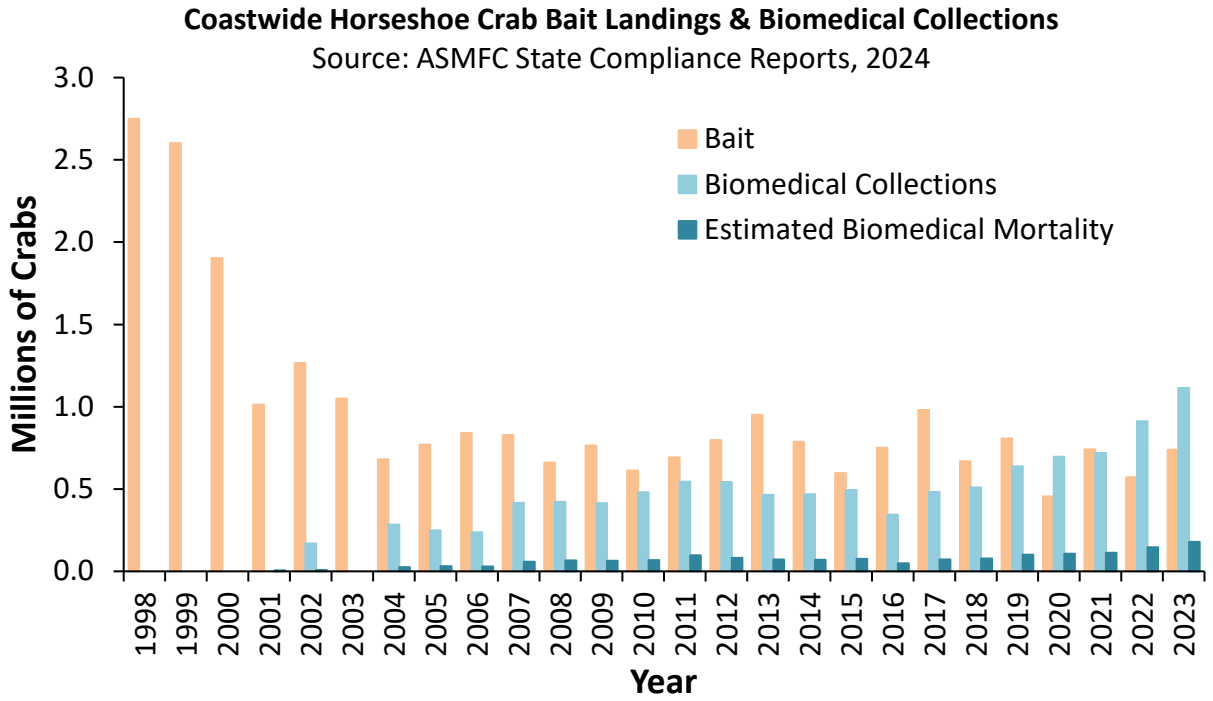

Figure 2. Number of horseshoe crabs harvested for bait and collected for biomedical purposes, 1998-2023.

*Biomedical collections are annually reported to the Commission and include all horseshoe crabs brought to bleeding facilities except those that were harvested as bait, “rented” by biomedical facilities and counted against state bait quotas.

*Crabs collected solely for biomedical crabs are returned to the water after bleeding; a 15% mortality rate is assumed for all bled crabs that are released. This number plus observed mortality reported annually by bleeding facilities via state compliance reports equals the 'Estimated Biomedical Mortality.'

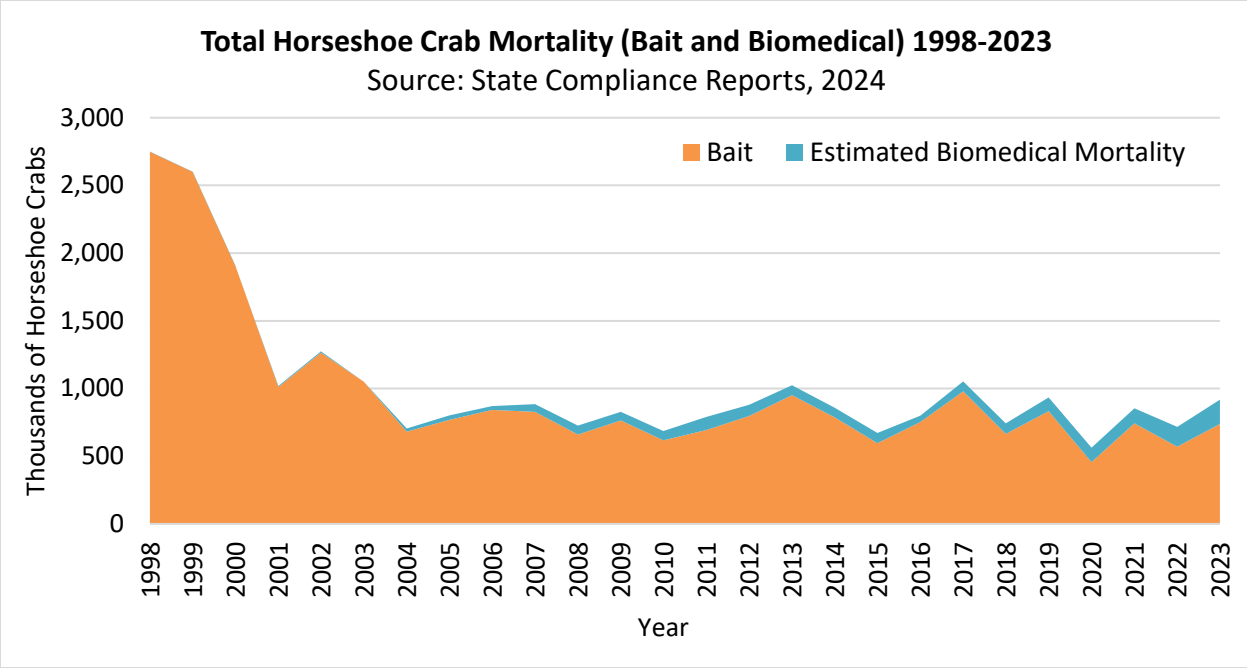

Figure 3. Total Horseshoe Crab Mortality from Bait and Estimated Biomedical Mortality, 1998-2023.

Table 2. Numbers of horseshoe crabs collected, bled, and estimated mortality for the biomedical industry. Numbers shown are for crabs collected solely for biomedical use. Mortality of bled crabs that later enter the bait industry is included in bait harvest.

Year	Crabs Collected	Crabs Bled	Post-Bleeding Mortality	Observed Mortality	Total Mortality
2010	480,914	412,781	61,917	6,829	68,746
2011	545,164	486,850	73,028	24,139	97,166
2012	541,956	497,956	74,693	7,370	82,063
2013	464,657	440,402	66,060	5,447	71,507
2014	467,897	432,340	64,851	5,658	70,509
2015	494,123	464,506	69,676	5,362	75,038
2016	344,495	318,523	47,778	1,004	48,782
2017	483,245	444,115	66,617	6,056	72,674
2018	510,407	479,142	71,871	5,588	77,459
2019	637,029	589,361	88,404	12,789	101,193
2020	697,025	649,546	97,432	8,907	106,339
2021	718,809	667,951	100,193	11,911	112,104
2022	911,826	828,181	124,227	21,693	145,920
2023	1,113,644	1,038,673	155,801	22,431	178,232

**Some biomedical collections were reduced in 2016 due to temporary changes in production.*

IV. Status of Research and Monitoring

The Horseshoe Crab FMP set forth an ambitious research and monitoring strategy in 1999 and again in 2004 to inform future management decisions. Despite limited time and funding there

are many accomplishments since 1999. These accomplishments were largely made possible by forming partnerships between state, federal and private organizations, and the support of hundreds of public volunteers.

Addendum III Monitoring Program

Addendum III requires affected states to carry out three monitoring components:

1. All states who do not qualify for *de minimis* status report monthly harvest numbers and subsample a portion of the catch for sex and harvest method. In addition, those states with annual landings above 5% of the coastwide harvest report all landings by sex and harvest method. Although states with annual landings less than 5% of annual coastwide harvest are not required to report landings by sex, the PRT recommends all states require sex-specific reporting for horseshoe crab harvest.
2. States with biomedical collections are required to monitor and report collection numbers and mortality associated with the transportation and bleeding of the crabs.
3. States must identify spawning and nursery habitat along their coasts. All states have completed this requirement, and a few continue active monitoring programs.

Virginia Tech Research Projects

The Virginia Tech Horseshoe Crab Trawl Survey (VT Survey) has been sampling horseshoe crab to estimate relative abundance since 2002, except for the years 2013-2015, due to a lack of funding. The survey conducted in 2023, and is in progress for 2024. Funding sources beyond 2024 continue to be explored. The 2023 surveys were conducted between September 6 and October 30. The lower Delaware Bay area of the survey was not sampled in 2022 and 2023 as increased operational costs resulted in limitations to time on the water.

For the Delaware Bay Area (DBA), the 2023 survey results indicate that mean stratified catches-per-tow for mature males and females increased substantially. The number of newly mature females continued to be low, and the number of newly mature males was much lower than in the past two years. Immature individuals decreased, but have been relatively stable since 2016. Newly mature females' relative abundance has been low since 2019, and none were caught this year. Prosomal widths of mature and newly mature males and females show decreasing trends over the time series in the DBA.

The indices from this survey, along with the New Jersey Ocean Trawl and Delaware Fish and Wildlife Adult Trawl Survey indices, are used to estimate horseshoe crab abundance in the ARM Framework to produce optimal harvest limits for the upcoming year.

Spawning Surveys

The Delaware Bay spawning survey was completed for the twenty-fifth consecutive year in 2023. Ten beaches in Delaware and ten beaches in New Jersey were sampled. Peak spawning occurred during the second lunar period in May (17-21) in New Jersey and in the first lunar period in June (1-5) in Delaware. Baywide female and male spawning activity has exhibited a statistically significant increasing trend since 2010.

Tagging Studies

The USFWS continues to maintain a toll-free telephone number and a website for reporting horseshoe crab tag returns and assists interested parties in obtaining tags. Tagging work continues to be conducted by biomedical companies, research organizations, and other parties involved in outreach and spawning surveys. Beginning with the 2013 tagging season, additional efforts were implemented to ensure that current tagging programs are providing data that benefits the management of the coastwide horseshoe crab population. All existing and new tagging efforts are required to submit an annual application to be considered for the USFWS tagging program and all participants must submit an annual report along with their tagging and resighting data to indicate how their tagging program addresses at least one of the following objectives: determine horseshoe crab sub-population structure, estimate horseshoe crab movement and migration rates, and/or estimate survival and mortality of horseshoe crabs. The PRT recommends all tagging programs approved by the states coordinate with the USFWS tagging program, in order to ensure a consistent coastwide program to support management.

From 1999 through 2023, 428,553 horseshoe crabs have been tagged and released through the USFWS tagging program along the Atlantic coast, and 67,210 unique crabs have been recaptured. Horseshoe crabs have been tagged and released from every state on the Atlantic Coast from Florida to New Hampshire. In the early years of the program, tagging was centered around Delaware Bay; however, tagging has expanded and increased in Long Island Sound and the Southeast. Tagging information from this database has been used in the 2019 Benchmark Stock Assessment to define stock structure, estimate total mortality, and characterize impacts of biomedical use on horseshoe crab mortality.

New York Region Monitoring

Following the 2019 Benchmark Stock Assessment, which characterized the status of the horseshoe crab population in the New York region as “Poor”, the Board directed the PRT to monitor fishery-independent surveys in this area to track progress of state management actions toward improving this regional population. During the assessment, five surveys were included in the ARIMA model to characterize this population. One of these, the Northeast Area Monitoring and Assessment Program (NEAMAP), includes sample areas outside of the New York region, making it too data-intensive to specify the regional index on an annual basis. The most recent information from the state-conducted surveys used in the assessment is summarized below, but can be viewed in greater detail in the Connecticut and New York state compliance reports. The Western Long Island (WLI) Little Neck Bay and Manhasset Bay seine surveys were combined in the assessment to form a single index, but are shown below separately. None of these beach seine surveys were completed in 2020 due to the COVID-19 pandemic but resumed in 2021. Figures 5-8 show the annual index for each survey over the time series until 2023.

Connecticut

- Long Island Sound Trawl (LISTS) (Fall) – 2023 index – The 2022 and 2023 surveys were limited in April and June due to staff limitations and in June because of mechanical issues with the research vessel. The LISTS indices for 2023 were above average in both the spring and fall, though the spring index has been decreasing over the last few years.

The fall index has been increasing in recent years, with the 2023 index being the highest in the time series.

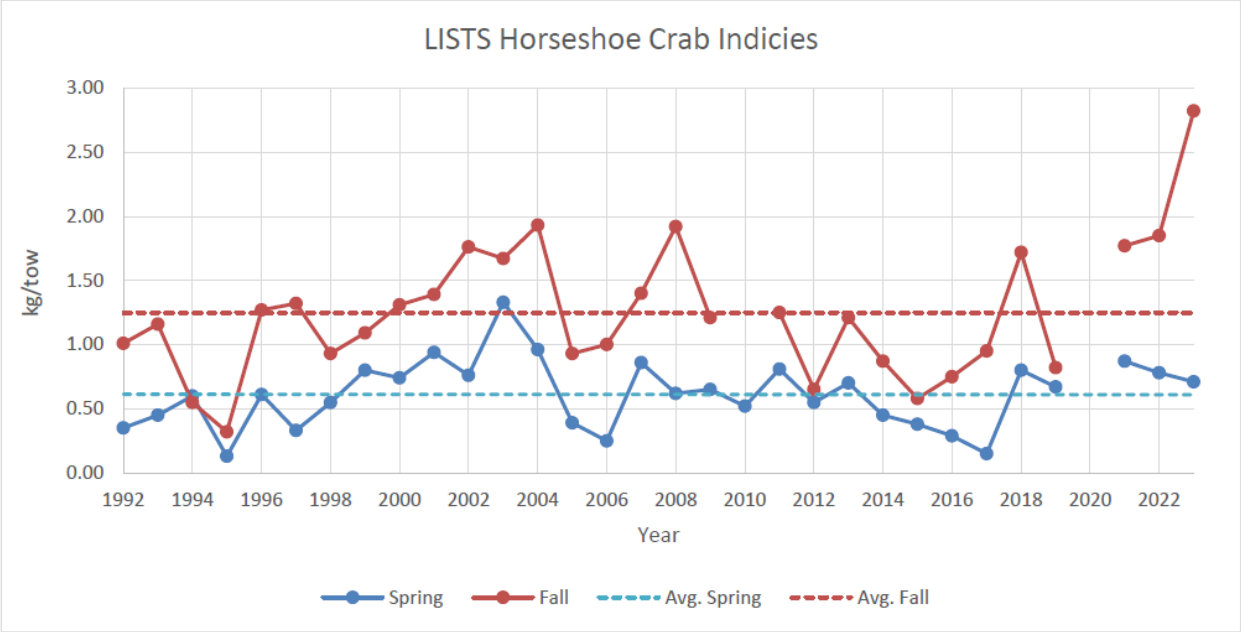

Figure 4. LISTS Horseshoe Crab Indices, 1992-2023.

New York

- Peconic Trawl – 2023 index = 0.26 (delta distribution average catch per unit effort [CPUE]), increase from 2022.
- WLI Jamaica Bay Seine (all horseshoe crabs) – 2023 index = 0.32 (geometric mean), increase from 2022.
- WLI Little Neck Bay Seine (all) – 2023 index = 1.80 (geometric mean), increase from 2022.
- WLI Manhasset Bay Seine (all) – 2023 index = 0.59 (geometric mean), decrease from 2022.

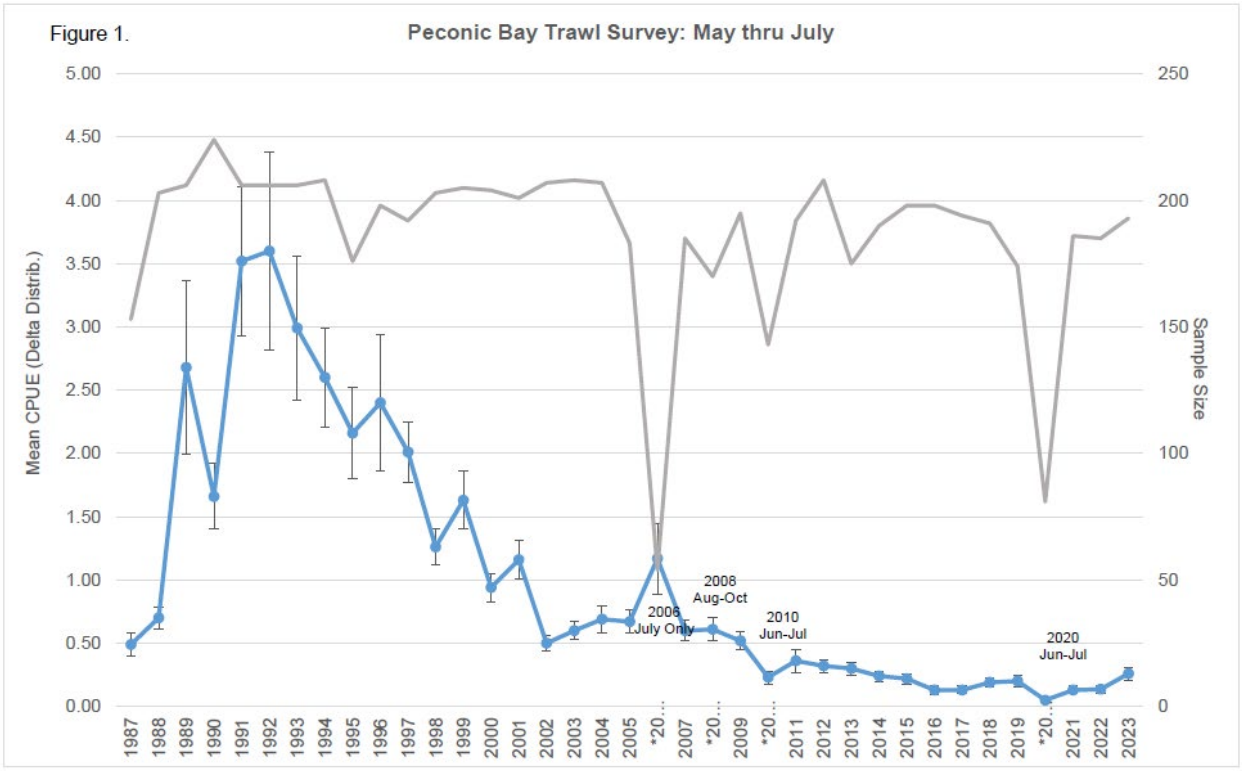

Figure 5. Peconic Bay Trawl Survey: May through July, 1987-2023. (Gray line=sample size, blue line=mean CPUE).

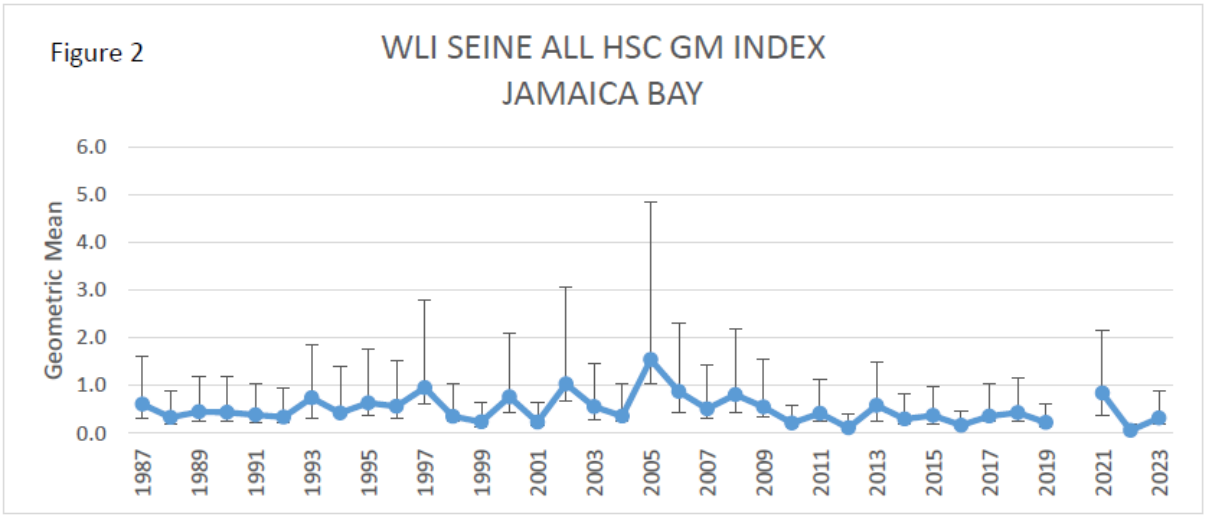

**Figure 6. NYSDEC WLI Jamaica Bay Beach Seine Survey All Horseshoe Crab GM Index, 1987-2023. ***Due to the COVID-19 pandemic, in 2020 sampling did not begin until July.

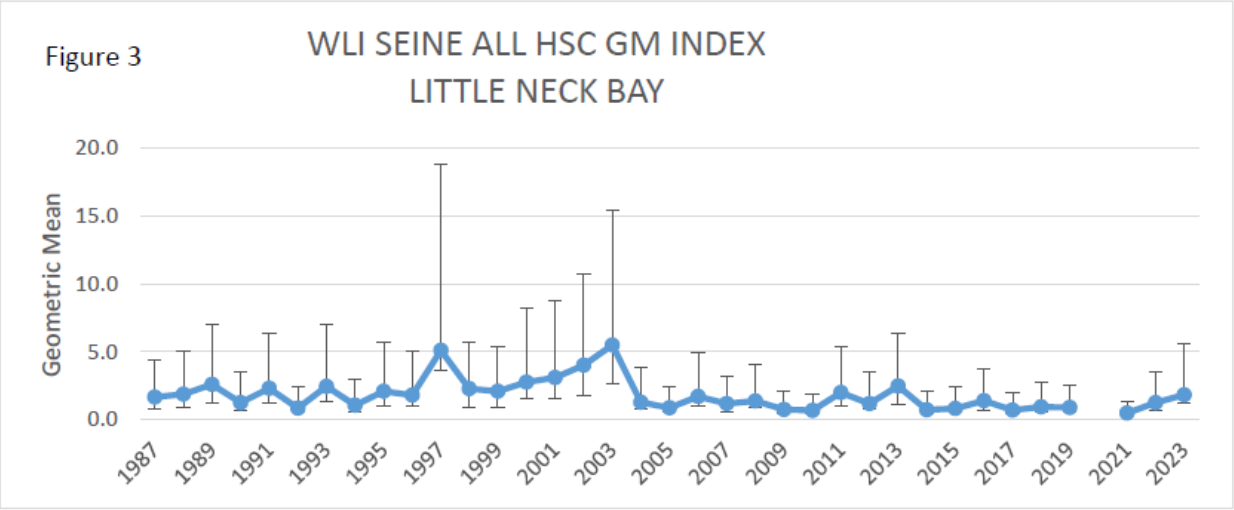

Figure 7. Little Neck Bay Seine Survey All Horseshoe Crab GM Index, 1987-2023. *Due to the COVID-19 pandemic, in 2020 sampling did not begin until July.

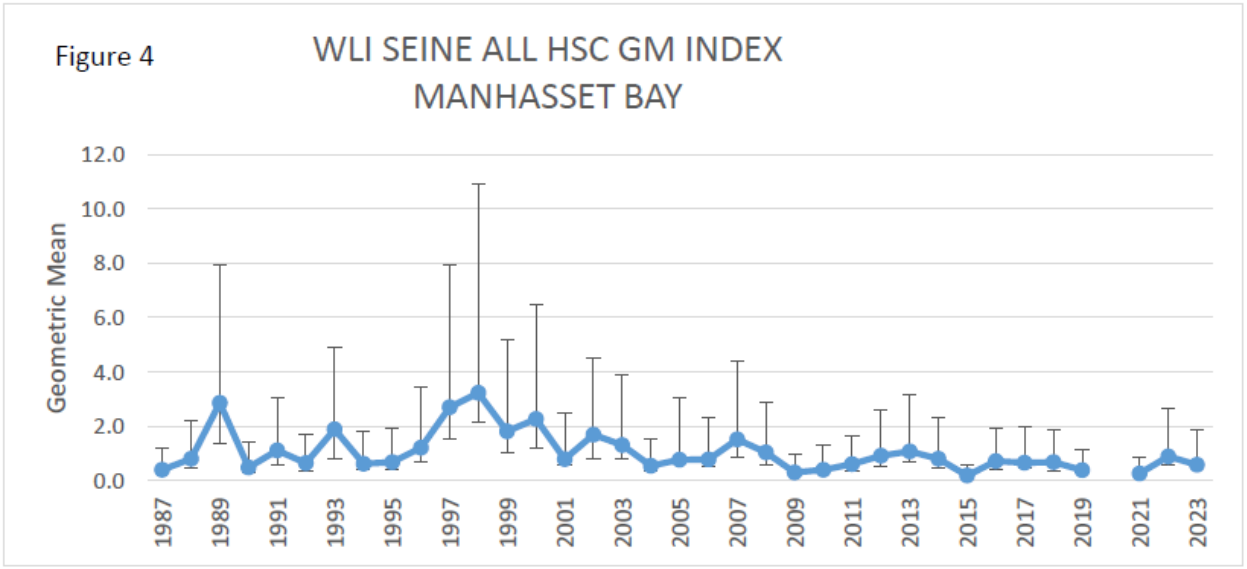

Figure 8. Manhasset Bay Seine Survey All Horseshoe Crab GM Index, 1987-2023. *Due to the COVID-19 pandemic, in 2020 sampling did not begin until July.

V. Status of Management Measures and Issues

ASMFC

Initial state harvest quotas were established through Addendum I. Addendum III outlined the monitoring requirements and recommendations for the states. Addendum IV set harvest closures and quotas, and other restrictions for New Jersey, Delaware, Maryland, and Virginia, which were continued in Addenda V and VI.

In February 2012 the Board approved Addendum VII to implement the ARM Framework; it was implemented in 2013. The ARM Framework was updated in 2021, and the Board adopted use of the revised ARM Framework through Addendum VIII in 2022. Addendum VIII maintains the Addendum VII allocation mechanism to divide the Delaware Bay optimized harvest output from the ARM Framework among the four Delaware Bay states (New Jersey, Delaware, Maryland, and Virginia east of the COLREGS line).

In reviewing state compliance with the FMP, the PRT noted that while New Jersey (through a moratorium) and Delaware do not allow harvest from January 1 to June 7, which was a provision of Addendum VI. Maryland regulations allow horseshoe crab harvest starting May 1. The PRT has some concerns that this creates an inconsistency within the Delaware Bay region. According to Addendum VI, the season closure provisions for New Jersey, Delaware, and Maryland (no harvest from January 1 to June 7) expired in April 2013. Subsequent Addenda VII and VII do not contain any seasonal provisions. Therefore, the PRT recommends the Board clarify whether the season closure provisions were intentionally or unintentionally excluded from these Addenda.

State-specific charts outlining compliance and monitoring measures are included in Section VII. Massachusetts did not report all required data to ASMFC by the required deadline. The PRT finds that all other jurisdictions appear to be in compliance with the FMP and subsequent Addenda in 2023.

Changes to State Regulations

- Massachusetts decreased its state quota to 140,000 crabs.
- The State of Connecticut passed bill no. 6484 that prohibits the hand harvesting of horseshoe crabs or their eggs in state waters, effective October 1st, 2023.
- Delaware changed its daily harvest limit from a volumetric quantity to a numerical quantity (3,000 male horseshoe crabs). Delaware also revised the dredging lottery process to reflect current fishery operation. The lottery date of January 1 was changed to a date and time announced annually by the Division based off fishery performance up to that point.

Alternative Baits

Trials testing effectiveness of alternative baits to horseshoe crab for the American eel and whelk fisheries have previously been conducted. Additionally, a survey of bait usage in the eel and whelk fisheries was conducted in 2017. This survey is available at: http://www.asmfc.org/uploads/file/5a04b785HSC_BaitSurveyTCReport_Oct2017.pdf.

Shorebirds

The USFWS received petitions in 2004 and 2005 to emergency list the red knot under the Endangered Species Act. In fall 2005, it determined that emergency listing was not warranted at the time. As part of a court settlement, the USFWS agreed to initiate proposed listings of over 200 species, including the red knot. In fall 2013, the USFWS released a proposal for listing the

red knot as threatened. In January 2015 the USFWS designated the red knot as threatened under the Endangered Species Act.

In 2022 the USFWS conducted an analysis of the changes to horseshoe crab management that would occur under the 2021 ARM Revision to determine the likelihood of impacts to the red knot. The finding from analysis is that there is a < 1% chance of a red knot population decline due to the implementation of potential female harvest under the revised ARM. Therefore, the Service concluded that take, defined under the Endangered Species Act as killing or injuring, of red knots is not likely.

The red knot has been listed as an endangered species in the state of New Jersey since 2012.

VI. PRT Recommendations and Research Needs

De Minimis

States may apply for *de minimis* status if, for the last two years, their combined average horseshoe crab bait landings (by numbers) constitute less than one percent of coastwide horseshoe crab bait landings for the same two-year period. States may petition the Board at any time for *de minimis* status, if their fishery falls below the threshold level. Once *de minimis* status is granted, designated States must submit annual reports to the Board justifying the continuance of *de minimis* status.

States that qualify for *de minimis* status are not required to implement any horseshoe crab harvest restriction measures, but are required to implement components A, B, E and F of the monitoring program (Section 3.5 of the FMP; further modified by Addendum III). Since *de minimis* states are exempt from a harvest cap, there is potential for horseshoe crab landings to shift to *de minimis* states and become substantial, before adequate action can be taken. To control shifts in horseshoe crab landings, *de minimis* states are encouraged to implement one of the following management measures:

1. Close their respective horseshoe crab bait fishery when landings exceed the *de minimis* threshold;
2. Establish a state horseshoe crab landing permit, making it only available to individuals with a history of landing horseshoe crabs in that state; or
3. Establish a maximum daily harvest limit of up to 25 horseshoe crabs per person per day. States which implement this measure can be relieved of mandatory monthly reporting, but must report all horseshoe crabs harvests on an annual basis.

The following states have been removed from the Management Board since its formation: Pennsylvania (2007), Maine (2011), and New Hampshire (2014). South Carolina, Georgia, and Florida are requesting *de minimis* status for the 2024 fishing season based on the 2022-2023 season landings, and meet the FMP requirements for being granted this status (Table 1). The PRT recommends granting these jurisdictions *de minimis* status.

Biomedical Threshold

The 1998 FMP established a biomedical mortality threshold of 57,500 crabs that, if exceeded, requires the Board to consider management action. This threshold has been exceeded in all but one year since 2008. Results of the 2019 Benchmark Stock Assessment indicate that levels of biomedical mortality prior to 2017 (the terminal year of data used in the assessment) did not have a significant effect on horseshoe crab population estimates or fishing mortality in the Delaware Bay region.

In 2020 the Board tasked the PDT to review the threshold for biomedical use to develop biologically-based options for the threshold and to develop options for action when the threshold is exceeded. It also tasked the PDT to review the best management practices (BMPs) for handling biomedical catch and suggest options for updating and implementing BMPs. The PDT concluded that given the lack of coastwide population estimates for horseshoe crabs, it is not possible to develop a biologically-based threshold for biomedical mortality. Thus, the PDT did not recommend a change to the threshold. Based on this information the Board determined no action is warranted. A Board-appointed work group was formed in 2023, which reviewed and updated the best management practices for biomedical handling to further reduce stress, injury, and mortality to horseshoe crabs collected for biomedical purposes.

Funding for Research and Monitoring Activities

The PRT strongly recommends the funding and continuation of the VT benthic trawl survey. 2023 sampling had to be reduced due to increased costs. This effort provides a statistically reliable estimate of horseshoe crab relative abundance that is essential to continued ARM implementation and use of the CMSA stock assessment model.

Discard Mortality Estimation

Results of the 2019 Benchmark Stock Assessment indicate that discard mortality may be significant, of similar or greater magnitude than bait harvest. The Review Panel's report indicated that these estimates could be further refined to reduce their uncertainty and more precisely characterize this mortality source. The PRT recommends the Board take steps to increase access to and use of data from the NEFOP, allowing for improved monitoring and estimation of discard mortality.

Improvement of the New York Regional Population

Results of the 2019 Benchmark Stock Assessment and 2024 update indicate a "Poor" status for the New York regional population, due to negative trends in regional abundance indices. New York and Connecticut have indicated that they will take actions within their states to improve this population. The PRT and Board have recommended such actions so that this population's status may improve.

Prior to the 2022 Spring season, Connecticut implemented measures to reduce harvest, including the commercial fishing season moving from May 22 to the calendar date three days after the last full or new moon (whichever is later) in May, and a new 5-day closure centered on

the first moon phase in June. The daily possession limit for commercial hand-harvest was also decreased from 500 to 150 crabs. Effective October 1, 2023, hand harvest of horseshoe crabs and their eggs is prohibited in Connecticut. The New York state legislature is currently considering a bill that would prohibit all commercial and biomedical harvest of horseshoe crabs. If approved by the Governor it would take effect January 1, 2025.

The PRT will continue to annually report regional indices of abundance so that progress of management actions may be tracked through the annual FMP Reviews.

VII. State Compliance and Monitoring Measures

MASSACHUSETTS		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	Did not request *de minimis*	Did not request *de minimis*
Bait Harvest Restrictions and Landings		
ASMFC Quota (Voluntary State Quota)	330,377 (140,000)	330,377 (165,000)
Landings	139,746	--
Other Restrictions	Bait: 400 crab daily limit year round; limited entry; Biomedical: 1,000 crab daily limit; Conch pot and eel fishermen: no possession limit Mobile gear: 75 crab trip limit, exempted from "no-fishing days" starting 10/9/2020; All: May and June 5-day lunar closures; 7" PW minimum size; Pleasant Bay Closed Area	Bait: 300 crab daily limit year round; Biomedical: 200,000 crab quota; 1,000 crab daily limit; Conch pot and eel fishermen: no possession limit All: Closure April 15th-June 7th; No mobile gear harvest Fri-Sat during summer flounder season; 7" PW minimum size; Closed Areas
Landings	139,746	-
Monitoring Component A_1		
Mandatory monthly reporting	Yes, plus weekly dealer reporting through SAFIS	Yes, plus weekly dealer reporting through SAFIS
Characterize commercial bait fishery	Yes	Yes
Monitoring Component A_2		
Biomedical reporting	Yes	Yes
Required information for biomedical use of crabs	Yes	Yes
Monitoring Component B_2 Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B_3 Implement spawning survey	Yes	Yes
Monitoring Component B_4 Tagging program	Yes – w/NPS and USFWS; Pleasant Bay, Monomy NWR, Waquoit Bay	Yes – w/NPS and USFWS; Pleasant Bay, Monomy NWR, Waquoit Bay

RHODE ISLAND		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	Did not request *de minimis*	Did not request *de minimis*
Bait Harvest Restrictions and Landings		
ASMFC Quota (Voluntary State Quota)	26,053 (8,398)	26,053 (8,398)
Other Restrictions	State Restrictions: - Daily possession limit: 60 crabs per permit - Bait Fishery Closure: May 1-May 31 - Biomedical Fishery Closure: 48 hours prior to and 48 hours following new and full moons during May. - Biomedical quota and best management practices	State Restrictions: - Daily possession limit: 60 crabs per permit - Bait Fishery Closure: May 1-May 31 - Biomedical Fishery Closure: 48 hours prior to and 48 hours following new and full moons during May - Biomedical quota and best management practices
Landings	2,314	--
Monitoring Component A_1		
Mandatory monthly reporting	Yes, weekly call in and monthly on paper	Yes, weekly call in and monthly on paper
Characterize commercial bait fishery	Yes	Yes
Monitoring Component A_2		
Biomedical reporting	Yes	Yes
Required information for biomedical use of crabs	Yes	Yes
Monitoring Component B_2 Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B_3 Implement spawning survey	Yes, since 2000	Yes
Monitoring Component B_4 Tagging program	No	No

CONNECTICUT		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	Did not request *de minimis*	Did not request *de minimis*
Bait Harvest Restrictions and Landings		
ASMFC Quota	48,689	48,689
Other Restrictions	- Limited entry program - Hand-harvest possession limit of 150 crabs - seasonal and lunar closures -Prohibit harvest effective Oct. 1, 2023	Prohibit hand harvest of horseshoe crabs or eggs in state waters, effective Oct. 1, 2023
Landings	3,927	--
Monitoring Component A_1		
Mandatory monthly reporting	Yes	Yes
Characterize commercial bait fishery	No – exempt under Addendum III because landings are < 5% of coastwide total	No – exempt under Addendum III because landings are < 5% of coastwide total
Monitoring Component A_2		
Biomedical reporting	Not Applicable	Not Applicable
Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component B_2 Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B_3 Implement spawning survey	Yes, since 1999 (methods differ from DE Bay survey)	Yes
Monitoring Component B_4 Tagging program	Yes, in collaboration with local universities (Sacred Heart University since 2015)	Yes

NEW YORK		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	Did not request *de minimis*	Did not request *de minimis*
Bait Harvest Restrictions and Landings		
ASMFC Quota (Voluntary State Quota)	366,272 (150,000)	366,272 (150,000)
Other Restrictions	Ability to close areas to harvest; seasonal quotas and daily harvest limits Five-day lunar closures around the full moon in May and the new moon in June. Initial trip limit dropped to 150 crabs in period 2.	Ability to close areas to harvest; seasonal quotas and daily harvest limits - Five-day lunar closures around the full moon in May and the new moon in June. -Initial trip limit dropped to 150 crabs in period 2.
Landings	130,658	--
Monitoring Component A_1		
Mandatory monthly reporting	Yes	Yes
Characterize commercial bait fishery	Yes	Yes
Monitoring Component A_2		
Biomedical reporting	Yes	Yes
Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component B_2 Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B_3 Implement spawning survey	Yes	Yes
Monitoring Component B_4 Tagging program	Yes	Yes

NEW JERSEY		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	Did not request *de miminis*	Does not request *de miminis*
Bait Harvest Restrictions and Landings		
ASMFC Quota (Voluntary State Quota)	164,364 (male only) (0)	173,014 (male only) (0)
Other Restrictions	Bait harvest moratorium	Bait harvest moratorium
Landings	0	--
Monitoring Component A_1		
Mandatory monthly reporting	Not Applicable	Not Applicable
Characterize commercial bait fishery	Not Applicable	Not Applicable
Monitoring Component A_2		
Biomedical reporting	Yes	Yes
Required information for biomedical use of crabs	Yes	Yes
Monitoring Component B_2 Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B_3 Implement spawning survey	Yes	Yes
Monitoring Component B_4 Tagging program	No	No
Monitoring Component B_5 Egg abundance survey	Yes, no longer mandatory	Yes
Monitoring Component B_6 Shorebird monitoring program	Yes	Yes

DELAWARE		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	Did not request *de minimis*	Did not request *de minimis*
Bait Harvest Restrictions and Landings		
ASMFC Quota	164,364 (male only)	173,014 (male only)
Other Restrictions	Closed season (Jan 1 – June 7)	Closed season (Jan 1 – June 7)
Landings	168,208 (male only)	--
Monitoring Component A_1		
Mandatory monthly reporting	Yes (daily call-in reports & monthly logbooks)	Yes
Characterize commercial bait fishery	Yes	Yes
Monitoring Component A_2		
Biomedical reporting	Not Applicable	Not Applicable
Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component B_2 Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B_3 Implement spawning survey	Yes	Yes
Monitoring Component B_4 Tagging program	No state program but has assisted in the past with various Delaware Bay horseshoe crab tagging initiatives	No
Monitoring Component B_6 Shorebird monitoring program	Yes	Yes

MARYLAND		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	Did not request *de minimis*	Did not request *de minimis*
Bait Harvest Restrictions and Landings		
ASMFC Quota	255,980 (male only)	255,980 (male only)
Other Restrictions	Season closure until May 1, catch limits, no harvest Saturday and Sunday	Season closure until May 1, catch limits, no harvest Saturday and Sunday
Landings	186,466 (male only)	--
Monitoring Component A_1		
Mandatory monthly reporting	Yes (weekly reports for permit holders; monthly for non-permit holders)	Yes (weekly reports for permit holders; monthly for non-permit holders)
Characterize commercial bait fishery	Yes	Yes
Monitoring Component A_2		
Biomedical reporting	Yes	Yes
Required information for biomedical use of crabs	Yes	Yes
Monitoring Component B_2 Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B_3 Implement spawning survey	Yes	Yes
Monitoring Component B_4 Tagging program	Yes	Yes

POTOMAC RIVER FISHERIES COMMISSION		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	Did not request *de minimis*	Did not request *de minimis*
Ability to close fishery if *de minimis* threshold is reached	No horseshoe crab fishery	No horseshoe crab fishery
Daily possession limit <25 for *de minimis* state		
HSC landing permit		
Bait Harvest Restrictions and Landings		
ASMFC Quota	0	0
Other Restrictions	None	None
Landings	0	0
Monitoring Component A_1		
Mandatory monthly reporting	Yes - weekly	Yes - weekly
Characterize commercial bait fishery	Not Applicable	Not Applicable
Monitoring Component A_2		
Biomedical reporting	Not Applicable	Not Applicable
Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component B_2 Continue existing benthic sampling programs	Not Applicable	Not Applicable
Monitoring Component B_3 Implement spawning survey	Not Applicable	Not Applicable
Monitoring Component B_4 Tagging program	Not Applicable	Not Applicable

VIRGINIA		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	Did not request *de minimis*	Did not request *de minimis*
Bait Harvest Restrictions and Landings		
ASMFC Quota (Voluntary State Quota)	172,828 (81,331 male-only east of COLREGS line)	172,828 (81,331 male-only east of COLREGS line)
Other Restrictions	Closed season (January 1 – June 7) for federal waters. Harvest of horseshoe crabs east of the COLREGS line limited to trawl gear and dredge gear.	Closed season (January 1 – June 7) for federal waters. Harvest of horseshoe crabs east of the COLREGS line limited to trawl gear and dredge gear.
Landings	107,166 (85,788 males)	--
Monitoring Component A_1		
Mandatory monthly reporting	Yes	Yes
Characterize commercial bait fishery	Yes	Yes
Monitoring Component A_2		
Biomedical reporting	Yes	Yes
Required information for biomedical use of crabs	Yes	Yes
Monitoring Component B_2 Continue existing benthic sampling programs	Not Applicable	Not Applicable
Monitoring Component B_3 Implement spawning survey	No	No
Monitoring Component B_4 Tagging program	No	No

NORTH CAROLINA		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	Did not request *de minimis*	Did not request *de minimis*
Bait Harvest Restrictions and Landings		
ASMFC Quota	24,036	24,036
Other Restrictions	Trip limit of 50 crabs; Proclamation authority to adjust trip limits, seasons, etc.	Trip limit of 50 crabs; Proclamation authority to adjust trip limits, seasons, etc.
Landings	934	--
Monitoring Component A_1		
Mandatory monthly reporting	Yes	Yes
Characterize commercial bait fishery	Yes	Yes
Monitoring Component A_2		
Biomedical reporting	Not Applicable	Not Applicable
Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component B_2 Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B_3 Implement spawning survey	No	No
Monitoring Component B_4 Tagging program	No	No

SOUTH CAROLINA		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	*De minimis* status granted for 2023.	*De minimis* requested for 2024 and meets criteria.
Ability to close fishery if *de minimis* threshold is reached	No horseshoe crab bait fishery	No horseshoe crab bait fishery
Daily possession limit <25 for *de minimis* state		
HSC landing permit		
Bait Harvest Restrictions and Landings		
ASMFC Quota	0	0
Other Restrictions	None	None
Landings	0	--
Monitoring Component A_1		
Mandatory monthly reporting	Yes (Biomedical)	Yes (Biomedical)
Characterize commercial bait fishery	Not Applicable	Not Applicable
Monitoring Component A_2		
Biomedical reporting	Yes	Yes
Required information for biomedical use of crabs	Yes	Yes
Monitoring Component B_2 Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B_3 Implement spawning survey	Yes	Yes
Monitoring Component B_4 Tagging program	Yes	Yes

GEORGIA		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	*De minimis* status granted in 2023.	*De minimis* requested for 2024 and meets criteria.
Ability to close fishery if *de minimis* threshold is reached	Yes	Yes
Daily possession limit <25 for *de minimis* state	25/person; 75/vessel with 3 licensees	25/person; 75/vessel with 3 licensees
HSC landing permit	Must have commercial shrimp, crab, or whelk license; LOA permit required	Must have commercial shrimp, crab, or whelk license; LOA permit required
Bait Harvest Restrictions and Landings		
ASMFC Quota	29,312	29,312
Other Restrictions	None	None
Landings	0	--
Monitoring Component A_1		
Mandatory monthly reporting	Yes	Yes
Characterize commercial bait fishery	Not Applicable	Yes
Monitoring Component A_2		
Biomedical reporting	Not Applicable	Not Applicable
Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component B_2 Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B_3 Implement spawning survey	No	No
Monitoring Component B_4 Tagging program	No	No

FLORIDA		
	2023 Compliance	**2024 Management Proposal**
***De minimis* status**	*De minimis* status granted in 2023.	*De minimis* requested for 2024 and meets criteria.
Ability to close fishery if *de minimis* threshold is reached	Yes	Yes
Daily possession limit <25 for *de minimis* state	25/person w/ valid saltwater products license; 100/person with marine life endorsement	25/person w/ valid saltwater products license; 100/person with marine life endorsement
HSC landing permit	See above	See above
Bait Harvest Restrictions and Landings		
ASMFC Quota	9,455	9,455
Other Restrictions	Daily possession limit	Daily possession limit
Landings	Confidential	--
Monitoring Component A_1		
Mandatory monthly reporting	Yes	Yes
Characterize commercial bait fishery	Yes	Yes
Monitoring Component A_2		
Biomedical reporting	Not Applicable	Not Applicable
Required information for biomedical use of crabs	Not Applicable	Not Applicable
Monitoring Component B_2 Continue existing benthic sampling programs	Yes	Yes
Monitoring Component B_3 Implement spawning survey	Yes	Yes
Monitoring Component B_4 Tagging program	No	No

Horseshoe Crab Management Board, Atlantic States Marine Fisheries Commission
Comments Submitted by: Amanda Dey, PhD., September 24, 2024.

Dear Members of the Horseshoe Crab Management Board:

During the period 2001 to 2022, I served on ASMFC technical committees representing the NJ Div. of Fish and Wildlife's Endangered and Nongame Species Program (shorebirds). During this time, I oversaw the horseshoe crab surface egg survey in NJ. The ARM Sub-committee never requested surface egg density data during this period or thereafter. Had the ARM Subcommittee requested egg density data at any time, it would have been willingly shared in its entirety including historic egg density data.

From 2005 to 2012, NJ and DE conducted surface egg density surveys, and provided annual reports to the ASFMC and its technical committees. Raw surface egg density data (DE & NJ 2005 – 2012) were openly shared with technical committees including the HS Crab Technical Committee whose members primarily comprised the ARM Subcommittee. This included Horseshoe crab biologists Jordan Zimmerman (DE) and Jeffrey Brust (NJ), DE fisheries biometrician Rich Wong, ASFMC Fisheries Management Plan Coordinator Danielle Chesky, USFWS Gregory Breese [1]. Data were also provided to David Smith, USGS Leetown Aquatic Center, WV, as evidenced in a February 22, 2012, email from Dr. Smith to Kevin Kalasz, the DE Shorebird biologist (and my counterpart) [2].

In 2005 the States of NJ and DE implemented a "core-sample method" developed by Dr. Dave Smith USGS Leetown Center, WV [3]. This was meant to address variability of surface egg densities within/between beaches and standardize surface egg density data collection in NJ and DE. DE had not conducted surface egg surveys prior to 2005. Drs. Dick Weber (DE) and Daniel Hernandez (NJ) conducted egg surveys on behalf of state fish and wildlife agencies. We provided annual reports to the ASFMC and technical committees including detailed information on surface egg densities and description of differences in egg enumeration methods (volumetric estimation in DE, hand count in NJ) [4]. In 2013, DE disbanded its egg survey because of these differences. Surface egg surveys were conducted in NJ in the late 1980s, early 1990s, and 2000 to present. The results are described in Smith et al. 2022. [5]

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[1] Email 9-17-2012 from A. Dey, NJ Div. of Fish and Wildlife, to R. Wong, DE Marine Fisheries Biometrician with 2005-2012 raw surface egg data attached. The agency people listed above were copied on the email.
[2] Email 2-22-2012 from D. Smith, USGS, to K. Kalasz, DE Div. of Fish and Wildlife, cc: A Dey
[3] Pooler, P.S., D.R. Smith, R.E. Loveland, M.L. Botton, and S.F. Michels. 2003. Assessment of sampling methods to estimate horseshoe crab (Limulus polyphemus L.) egg density in Delaware Bay. Fish. Bull. 101:690-703.
[4] Delaware Bay Horseshoe Crab Egg Survey: 2005-2012. Report to the Atlantic States Marine Fisheries Commission. March 14, 2012. This report was updated on 3-14-13 and resubmitted to ASFMC to include results of 2012 site visits by DE & NJ fisheries biologists (pg. 9 bottom).
[5] Smith, J.A.M., A. Dey, K. Williams, T. Diehl, S. Feigin, and L. J. Niles. Horseshoe crab egg availability for shorebirds in Delaware Bay: Dramatic reduction after unregulated horseshoe crab harvest and limited recovery after 20 years of management. Aquatic Conserv: Mar Freshw Ecosyst. 2022;32:1913–1925.

Dr. Joseph Smith, probably in 2019, presented egg cluster and surface egg data, and their relationship, to a joint meeting of the HS Crab and Delaware Bay Ecosystem Technical Committees at ASFMC offices in Arlington VA. [6] Briefly, spawning beaches reached egg-cluster carrying capacity early in May, surface eggs increase rapidly and remained high through the shorebird stopover period. This condition was documented by Drs. Robert Loveland and Mark Botton in their comparison of early vs. late 1990s egg surveys in NJ. After overharvests of crabs, a reduced crab population, lower crab densities per spawning event, and less frequent spawning events, no longer functioned to generate "windrows" of eggs. There was much head-nodding and recognition by technical committee members, but no action was taken by ASFMC or fisheries biologists to consider the relationship between spawning crab population size, egg clusters, surface eggs and red knots.

State and federal fisheries biologists continue to wave away horseshoe crab egg data by characterizing it as "too variable" to be useful.

While surface egg densities and egg clusters are the most relevant measure of spawning crab population status vis-à-vis shorebirds, it is easier to "maximize" harvest and avoid conservation action by using fisheries trawl data -- including trawl data dismissed in 1998 as inadequate because it was "not geared to sample HS crabs".

Three such trawl surveys: DE 30-foot trawl, the NJ Ocean and NJ Delaware Bay Trawls, were recently used the Catch Multiple Survey Analysis in the ARM Model Revision.

In a 2015 composite estimate of crab population size (2012-2015), these same 3 trawls produced a doubling of the female crab population, and an increase by half of male crabs, over population estimates produced by the Virginia Tech Trawl Survey (which <u>is</u> geared to sample Horseshoe Crabs). This composite estimate was meant to fill in "gap" years where the Virginia Tech trawl was not funded (2012-2015).

This doubling of the female crab population was waved off as "variability" by Dr. John Sweka, USFWS at the October 9, 2015, joint technical committee meeting in Arlington, VA. [7]

The standard of "best available data" is being seriously misused.

Thank you for your time and consideration.

Amanda Dey, PhD

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[6] Smith, J. A. M. 2019 white paper, The Case for Beach-based Metrics 20191007.pdf

[7] ASFMC Horseshoe Crab and Delaware Bay Ecosystem Technical Committees Meeting, October 9, 2015, Doubletree Crystal City, 300 Army-Navy Drive, Arlington, VA 22202. Meeting Summary.

EARTHJUSTICE
BECAUSE THE EARTH NEEDS A GOOD LAWYER

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EARTHJUSTICE.ORG

September 27, 2024

Horseshoe Crab Management Board
Atlantic States Marine Fisheries Commission
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22201
comments@asmfc.org

VIA ELECTRONIC MAIL

Re: ASMFC's "Technical Response to External Review of the 2022 ARM Framework Revision"

Dear Members of the Horseshoe Crab Management Board:

New Jersey Audubon and Defenders of Wildlife urge the Atlantic States Marine Fisheries Commission ("ASMFC" or the "Commission") to maintain the prohibition on the bait harvest of female Delaware Bay-origin horseshoe crabs. The attached report by Dr. Kevin Shoemaker reaffirms that the Commission's adaptive resource management ("ARM") model fails to represent the relationship between red knots[1] and horseshoe crabs, underestimates the risks to both species, and is not suitable for determining bait harvest quotas. The ARM model therefore cannot legitimately serve as a basis for resuming the female bait harvest, and its recommendation for a female harvest should not be adopted.

Dr. Shoemaker has prepared two prior analyses of the ARM model: first during the public comment period in 2022, which was held before the model's computer code was publicly available, and again in 2023 after the computer code was released and analyzed by Dr. Shoemaker. Both of his analyses identified critical flaws demonstrating the grave risks that utilizing the ARM model would pose for the fragile Delaware Bay ecosystem. ASMFC responded to the merits of those analyses for the first time in April 2024, and Dr. Shoemaker addresses that response in his new report attached to this letter.[2]

In addition to Dr. Shoemaker's analyses, more than 34,000 members of the public opposed adopting the new model and resuming a female horseshoe crab harvest during the 2022 comment period, compared to only seven commenters in support. The public expressed concern about horseshoe crabs and the species that rely upon them, including the red knot, a

[1] In these comments, "red knot" refers to the *rufa* subspecies unless otherwise noted.
[2] Dr. Shoemaker's new report is attached as Exhibit A. Dr. Shoemaker's 2022 and 2023 analyses (hereinafter "Shoemaker 2022" and "Shoemaker 2023") are available at https://earthjustice.org/wp-content/uploads/2023/09/nj-audubon-defenders-of-wildlife-2023-comments-to-hsc-board.pdf. ASMFC's "Technical Response to External Review of the 2022 ARM Framework Revision" appeared in the Horseshoe Crab Management Board's spring 2024 meeting materials.

shorebird that migrates up to 17,000 miles every year and requires horseshoe crab eggs as a crucial energy source. In 2015, red knots were listed as a threatened species under the federal Endangered Species Act ("ESA"), with the overharvest of horseshoe crabs identified as a key contributor to their decline. If ASMFC authorized a bait harvest of female horseshoe crabs that reduced the food source available to migrating red knots, it would risk violating the ESA by depriving red knots of essential nutrition and thereby committing "take" of this threatened shorebird.

In his attached report, Dr. Shoemaker has carefully assessed ASMFC's response and demonstrated that it does not undermine his core conclusions. Critically, the model fails to accurately represent red knots' reliance on horseshoe crabs. It would not predict a decline in red knots even under a collapse of the horseshoe crab population, and it ignores horseshoe crab egg surveys, which are much more closely linked to red knot survival than the data inputs used by the model. The model also significantly overestimates red knots' survival rate—and ASMFC has misread or misconstrued many of the studies that it relies on to support its erroneously high estimate. In the few instances where ASMFC's claims provided a legitimate basis for Dr. Shoemaker to update his prior analyses, he has done so. Nevertheless, his updated analysis continues to demonstrate significant flaws in the ARM model.

This cover letter describes key points from Dr. Shoemaker's analysis and raises other concerns with the ARM model, including ASMFC's shifting strategies for gap-filling the extremely low estimates of newly mature female horseshoe crabs, which offer additional reasons that the model-generated female harvest recommendation should not be adopted. While elements of Dr. Shoemaker's analysis are summarized below, please refer to his attached report for his complete response.

I. The ARM model would fail to predict a decline in red knots even under a collapse of the horseshoe crab population.

At the outset, a key conclusion that Dr. Shoemaker reached two years ago holds true today and continues to counsel against relying on the ARM model to set harvest quotas: the model fails to accurately reflect the relationship between the red knot and horseshoe crab populations. In his 2022 analysis, Dr. Shoemaker evaluated the weak relationship between red knots and horseshoe crabs in the ARM model and calculated that the model would predict an increase in red knots passing through Delaware Bay even if horseshoe crabs disappeared entirely from the region.[3] This finding raised concerns about the model's ability to predict future declines in red knot abundance in Delaware Bay, including under new proposed horseshoe crab harvest scenarios, as it would not have predicted the historical decline that occurred in the wake of severe horseshoe crab overharvest in the late 20th century. Because ASMFC held its 2022 public comment period on the model at a time when the federal government was denying repeated requests to release the model's computer code to the public for independent review, Dr. Shoemaker by necessity based this finding on a back-of-the-envelope calculation, as he repeatedly noted in his analysis.[4]

[3] Shoemaker 2022 at 6-12.
[4] *Id.* at 7, 9.

ASMFC's April 2024 response nevertheless criticizes Dr. Shoemaker based on technical information that was not available to the public when he conducted his analysis. Regardless, the points raised in the April 2024 response are misguided. The response contains two principal contentions. First, with the benefit of the computer code, it is evident that an increase in red knots when there are zero horseshoe crabs in Delaware Bay is "mathematically impossible."[5] But this argument misses the point. The importance of Dr. Shoemaker's critique is not merely that the ARM model would be inadequate if horseshoe crab numbers actually reached zero, but that the model fails to represent red knots' response generally across a wide range of horseshoe crab abundance, including abundance figures that have been historically observed. Further, while the model would not predict an increase in red knots if the horseshoe crab population were literally zero, ASMFC has not—and could not—deny that the model *would* predict an increase in red knots at breathtakingly low horseshoe crab abundance levels indicating an ecosystem collapse.

ASMFC neglected to provide the precise horseshoe crab abundance threshold at which the model would begin to predict a decline in red knots at Delaware Bay, so Dr. Shoemaker reran his analysis using the model's computer code to answer that question. He calculated that the model would not predict a decline in red knot abundance unless the number of mature female horseshoe crabs in Delaware Bay fell below approximately 300,000—less than a tenth of the lowest number ever estimated from empirical data. Of course, red knot abundance plummeted when the relevant crab population actually reached that prior low. Yet the ARM model predicts that red knot abundance would remain stable even if the horseshoe crab population plunged dramatically lower still. Thus, for management purposes, whether the model begins to show a decline in red knots at zero or 300,000 female horseshoe crabs is immaterial. The material fact is that the model cannot accurately predict the red knot population response to horseshoe crab harvest scenarios such as the female harvest recommendation that is now being considered.

ASMFC's second argument is to accuse Dr. Shoemaker of conducting a "dangerous exercise"[6] for running a scenario well outside of the ARM model's training data. Furthermore, ASMFC forecasts unanimous support for curtailing the horseshoe crab harvest under such dire conditions in which the horseshoe crab population plummeted. Again, this misses the point, which is that the model would fail to predict a decline in red knots even under conditions that have been historically observed to cause such a decline. If the model is intended to be functional only within limited bounds of female horseshoe crab abundance, ASMFC should specify as much—especially if the model cannot function within the full range of historically observed conditions. Speculation that fisheries managers would intervene under catastrophic circumstances, even if well founded, does not alter the conclusion that the ARM model fails to accurately represent the environmental conditions that it purports to reflect.

II. The ARM model significantly overstates red knot survival rates.

The ARM model is also plagued by critical reliance on an assumed survival rate for red knots that is insupportably high. Dr. Shoemaker explained that the ARM model's finding that red

[5] ASMFC Response 26.
[6] *Id.*

knots have a 93% survival rate is likely erroneously high.[7] He hypothesized that this error resulted from relatively rare but consequential mistakes in the dataset. Specifically, the survival rate formula is based largely on resighting observations—birds that are spotted over multiple years, as identified by leg flags bearing unique codes that can be read from a distance without requiring physical recapture. However, the difficulty of reading leg flags from afar gives rise to the possibility of error. If the same leg flag is spotted more than once in a season, the subsequent sightings help to verify the initial identification, and there is a high likelihood that the bird was truly present in Delaware Bay. Conversely, flag codes spotted only once in a season (approximately 9% of total resighting observations) lack that verification and carry a higher probability that they were misreads. These misreads are likely to bias the estimated survival rate higher because the birds bearing those flag codes may be dead and are mistakenly recorded as living longer than they did, potentially by many years.

In his 2023 analysis, Dr. Shoemaker recalculated the red knot survival rate with the same dataset used by ASMFC but excluded birds that were resighted only once in a season. He found that the survival rate plunged to around 80%. He also calculated the survival rate exclusively from birds whose leg bands were read upon recapture—when misreads are likely to be negligible—and again calculated around 80%. The difference in survival rates has profound consequences: with ASMFC's likely erroneous survival rate, the average red knot would live nearly 14 years, but using the more realistic survival rate, the average lifespan drops to less than 5 years.

ASMFC's April 2024 analysis makes no attempt to refute or explain the discrepancy between the ARM model's survival rate and the survival rate calculated with more verified data. Instead, it undermines its own position by presenting data that directly support Dr. Shoemaker's findings. ASMFC's response states, "[O]bservations of birds more than 5 years old are common in the mark-recapture data set (approximately 20% of birds), with a maximum of 17 years between physical recaptures."[8] But as Dr. Shoemaker explains in his attached report, those figures are consistent with (if not lower than) what would be expected with an 80% survival rate. In contrast, under a 93% survival rate—as assumed by ASMFC—70% of birds would survive to age 5, and more than 2% would survive past 17 years. Yet ASMFC does not report any such results from the mark-recapture data, because they do not exist. Instead, ASMFC appears to have inadvertently raised the question of why, if the survival rate is 93%, there are so few red knots that are confirmed to be at least 5 years old.

ASMFC's next defense of its high survival rate estimate in the April 2024 response is to point to scientific publications, including Piersma et al. (2016), which studied a different subspecies of red knot (*Calidris canutus piersmai*) in Australia. While studies of a different subspecies across the world cannot substitute for a rigorous interpretation of the data collected at Delaware Bay, they may be informative. But Piersma et al. does not support ASMFC's

[7] In its April 2024 response, ASMFC implies that the ARM model found a survival rate of 90%, but the actual figure is 93%. ASMFC Response 6; ASMFC, *Revision to the Framework for Adaptive Management of Horseshoe Crab Harvest in the Delaware Bay Inclusive of Red Knot Conservation (Draft for Board Review)* 74 (2021). While the discrepancy may seem trivial, it amounts to a four-year difference in red knots' mean expected lifespan.

[8] ASMFC Response 6.

conclusions, and ASMFC appears to have misinterpreted the study. ASMFC asserts that Piersma et al. found "annual apparent survival for red knots in Western Australia were well above 90% in most years of their study."[9] Yet the study says no such thing: for most years of the study, the annual apparent survival percentage rate hovered in the 80s; it never reached 90%, and in the final two years, it plummeted to 76% and 67%.[10] (ASMFC may have confused *annual* survival rates with *seasonal* survival rates, which were also discussed in the study.) Moreover, Piersma et al. attributed the plunging survival rate observed in its study to habitat loss in a key staging area. Thus, the study found that red knot survival rates were *never* as high as ASMFC stated, and in fact the study supports the conclusion that problems at a staging area—like Delaware Bay for the *rufa*—can harm the species.

ASMFC's April 2024 response then references another scientific study (also of non-*rufa*), Boyd & Piersma (2001), for the proposition that some red knots have long lifespans—which, as explained above, is not in dispute and would be expected even under lower survival rates. Confoundingly, ASMFC's response fails to disclose that the study also estimated mean adult survival of red knots using two different methods, both of which yielded estimates below 80% over the duration of the study.[11] Again, ASMFC's response erroneously claims support from a scientific publication that does not support ASMFC's conclusions, and, to the contrary, supports Dr. Shoemaker's analysis. More fundamentally, the Commission fails to square its defense of a 93% red knot survival rate with the contrary data reported in the very studies cited in ASMFC's own response.

A third article that ASMFC cites, Tucker et al. (2022), was authored predominantly by researchers who collaborated to create the ARM model[12] and used the same method of counting singlet observations that Dr. Shoemaker critiques. The study and the ARM model made the same error and thereby generated similar results. The study therefore does not provide independent validation of the ARM model's methodology or estimated survival rate. All told, of the five studies that ASMFC cites to support a higher survival rate, three of them either directly refute ASMFC's position or replicate the ARM model's contested approach.

In addition, the scientific evidence for a red knot survival rate far lower than 93% continues to grow. A new study of red knots wintering in Texas, Louisiana, and Florida found mean apparent annual survival rates of 76.8%, 81.9%, and 79.0%, respectively.[13] Further, Amie MacDonald of Birds Canada recently presented research estimating that the true annual survival for adult red knots staging in Canada's James Bay is 81%.[14] Concerningly, both of

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[9] *Id.*

[10] Theunis Piersma et al., *Simultaneous declines in summer survival of three shorebird species signals a flyway at risk*, Journal of Applied Ecology vol. 53, 479, at 486 tbl. 5 (Apr. 2016).

[11] Hugh Boyd & Theunis Piersma, *Changing Balance Between Survival and Recruitment Explains Population Trends in Red Knots Calidris Canutus Islandica Wintering in Britain, 1969-1995*, Ardea vol. 89(2) 301, at 307 tbl. 2 (Jan. 2001).

[12] *Compare* ASMFC Response 1 (listing contributors to response) *with id.* at 31 (listing authors of Tucker et al.). Anna Tucker, Conor McGowan and James Lyons appear in both places.

[13] David J. Newstead et al., *Survival of red knots in the northern Gulf of Mexico*, Frontiers in Ecology and Evolution, at 7 tbl. 2 (Apr. 9, 2024) (attached as Exhibit B).

[14] Amie MacDonald et al., *Uniting* rufa *Red Knot resighting data throughout the western Atlantic Flyway offers myriad opportunities for survival analysis* 24, PowerPoint presentation (2024) (attached as Exhibit C).

these studies, like Piersma et al. (2016), found survival rates declining significantly over time. The red knot survival rate utilized in the ARM model is out of step with these research findings.

III. ASMFC provides no compelling reason to exclude horseshoe crab egg density surveys from the ARM model.

ASMFC's April 2024 response does not dispute Dr. Shoemaker's analysis that egg density—the concentration of horseshoe crab eggs on the beach—has a significant positive correlation to red knot survival. And ASMFC expressly (and accurately) "does not deny that eggs are the true link between horseshoe crabs and red knots."[15] Nevertheless, to explain the omission of egg density from the ARM model, ASMFC's response states, "Ultimately, egg density data could not be considered in the ARM Revision because they were not provided to the ARM Subcommittee when requested."[16]

Whatever data availability issues may have arisen previously, ASMFC presents no evidence that they persist. Moreover, ASMFC may have been at least partly responsible for any past availability issues: when excluding egg density data from the prior version of the ARM model, ASMFC made no mention of data availability and wrote, "We do not foresee using the egg survey data in our models or in our decision analysis in the foreseeable future, and we place low priority on continuing this survey and researching/improving survey methodologies."[17] In 2013, at the request of the state of Delaware, ASMFC dropped egg density surveys as a compliance requirement.[18] Thus, any data availability issues that ASMFC previously encountered may have arisen at least partly from ASMFC's own actions. In light of that history, it is especially inappropriate for ASMFC to criticize Dr. Shoemaker's analysis on the basis that it did not include egg density data from Delaware.[19] But regardless, now that the data availability concerns appear resolved, ASMFC's statement that it "is not opposed to using the egg density data" is welcome.[20]

While ASMFC describes challenges associated with incorporating egg density data into the ARM model, there is no justification for continuing to rely exclusively on measures (horseshoe crab trawl surveys) that bear minimal correlation to red knot survival while ignoring measures (egg surveys) that bear a strong correlation. The technical challenges raised by ASMFC center on the lack of a modeled connection between egg density and female horseshoe crab abundance, which the Commission acknowledges "must ultimately be linked."[21] More research into this system would be beneficial, but that should not prevent or

[15] ASMFC Response 11.
[16] *Id.*
[17] ASMFC, *A Framework for Adaptive Management of Horseshoe Crab Harvest in the Delaware Bay Constrained by Red Knot Conservation* 40 (Sept. 2009).
[18] *See* ASMFC Horseshoe Crab Delaware Bay Ecosystem Technical Committee, Meeting Summary 3 (Sept. 24, 2013) (recommending to discontinue egg surveys as a requirement); ASMFC, Proceedings of the Atlantic States Marine Fisheries Commission Horseshoe Crab Management Board 16-17 (Oct. 31, 2013) (formally removing egg surveys as a requirement).
[19] ASMFC Response 12.
[20] *Id.*
[21] *Id.*

delay ASMFC from including egg surveys in the ARM model. Indeed, the connection between female horseshoe crab abundance and red knot survival must logically include egg availability as an intermediate step. Thus, by modeling red knot survival as a linear function of horseshoe crab abundance, ASMFC implicitly assumes that horseshoe crab abundance strongly corresponds to egg availability. Although there are mechanistic questions about that link, ASMFC has nonetheless attempted to model the connection between horseshoe crab abundance and red knot survival. Given the availability of long-term egg survey data, the case is at least as strong for explicitly modeling the connection between red knot survival, egg density, and female horseshoe crab abundance.

IV. Dr. Shoemaker has reaffirmed his analysis of uncertainty in the ARM model and updated his assessment of trends in female horseshoe crab abundance.

As detailed in his attached report, Dr. Shoemaker has considered ASMFC's response regarding technical flaws in the horseshoe crab catch multiple survey analysis ("CMSA") model. Two aspects of that report bear noting here.

First, ASMFC acknowledged that Dr. Shoemaker's critique of how the CMSA model propagates uncertainty has merit and should be considered in future ARM revisions.[22] That acknowledgment is welcome, although it is inappropriate for ASMFC to continue using the inferior method pending some future revision. The Commission seeks to downplay this issue by noting that Dr. Shoemaker's suggested method of propagating uncertainty produces a similar equilibrium number of mature female horseshoe crabs as the CMSA model's method. But an essential question when propagating uncertainty is whether the model appropriately recognizes the degree of uncertainty (e.g., 95% confidence interval) associated with various harvest scenarios. Dr. Shoemaker has demonstrated that the CMSA model does not.

The critique about propagating uncertainty stems from the CMSA's treatment of the recruitment rate for mature female horseshoe crabs. The recruitment rate is an important parameter in the CMSA model, and this type of uncertainty is called "parameter uncertainty." The model's flawed treatment of parameter uncertainty is separate from—and additional to—the ARM model's flawed treatment of structural uncertainty, which Dr. Shoemaker explains in his first opening statement in the attached report. ASMFC characterizes the model as adaptive resource management, but such management entails testing various hypotheses. The relative weight given to each hypothesis changes as new information is learned about the ability of each hypothesis to represent the system. In contrast, the ARM model incorporates only one hypothesis and excludes consideration of any alternatives. While the model may be updated every few years to reflect new data, iterative updates do not amount to adaptive resource management. Under this flawed approach, the model never has to earn the 100% confidence value it is given, and ASMFC's asserted commitment to adaptive resource management is illusory. It is critical for the model to recognize all types of uncertainty when representing the ecosystem.

Second, Dr. Shoemaker reviewed ASMFC's response regarding trends in mature female horseshoe crab abundance. In his prior analyses, he observed that there had not been a

[22] *Id.* at 23.

statistically significant increase in such crabs since 2000, the first year when state-based harvest quotas became effective. ASMFC argued that the trend should be measured from 2010 to reflect the roughly ten years needed for female horseshoe crabs to reach maturity.[23] Dr. Shoemaker agreed that 2010 is a non-arbitrary threshold and re-ran his analysis from that year. He confirmed that the data from each of the three trawl surveys that inform the CMSA show apparent increases in adult female horseshoe crab abundance since 2010. Nevertheless, this finding is based only on the data reported from the trawl surveys and does not resolve concerns about the reliability of those surveys or the methodology for incorporating the data into the CMSA and the larger ARM model.

V. Unsupported estimates of newly mature female horseshoe crabs further compromise the ARM model's harvest recommendations.

The ARM model's recommendations are further undermined by the modelers' reliance on speculative estimates of a key data point needed to make the model work at all. Since 2019, the estimated abundance of newly mature female horseshoe crabs in the Delaware Bay population has been alarmingly low—even as low as zero. ASMFC has explained that the CMSA cannot operate with such low recruitment numbers and has devised various methods to "gap-fill" that data input.[24] Last year, the ARM Subcommittee and Delaware Bay Ecosystem Technical Committee ("DBETC") hypothesized that the low newly mature female horseshoe crab numbers did not reflect a true recruitment failure but rather a classification error, and responded by "re-proportion[ing]" 19.9% of the mature female estimate to the newly mature age class.[25] Their management recommendation to the Board, which included a substantial female bait harvest, was based on that recommendation.

However, at its meeting on September 13, 2024, the ARM Subcommittee and DBETC concluded that the previous hypothesis was incorrect. Accordingly, they now hypothesize that surveyors had misclassified newly mature female horseshoe crabs as immature, not fully mature, and they propose to gap-fill the newly mature female estimate by reallocating a quantum of immature female horseshoe crabs equal to a designated percentage of the newly mature *male* abundance estimate.

As of this writing, ASMFC has not released a written explanation of the new method, but it appears to lead to troubling results. Because the method will be applied retroactively, it will significantly increase the gap-filled estimates used since 2019, resulting in much larger population estimates. While the committees may have reason to believe that the newly mature females were misclassified as immature rather than fully mature, that does not mean that the estimate should be gap-filled based on surveys of newly mature males. How newly mature females were possibly misclassified is a separate question from how their abundance should be estimated.

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[23] *Id.* at 14.
[24] Memorandum from Delaware Bay Ecosystem Technical Committee and Adaptive Resource Management Subcommittee to Horseshoe Crab management Board re: "Delaware Bay Horseshoe Crab Harvest Recommendation for 2024" 2 (Oct. 2, 2023).
[25] *Id.*

More troublingly, the whiplash over newly mature female estimates demonstrates the peril of patching up the ARM model with speculative hypotheses even as it is being used to generate management recommendations. For the second consecutive year, ASMFC cannot credibly claim that it is running a peer-reviewed model because a significant function of the model has been assembled on the fly. What ASMFC believed to be the best hypothesis last year was immediately utilized for management recommendations and turned out to be erroneous. Now a new hypothesis is being substituted without peer review or any meaningful public scrutiny. And because it is already known that the newly mature female estimate will be zero again next year, the pattern of utilizing unproven methods to generate harvest recommendations will continue.

This new development compounds a long history of ASMFC using unfounded estimates of newly mature female horseshoe crabs in its modeling analyses. In his 2022 analysis, Dr. Shoemaker observed that the ARM model's estimate of horseshoe crab recruitment was strongly influenced by nonsensical estimates that ASMFC plugged in for the years 2013-2016, when the survey that measures newly mature females was not performed. The average annual estimated recruitment for 2003-2012 was 1.2 million newly mature females, and the average annual estimate for 2017-2019 was 1.9 million. But for 2013-2016, lacking the empirical measurement, ASMFC plugged in extraordinary estimates averaging *4.2 million*—nearly *2 million more than the highest empirical estimate ever recorded*.[26] That average masks even more absurd estimates for individual years, including *9.6 million* in 2013.[27]

Understandably, ASMFC's peer reviewers for the ARM model specifically emphasized that estimates of newly mature females needed to become more reliable over time by utilizing empirical counts.[28] And in its April 2024 response to Dr. Shoemaker, ASMFC acknowledged that the CMSA's volatile recruitment estimates for 2013-2016 were "nonsensical."[29] But the use of nonsensical, unempirical estimates has persisted well beyond anything that the peer reviewers contemplated. Under ASMFC's latest method for gap-filling the missing recruitment data, the estimates return to nonsensical territory, swinging from 8.2 million in 2020 to 1.3 million in 2021 and back up to 6.5 million in 2022.[30] ASMFC offers little reason to believe that these wildly diverging estimates reflect actual biological reality in the Delaware Bay ecosystem.

As a result of all the foregoing gap-filling efforts, the model now significantly deviates from the version that was peer-reviewed, both by the absence of actual newly mature female data and by the increased weight being placed on the newly mature male estimate. While all data inputs are imperfect, ideally the use of multiple inputs will balance out those imperfections.

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[26] ASMFC, *Supplemental Report to the 2021 Revision to the Adaptive Resource Management Framework* 16 tbl. 3 (2022).
[27] *Id.*
[28] *See* ASMFC, *Horseshoe Crab Adaptive Resource Management Revision Peer Review Report*, at 270 of PDF ("[T]he primiparous estimates for [the missing survey] years are not reliable, potentially introducing large uncertainties (and biases) in the projection model and ARM. The Panel agrees that such uncertainty will be reduced when more years of survey catch data become available in future.").
[29] ASMFC Response 23.
[30] Again, these data were presented at the September 13, 2024, ARM Subcommittee and DBETC meeting. No written explanation or additional context has been released to the public.

But if one input (newly mature females) is based entirely on another (newly mature males), any errors in the latter input will be replicated in the former and compromise more of the model. The ARM model's peer reviewers did not approve placing so much weight on—or taking that risk with—the estimate of newly mature males. The appropriate course now is to exercise caution and not recommend a female bait harvest based on an untested, unreviewed model. And regardless of any recommendations that the model may produce, ASMFC certainly should not reauthorize a female harvest.

As noted above, the problem with the newly mature female horseshoe crab estimate has been recognized and acknowledged for many years. When ASMFC accepted comments on the ARM revision in 2022, commenters were already raising concerns about low estimates dating to 2019. Now ASMFC suggests, based on a discussion with surveyors, that newly mature females were simply not being counted. It is striking that ASMFC spent five years devising hypotheses if the explanation was so straightforward, and it seems emblematic of a serious disconnect between ASMFC's complex computer model and conditions on the ground.

VI. Conclusion

The ARM model contains fundamental flaws rendering it unfit for managing the harvest of Delaware Bay-origin horseshoe crabs. Now that ASMFC has responded to Dr. Shoemaker's analysis, it remains evident that the model does not accurately represent the ecosystem, and its outputs are not a defensible basis for imposing additional risk on red knots and horseshoe crabs in Delaware Bay. Most importantly, the model cannot justify—and ASMFC must continue to prohibit—the bait harvest of female horseshoe crabs. Longer term, ASMFC should discontinue using the ARM model or make fundamental improvements through a transparent public process.

Respectfully submitted,

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EXHIBIT A

Report of Dr. Kevin Shoemaker

Review of the Atlantic States Marine Fisheries Commission's (ASMFC) Adaptive Resource Management (ARM) framework for regulating Horseshoe Crab bait harvest in Delaware Bay

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This document is submitted in reference to the Atlantic States Marine Fisheries Commission's (ASMFC) response to two peer review reports examining the 2021 revised ASMFC Adaptive Resource Management (ARM) framework – which has been approved for use in managing the Horseshoe Crab fishery in Delaware Bay. This document, and the 2022 and 2023 peer review reports referred to in the ASMFC response, were written by Kevin Shoemaker, Ph.D.

Dr. Shoemaker holds an M.S. and Ph.D. in Conservation Biology from SUNY-ESF in Syracuse, NY, and a B.S. degree in Biology from Haverford College. He was a Postdoctoral Fellow in the Department of Ecology and Evolution at Stony Brook University and has served as Senior Scientist at Applied Biomathematics, an ecological research and development company located in Setauket, NY. Dr. Shoemaker is currently an Associate Professor at the University of Nevada, Reno, where he uses quantitative models to inform wildlife conservation and management. He has over 15 years of experience as a wildlife ecologist and conservation modeler and has authored over 50 peer-reviewed scientific articles and book chapters on topics in ecology and conservation. He has expertise in Bayesian inference, population ecology, population viability analysis (PVA) and ecological modeling.

Overview

In 2022 and 2023 I was asked by Earthjustice (a not-for-profit public interest legal organization) to provide an independent peer review of the quantitative models used by the Atlantic States Marine Fisheries Commission (ASMFC) in their '*Revision to the Framework for Adaptive Management of Horseshoe Crab Harvest in the Delaware Bay Inclusive of Red Knot Conservation*' (ASMFC 2021; hereafter, 'revised ARM'). In both peer review reports, I identified several lines of evidence that suggest the revised ARM framework, as approved by ASMFC in 2022, underestimates the risk of commercial harvest of female horseshoe crabs on the Federally Threatened *rufa* Red Knot (*Calidris canutus* rufa) and other shorebirds that rely on the Delaware Bay staging area. Earlier this year (2024) ASMFC's ARM subcommittee released a statement in response to my review of the revised ARM (hereafter, "ASMFC response"). In this document I explain why my analysis generally holds up to the critiques raised in the ASMFC response, and highlight a couple of areas where the ASMFC response led me to reconsider my original conclusions. My overall conclusion remains the same: the revised ARM fails to recognize evidence that commercial harvest of female

horseshoe crabs could harm the red knot and other migratory shorebird populations, nor does it acknowledge the extent to which recovery of the red knot population may be tied to the growth of the Delaware Bay horseshoe crab population. Therefore, the revised ARM framework does not live up to its stated mission to "*Manage harvest of horseshoe crabs in the Delaware Bay to maximize harvest but also to maintain ecosystem integrity, provide adequate stopover habitat for migrating shorebirds, and ensure that the abundance of horseshoe crabs is not limiting the red knot stopover population or slowing recovery*" (ASMFC 2021).

I begin with a short essay (opening statement #1) arguing that the revised ARM framework failed to implement a key component of the Adaptive Resource Management (ARM) paradigm: multiple competing hypotheses. Not only does the revised ARM framework assume the relationship between red knots and horseshoe crabs is extremely weak, there are several compelling lines of evidence (including the re-analyses I presented in my 2023 peer review report) that this ecological relationship may in fact be much stronger than the "weak relationship" hypothesis that is currently formalized in the revised ARM. By assigning 100% of model weight to a "weak relationship" model -- whereby harvest of female horseshoe crabs is expected to have negligible impact on red knots -- the revised ARM misrepresents the risk of horseshoe crab harvest to red knots in contradiction with well-established science. Therefore, I argue that the ARM framework should be revised to incorporate at least one additional model that acknowledges the possibility of a strong and meaningful ecological relationship between red knots and horseshoe crabs.

Following this initial opening statement, I provide a revised analysis (opening statement #2, responding to ASMFC's comments on an analysis presented in my 2022 peer review report) that reinforces an important assertion from my reviews of the revised ARM framework -- specifically, that the fitted relationship between horseshoe crab abundance and red knot vital rates (survival and fecundity) is of insufficient magnitude to induce a decline in projected red knot population growth even under a major collapse of the horseshoe crab population. This point is central to my critique of the current ARM framework, as it clearly demonstrates that (1) the model is incapable of predicting the observed decline of red knots in the early 21st century, which is widely attributed to over-harvest of horseshoe crabs, and (2) the modeled relationship between red knots and horseshoe crabs is too weak to meaningfully constrain harvest recommendations of female horseshoe crabs. Finally, I provide a point-by-point response to ASMFC's comments.

Before I respond to the specific critiques raised by ASMFC, I emphasize that my peer review was motivated by the same stated principles that guide the ARM subcommittee: a commitment to science-based decision making in natural resources conservation and management. I reject the implication that my perspectives were infused with advocacy, or that my peer review reflected a "reluctance to learn within an adaptive management framework and a desire to cling to previous beliefs in spite of scientific advances". To the contrary, in the interest of encouraging productive scientific dialog, I reached out to the ASMFC reviewers soon after they began their review with an offer to share code and information and address any questions or concerns directly -- and although they did not respond, I would be happy to engage with the ARM subcommittee to discuss any of these issues in more depth. While I was compensated for my time by Earthjustice, no one attempted to exert any influence over my scientific conclusions, and my comments should be

received in the spirit they were offered: as an independent scientific evaluation of the revised ARM framework. As a quantitative ecologist and conservation biologist, I promote the use of data and simulation models in support of conservation decisions, and I believe in the value of adaptive management for making decisions in the face of uncertainty.

Opening statement #1: *the revised ARM framework fails to account for structural uncertainty by incorporating multiple alternative hypotheses*

Under the adaptive resource management (ARM) paradigm, regular monitoring of the managed system enables decision makers to (1) react to new information (e.g., reducing or eliminating harvest quotas after observing population declines) and (2) update their assumptions and understanding of the managed system, learning from mistakes and reinforcing successes to continually develop improved management recommendations (Nichols et al. 2007; Williams 2011; Runge 2011). Furthermore, the objectives and other key premises of the system (data sources, monitoring protocols, allowable management actions, etc.) are revisited periodically: a process commonly known as the "double loop" (Williams et al. 2011; ASMFC 2021). Adaptive management, when properly applied, is central to science-based management of natural systems. However, I argue that the revised ARM (and ASMFC's response to my peer review reports) fails to embrace a core feature of the adaptive resource management (ARM) paradigm: the incorporation of multiple alternative hypotheses (Williams 2011). That failure results in a misrepresentation of the risk of horseshoe crab harvest to red knots and a missed opportunity to learn about the system.

In any ARM problem there is an inherent trade-off between maximizing the rate of learning and minimizing the risk of harming or destabilizing the system (Runge 2011). For example, we might be able to learn more about the resilience of the horseshoe crab population and the ecological dependency of red knots on horseshoe crabs by harvesting as many female horseshoe crabs as possible and then closely monitoring the population response of both species to this disturbance. In contrast, placing a moratorium on commercial harvest of female horseshoe crabs may reduce the learning rate but it also minimizes the risk of imperiling or impeding the recovery of a threatened species. It seems clear that the risk calculus must shift to some extent when a threatened or endangered species (TES) is part of the equation (Runge 2011), as is the case for the horseshoe crab harvest in Delaware Bay (involving a federally listed shorebird). A fully precautionary approach might lead to paralysis (possibly precluding beneficial conservation actions), while an opposing strategy that prioritizes action in the face of substantial risk to TES would risk irrevocable consequences. By formally embracing multiple alternative hypotheses, the ARM paradigm offers a compelling middle ground (Runge 2011).

In a multi-hypothesis ARM framework, each alternative model formalizes a plausible alternative hypothesis about how the focal system works (Williams 2011; Runge 2011). This enables ARM frameworks to accommodate structural uncertainty: one of the key sources of uncertainty that must be considered in natural resources management (Williams 2011). Together, the ensemble of models represents the current state of scientific knowledge (including a range of plausible hypotheses and assumptions) and captures the uncertainty and risks inherent to a managed

natural system. Each alternative model is assigned a weight, or confidence value, that reflects its current standing relative to the other models included in the ARM framework. The weights assigned to each model at each successive decision point reflect each model's current degree of empirical support (the degree to which it effectively predicts current and historical system states and the observed response to prior management actions) and the degree to which the model captures the prior beliefs and risk tolerances of the stakeholder community (Williams 2011; Runge 2011).

By contrast, in the revised Delaware Bay ARM framework, a single hypothesis is effectively assigned a confidence value of 100%. Under this hypothesis, the relationship between horseshoe crab abundance and red knot demographic rates is so weak that it has little to no practical relevance to the dynamics of this system, as documented in this report (below) and in my 2022 peer review report. I will refer to this as the "weak relationship" hypothesis. My reanalysis, in which I detected a strong link between horseshoe crab egg densities and red knot survival (documented in my 2023 peer review report), along with numerous other published studies and government reports (e.g., Niles et al. 2009; USFWS 2014), provide evidence that the biotic interaction between horseshoe crabs and red knots may be substantially stronger and more ecologically meaningful than the ASMFC's model suggests. I will refer to this as the "strong relationship" hypothesis. The "strong relationship" hypothesis (unlike the "weak relationship" hypothesis) is capable of explaining the observed decline of the *rufa* red knot in the early years of the 21st century, for which the unregulated exploitation of horseshoe crabs in Delaware Bay is widely believed to be a primary cause (Niles et al. 2009; USFWS 2014). To accommodate structural uncertainty under the multi-hypothesis ARM paradigm (Williams 2011), it seems clear that a "strong relationship" model should be incorporated as a plausible hypothesis, and assigned some degree of credibility.

Furthermore, given the overwhelmingly negative public response to the prospect of harvesting female horseshoe crabs, it appears that the risk tolerance of the revised ARM may not be well aligned with that of the broader stakeholder community. By adding a plausible "strong relationship" model to the ARM framework, and by assigning an initial weight to this model that reflects diverse stakeholder perspectives, the ARM subcommittee could retain a robust, science-based management framework while also satisfying the many shorebird advocates within the stakeholder community that their perspectives are being formally considered and appropriately weighted. If the "weak relationship" model offered by ASMFC proves a more robust predictor of the future dynamics of this managed system relative to the "strong relationship" model and any other plausible alternative models, then this "weak relationship" model (the dominant hypothesis under the current ARM framework) will accrue a high credibility value over time and will come to dominate future recommendations for horseshoe crab harvest.

Regardless of the problematic issues with the original ARM framework that motivated the development of the revised ARM framework (documented in ASMFC 2021), the original ARM framework incorporated several alternative plausible hypotheses, including a weak, moderate, and strong biotic linkage between horseshoe crabs and red knots, respectively (McGowan et al. 2015). Furthermore, the original ARM framework used a formal stakeholder elicitation process to assign initial model weights to these models, ultimately leading ASMFC to assign substantial model weights to the moderate and strong interaction models, despite the fact that their empirical

analyses suggested a much weaker relationship (McGowan et al. 2015). For reasons I do not fully understand, ASMFC abandoned a multi-hypothesis approach in developing their revised ARM framework. ASMFC supplied several reasons why they believe the revised ARM framework was an improvement over the original; for example, they point out some inadequacies and technology limitations with the previous framework, and highlight the fact that the revised ARM framework makes extensive use of empirical data from Delaware Bay (ASMFC 2021). However, none of these factors precludes the use of a multi-hypothesis ARM framework: for example, formally incorporating one ore more hypotheses that mechanistically link horseshoe crab surface egg densities (for which long-term data are available) with red knot demography.

In the conclusion of their response, ASMFC criticized my peer-review reports for failing to include concrete suggestions for improvement. While offering specific solutions was not a primary objective of my peer review reports, I will offer one suggestion: I encourage the ARM subcommittee to work with other independent researchers and the stakeholder community to develop an ARM framework that formally incorporates alternative plausible hypotheses about the strength of this two-species interaction. There is a well-developed literature that provides concrete recommendations for implementing the multi-hypothesis ARM paradigm. Although there are several data gaps and challenges to address, the explicit mechanism linking horseshoe crabs to red knots must be formally recognized: red knots depend on horseshoe crab eggs available near the ground surface, which requires perturbation of egg masses deposited by sufficient numbers of spawners prior to or concurrent with the arrival of red knot migrants. These mechanistic linkages will greatly benefit from the incorporation of available data on horseshoe crab surface egg densities as well as spawning counts and egg mass counts if available. Although some of the linkages in this system remain uncertain, the spirit of ARM encourages modelers and stakeholders to confront uncertainty by developing a comprehensive program for iterative learning through constructive and well-conceived actions. Following the above discussion, the multi-hypothesis ARM paradigm offers a compelling solution for making well-considered decisions in the face of uncertainty, while continually gaining new insights about how the system works. The ingredients are in place for a well-designed, multi-hypothesis ARM framework for this system and I hope ASMFC rises to this challenge.

Opening statement #2: *the relationship between horseshoe crabs and red knots in the revised ARM framework is exceptionally weak*

In my peer review reports I have paid particularly close attention to the strength of the relationship between red knot demography and horseshoe crabs, as this relationship is in many ways the crux of the matter: if the relationship is weak, then harvesting female horseshoe crabs is not a major issue for red knots, and if the relationship is strong, then red knot populations may suffer or their recovery may be stifled. My decision to focus on the strength of this relationship was not because of some preconceived bias or “clinging to belief” (as ASMFC claims in the conclusion of their response) but because this relationship is so important that it deserves special scrutiny. One of the most important issues I raised in my 2022 peer review report was that the relationship between red knot demographic rates (survival and recruitment) and horseshoe crab abundance (later published in Tucker et al. 2023) was so weak that changes in the horseshoe crab population would (under

this model) have a negligible effect on the viability of the red knot population. Consequently, the revised ARM framework appeared unsuitable as a tool for making projections and contributing to policy decisions concerning management of this two-species system.

In their response, ASMFC criticized the back-of-the-envelope calculations in my 2022 report, noting that my calculations (performed before I gained access to the data and code for the red knot IPM) failed to recognize that ASMFC had log-transformed the horseshoe crab abundance values prior to incorporating these values in their integrated population model (IPM) (for my original report I used the raw values instead of the log-transformed values). This argument by ASMFC has more to do with mathematical technicalities than with ecology, and their objection is ultimately immaterial. When I run the same calculation with the log-transformed relationship, the conclusion remains the same: under the revised ARM framework, it would take a massive collapse of the horseshoe crab population (well under 0.5 million female horseshoe crabs across Delaware Bay) to cause a decline of the red knot population using mean parameter values from the red knot IPM (see below). Therefore, I do not concede that I was “wrong” (or “prejudicial”) on this issue in any of my analyses, as ASMFC claimed in their response under the “Criticism 8” header (below).

Prompted by the ASMFC review, I revised my original calculations to reflect the log-transformation used in the red knot demographic model – specifically, modeling red knot demographic rates as a function of log-transformed horseshoe crab abundance (Tucker et al. 2023). I generated figures illustrating these demographic effects to validate that they matched the relationships displayed in ASMFC 2021 and Tucker et al. (2023). After verifying a match (Fig. 1, left panels), I used this model to extrapolate the expected red knot survival and recruitment rates at very low horseshoe crab abundances (approaching zero) (Fig. 1, right panels). I then computed the expected population growth rate (lambda) for horseshoe crab abundances ranging from near-complete collapse (e.g., 1000 female horseshoe crabs) to recovery (around 20 million females), where values of lambda greater than or equal to one indicate a sustainable or growing red knot population.

These tests demonstrate that, under the revised ARM framework, red knot populations are expected to exhibit strong and sustained growth (lambda > 1) across all but the most extreme scenarios of horseshoe crab collapse (Fig. 2): red knot population growth would only be expected to exhibit mean net declines (lambda < 1) if the number of female horseshoe crabs in the Delaware Bay region fell below around 300,000 (the lowest recorded estimate from the last two decades places the number of females at around 4 million). Accordingly, the substance of my critique remains valid: the relationship between red knots and horseshoe crabs that was formalized within the revised ARM framework is exceptionally weak. Furthermore, this exercise demonstrates that the ARM model would not have predicted the decline of red knots due to horseshoe crab overharvest in the 1990s (which remains the dominant hypothesis for this observed population decline), which calls into question its usefulness in making projections and contributing to policy decisions that could help both species recover.

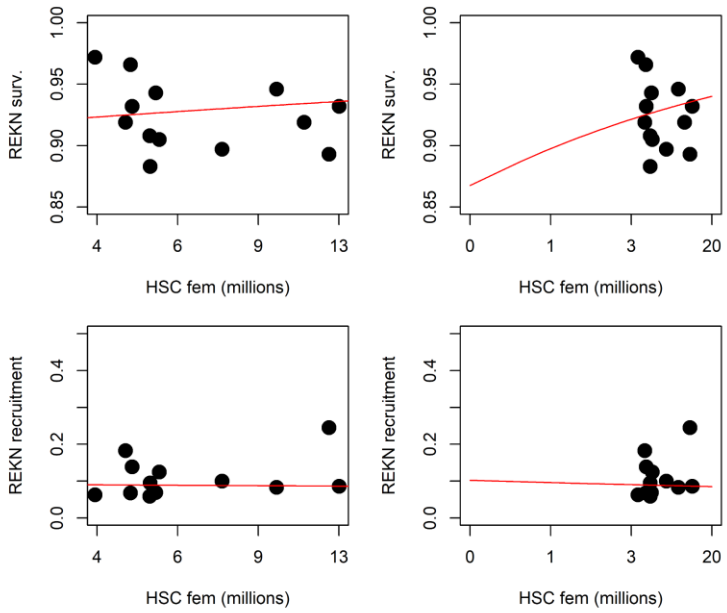

***Figure 1**. Visualizations of Red Knot (REKN) survival (y axis, top panels) and recruitment (y axis, lower panels) as a function of horseshoe crab abundance (x axis, all panels), derived from ASMFC's ARM model, later published as Tucker et al. (2023). Left-hand panels replicate Figure 4 from Tucker et al. (2023), whereas right-hand panels extend the x-axis to visualize these relationships at levels of horseshoe crab abundance ranging from well under 1 million (near-complete collapse of the stock) up to 20 million (an approximation of full recovery).*

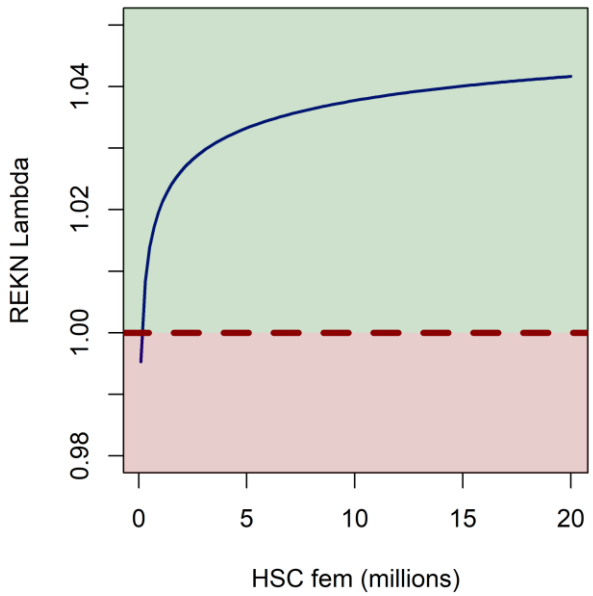

***Figure 2**. "Back of the envelope" illustration of the relationship between Red Knot (REKN) population growth, Lambda (y axis) and female horseshoe crab abundance (x axis, in millions), derived from ASMFC's ARM model, and published in Tucker et al. (2023). The*

range of the x-axis is intended to visualize the expected growth of the REKN population for horseshoe crab abundances ranging from well under 1 million (near-complete collapse of the stock) up to 20 million (an approximation of full recovery). Lamba ≥ 1 (green shaded region) represents a growing population whereas Lambda < 1 (red shaded region) represents a declining population. Under the revised ASMFC model, declines of the REKN population would only be expected under a near-complete collapse of the horseshoe crab population (total population less than 300,000 individuals across Delaware Bay).

Point-by-point response

NOTE: for the remainder of this document, all original text from the ASMFC response is in gray font, while my responses are indented and in dark green font. For clarity, I have removed some text from the original ASMFC response (for instance, historical summaries or overview statements) that I did not feel required a response. Also, I removed all figures from the ASMFC response- to view these figures, please refer to the original ASMFC response.

EXECUTIVE SUMMARY

While the ARM Revision represents significant advances in modeling and data use, the conversation around the revised ARM Framework quickly focused on the allowance of female horseshoe crab harvest when horseshoe crab population estimates are sufficiently high as to not limit red knot populations. The original ARM Framework had a technical flaw where it recommended 0 female horseshoe crab harvest when the adult female population was estimated to be less than 11.2 million, as it did from 2013-2022, or maximum female harvest (210,000 female horseshoe crabs) when the population was estimated to be greater than 11.2 million females, as it did in 2023. Rarely were the intermediate harvest levels selected by the model, as was shown through a simulation study. To correct this, the ARM Revision allowed a *gradual* increase of female harvest from 0-210,000 females as population estimates of female horseshoe crabs increased. The nuance of this change was lost in the discourse as stakeholders greatly opposed female harvest at any level, despite the original ARM Framework also recommending female harvest in recent years.

Based on my revised tests, which are discussed in opening statement #2, "sufficiently high as to not limit red knot populations" in the context of the revised ARM framework means all levels of female horseshoe crab abundance except for extreme collapse of the horseshoe crab fishery (<=300,000 females; Fig. 2). I acknowledge that the revised ARM framework incorporated some improvements over the original ARM, but I was not tasked with reviewing the original ARM framework: since the revised ARM was formally approved in 2022, the revised ARM is now the legitimate subject of scrutiny.

Briefly, the ARM Subcommittee maintains that the red knot and horseshoe crab population models used in the ARM Framework currently represent the best use of the available data. Red knot survival rates and horseshoe crab population trends from the ARM Revision are consistent with other published values or data sources in the Delaware Bay region. This includes horseshoe

crab egg density data, which were not provided to the ARM Subcommittee, but were subsequently published in the literature and show a similar trend to the horseshoe crab relative abundance indices.

> While the red knot demographic rates used in the revised ARM are consistent with some prior estimates, there are also many examples of lower survival rates in the published literature. While the previous literature is not conclusive on this point, in my re-analysis the Delaware Bay banding and resighting data support a survival rate of approximately 80%, much lower than the estimate of 93% that was used in the revised ARM framework. These two estimates have vastly different implications for the population ecology of this species, including the expected resilience of this population to horseshoe crab harvest and other threats (for example, a population with lower survival rates would likely be less resilient to a series of years with low resource availability) and the levels of recruitment that would be required to ensure population viability.
>
> I remain convinced that ASMFC's estimates of red knot survival are biased high due to the presence of misread errors in the resighting database. Perhaps the most convincing evidence for this is that survival estimates become substantially lower when "singlet" observations (resighting observations by a single observer at a single occasion, which are likely contaminated with flag misread errors) are dropped from the analysis. This method of subsetting the data has been suggested as a simple and effective technique for correcting potential biases in estimates of survival and survival trends due to misread errors (Tucker et al. 2019). If misread errors were not an issue, mean survival estimates should be similar whether or not these "singlet" observations are removed from the data set.

The ARM Subcommittee reiterates that an important benefit of the adaptive management process is the ability to make decisions even with imperfect knowledge of an ecological system. The overall goal of the ARM was to produce a decision-making framework informed by science and stakeholder values, given the available knowledge about the Delaware Bay ecosystem and horseshoe and red knot populations. At the time of the original ARM Framework, this knowledge was limited. However, the re-evaluation of the data, values, and knowledge on a regular basis is essential to the adaptive management process and is built into the ARM Framework. The 2022 ARM Revision represented a learning event where population models were re-designed to accommodate the advancement of data and knowledge since 2009. The peer reviews from Earthjustice fail to provide any real recommendations for improvement to the ARM Framework or provide other means for helping managers make an informed harvest decision beyond a mandate for zero female harvest at any population level. If the values of all stakeholders have changed (i.e., no female harvest under any circumstances), that change could be considered in a new approach in the future by the ARM Subcommittee. As it stands, the current ARM Framework represents the objectives previously established through stakeholder engagement: to manage harvest of horseshoe crabs in the Delaware Bay to maximize harvest but also to maintain ecosystem integrity, provide adequate stopover habitat for migrating shorebirds, and ensure that the abundance of horseshoe crabs is not limiting the red knot stopover population or slowing recovery.

First, I agree with the ARM subcommittee on the value of adaptive management for enabling informed decision making in the face of uncertainty and learning about the system via ongoing management and monitoring. However, navigating potential risks to a threatened or endangered species (TES) adds some complexity to the problem (as I discuss in opening statement #1 of this response). As I documented in my peer review reports, there are multiple lines of evidence suggesting that the revised ARM does not effectively account for the very real ecological risks of re-opening a commercial harvest on female horseshoe crabs. In failing to acknowledge the risks to red knots and the potential to jeopardize the recovery of this and other migratory shorebirds, the revised ARM appears to be mis-aligned with its own core objectives (from ASMFC 2021: "*Manage harvest of horseshoe crabs in the Delaware Bay to maximize harvest but also to maintain ecosystem integrity, provide adequate stopover habitat for migrating shorebirds, and ensure that the abundance of horseshoe crabs is not limiting the red knot stopover population or slowing recovery*".

As for the critique that my peer review failed to "provide any real recommendations for improvement to the ARM Framework or provide other means for helping managers make an informed harvest decision", my task as a peer reviewer was to evaluate the revised ARM on its merits rather than to develop an improved alternative. Nevertheless, in opening statement #1 above, I outline how a multi-hypothesis adaptive management framework could effectively incorporate alternative quantitative descriptions of the relationship between red knots and horseshoe crabs in Delaware Bay and reflect stakeholder perspectives, thereby representing a more legitimate approach to adaptive resource management than is reflected in the current version of the ARM framework.

Finally, I have read this review carefully and I thank ASMFC for their feedback. I continue to stand by the main conclusions from my 2022 and 2023 peer reviews -- with one notable exception: upon further consideration, ASMFC raised legitimate points regarding my use of linear regression to analyze the long-term trawl capture records for female horseshoe crabs. Nevertheless, the thrust of my critique of the revised ARM model remains valid. My re-analysis was offered as an independent evaluation of the data and was intended to contribute to a scientific dialog. In this spirit, I hope my peer-review reports and re-analyses contribute to ASMFC's ongoing efforts to understand and manage this system.

Criticism 1: Estimates of red knot survival used in the ARM appear to be artificially inflated, resulting in falsely optimistic estimates of population resilience.

- High survival and long lifespans are common for red knots and other shorebirds of similar size and life histories.
- Survival rates used in the ARM are calculated from the tagging data for red knots in the Delaware Bay region and are comparable with other published survival values.
- The tagging data were critically analyzed by the ARM Subcommittee to represent the

best available data and caveats to the survival estimates were provided in the ARM Revision. The analysis of the tagging data and its use in the modeling was commended by the peer review panel.

Technical Response: Dr. Shoemaker asserts that red knot annual survival probability is more likely closer to 0.8 than the 0.9 used in the revised ARM Framework, corresponding to an expected lifespan of about 5 years. There is not strong evidence for this lower annual survival probability for *rufa* red knot. In fact, previous studies of *rufa* red knot in Delaware Bay (McGowan et al. 2011) and Florida (Schwarzer et al. 2012) also estimated annual survival probability at approximately 0.9. In a separate published analysis, only using data collected by the state of Delaware, Tucker et al. (2022) estimated red knot annual survival probability at 0.89, and at 0.91 for ruddy turnstones, a species with similar body size and a similar annual life cycle.

The evidence I provided in my 2023 peer review report strongly suggests that the ASMFC's estimates of red knot survival are biased high, and average survival is closer to 80% in this system (versus 93% per the revised ARM framework). The primary evidence for this is that red knot survival estimates become much lower after "singlet" observations of flag codes (unconfirmed sightings that are likely to be contaminated with misread errors) are removed from the analysis, suggesting that flag misread errors are likely biasing the ASMFC's survival estimates high. A strong secondary line of evidence is that when the banding data are used as the sole source of information (these observations involve direct capture and are therefore much less likely to include misread errors), the mean survival estimate is again around 80%.

Finally, I think it is important to note that the adult red knot survival estimate used by ASMFC averages 93%, not 90% as stated in the comment above. While this may seem like a trivial point, the difference between 93% survival (corresponding to median expected lifespan of around 9.5 years and mean lifespan of nearly 15 years) and 90% survival (corresponding to median lifespan of around 6.5 years and mean lifespan of nearly 10 years) can make the difference between growth and decline for many real-world populations.

Additionally, observations of birds more than 5 years old are common in the mark- recapture data set (approximately 20% of birds), with a maximum of 17 years between physical recaptures. These observations are a conservative minimum estimate of lifespan.

This comment appears to confuse the concept of maximum lifespan with average lifespan. Even if median or expected lifespan is low, some fraction of individuals would be expected to reach more advanced ages; an expected lifespan of 5 years old does not preclude some fraction of individuals from reaching age 20 or beyond. At a constant survival rate of 80% (median lifespan of 3.1 years, mean lifespan approaching 5 years), we would expect more than 30% of individuals to live to age 5 and beyond (close to the "20% of birds" referred to in the above comment) and about 25% of individuals to live to age 6 and beyond (ignoring for simplicity that survival is likely to be lower in the first year of life). At a constant 80% survival rate, a little over 2% of birds would be expected to live past 17 years of age and

around 1% would live as long as 20 years. With thousands of unique individuals in the database, we would expect to observe many cases of high longevity in the database even if the mean annual survival rate was approximately 80%.

In contrast, the expected distribution of ages under a constant annual survival rate of 93% appears inconsistent with the Delaware Bay capture-recapture database: under this scenario, nearly 70% of individuals would be expected to survive to 5 years of age and beyond (far greater than the 20% cited in the above response by ASMFC), around 30% would reach 17 years of age and beyond, and around 3% would live to 50 years of age and beyond. Therefore, the information ASMFC cited above (i.e., that approximately 20% of birds in the database are more than 5 years old, with a maximum of 17 years verified age) is much more consistent with an average survival rate of 80% per year (as my reanalysis suggests) than with an average survival rate of 93% (as in the revised ARM).

Further, it is worth noting that almost all vertebrate species with delayed maturation life cycles, like red knots, that do not recruit to the breeding population until their third year, exhibit high adult survival rates. This is especially true when annual reproductive output is low, as it is with red knots, which lay only four eggs in a single nest per year.

This comment is hard to interpret, given that "high" and "low" are not defined. The red knot recruitment estimates used in the revised ARM are indeed very low (around 0.1 adult females recruited per female per year) and would require a very high survival (greater than approximately 90%) to result in a stable or growing population. However, red knot recruitment rates (in the revised ARM framework, a compound of reproductive output and survival to the first breeding migration) are poorly understood, and further research is needed to better understand this critical demographic process.

Outside of the Delaware Bay system, high survival and long lifespans are also reported for red knots and other shorebirds of similar size and annual cycle. For example, Piersma et al. (2016) report that annual apparent survival for red knots in Western Australia were well above 90% in most years of their study. In another example, Boyd and Piersma (2001) reported that they recaptured 155 birds in their sample >14 years after initial capture and 2 over 24 years after initial capture. There are published studies that report survival rates at 80% or lower, but to assert that the estimated survival rates used in the ARM based on the mark-recapture data are outliers or excessively high is erroneous.

While the previous literature is not definitive on this topic, I was primarily basing my conclusions on a reanalysis of the raw banding and resighting data from Delaware Bay rather than on prior studies. Regardless, the question of mean survival rates (and the role of staging areas in regulating survival and trends in survival) for red knots and other similar shorebirds is important for conservation and management and I hope this discussion continues in the form of peer-reviewed publications and other constructive scientific dialog.

In his report, Dr. Shoemaker claims that the survival estimates in the ARM are biased by individual misidentification, or flag misreads. Before analyzing the data, the ARM Subcommittee

conducted a thorough QA/QC, including filtering records to only lime and dark green flags that were first deployed by New Jersey or Delaware, removing records of 5 duplicate flags (n = 36), flags apparently resighted before they were deployed (n = 711), and flags that were never deployed (n = 1). Removal of these records represents only 0.35% of the total resightings.

Members of the ARM Subcommittee have worked extensively on the issue of flag misreads, including conducting a thorough simulation study investigating the situations in which misreads might bias survival estimates and the implications of that bias (Tucker et al. 2019). The key points from that work are: 1) misreads disproportionately affect survival estimates from the first years of the study, causing apparent negative trends in survival over time, and 2) there is an important tradeoff to consider between potential bias due to misreads and loss of precision if data filtering is applied. In that paper, the authors suggest a data filtering step of removing all observations of flags that were only seen once in a year as a way to potentially mitigate misidentification errors. However, there are nuances to consider when determining whether this is necessary, because this data filtering will inevitably remove some number of valid observations, and the authors identify thresholds that depend on study length and error rate. For a 10-year study, removing single observations becomes beneficial if the error rate is >5%; below that rate the bias is minimal relative to the detrimental effects of removing valid observations. In the Delaware Bay mark-recapture dataset, the misread error rate is between 0.38% (712 impossible observations/187,587 total) and 4.5% (8,448 single observations).

Additionally, the characteristic apparent negative trend in survival over time that would indicate bias due to misreads is not observed. To examine this further, the distribution of the number of resightings in a year for every flag (Figure 1) was plotted, with and without removing single observations. The shape of the resulting histogram indicates that removing these records results in fewer flags being seen once in a year than would be expected, i.e., that the data filtering removes a large number of valid records (> 3,000).

First, I acknowledge the important work done by members of the ARM subcommittee related to the issue of flag misread errors in shorebird resighting surveys. Notably, I relied heavily on Tucker et al. (2019) in my reanalysis of the resighting data, and used the method they suggested (removing 'singlet' observations from the analysis) to correct the potential bias in survival rates due to misread errors. Given the prior work on this issue by members of the ARM subcommittee, I was surprised that they did not attempt to correct for this possible source of bias when estimating red knot vital rates for the revised ARM. While they claim that the characteristic negative trend in survival across time (an artifact of this type of flag misread errors) is not observed, I am not convinced on this point. Upon visual inspection, there does appear to be a negative trend in survival across time in Fig. 3a from Tucker et al. (2023; also Fig. 44 from the revised ARM; ASMFC 2021), and this pattern also appeared in my analyses of the same data using data that included the "singlet" observations (which were potentially contaminated by misreads).

While I understand that ASMFC performed quality checks and removed obvious misread errors (e.g., flag codes observed before they were deployed) there is simply no way to detect an errant flag code if that code had been previously deployed in Delaware Bay

(although one recent paper suggested a model-based approach for estimating the misread process; Rakhimberdiev et al. 2023). The longer the period of flag deployment and the more birds that are tagged, the more likely an errantly recorded flag code may match with a previously deployed code. Importantly, if the errant match is to a bird that died many years prior, the capture-recapture analysis will adjust the estimated survival rate upward to reflect the "survival" of the long-dead bird (therefore, the longer the time series, the stronger the potential bias due to this class of flag misread errors). Finally, I note here (as I did in my 2023 peer review report) that all or nearly all of the available flag codes have been deployed at Delaware Bay (at least for the lime green flags). If so, any misread errors are likely to match with previously deployed flag codes and thereby inflate survival estimates.

To be safe, it makes sense to remove "singlet" observations, retaining only those flag codes that were confirmed via multiple observations to be present in Delaware Bay each year. This ensures that survival estimates are not biased from the potential misreads. Clearly, many of those "singlet" observations are true observations, and discarding these records necessarily involves omitting a substantial amount of valid data from downstream analyses. As an ecologist I understand the drive to use all available data. But in this case, even a small number of misread errors can induce an unacceptable bias in survival estimates. Furthermore, the dataset is so information-rich that we can afford to filter out a relatively small fraction of the data ("singlets" comprised approximately 9% of total resighting observations and around 35% of unique individual-year occurrences) to address an important source of potential bias in survival estimates.

Finally, I reiterate that the primary evidence that ASMFC's estimates of red knot survival are biased high is that there was a marked decline in the mean survival estimate after the singlet observations were removed (per Tucker et al. 2019). I do not know of a reasonable alternative interpretation of this result except as strong evidence for the influence of misread errors in the resightings database. Moreover, analyzing the capture/banding data (where misread errors are likely negligible) as the sole source of information also yielded a mean survival rate of around 80% after accounting for potential transients. Overall, I remain convinced that the red knot survival estimates used by ASMFC were biased high due to the presence of misread errors. I recommend that the ARM subcommittee correct for this source of bias, either by eliminating "singlet" observations or by explicitly modeling the flag misread process (e.g., Rakhimberdiev et al. 2023).

The integrated population model uses the mark-recapture data to estimate survival as well as parameters related to stopover site use within each year. There were concerns that removing single observations would bias estimation of within-year parameters, and because the error was below the thresholds identified by Tucker et al. (2019) and the characteristic negative trend in survival was not observed, single observations were kept in the data set for the analysis.

In this statement, the ARM subcommittee indicates that their decision not to account for potential misread errors was due largely to the perception that the "singlet" observations were necessary for fitting additional parameters in their open robust design (ORD) model

(the component of the red knot integrated population model that is primarily responsible for survival estimation). The ORD model uses the mark-resight data to fit multiple parameters related to within-year stopover use and availability for capture (e.g., timing of entry and exit to the staging area), in addition to among-year processes -- most notably, survival. The ORD model is impressively complex, and appears to perform well at parameter estimation when the data do not violate key assumptions (see Tucker et al. 2023 and my 2023 peer review report). However, like all statistical models, biases can arise due to violation of model assumptions. One of the key assumptions of the ORD model (like most capture-recapture analyses) is that the unique identification marks assigned to each individual (in this case, flag IDs) are neither lost nor mis-identified. Violation of this assumption can result in biased parameter estimates (especially survival).

It appears the red knot modelers were concerned that removing "singlet" observations could bias the estimates for some of the within-year parameters estimated in the ORD model, such as the dates of entry and exit each year. I can understand why the authors of the revised ARM wanted to fit a complex model that incorporated within-year processes. But there are always trade-offs when building ecological models. In this case, there is an apparent tradeoff between potential biases in survival estimates and potential biases in estimating within-year parameters like entry/exit dates. The modelers could have chosen to use a simpler capture-recapture model that did not explicitly incorporate detailed within-year processes (such as the Cormack Jolly Seber models I used in my 2023 peer review report) -- in this case, there would have been little downside to removing the "singlet" observations. However, the ARM subcommittee ultimately chose to use the more complex ORD framework.

Although I am sympathetic to the modelers in this case, I ultimately disagree that the benefits of adopting the more complex model should outweigh the potential biases in survival estimation due to misread errors. From a conservation and management perspective, survival represents one of the key processes of population ecology (survival and reproduction rates are typically referred to as "vital" rates in wildlife demography). Biased survival estimates can easily tip the balance between a growing and declining population. Biases in the estimated date of entry into the staging area (for example) would tend to be much less consequential for the revised ARM than biases in adult survival rates. Nonetheless, simulation trials would be necessary to quantify the degree to which removing "singlet" observations could bias the within-year parameter estimates and whether biases in within-year parameters could have an effect on survival estimates in the ORD model.

The ARM Revision (ASMFC 2022) contains a thorough discussion of this topic on pages 63-64, in which several hypotheses for the disagreement in annual survival probability estimates from the older studies was described. Dr. Shoemaker points to lower estimates of survival from studies from the early 2000s, when red knot annual survival probability was estimated to be close to 0.8. It is likely that older estimates were negatively biased to some extent due to short study periods, low detection probably, and unmodeled temporary emigration from the system. It is

also possible that during that time, when horseshoe crab populations were lower, red knot survival probability was truly lower. Alternatively, because permanent emigration from the system cannot be distinguished from mortality in older mark-recapture studies, a higher rate of permanent emigration (i.e., birds abandoning Delaware Bay for other spring stopover sites) would appear as lower survival probability. It is possible that there is a threshold of horseshoe crab abundance below which red knot survival probability might be expected to drop dramatically. If such a threshold exists, it was not observed over the time series included in the model (2005-2018). It has also been proposed that southern-wintering birds (with longer migrations) have lower annual survival probabilities than northern-wintering birds. Declines in the number of red knots overwintering in Argentina (Niles et al. 2009) suggest a decline in the southern-wintering subpopulation and therefore it is possible that in more recent years a greater proportion of the Delaware Bay stopover population are northern-wintering birds. As discussed in the report, this is a key area for future research.

> I appreciate this discussion and I understand there are many nuances that must be considered when comparing survival estimates across multiple populations or time periods. However, none of this information contradicts my reanalyses.
>
> In the above statement ("It is possible that there is a threshold of horseshoe crab abundance below which red knot survival probability might be expected to drop dramatically"), ASMFC acknowledges that the relationship between horseshoe crabs and red knots may in fact be stronger than the weak relationship they detected using the 2005-2018 time series. If a stronger relationship is plausible and consistent with the observed red knot decline (which has been attributed to unregulated commercial harvest of horseshoe crabs), it seems prudent to include this hypothesis within an ARM framework for this system. ASMFC maintains that the revised ARM represents a major advance because it uses data from the Delaware Bay system. However, in this case I think the ARM subcommittee may have prioritized mathematical elegance (ability to fit a single integrated model using only data collected from the target population) over comprehensiveness (e.g., including knowledge about the system prior to the deployment of leg flags). The more comprehensive approach (incorporating data from additional populations and time periods, including multiple alternative models) may be messier, but will better reflect relevant knowledge and more effectively guide critical decisions about this system. Furthermore, by fitting and comparing multiple models and data sources we can learn more rapidly about this two-species system and better understand where potential biases lie.

Criticism 2: Trawl-based indices of horseshoe crab abundance are inadequate for modeling the biotic interaction between red knots and horseshoe crabs.

- The inclusion of trawl surveys as indices of horseshoe crab abundance may be imperfect but it is the best available science and its use has been approved by several independent peer reviews.
- Most of the criticisms and caveats relevant to trawl surveys would also apply to egg

density and red knot abundance estimates.

- There is consensus among the trawl surveys for an increasing trend in horseshoe crab abundance since 2010.
- Trawl surveys are the standard for bottom dwelling organisms and for evaluating the abundance of many species.

Technical Response: Dr. Shoemaker argues that the trawl surveys used to monitor horseshoe crab abundance and serve as the basis of the catch multiple survey analysis (CMSA) are "…imperfect snapshots of the abundance of horseshoe crabs occupying Delaware Bay, obscured by differing survey methodologies and poorly understood aspects of horseshoe crab ecology, including seasonal and daily activities, habitat preferences, and degree of clustering on the seafloor." The ARM Subcommittee agrees that the trawl surveys are imperfect; catchability differs in each survey and possibly differs both within and between years. Such is the nature of fishery-independent surveys, and these same arguments also apply to indices of abundance for red knots and horseshoe crab egg density estimates. However, the use of the trawl surveys to index horseshoe crab abundance has gone through multiple peer reviews (e.g., ASMFC 2009b, ASMFC 2019, ASMFC 2022, Anstead et al. 2023) and found to be a scientifically sound measure of horseshoe crab abundance.

I agree that there is substantial uncertainty in all of the data sets related to horseshoe crab abundance in Delaware Bay, including the trawl surveys, spawning surveys and surface egg density estimates. Since ASMFC primarily used trawl-based indices of abundance (in addition to harvest, bycatch estimates, etc.), I focused my peer review reports on the uncertainty inherent to the trawl-based surveys. The presence of substantial uncertainty in this system underscores the critical importance of treating uncertainty appropriately--from acknowledging measurement uncertainty (uncertainty in the raw measurements), parameter uncertainty (uncertainty about the true value of a particular parameter) to formally incorporating structural uncertainty (multiple alternative hypotheses for how the system works). Furthermore, given that a Federally Threatened species is involved, I argue that plausible "worst-case" scenarios or hypotheses should be assigned substantial weight until they can be effectively ruled out. In this case, given the extreme uncertainty about horseshoe crab demography, behavior and abundance, I think it is prudent to acknowledge a non-negligible possibility that this population is not currently experiencing a strong recovery. While the ARM subcommittee claims that the revised ARM accounts for uncertainty, their accounting is incomplete. Most importantly, the revised ARM fails to acknowledge structural uncertainty; in effect, they are assigning a 100% credibility score to their chosen model structures (e.g., the CMSA model) and data sources (e.g., assigning substantial weight to the trawl-based surveys while ignoring the horseshoe crab egg density data). The horseshoe crab population may indeed be recovering (and as discussed below, there is some evidence for a recent population increase) but multi-model inference (using model weights to express the uncertainty among alternative models) is needed if we want to more realistically express our overall belief in this hypothesis.

Dr. Shoemaker faults the trawl-based indices of abundance used by the ARM Subcommittee for not considering environmental covariates that could influence the catch of horseshoe crabs, and he obtained the raw data to recalculate the indices using generalized linear models (GLM) and generalized additive models (GAM). The ARM Subcommittee does not disagree with this approach to standardizing abundance indices based on environmental covariates, and this sort of analysis was conducted as part of the 2019 stock assessment (ASMFC 2019) but it did not improve the indices of abundance (e.g., decrease errors, reduce large annual fluctuations). The peer review panel for the ARM Revision (2022 ASMFC) recommended using a model-based index for the Delaware Trawl Survey because it is a fixed station survey; consequently, the ARM Subcommittee applied this approach prior to using this survey in the CMSA. The Virginia Tech Trawl Survey has a well-designed sampling scheme that stratifies sampling based on habitat; thus, habitat features that could influence catchability are already incorporated into the abundance estimates from this survey. Finally, and as stated earlier, a GLM did not improve the precision of the New Jersey Ocean Trawl Survey (ASMFC 2019) and the ARM Subcommittee continued using a simpler calculation of the abundance estimate (the delta-mean catch-per-unit-effort).

> I agree that both model-based and design-based approaches can be useful in this context. In this case, ASMFC chose to use a fully design-based approach for generating abundance indices from the three trawl surveys. While the approach used by the ARM subcommittee was a fairly standard approach for analyzing trawl survey data, I was surprised that they did not use model-based standardization to further control for environmental and seasonal factors known to influence horseshoe crab capture rates. The rationale for performing model-based standardization is particularly strong considering that (1) horseshoe crab captures are known to be strongly influenced by factors like temperature, depth and season, and (2) these key environmental drivers are measured as part of all three trawl surveys used in the revised ARM. The decision to ignore the available covariate data places a degree of trust in the design-based controls that does not seem warranted in this case. Importantly, ignoring the covariate data implicitly assumes that these data have zero effect on the trawl survey results -- a strong assumption that is likely to be false in this case. I maintain that ASMFC should use all available covariates to help standardize observations across surveys and across years, although I would welcome continued dialogue about the nuances of this analysis.

Like trawl surveys for any aquatic species, there is considerable variation in the catches of horseshoe crabs among individual trawl samples resulting in high inter-annual variation in abundance indices. Dr. Shoemaker concludes there is a lack of statistically significant correlation coefficients among the trawl surveys, and there is a fatal flaw in using those data to infer abundance. The ARM Subcommittee disagrees with this analysis and can demonstrate that there is in fact a significant correlation between trawl surveys and with the CMSA estimates of abundance (see response to Criticism 3). There is observation error associated with each survey (e.g., being in the right place at the right time) and it is not uncommon for a relatively high catch in one survey to correspond with a relatively low catch in another for the same survey year, so it is not surprising that there could be some “non-significant” correlations or correlation

coefficients that one may consider low. However, each trawl survey could very well show a statistically significant trend. It is the consensus among surveys about the trend that is important, not how closely individual observations from the respective surveys track one another. The ARM Subcommittee acknowledges that each survey does not perfectly track the population, which is why the CMSA uses multiple surveys. In addition, it is very possible, from a statistical sense, that two time series of abundance data could not show a statistically significant correlation, but could still both show a statistically significant trend (Figure 2).

> Here I agree that more data is better than less data, and more independent datasets are better than fewer. Correlation tests and scatterplots remain a valuable exploratory analysis for detecting the degree to which different datasets share information. However, as ASMFC points out above, uncorrelated datasets can yield emergent patterns when their information is combined. In fact, after reviewing the ASMFC response to my peer review reports, and after running some confirmatory analysis, I see evidence for a recent increase in the Delaware Bay horseshoe crab population. Taken together, I agree that the three trawl-based surveys provide some evidence for a recent increase in the horseshoe crab population since around 2010.
>
> However, the evidence for a recent increase in the Delaware Bay horseshoe crab population based on the trawl-based surveys is predicated on several important assumptions, including: (1) all three trawl-based surveys are equally valid (and therefore should be assigned equal weight in the analysis), (2) each survey is equally informative with respect to the key state variable of interest (e.g., the abundance of female horseshoe crabs), and (3) that each survey is an independent sample from the population of interest. Potential violations of each of these assumptions should be carefully considered; it would be prudent to perform additional sensitivity tests to evaluate the effects of plausible violations -- and possibly to formally incorporate alternative models in which one or more of these assumptions is relaxed.

Dr. Shoemaker also conducted his own capture-recapture analysis to determine the relationship between trawl-based indices of horseshoe crab abundance, horseshoe crab egg density, and red knot survival. Contrary to the results of the ARM Subcommittee, Dr. Shoemaker did not find any positive relationships between horseshoe crab abundance and red knot survival. Although additional analysis of these data is welcome, the ARM Subcommittee questions the value of such a comparison due to the many differences in how the data were analyzed. Dr. Shoemaker's analysis only used information about whether a bird was seen at least once in a year in a standalone Cormack-Jolly-Seber model, whereas the ARM Revision uses both within-year and among-year observations in an open robust design model that is embedded within an integrated population model. These differences in modeling approaches make it difficult to draw meaningful conclusions regarding differences in results. The analysis done by the ARM Subcommittee did find a positive relationship between horseshoe crab abundance and red knot survival, providing the demographic link between population models used in the ARM Framework.

> Here I do not find ASMFC's response convincing. In my reanalysis of the banding and

resighting data, I used a Cormack-Jolly-Seber (CJS) framework to estimate annual survival rates. The CJS method has for many decades been the gold standard for estimating survival on the basis of capture-recapture data. In fact, the open robust design (ORD) model used in ASMFC's integrated population model for red knots uses a modified CJS framework to estimate survival and other inter-annual population processes (Tucker et al. 2023). Regardless, estimates of apparent survival from different analytical methods are comparable, as they represent the same fundamental ecological process. Of course, this statement requires that both approaches are statistically valid-- but ASMFC does not appear to be questioning the validity of my methods.

Given that it is meaningful to compare my results with ASMFC's capture-recapture results, the fact that the CJS approach failed to detect a statistical signal linking red knot survival to trawl-based horseshoe crab population estimates is notable. This was true whether I used the CMSA estimates of horseshoe crab abundance (following ASMFC's approach) or any of the trawl-based surveys (NJ, DE, VT) separately (whether or not these indices were adjusted to control for seasonality and environmental conditions). Although I do not have a ready explanation for why my results differed from ASMFC's integrated population model, I think it would be prudent and instructive to run additional tests to try to understand the underlying reasons for these differing results - especially given the fundamental importance of this relationship to this two-species ARM framework.

Finally, I reiterate that, although ASMFC detected a positive relationship between red knot demographic rates (specifically, adult survival) and horseshoe crab abundance, this relationship was not ecologically meaningful (see my response under section titled "Criticism 8", below). Therefore, in one sense the results of our two independent analyses yield the same conclusion: that red knot demographic rates are not directly or meaningfully correlated with trawl-based indices of horseshoe crab abundance during the time period for which data are available. In contrast, using the same CJS modeling framework, I found that red knot survival was meaningfully and positively related to an alternative horseshoe crab population index -- surface egg densities.

Criticism 3: Red knot survival is strongly sensitive to horseshoe crab egg density, indicating that persistent degradation of the horseshoe crab egg resource could have dire consequences for the red knot population.

- During the development of the ARM Revision, horseshoe crab egg density data were requested, but were not provided to the modeling team. Therefore, these data could not be considered as an input to the models.
- Trends in horseshoe crab egg density (extracted from Smith et al. 2022 following the publication of the ARM Revision) are correlated with other data inputs for the years included in the ARM models and thus the inclusion of egg density data in the models is unlikely to result in any meaningful difference from the current ARM Framework in terms of harvest recommendations.

- Smith et al. (2022) showed a general increasing trend in horseshoe crab egg density in recent years similar to that of horseshoe crab abundance, consistent with findings from the ARM Revision.

Technical Response: The debate over the inclusion or exclusion of egg density data has been ongoing since the ARM Framework was initiated in 2007. The ARM Subcommittee does not deny that eggs are the true link between horseshoe crabs and red knots. However, the reasons for excluding egg density data from the ARM model, which range from sampling design to data availability, have been extensively discussed since the inception of the original ARM Framework, in both published versions of the ARM Framework (ASMFC 2009a, 2022) and in response to a minority report on the ARM Revision (ASMFC 2022). Ultimately, egg density data could not be considered in the ARM Revision because they were not provided to the ARM Subcommittee when requested. When egg density data were published (Smith et al. 2022), the trends appeared to be increasing during the years modeled, consistent with trends of the trawl- based indices used in the model.

> I am not able to comment on data availability issues. Nevertheless, reading the minority reports on the revised ARM prompted the idea of running capture-recapture analyses using surface egg density data as an alternative metric to represent year-to-year variation in the horseshoe crab resource at the Delaware Bay staging area. As discussed above, this analysis demonstrated that red knot survival was meaningfully and positively related to surface egg densities.

Egg density data are highly variable, both spatially and temporally within a spawning season, and discrepancies in egg density results have been noted depending on who processed samples and how they were processed.

> I agree that the surface egg density data is variable from sample to sample, but the sample size is large each year (hundreds to thousands of samples), and covers a large area within 16 beach segments that span most of the New Jersey side of Delaware Bay. Therefore, the average egg density observed each year still seems likely to contain useful information about annual mean densities via the law of large numbers. Furthermore, I did my best to use model-based controls to account for differences in effort and differing sampling methods.

To incorporate egg density data into the ARM would require development of two linked models, in which the relationship between horseshoe crab abundance and observed egg density is quantified in one, and the relationship between egg density and red knot survival/recruitment is quantified in the other. Such analysis and data exploration were not conducted during the ARM Revision primarily because the egg density data were not provided. The ARM Subcommittee is not opposed to using the egg density data as another index of horseshoe crab abundance once a reliably quantifiable relationship can be established. However, the first time the ARM Subcommittee saw the recent egg density results was in 2021 in the form of a draft manuscript (later published as Smith et al. 2022) as part of a minority report by Dr. Larry Niles. If the owners of the egg density data had been willing to provide the raw data, those data would have been

considered in the revision of the ARM Framework. Instead, the ARM Subcommittee accounted for egg availability to shorebirds by including the timing of horseshoe crab spawning in the red knot integrated population model and made a research recommendation to examine the relationship between egg density estimates and horseshoe crab abundance estimates.

> I am pleased to hear that the ARM subcommittee is amenable to using the surface egg density data in the ARM. However, it does not seem appropriate to treat the egg density data as just "another index of horseshoe crab abundance" for use in the CMSA model. The CMSA model (which I have some additional concerns about; see below) is meant to provide an index of horseshoe crab abundance in and around Delaware Bay. The egg density data, on the other hand, is a measure of the usable food resource available to red knots. My re-analysis of the Delaware Bay red knot data strongly suggests that the egg density data provide a crucial empirical link between the red knot population and the horseshoe crab population. I suggest that a more useful and ecologically informed approach would be to use the surface egg density data to specify a mechanistic link between female horseshoe crab abundance (as described in the next paragraph) and the red knot population (possibly even mediated by a spawning process model). Simply incorporating the egg density data into the CMSA model would inappropriately combine fundamentally different data and ecological processes (and would raise difficult questions about how to weight these data relative to the trawl surveys), and would dilute key information about the functional link between these two species.
>
> I think ASMFC should consider incorporating the egg density data even if a precise functional relationship between horseshoe crab abundance estimates and surface egg densities cannot be immediately established. Logic dictates that a relationship must exist, although there are several intermediary mechanisms linking these system states (female abundance linking to egg masses deposited prior to red knot arrival, linking to surface egg availability via beach disturbance processes; perhaps as part of a structural equation model; Grace et al. 2010) that will add ecological realism to the overall process model. While there is uncertainty about the exact functional form of the relationship between surface egg density and horseshoe crab abundance (as is the case for many ecological relationships), it is a known causal linkage and so even a linear model could provide a simple and logically defensible quantitative description of this relationship. Furthermore, the adaptive resource management paradigm enables researchers to incorporate uncertainty into policy decisions. In this spirit, the ARM could incorporate several alternative plausible functional forms to describe the relationship between horseshoe crab abundance and surface egg densities just as the original version of this ARM framework incorporated several alternative functions relating red knot mass (itself a function of horseshoe crab population) to red knot survival (McGowan et al. 2015).

In Dr. Shoemaker's report, he finds that surface egg densities are uncorrelated or negatively correlated with the CMSA results and other indices of abundance used in the ARM Framework. In this analysis, he uses data from 1990-2022 although the CMSA and ARM Framework use data beginning in 2003. The CMSA model starts in the early 2000s to coincide with the start of many

of required data sets used in the analysis (e.g., Virginia Tech Trawl, biomedical harvest, estimated dead discards from other fisheries). If the correlation analysis is abbreviated to include only the years used in CMSA modeling, all time series are positively correlated (Figure 3) for female horseshoe crabs (Dr. Shoemaker's analysis does not specify if his correlation analysis is for males, females, or both). In fact, the egg density time series from Smith et al. (2022) is positively and significantly correlated with the CMSA estimates of female horseshoe crabs. Therefore, it is likely that if the egg density time series were included in the ARM Framework as another index of horseshoe crab abundance, the CMSA results would not be much different from the current results.

I reached out to the ARM subcommittee on Oct 21 2023, soon after ASMFC announced that they would issue a formal response to my peer review report, to inform them that I would be happy to address any questions that came up during their review of my work. If they had a question about how I analyzed or subsetted the trawl data (all of my analyses of the trawl data were for females only), then they could have asked me directly. They did not do so.

In response to the above comments, I re-ran the correlation tests with a subset of the data that only included years from 2003 onward. The results were no different from my original analysis- there were weak (statistically inconclusive) negative correlations between the trawl-based abundance indices and the surface egg density index. However, the sign of the correlation flipped when I used the raw (without model-based standardization) trawl-based indices and the unadjusted egg density index. Nonetheless, correlation coefficients for the raw indices remained very weak (0.2 to 0.3) and were statistically inconclusive at alpha = 0.05.

However, this discussion is of limited importance in comparison with the key point -- surface egg densities (whether raw or adjusted) strongly influenced red knot survival in my reanalysis of the capture-recapture data. In contrast, abundance indices from the trawl-based surveys showed no conclusive relationship with red knot survival. These facts provide strong support for incorporating the surface egg density data in the revised ARM (and not simply as another index of horseshoe crab abundance for use in the CMSA model- see above). I conclude that the trawl-based abundance estimates are not an adequate substitute for the information contained in the surface egg density data.

Additionally, Dr. Shoemaker analyzed the egg density data from Smith et al. (2022) and accounted for differences in survey methodology through time. The results of his reanalysis showed no trend in egg density although Smith et al. (2022) showed a general increasing trend in recent years similar to that of horseshoe crab abundance from the CMSA (Figure 4).

In my re-analysis of the long-term egg density data, I added an offset term to account for differences in survey methodologies through time and thereby enable more robust comparisons among these different time periods. I have discussed this issue with the lead author of Smith et al. (2022), who agrees that the methods I used to re-analyze the trend in the long-term surface egg density data improved upon the methods used for trend estimation in Smith et al. (2022); which did not account for differences in survey effort in

different segments of the time series (J.A.M. Smith, *pers. comm.*).

Dr. Shoemaker also conducted an analysis that shows the effect of egg density on red knot survival. However, this survival analysis is not documented in great detail and only includes data from the New Jersey side of the Delaware Bay. Thus, it is questionable whether this analysis is representative of the red knot population as a whole.

It is unfortunate that similar egg density data were not available for the Delaware side, but that fact does not invalidate my analysis; in ecological modeling we do the best we can with the available data in spite of known limitations. Furthermore, I fail to see why this relationship would not hold on one side of the bay if it holds for the other. Nonetheless, my results strongly suggest that it will be important to continue collecting surface egg density data. Fortunately, it appears that standardized horseshoe crab egg density surveys will be available on both sides of the bay going forward.

While my peer review report admittedly did not contain the level of analytical detail that would be expected of a scientific paper, I offered to share the code for running these analyses with ASMFC and to address any questions or concerns about my reanalyses. This offer still stands.

If these analyses by Dr. Shoemaker are correct, it still begs the question of how to incorporate this into the ARM Framework. In Dr. Shoemaker's report, red knot survival is positively correlated with egg density but egg density has not changed over time; however, female horseshoe crab abundance has increased. Therefore, while egg density and female horseshoe crab abundance must ultimately be linked, this relationship is not evident in the data. The lack of an empirical relationship ultimately complicates any effort to quantify a model linking horseshoe crab abundance to red knot survival through egg density. Dr. Shoemaker falls short of proposing a way to do this.

If my analysis is correct, there is reason to believe the relationship between red knots and horseshoe crabs is much stronger than the current ARM framework suggests, and that surface egg densities provide a critical link for understanding and describing this relationship. Regardless of the nuances and complications that might be involved in incorporating these data in the revised ARM, the rationale for incorporating surface egg density data into this ARM framework is very clear.

In my peer review of the revised ARM, I was only tasked with evaluating its scientific merits; offering suggestions for improvement was not a primary objective of my previous reports. However, I would be happy to work with ASMFC to discuss incorporating horseshoe crab surface egg density data in the next iteration of this ARM framework.

Regardless, for the time series of the CMSA model, egg density is positively correlated with the other time series of horseshoe crab abundance used. Because egg density data are not readily available to the ARM Subcommittee (either for the model development in 2021 or possibly on an annual basis that would be required for their inclusion), the data only cover New Jersey beaches, and their use and sampling design have been questioned over the years, the trawl surveys remain the best available data for horseshoe crab abundance in the ARM Framework.

The surface egg density data are now available. Further, it seems likely that the results of future surface egg density data would be furnished to ASMFC on a regular basis. If these data are important for linking red knot demographic rates to horseshoe crab abundance, and if they are indeed available, then ignoring these data seems to contradict the spirit of the term "best available data".

Criticism 4: The ARM exaggerates the evidence for an increasing trend in the number of female horseshoe crabs in the Delaware Bay.

- The analysis provided in Dr. Shoemaker's report contains errors, including the use of incorrect data subsetting for the indices and application of an analysis that was inappropriate for the data.
- The trawl-based indices were thoroughly considered by the ARM modelers and represent the best available data for tracking horseshoe crab abundance.
- The goal of the ARM modelers was not to find an increasing trend, but to develop the data in the most statistically sound way possible regardless of the answer.

Technical Response: Dr. Shoemaker suggests the ARM Subcommittee exaggerates the evidence for an increasing trend in horseshoe crab abundance through time. A long time to maturity for horseshoe crabs (9-10 years) suggests that recovery from overfishing would take some time to become evident in fishery-independent surveys. With reductions in harvest in the Delaware Bay region in the early 2000s, it makes sense that any increase in abundance would not be seen until approximately 10 years later (~2010). This is what was observed in the three trawl surveys used to index abundance. When a simple linear regression model is fit to each one of the trawl surveys beginning in 2010, all of them show statistically significant increasing trends (Figure 5). Dr. Shoemaker argues that "…trawl-based indices of horseshoe crab abundance are a noisy and unreliable indicator of annual fluctuations in the horseshoe crab population, and are likely an inadequate metric for quantifying the biotic interactions between red knots and horseshoe crabs in the Delaware Bay." The ARM Subcommittee emphatically disagrees with this statement given the life history of horseshoe crabs, the amount of time since bait harvest has been curtailed, and the agreement of the three trawl surveys for an increasing trend in abundance. Harvest management appears to have worked to increase abundance. A rebuttal to this point is also given in Criticism 2.

First, I agree that we would expect to observe a delay between the initiation of regulation and the initiation of an observable population recovery due to the delayed maturation of female horseshoe crabs. I also agree that a segmented regression (or even a spline or polynomial fit), rather than an ordinary linear regression, is an appropriate approach for analyzing trends in the long-term trawl data (see below). Therefore, I agree that linear regression was too simplistic to be used for this purpose (Fig. 12 from my 2023 peer review report).

I ran additional tests to confirm the ARM subcommittee's statement that "when a simple linear regression model is fit to each one of the trawl surveys beginning in 2010, all of

them show statistically significant increasing trends". Using my adjusted catch per unit effort (CPUE) indices that controlled for several potentially confounding factors, my analyses confirmed the apparent increases in horseshoe crab CPUE since 2010 (note that, as of this writing, I do not have access to the trawl survey results after 2022; Fig. 3). It is interesting to note that none of these relationships were statistically significant at alpha = 0.05 when trawl data from 2000 and onward were included in these regression analyses. However, since the 2010 threshold was not arbitrary, but was based on the expected delay in an observed population rebound (see above), there is nevertheless evidence for a recent increase in the Delaware Bay horseshoe crab population.

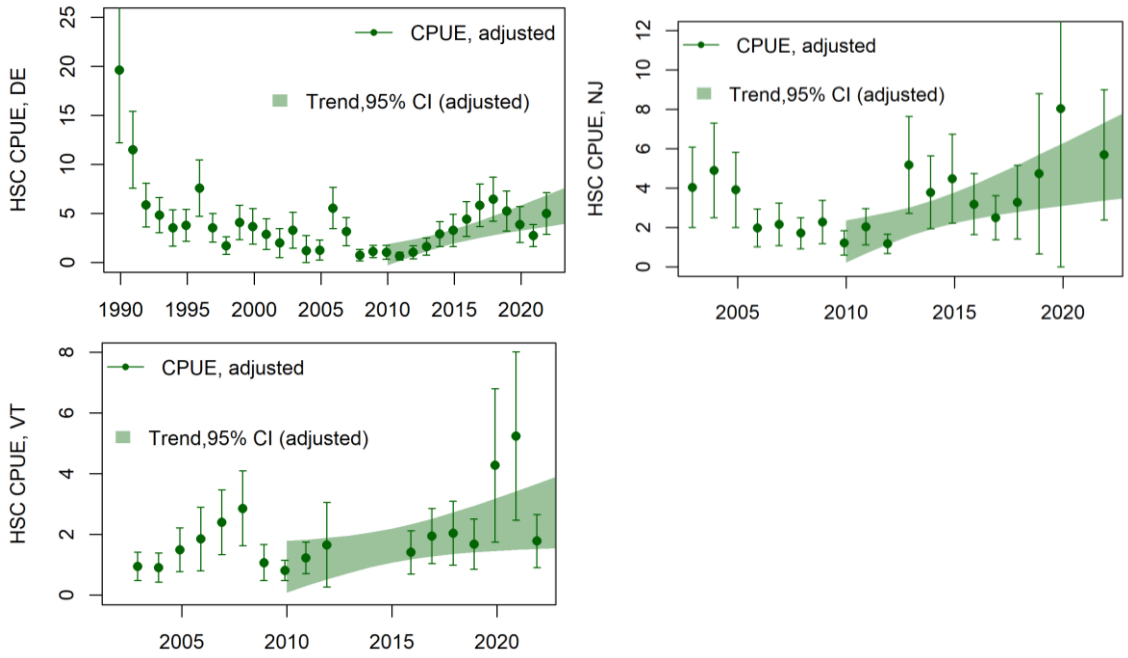

Figure 3. *Analyses indicating that there is an apparent positive linear relationship between three trawl-based horseshoe crab abundance indices (from NJ, DE, and Virgina Tech data) since the year 2010. Each figure displays catch per unit effort (CPUE) estimates adjusted for the effects of seasonality, water temperature, depth, and dissolved oxygen. Error bars represent 95% credible intervals for a linear regression of CPUE over time since. The green polygons represent 95% confidence intervals for the linear regression of the adjusted CPUE against time in years since 2010.*

Dr. Shoemaker again faults the indices of abundance used by the ARM Subcommittee for not being standardized according to environmental covariates in a GLM approach, and he specifically demonstrates his standardization on the New Jersey Ocean Trawl data. However, during an initial review of his report by New Jersey and Delaware staff, it was recognized that he subset the data incorrectly, using the wrong time periods including sample periods when the crabs are not fully available to the survey, resulting in data and an index of abundance that are not used the by ARM Subcommittee. Dr. Shoemaker included the January samples, when the overwintering crabs may remain farther offshore than the survey's sample area, accounting for

the significantly decreased catches during this period. He also included the June samples, when most of the adult crabs have migrated into bays and estuaries to spawn, again making them unavailable to the survey. The inclusion of these two sampling periods has an inappropriately dampening effect on the resulting indices which cannot be corrected through a GLM standardization and will not provide an accurate index of relative abundance. Again, a GLM standardization was attempted with the New Jersey Ocean Trawl data during the 2019 benchmark stock assessment (ASMFC 2019), but it was found to not provide any improvement over a simple delta-mean index. Standardization of the trawl survey catches by a GLM or GAM is still something worth exploring in future assessments as additional years of data may provide the necessary information to better evaluate the true effects of covariates on catches.

I stand by my reanalysis of the New Jersey Ocean Trawl survey data. For these trawl data, as with the red knot data, I made an effort to analyze the data independently, using my training and experience rather than relying on ASMFC's analytical methods. In their response, ASMFC claims that my analysis of the New Jersey trawl data (which included survey data collected from all months of the year) was incorrect, stating that "the inclusion of these two sampling periods has an inappropriately dampening effect on the resulting indices which cannot be corrected through a GLM standardization and will not provide an accurate index of relative abundance". However, ASMFC did not provide further evidence or rationale for this statement, and I maintain that my methods were appropriate.

In my re-analysis of the NJ trawl data (and the other two trawl surveys; more detail can be found in my 2023 peer review report), I relied on a model-based approach to control for potentially confounding factors such as water temperature, trawl depth and seasonal effects (ordinal date). Specifically, I modeled horseshoe crab captures as a complex, non-linear function of survey effort, environmental factors, and season. By using spline fits within a Generalized Additive Model (GAM) framework I was able to account for complex relationships between catch-per-tow and factors such as ordinal date (controlling for seasonality and allowing for strong fluctuations across different times of year; see Fig. 10 from my 2023 peer review report). Therefore, I was able to use the full NJ trawl dataset while accounting for times of year during which crabs were not fully available for capture. These models passed tests of model adequacy (using quantile residuals, implemented in the 'DHARMa' package in R) and appeared to perform admirably in accounting for these complex, potentially confounding factors.

In contrast, the ASMFC experts relied on sampling design and data sub-setting to control for any potentially confounding factors. I argue that there are very good reasons to use model-based controls to enable standardized comparisons across surveys and years. Sampling design and data sub-setting cannot control for all the factors known to affect horseshoe crab detection rates. Furthermore, data sub-setting effectively discards data that could potentially help to shed light on key questions of interest; in contrast, model-based controls enable us to use all available data. Horseshoe crab capture rates are known to be strongly influenced by multiple factors, including temperature and seasonality. Since information on environmental factors is collected as part of each trawl survey used in the

revised ARM, failure to use these data is a notable oversight of ASMFC's approach. By failing to use model-based standardization, ASMFC is implicitly assuming that these factors have zero effect on horseshoe crab captures -- which is a strong and likely false assumption.

After a research scientist from the New Jersey DEP contacted me with their concerns, I re-ran my analyses with only the April and August samples. Finding no substantive difference in my results (and after running additional tests to confirm that the GAM standardization analysis was adequately accounting for the effects of seasonality), I proceeded with my original analyses in my 2023 peer review report. Of course, it is possible that there are legitimate reasons for a different analytical choice, and I would be happy to have a further discussion on the merits of sub-setting this dataset.

Overall, I maintain that there are strong reasons to use model-based standardization methods (e.g., GLM, GAM, or machine learning approaches like random forest) to control for factors that could confound the inter-annual variation in catch-per-tow, and I am glad to hear the ARM subcommittee is open to using model-based standardization methods in future assessments.

Beyond the issue of the erroneous data standardization of the New Jersey Ocean Trawl Survey data by Dr. Shoemaker, he made a questionable analytical choice leading to the conclusion that female horseshoe crab abundance has not increased. Dr. Shoemaker used both the "raw" and "adjusted" catch-per-tow data from the entire time series of the three trawl surveys in a linear regression analysis to determine if there was a trend in abundance through time (Figure 6). The Delaware Bay crab population is known to have declined to a minimum level by the early 2000s (prompting harvest restrictions), thus, a linear model fit through the entire time series (1990 to present) of all surveys is nonsensical. The near zero slope of the linear model is driven by the high CPUE from the Delaware Trawl Survey at the very beginning of the time series (1990 – 1992). That horseshoe crabs declined in the 1990s and early 2000s is undisputed. All surveys show a low point around 2010, with an increase afterwards. The pattern of the combined surveys looks like a "U" – decreasing and then increasing. A linear model fit to such a pattern will show a non-significant slope (i.e., trend) over the entire time period. It is unclear whether Dr. Shoemaker investigated the resulting residual pattern, as that would have confirmed the inappropriateness of using a simple linear trend model. Perhaps this analysis is indicative of Dr. Shoemaker's unfamiliarity with the changes in horseshoe crab harvest management through time, but it nevertheless perpetuates the unfounded belief that the horseshoe crab population has not responded positively to harvest restrictions. As previously stated in the rebuttal to Criticism 2, all surveys have shown an increasing trend since 2010 (Figure 5). Alternatively, a segmented regression model could be fit to the time series of data to demonstrate how abundance trends have changed through time. When this is done, both the Delaware and New Jersey Ocean Trawl Surveys show declining abundance followed by an increase after 2010 (Figure 7). Given the lengthy time to maturity of horseshoe crab, it has long been understood that it would take about a decade to begin seeing an increase in abundance following the initiation of harvest restrictions.

After further consideration, I agree that there is a detectable statistical signal of a recent population increase in the trawl data. I also agree that horseshoe crabs are a long-lived species, and one would expect to observe a substantial delay between the implementation of harvest regulation (in 2000) and the recovery of the population (a large cohort born in 2005 would only mature and contribute to population growth in 2015 or later). Therefore, (1) time periods prior to the initiation of harvest regulations should not be included in this analysis (Fig. 12 from my 2023 peer review report), as few would claim that the horseshoe crab population was increasing in the 1990s (in fact, excessive commercial harvest of horseshoe crabs in Delaware Bay during this decade is widely believed to have caused a major decline in both horseshoe crab and shorebird populations; Niles et al. 2009) and (2) a segmented or nonlinear regression model makes sense for this analysis, as it can accommodate an initial period of decline or depletion followed by a more recent period of increase (e.g., decline in capture rates during the early 2000s followed by a recent recovery since around 2015).

For the sake of completeness, I am including a revised version of Figure 12 from my 2023 report that has been updated to use a GAM and GLM (with a quadratic relationship with time) to allow for a non-linear relationship with catch per unit effort over time (Fig. 4). Both methods yield the same result: an increase in the abundance of female horseshoe crabs since around 2010, indicating that the trawl surveys (considered together) contain evidence for a recent increase in female horseshoe crab abundance.

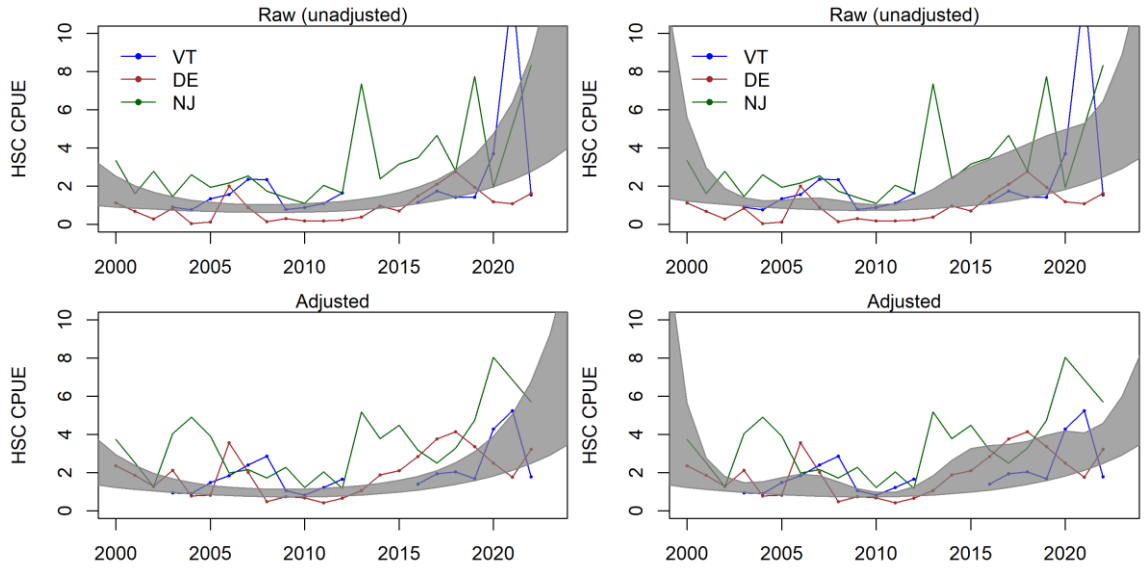

Fig. 2. *Updated version of Fig. 12 from my 2023 report, modified to add a (left) quadratic and (right) spline (GAM) trend of horseshoe crab catch-per-unit-effort (CPUE) over time. Both methods suggest a positive trend in female horseshoe crab abundance beginning around 2010, regardless of whether the raw or adjusted CPUE estimates are used.*

Dr. Shoemaker also reanalyzed egg density data from New Jersey to further argue that

horseshoe crab abundance has not increased. These data were published by Smith et al. (2022) and showed a variable but increasing trend in egg densities over the last two decades (Figure 4). However, upon reanalysis, Dr. Shoemaker contradicts Smith et al.'s (2022) conclusion for an increasing trend, suggesting that it was an artifact of differing sampling methodologies through time. There is not much the ARM Subcommittee can say concerning trends in egg density data beyond what is published by Smith et al. (2022) because those data were not supplied to the ARM Subcommittee when requested during the ARM Revision. The acknowledgement by Dr. Shoemaker of the changing methodology in egg density data does corroborate one of the reasons the ARM Subcommittee has been reluctant to make use of egg density data since the development of the original ARM Framework in 2007. If the owners of the egg density data would follow the established ASMFC data acquisition processes by sharing the data when requested at the beginning of a stock assessment, the ARM Subcommittee would certainly evaluate the utility and inclusion of such data in the ARM modeling process just like any other data source.

> Notably, the strong positive relationship between horseshoe crab egg density and red knot survival did not depend on whether or not I used the results from Smith et al. (2022) or my adjusted numbers. I am glad that the ARM subcommittee is open to using these data in the ARM framework.

Criticism 5: The integrated population model used for estimating red knot population parameters is overparameterized and likely to yield spurious results.

- Dr. Shoemaker's criticism of the red knot model is unsubstantiated and misrepresents the models used in the ARM Framework.
- Much like the trawl surveys, the red knot data are imperfect but represent the best available data.
- Dr. Shoemaker assumes that too many parameters will produce incorrect results, when the relationship between overparameterization and biased models is more nuanced.

Technical Response: The critique of the state-space model ignores the fact that this model is not analyzed independently, but as a sub-model within an integrated analysis. This viewpoint is apparent in several places in Dr. Shoemaker's critique, as he writes about using the two data sources (i.e., red knot count data and mark-recapture data) to "train" the two sub-model components as if they were separate endeavors where information from one has no influence on the model parameters in the other. Integrated population models combine the likelihoods of two or more sub-models, allowing researchers to estimate demographic parameters from multiple models and data sources simultaneously (Schaub and Abadi 2011). In the ARM Framework, the admittedly limited count data are integrated with 100,000s of mark-resight observations from Delaware Bay. A third component, a Markov population model, provides a strong structural prior that links estimates from multiple sub-models based on an understanding of the life history of the species. One key benefit of this approach is the ability to estimate parameters that would not be estimable with any one model or data source alone. In the case of

the ARM Framework, the estimation of the red knot recruitment rate is informed by both the analysis of the count data (state-space sub-model) and the mark-recapture data (open robust design sub-model).

First, I point out that integrated population models (IPMs) such as the red knot model used in the revised ARM framework are complex, and their statistical properties are not fully understood by practitioners or statisticians (Schaub and Kery 2021). Second, I do not dispute the value of integrated models for conservation and management, and I agree that the red knot IPM is an integrated model whose components borrow information and inherit constraints from one another. However, it is also true that (1) the red knot IPM consists of two primary submodels (state-space submodel and open robust design [ORD] submodel), (2) the available data sources do not contribute equally to informing each submodel, and (3) one of the available data sources is very information-rich (the banding and resighting data, with tens of thousands of observations each year) and the other is very information-poor (the peak count data, with a single observation per year). Therefore it is instructive to deconstruct this IPM into a set of separate component models for heuristic reasons even as we acknowledge this is not strictly the case.

Ultimately, the red knot population simulation model (used for optimizing the harvest functions and fit within the red knot IPM) is a Markov population process described by (1) initial adult abundance, (2) adult survival (including an effect of horseshoe crab abundance in addition to arctic snow cover and spawn timing), and (3) recruitment (a compound parameter incorporating reproduction and first-year survival, also including an effect of horseshoe crab abundance). The information-rich data source (the mark-resight data) primarily informs the open robust design (ORD) submodel, resulting in well-informed estimates of annual survival (although likely biased high due to misread errors; see earlier discussion). Importantly, the information-rich mark-resight data are virtually non-informative with respect to two of the three demographic processes: initial abundance and recruitment. The reason for this is that the ORD likelihood (like all Cormack-Jolly-Seber variants) is conditioned on the initial capture event and is therefore only informed by the history of subsequent recaptures (i.e., it isolates the survival and state-transition processes from other demographic processes such as abundance and recruitment). Aside from survival, the ORD submodel (informed by the mark-resight data) is also used to estimate the fraction of the flyway population using the Delaware Bay staging area each year -- a process that appears to be mis-specified in ASMFC's red knot IPM (see discussion of 'pi' parameter below).

With the information-rich mark-resight data contributing little to the critical initial abundance and recruitment processes, the information-poor source of data (the peak count data) necessarily does the heavy lifting when it comes to estimating these parameters (but contributes very little to the survival estimates). Some components of the state-space submodel are informed by the information-rich dataset- notably, the fraction of the stopover population available to be observed during each 3-day interval is derived largely from the ORD submodel but forms an important part of the state-space likelihood.

However, this “cross-over” between the two likelihoods does little to mitigate the central issue that the information-poor peak count data is the primary source of information for estimating red knot recruitment and initial abundance.

The ARM subcommittee seems to be making the claim that the recruitment parameters are estimated jointly from the mark-resight data and the peak-count data. While true in a strict mathematical sense (in any integrated model there will likely be at least some information leakage among the joint model components), this is not the case in any important practical sense. As I mentioned above, the way these data enter the likelihood function, as specified in the L1 component of the open robust design (ORD) model, ensures that this data can only directly inform the survival process (along with temporary emigration and some within-year processes like the timing of stopover entry and exit). Effectively, the information-poor peak-count data are used to estimate initial abundance as well as the changes in abundance from year to year (annual lambda, or population growth). The model then solves for the unknown recruitment rates, conditional on the estimated survival rates (from the mark-resight data) and the annual population growth rates (from the peak-count data). The ORD model by itself is largely uninformative with respect to recruitment- it is the addition of the peak-count data that makes it possible to estimate recruitment. Therefore, it is disingenuous to claim that the mark-resight data contribute to the estimation of recruitment in any real sense.

Finally, a claim like “the admittedly limited count data are integrated with 100,000s of mark-resight observations from Delaware Bay” ignores the fact that the 100,000s of mark-resight observations contribute virtually no information for fitting two of the three key demographic processes estimated by the IPM: abundance and recruitment. The implication that the red knot IPM is rescued from standard statistical concerns (such as over-fitting to the data) because it borrows information from the information-rich band-resight observations to supplement deficiencies in the information-poor peak-count data is misleading and dangerous. It can become all too easy to claim “empirical” support for poorly specified or unsupported model components by making facile but rhetorically appealing claims about integrated likelihoods. For this reason, it is very important to break down these complex models (for heuristic reasons) into their subcomponents and discuss which data sources are doing the heavy lifting for fitting all key parameters-- at least until the statistical properties of integrated population models are more fully understood and documented.

By ignoring the structural linkage that shares information between model sub-components, Dr. Shoemaker set up a misleading basis to make unsubstantiated claims about model overparameterization and to falsely demonstrate spurious results produced by the ARM model. Regarding overparameterization, he referred to the familiar rule-of-thumb of 30 data points per model parameter as sample size guidance for robust estimation. While this guidance is useful in traditional applications where data are used to inform the parameters of a single model, its relevance for integrated modeling – where information is shared across multiple model components – is unclear. His assessment that 18-28 parameters were estimated from 14 data

points is a serious mischaracterization of the model and requires overlooking the fact that information from mark-resight data also informs the state-space model. In the ARM Framework, the number of parameters estimated from the count data alone is three: one initial population size and two counting errors. The recruitment parameters (three parameters: mean, variance, and effect of horseshoe crab abundance) are estimated jointly using information from all three components of the integrated population model. The availability parameters are specified with highly informative priors, which were developed externally to the model. In the ARM Subcommittee's view, the availability parameters should be more appropriately thought of as data informing the model, not estimates on which inference was based.

> I do not think it is misleading, unsubstantiated or false to claim that the peak count data are the primary source of data for estimating recruitment and initial abundance. In counting up the number of parameters estimated primarily using the 14 peak-count data points I acknowledged that some of these parameters (such as the 'availability' parameters) were assigned strong priors, and that some represented individual random effects (for which the calculus for estimating degrees of freedom is unclear). I dispute that any of the parameters in Table 2 (including the recruitment parameters) are estimable on the basis of the information-rich mark-resight data. Therefore, there are at least 8 to 10 free parameters (and probably more) estimated primarily from the information-poor peak count data- which approaches or even exceeds the available sample size (n = 14). As IPMs have poorly understood statistical properties, I referenced a common rule of thumb in statistics that is generally relevant to non-informative statistical models (those without good prior information).

Dr. Shoemaker used a simulation exercise to purportedly demonstrate production of spurious results by the model. By replacing the peak counts with white noise in the simulation runs, he anticipated that the simulated abundance at the end of the time series should match the initial abundance on average. Instead, he was surprised to discover negative trends in simulated abundance and that final abundances produced by the model were most often lower than initial abundance. He did not know the cause of this outcome, and he speculated on a variety of reasons having to do with simulation methods, starting values, etc. The cause is simple to explain, but it requires acknowledgement that the information sources are linked to each other through the Markov population model. By providing a stream of pattern-less peak count data to the model, Dr. Shoemaker effectively contaminated information about recruitment, leaving survival rate as the only reliably informed parameter. Therefore, a population simulated with no recruitment and survival probability <1 will most often decline. Though he failed to understand the cause of the observed simulation behavior, and he cautioned against using his results to infer a systemic bias in the model, he nevertheless concluded that the model is unstable and has a strong tendency to produce spurious results.

> IPMs are a relatively new - and particularly complex - class of ecological models, and the statistical properties and biases inherent to these models are poorly understood by statisticians. It is possible that the simple tests I ran using "white noise" (random numbers from a normal distribution with mean, variance and sample size that matched the peak

count data and with no temporal trend) to substitute for the peak count data (which was meant to assess the tendency for spurious estimates of growth or decline) may not have been sufficiently informative. It is also possible that the constraints introduced by the Markov population model had the effect of inducing a negative bias in these tests. Nevertheless, the rationale provided by the ARM subcommittee seems overly simplistic. While it is true that a population will necessarily decline with zero recruitment (and survival <1) the explanation for this issue is certainly more nuanced; in my tests, the IPM estimated recruitment as a free parameter- and recruitment was constrained to be greater than zero. Nonetheless I had limited time to run tests, and given the results of my simulations (well over half of the tests resulted in an estimated population decline) an unintended source of bias may have affected my test results.

A better (but more time consuming) validation test would be to develop a complete simulation of the *rufa* red knot population, including a demographic process model (including survival, fecundity, abundance) and an observation model capable of generating data similar to the real-world system (including mark-resight and peak-count data) under a wide range of demographic scenarios (e.g. differing levels of survival and recruitment), and a wide range of observation error scenarios. With simulated data from such a model, researchers could test how often the IPM was able to successfully recover the true parameter values, including recruitment, variation in recruitment, and covariate effects on recruitment (including HSC abundance). The open robust design submodel has been extensively tested using similar tests with simulated data (Tucker et al. 2022), but I did not find any evidence that the full IPM was subjected to similar validation tests. If they did run simulation-based trials using data generated under known assumptions and parameter values, they did not report the results in the ARM report or in Tucker et al. (2023)(or in the code release for the IPM). Such tests require a good deal of time and thought to develop and run. However, investing such time and thought in such testing is necessary and important given the central role of the IPM in informing important ASMFC policy decisions affecting a threatened species.

Integrated population models are complex and largely untested, and there are unintended biases that can occur (Riecke et al. 2019), so it is important to test these models extensively, especially when used in the context of decisions that can detrimentally affect threatened and endangered species. Therefore, the ARM subcommittee should run a battery of validation tests before concluding the model is stable and that it reliably is able to recover key demographic information about the system -- including temporal variability and covariate effects. We cannot assume that complex models like the red knot IPM are free from serious biases and other statistical issues. Because they are relatively new and untested, IPMs should be presumed flawed until they have been adequately validated (such as running the simulation tests described above) -- this is especially true for an IPM that is used for making important decisions that could impact a threatened or endangered species. In this case, the burden is on ASMFC to demonstrate that the red knot IPM is capable of serving its intended role in the revised ARM.

The critique of the state-space sub-model also contains an assertion that overparameterized models are necessarily biased. While overparameterization can result in poor generalization to new datasets, it does not guarantee biased results. In fact, bias could also arise if models are under-parameterized and fail to capture system complexity. The relationship between bias and overparameterization is not as straightforward as is portrayed in Dr. Shoemaker's report.

> Indeed, over-parameterized models are not guaranteed to be biased. Instead, over-parameterized models tend to overpredict the training data (predicting the data used for training the model with high precision) but perform very poorly when confronted with independent data not used to train the model (out-of-sample data). The fact that the red knot IPM is being used to predict the population response to harvest management in the future means that over-parameterization could be a serious issue for the revised ARM.
>
> The above point about under-parameterization is important and relevant to this discussion. The trade-off between under-parameterization and over-parameterization is often known (somewhat confusingly) as the "bias-variance" trade-off. In this case, the term bias refers to under-parameterized models, which can provide biased estimates even for the data used for training. The term "variance" refers to the property of an over-parameterized model making inaccurate and often wildly off-base predictions when challenged with new data (the model treats the noise in the training data as if it were a useful signal, and therefore models fitted to different samples from the same statistical populations will make very different [variable] predictions despite the fact that the data samples reflect identical underlying processes). In general, over-parameterization can be assessed by withholding some data from the training set and testing to see how well the model is able to predict the left-out data. This is an important part of the model validation process -- and one that could add substantial credibility to the red knot IPM if applied to the Delaware Bay system.

The ARM Subcommittee readily acknowledges that the red knot count data are a much weaker data set than the mark-recapture data, but they were the only count data collected consistently over the all of the years of the monitoring program, so the ARM Subcommittee made the best use of them to better understand the system. As described in ASMFC 2022 (page 80), this model could be greatly improved by including auxiliary information such as survey-specific covariates (e.g., observer ID, tide state, weather conditions), integration of simultaneous ground count data, or future implementation of digital photography or double-observer methods. One of the challenges of working with historical monitoring data is the inability to influence study design or data collection processes. There were no auxiliary data that were consistently collected (or, at least, made available to the ARM Subcommittee) for aerial surveys that would allow counting error to be better estimated. Similarly, the ARM Subcommittee knows that concurrent ground counts were conducted in at least some years, but those data were not provided. The ARM Subcommittee made the best use of the available data, and conducted these analyses within the management decision context. Sometimes in decision support roles, scientists have to develop the best analysis to support decisions even when data are imperfect (McGowan et al. 2020). All modeling exercises require assumptions and constraints, and those included in this model

represent the best understanding of the system at this time; the ARM Subcommittee hopes and intends for this model to be updated as more information and more data become available. It should be noted that all previous attempts to model red knot populations in this system and assess the linkages between knots and horseshoe crabs in this management context required significant assumptions, and the ARM Subcommittee believes that their approach in the ARM Revision alleviates or improves many of those assumptions. Previously, all attempts to model productivity and recruitment in this population relied upon estimates from Europe and basic assumptions about life history (i.e., setting juvenile survival as a percentage of adult survival, see McGowan et al. 2011) and this approach uses data from this flyway in a complex but much improved model to estimate those parameters.

I appreciate the thoughtful discussion on the low information content of the count data and ways in which this critical information source for the IPM model could be improved in the future. Overall, I maintain that the peak count data are asked to do some heavy lifting in the red knot IPM for which they are ill-suited.

Stating that this is a 'much improved model' does not make it so. Complex models like the red knot IPM must be subjected to rigorous testing, and it appears the IPM (unlike the open robust design subcomponent) has not been adequately tested (see above). Also, I do not really understand why the use of data from other populations (e.g., European red knots, which have a similar life history) and time periods (e.g., the period of recent population declines in the early 21st century) is so heavily devalued by the ARM subcommittee. If there is useful information on the recruitment process that can be gleaned from other populations, why not use this information? I am not sure it is an improvement to use only data from the western Atlantic flyway if the best available information for this population comes in the form of 14 low-precision data points.

Criticism 6: The integrated population model exhibits poor fit to the available data.

- Dr. Shoemaker provides conflicting arguments for the use of the goodness of fit test for the red knot model.
- Goodness of fit tests applied to the red knot model indicated poor fit in one model component, but the portion of the model including the survival probability of red knots did not fail the test.

Technical Response: There are no unified goodness of fit tests for integrated population models, so the commonly-accepted approach is to assess model fit independently for each sub-model. Posterior predictive checks (PPCs) are the standard type of goodness of fit tests for Bayesian models. The PPC for the state space model indicated adequate fit (P = 0.44 where P = 0.5 indicates no evidence of either over- or under-dispersion, and P near 0 or 1 suggests poor model fit), but the PPC for some components of the open robust design model indicated lack of fit to the data.

I also made this point in my 2023 report, but I agree there are no unified goodness of fit

tests for IPMs, and that PPCs (in spite of some known flaws) are currently the preferred method for checking model adequacy. Nevertheless, I was not able to confirm adequate fit for any of the three subcomponents of the open robust design submodel, including the likelihood component responsible for estimating adult survival. I was able to confirm that the PPC for the state-space model indicated adequate fit, but the most authoritative available manual for IPMs (Schaub and Kery 2021) notes that this test has been shown to indicate model validity even in cases in which the model is demonstrably not valid. Therefore, following Schaub and Kery (2021), I do not consider the PPC results for the state-space model to constitute convincing evidence for adequate model fit (as I stated in my 2023 peer review report).

This critique contains shaky logic. First, Dr. Shoemaker asserts that PPCs are a good method for checking model fit and criticizes the lack of fit of the open robust design model. Indeed, Dr.

Shoemaker used a PPC in his analysis of banding data to conclude that his model had "reasonable fit." Next, he states that PPCs are not a reliable indicator of goodness of fit to cast doubt on the ARM Subcommittee's statement that the state space model "passed" the test. By Dr. Shoemaker's logic, PPCs are only to be trusted when they indicate lack of fit. Dr. Shoemaker's inconsistent logic with respect to checking goodness of fit casts doubt on the integrity of the analysis. Putting that aside, the apparent lack of fit for the open robust design model will be discussed. The open robust design model consists of three likelihoods, and PPCs indicated lack of fit for likelihood L3 (P = 0.9), which describes the process of reencountering individuals within years. This lack of fit could arise due to unmodeled heterogeneity in true arrival and persistence probabilities as a result of pooling encounters into three-day sampling periods. If aggregations occur over a time period that is short relative to the expected length of stay, the expected bias is minimal (Lindberg and Rexstad 2002; O'Brien et al. 2005). Average stopover duration for red knot at this site has been estimated to be 12 days (Gillings et al. 2009); 3 days should be a short enough window to avoid biased estimates of arrival and persistence but could introduce heterogeneity and overdispersion. The likelihood that contains the apparent annual survival probability is likelihood L1, which describes the process of encountering marked birds across years. PPCs for this likelihood did not indicate lack of fit (P = 0.31).

The ARM subcommittee misunderstood my argument in my 2023 report (see above). I did not state or imply broadly that PPCs are not useful in the context of IPMs. The only PPC test I raised questions about was the PPC test specifically for the state-space model; the PPC test (Bayesian *p*-value) in this particular case has been shown to indicate adequate fit even in cases where the model is known to be incorrectly specified (Schaub and Kery 2021). I did not broadly question the value of PPCs, nor did I unfairly imply that I only trust PPCs when they indicate lack of fit. Indeed, I used PPCs to assess goodness-of-fit for my survival models, and I used any indications of lack of fit as motivation to improve these models. In my tests with the red knot IPM, the open robust design subcomponents all exhibited poor fit to the data, whereas the state-space component exhibited adequate fit (as stated above).

In addition to the points raised by Schaub and Kery (2021), questioning the value of the PPC results in the context of the state-space component, it is important to note that "passing" posterior predictive checks is much more challenging for rich data sets like the mark-resight data and much less challenging for smaller datasets like the peak-count data (the primary data source for fitting the state space model). Therefore, "passing" PPC-based tests for very small datasets like the peak-count data can be a pretty low bar that does not generally validate model adequacy.

CONCLUSIONS

Continuous scientific review and critique is welcome as that is how science advances. There will always be room for improvement in any modeling effort in the management of natural resources. This is part of the double-loop learning in an adaptive management effort whereby model design and management are periodically reevaluated (Fabricius and Cundill 2014; Williams and Brown 2018). In this specific case, however, advocacy is infused into the scientific debate. The 2022 ARM Revision represented some great advancements in the understanding of the population dynamics of horseshoe crabs and red knots, and their interactions during the double-loop of the adaptive management process.

I agree about the value of scientific critique and debate, and I hope this exchange is useful for advancing scientific understanding of this system. I have taken my role as an independent scientific reviewer seriously, and my critiques are meant to ensure rigorous use of the best available science in this important decision-making context. I think it is unfair to claim that I infused advocacy into the debate or undermined the scientific process in any way.

It is curious that these advancements have stirred so much controversy because the technical criticisms of the ARM Revision could have equally applied to the original ARM Framework. In fact, the original framework merited specific criticism because it relied on life history parameters informed by literature values taken from outside the Delaware Bay or based on expert opinion. The ARM Subcommittee questions if the true problem is not with the process or technical modeling, but rather with the final result and harvest recommendation.

It seems clear that if a model recommends action that could potentially harm a threatened or endangered species (or impede their recovery), it is only prudent that the model is subjected to increased scrutiny.

An important benefit of the adaptive management process is the ability to make decisions even under imperfect knowledge of an ecological system (Williams et al. 2002). The overall goal of the ARM Framework was to produce a decision tool informed by science and stakeholder values, given the available knowledge about the Delaware Bay ecosystem and horseshoe and red knot population dynamics. In the original ARM Framework, knowledge about some system components, for instance red knot population dynamics, was quite limited. The ARM Revision represented a double-loop learning event, in adaptive management terms, and population models were re-designed to accommodate 1) the large volumes of high-quality data collected

on both species since the original ARM's inception, and 2) changes to both populations over that period. In the view of the ARM Subcommittee, the effect of a change to an ecological model must be judged according to its effect on both the properties of the overall decision framework, and the ability of the ARM Framework to incorporate new monitoring data to improve understanding of the system. One important goal in the development of the ARM Revision was to design population models for horseshoe and red knot that would allow for rapid and efficient learning given the monitoring efforts in place for each species (Williams 2011). This critical feature of the ARM Framework—the ability to learn from monitoring—is not addressed by Dr. Shoemaker or Earthjustice; and yet it was a major consideration by the ARM Subcommittee. The design of ecological models for use with adaptive management should also be guided by the decision objectives (Fuller et. al. 2020), a point not addressed by Earthjustice.

> I generally agree that adaptive management has great value for managing systems in the face of uncertainty. However, I think a multi-hypothesis approach to adaptive management is essential for capturing the spirit of adaptive management (see opening statement #1). By accommodating a range of plausible models of the system, including at least one model that formalizes a strong and ecologically meaningful link between red knots and horseshoe crabs, a multi-hypothesis approach to adaptive management will better encapsulate the scientific literature on this system (in which a strong relationship between these two species is indeed plausible). In addition, from a purely scientific perspective, a multiple hypothesis approach can yield more effective inference than a single model approach (Platt 1964). Finally, this approach is better able to accommodate the full spectrum of values within the stakeholder community.

Much of the 2022 and 2023 criticism by Dr. Shoemaker (as well as the comments by Earthjustice) stem from the belief that there must be a strong relationship between horseshoe crab abundance, horseshoe crab egg density on the beaches, and red knot survival. They claim that because the ARM Subcommittee did not find this “strong” relationship when examining the empirical data from the Delaware Bay region, the ARM Revision must therefore be fraught with error. It is apparent that Dr. Shoemaker reviewed the ARM Subcommittee’s work with an unwillingness to entertain the idea of anything but a “strong” relationship. A specific example of this is his statement in his 2022 report where he postulated that the collection of additional data may show that the relationship between horseshoe crab abundance and red knots survival could disappear or become negative. He states, “This outcome would pose an existential problem for the ARM Framework, decoupling the two-species Framework and rendering the red knot model unusable in the context of management.” Of course, the “no relationship” outcome would be expected if horseshoe crabs become sufficiently abundant to not limit red knot survival, but that knowledge does not challenge the scientific validity and usefulness of an adaptive management framework for decision making. Such comments demonstrate a reluctance to learn within an adaptive management framework and a desire to cling to previous beliefs in spite of scientific advances.

> I think I was clear: the only point of including a red knot population simulation model within this ARM framework is because of the potential risk to this population posed by

horseshoe crab harvest. If the model showed no response of the red knot population to horseshoe crab harvest (even under scenarios involving an extreme collapse of the horseshoe crab stock) then there would be no point in including a red knot simulation model as part of the ARM framework in the first place. Please refer to opening statement #2 for more discussion about the rationale for focusing on the strength of the relationship between red knots and horseshoe crabs.

There is no doubt that Dr. Shoemaker is a very knowledgeable quantitative ecologist. However, his critiques are unhelpful in advancing a two-species adaptive management effort. His criticisms focus on specific components of the overall ARM Framework, and why each may be wrong, but nowhere does he provide any recommendations for how to assemble the pieces into a unifying framework to make management decisions. For example, he makes strong arguments for using egg density to predict red knot survival but provides no recommendations for how to link egg density to female horseshoe crab abundance, which is directly affected by harvest management. He also makes a large issue about uncertainty in the horseshoe crab population projections but fails to recognize how uncertainty is handled in the optimization (approximate dynamic programming) or make any recommendations on alternative methods to conduct an optimization given the uncertainty.

As an independent peer reviewer, my primary goal was to review the existing ARM framework on its merits and not to provide a vision for how this system could be improved. Nevertheless, I suggest that a multi-hypothesis approach could offer important benefits in this case, and I would be very happy to engage in further discussions with the ARM subcommittee.

The ARM Framework is designed to continuously improve the underlying models through double-loop learning, and the ARM Subcommittee welcomes constructive input on how to do so. Unfortunately, the critiques by Dr. Shoemaker (and Earthjustice) fail to make any real recommendations for improvement or provide any other means for helping managers make an informed harvest decision beyond consideration of the values of a single stakeholder group. If the values of all stakeholders have changed (i.e., no female harvest under any circumstances), that change could be considered in a new approach in the future by the ARM Subcommittee. As it stands, the current ARM Framework represents the values previously established through stakeholder engagement: to manage harvest of horseshoe crabs in the Delaware Bay to maximize harvest but also to maintain ecosystem integrity, provide adequate stopover habitat for migrating shorebirds, and ensure that the abundance of horseshoe crabs is not limiting the red knot stopover population or slowing recovery.

While it was not my role to suggest recommendations for improvement, I hope ASMFC considers adopting a multi-hypothesis ARM framework. I certainly do not advocate for a framework that only considers the values of a single stakeholder group, and I hope ASMFC can find a way forward that uses science to bring stakeholders together rather than driving them further apart.

Criticism 7: The estimate of mean horseshoe crab recruitment and propagation of error

within the horseshoe crab population dynamics model is inappropriate.

- The estimate of mean horseshoe crab recruitment used by the ARM Subcommittee is the most biologically realistic. If mean recruitment were lower, as Dr. Shoemaker suggests, the current population estimate of horseshoe crabs would be well above a predicted "carrying capacity" of the Delaware Bay region.
- Dr. Shoemaker's proposed method of error propagation is worth considering in a future revision of the ARM model, but comparison of his population projections to those by the ARM Subcommittee are nearly identical.

Technical Response: The revised ARM Framework uses the same mathematical model to estimate the abundance of horseshoe crabs (the CMSA) and to project the horseshoe crab population into the future while accounting for annual removals of individuals due to bait harvest, dead discards from other fisheries, and mortality associated with biomedical facilities. In his 2022 critique, Dr. Shoemaker expresses his opinion that uncertainty in model parameters was not propagated through time in an appropriate manner. This criticism does have some merit and his proposed methodology is worth the ARM Subcommittee considering in future revisions of the ARM Framework. Dr. Shoemaker contends the current horseshoe crab projection model greatly underestimates uncertainty and its effects on predicted future abundance. Although Dr. Shoemaker's proposed methodology may be more appropriate, the ARM Subcommittee believes these concerns are overstated as there is still much uncertainty in the projected population – female horseshoe crab abundance can range between 5 – 15 million under a no harvest scenario.

> I agree that the proper treatment of uncertainty is critical for decision making and I am glad to hear that ASMFC is considering incorporating some of the changes I suggested within future iterations of this ARM framework.

Another parameter Dr. Shoemaker criticized was the estimate of mean horseshoe crab recruitment because of the gap in the Virginia Tech data from 2013 - 2016. The ARM Subcommittee agrees that CMSA estimates of recruitment during these years are poor; therefore, the average of them was used when calculating the overall mean recruitment level. One could argue that recruitment estimates during the Virginia Tech gap years should simply be thrown out. However, doing so ignores the obvious above-average recruitment during those years that must have occurred to increase the multiparous population to the degree that was observed in the following years. The treatment of the missing years of recruitment data balanced the nonsensical estimates of the CMSA with the biological reality that recruitment during these years had to have been relatively high. All other things being equal, changing the mean female horseshoe crab recruitment from 1.67 to 1.26 million, as suggested by Dr. Shoemaker, would result in an unexploited population size at equilibrium of 6.4 million (95% CI: 3.4 – 14.5 million) compared to 8.5 million (95% CI: 4.5 – 19.2 million) in the current parameterization of mean recruitment. If Dr. Shoemaker were correct in his estimate of mean recruitment, the latest population estimates from the Virginia Tech Trawl Survey swept area estimate and CMSA are well above this equilibrium level and the population will likely decline

even in the absence of any harvest. It is also interesting to note that Smith et al. (2006) estimated the female population size via a mark-recapture study at 6.25 million in 2003, shortly after the period of high horseshoe crab harvest. This is another line of evidence that the mean recruitment parameter used in the ARM Framework (1.67 million) is more appropriate than the one proposed by Dr. Shoemaker (1.26 million) given the observed increases in female abundance since the population was estimated by Smith et al. (2006).

First, it is important to point out (as I did in my 2022 report) that the mean recruitment rate parameter is as critical to this ARM framework as any other parameter, since the recruitment process determines the degree to which the horseshoe crab population is resilient to harvest. Therefore, the methods used by ASMFC to estimate horseshoe crab recruitment deserve special scrutiny.

While I understand the rationale of the ARM subcommittee for using the average recruitment estimate from the CMSA model from the Virginia Tech (VT) gap years when computing the mean recruitment rate parameter, I do not find this rationale convincing. If the CMSA results for these years were nonsensical (which we all agree upon), it does not necessarily follow that the arithmetic mean of those nonsensical results will be meaningful. In general, when a model produces nonsensical results, it should provide a signal to the modelers that there is something fundamentally wrong with the model. Furthermore, although the mean recruitment rate during the VT gap years is more sensible than the wildly non-credible estimates for the individual years, the mean value across these years (for which no data was available) was still greater than any single year for which data were available. In this sense, the mean value for the VT gap years also seems inconsistent with the data; such a discrepancy should prompt a re-evaluation of the underlying assumptions, and (ideally) modifications to the model that bring the model more in line with real-world observations of the system.

The ARM subcommittee argues that recent estimates of multiparous abundance from the Virginia Tech trawl are most consistent with the CMSA model results. Specifically, they argue that mean recruitment (under the CMSA model) would need to be higher than the estimate I suggested in my 2022 peer review report (which was based only on the years for which data are available) in order to produce an equilibrium abundance consistent with recent abundance estimates. This argument requires two assumptions: (1) the current horseshoe crab population is at an equilibrium state, and (2) most importantly, that their simulation model is an adequate representation of the horseshoe crab population. However, the nonsensical results from the VT gap years casts serious doubt on the adequacy of the model in the first place (see above).

I do not follow the argument regarding the Smith et al. (2006) study so I will not comment further on that point. Overall, the use of a “worst-case” scenario is commonly used in cases where a risk-averse approach is warranted (for example, when, as here, an action has a risk of harming a threatened or endangered species). In this case, the worst-case scenario (recruitment of 1.26 million) is also supported by the only available data source directly relevant for estimating recruitment rates for this population: the VT trawl surveys.

Therefore, I maintain that there is a strong case for including this as a plausible value to represent mean recruitment in this poorly understood population.

Dr. Shoemaker shows his female horseshoe crab population projection from his reformulated Bayesian CMSA model that includes his parameterization for recruitment and method for propagating uncertainty. It is interesting that given all his criticism of the ARM model, his model produces nearly identical results with respect to an equilibrium number of primiparous and multiparous females (Figure 8) and associated uncertainty. If anything, his equilibrium population size may be slightly higher than what the revised ARM Framework predicts and the uncertainty on each seems equivalent.

Simulation results from my Bayesian CMSA model were similar to the results from the ASMFC simulations under baseline conditions. However, a more important test would be to see if these two models produce similar results under a more extreme harvest scenario: that is, whether the ASMFC framework properly represents the stability or instability of the system under plausible future harvest regimes. The simple tests I included in my 2022 peer review report indicated that the way the ASMFC model propagated uncertainty may have overstated the stability of this system and its resilience to harvest (Fig. 3 of my 2022 report, middle and lower panels). Additional tests would be required to confirm this hypothesis. Regardless, I think there is a strong case for ASMFC to revise the horseshoe crab simulation model to ensure proper treatment of uncertainty.

Dr. Shoemaker did not comment on the harvest policy functions, which are the mathematical equations that actually tell the ARM Subcommittee how many horseshoe crabs to harvest given the abundance of horseshoe crabs and red knots. He also did not comment on the Approximate Dynamic Programming (ADP) process by which the harvest policy functions were derived. When solving for the optimal harvest policy functions, ADP incorporated the full range of uncertainty in population projections for both horseshoe crabs and red knots, and within the ADP process, the optimal harvest policy functions would be more conservative with greater uncertainty. Thus, any recommendation of harvest coming from the revised ARM Framework explicitly incorporates uncertainty in population projections.

During my peer review of the revised ARM framework, I focused my attention on reviewing the demographic models, which was appropriate because this is my primary area of expertise.

Criticism 8: That the ARM model would not predict a decline in red knots under a total collapse of the horseshoe crab population is evidence that the model is fatally flawed.

- Dr. Shoemaker is incorrect that the ARM model would not predict a decline in red knots if the horseshoe crab population collapsed. The assertion that red knots would continue to increase in the absence of horseshoe crabs is mathematically impossible in the model.

Technical Response: In his 2022 critique, Dr. Shoemaker states, "…the apparent inability of the ARM model to predict a decline in red knot abundance under a total horseshoe crab population collapse…undermines the apparent purpose of the model." This judgment can be seen echoed

throughout the materials submitted by Earthjustice in 2022 and 2023, where the narrative is peppered with claims of predicted red knot population increases even at complete depletion of horseshoe crabs from Delaware Bay. The critics' implication is this: if the model is unreliable at the population level of zero horseshoe crabs, how can it be trusted for harvest management at any population level of crab? This is an unfortunate and prejudicial coloring of the model because Dr. Shoemaker was wrong in his 2022 judgment. He not only failed to correct the false assertion in his analysis, but he also amplified it (p. 22) in his later critique.

In Dr. Shoemaker's 2022 critique, he acknowledged that he relied on a "back of the envelope" calculation to arrive at his conclusion because he lacked access to the model data and code at the time. Were he to obtain access to the materials, he fairly asked, "[w]hat would happen to the red knot population projections if female horseshoe crab abundance were set to zero?" For his 2023 evaluation, Dr. Shoemaker was provided access to the data and code, yet he failed to address his own question. He would have observed that the data used to establish the relationship between female horseshoe crab abundance and red knot survival was the logarithm of female horseshoe crab abundance (ASMFC 2022) and not female abundance as it comes straight from the CMSA estimates. Consequently, the model predicts that red knot survival declines to 0 as female horseshoe crab abundance decreases, and a population increase in red knots under this condition is mathematically impossible.

> This argument by the ARM subcommittee has more to do with mathematical technicalities than with ecology. Please see opening statement #2 for a detailed response to this comment.

Misunderstanding and mischaracterization of the model aside, prediction by any model for a scenario well outside of the data bounds of model development is a dangerous exercise. A complete loss of horseshoe crabs through harvest is an extreme and unlikely hypothetical scenario that was not considered by the ARM Subcommittee. Such a collapse would require a harvest level greatly exceeding any previously observed harvest level, let alone any harvest level that is within the range of possible values given the current fishery management plan stipulations. The critics should give the ARM Subcommittee and Board some benefit of the doubt: if the horseshoe crab population should fall below any historically observed levels, and outside the bounds of model development, the ARM Subcommittee is sure all would agree that horseshoe crab harvest should be drastically reduced or ceased. This demonstrates an attempt to sensationalize an extremely rare possibility and paint scientific management of the species as reckless.

> First of all, there is great heuristic value in understanding how the red knot population model, as implemented in the revised ARM, would fare under a collapse of the horseshoe crab stock. Importantly, this exercise illustrates that the ASMFC model, as currently specified, could not predict the observed decline of red knots in the late 1990s and early 2000s, which has been attributed largely to the decline of horseshoe crabs due to unregulated harvest in the 1990s (Niles et al. 2009). Notably, the original ARM used by ASMFC included candidate models with a stronger relationship between red knot demography and horseshoe crabs, and the modelers took care to demonstrate that these

models were capable of explaining the observed declines in the red knot (McGowan et al. 2011), thereby recognizing the value of performing this scenario test and of including a "strong interaction" model within the candidate model set.

Further, ASMFC argues that statistical extrapolation (making predictions outside the bounds of the data) can be dangerous and misleading. While there is some merit to this argument in a general sense, it ignores the fact that the model's primary utility was to make predictions across a broad range of future scenarios. In the context of the ARM optimization routine, simulation results from scenarios spanning a wide range of horseshoe crab abundance and harvest rates are used to generate optimal harvest functions for use in setting harvest quotas. This exercise requires extrapolation- the red knot simulation model must be able to predict what would happen under scenarios of reduced horseshoe crabs (and/or increased and recovering red knot populations, which in aggregate may require a higher total abundance of eggs) to be useful for making informed decisions across a wide range of plausible future system states. Finally, if ASMFC argues that the model is valid only within a particular range of horseshoe crab abundance, they should identify that range and explain why such limitation doesn't raise broader concerns about the revised ARM framework.

I don't think anyone seriously believes (or has claimed) that ASMFC would continue recommending commercial harvest of horseshoe crabs in the face of an observed and ongoing collapse of the horseshoe crab population. But that is not the point of my analysis. The point is that the decision-making value of this framework requires that the underlying models are able to make reasonable predictions across a wide range of scenarios- including a major decline (or increase) in one or both species. The revised ARM proved unable to do so.

Finally, in reviewing the methods used by the ARM subcommittee to prepare the horseshoe crab abundance estimates for use in the red knot IPM, I noticed that they log-transformed the CMSA estimate (in units of millions) and used this log-transformed covariate directly in their analyses. In Bayesian modeling (and GLMs more generally) it is common practice to center and scale all covariates, which typically involves subtracting raw measurement by the sample mean (zero-centering), often followed by dividing the resulting quantity by the sample standard deviation. This practice is useful for enabling regression coefficients to be directly comparable, but even more importantly, zero-centering aids in model convergence by reducing collinearity among the free parameters being estimated (for example, it reduces collinearity between intercept terms and regression coefficients). In the red knot IPM, all covariates were centered and scaled prior to analysis, with the exception of horseshoe crab abundance (which was log-transformed but not centered and scaled). I point this out because it is a surprising choice by the modelers, and it may have added to the instability of model convergence and potentially influenced the model results. For this reason, and as an appropriately cautionary approach, I would recommend running some tests to ensure that this decision did not unintentionally influence key model outputs.

Criticism 10: There is an incorrect specification of "pi" parameter in the red knot integrated population model.

- This is a criticism that does warrant further consideration by the ARM Subcommittee.

Technical Response: Dr. Shoemaker asserts that there is a missing parameter that should be included in the derivation of π_{jj} (the probability of being present in Delaware Bay in occasion *t* of year *j*) to represent the fraction of the population using Delaware Bay in the previous year. This seems to be a valid criticism, but requires further scrutiny to understand whether this parameter is derived incorrectly and, if so, what the implications might be. The ARM Subcommittee is exploring solutions.

I am glad to hear the ARM subcommittee is looking into this issue. I agree that the implications of this issue for the results of this analysis are unclear- and not necessarily minor.

Criticism 11: There is an over-representation of Mispillion Harbor in red knot resighting data.

- Use of data from Mispillion Harbor does not result in biased inferences.

Technical Response: More resighting data is collected in Mispillion Harbor than any other site in Delaware Bay. However, red knots move around the Bay during the stopover period and are often resighted in more than one location within a year. The open robust design sub-model makes use of those repeated observations instead of collapsing all information about each bird into a single 0 or 1, as Dr. Shoemaker did to fit his Cormack-Jolly-Seber model. Given this, it is unclear how Dr. Shoemaker decided that a given bird belonged to the "Mispillion" or "Not Mispillion" group, given that many birds are seen both within and outside of Mispillion Harbor in a given year. The proportion of birds seen only in Mispillion ranges from 0.12 to 0.54 (0). The proportion of birds never seen in Mispillion ranges from 0.17 to 0.69. Given this variation and lack of systematic bias towards birds only being resighted in Mispillion Harbor, we do not believe there is reason to think that the large number of observations from this site result in biased inference.

I do not think this is a major area of concern (which is why I included it as a supplement). My tests did not indicate a strong bias that was induced by the over-representation of this site in the resighting dataset. I do think it is worth noting, though, that the resighting data are so heavily dominated by this one site.

The method I used to separate "Mispillion" birds from "non-Mispillion" birds was simply to filter the red knot resightings data frame to include or exclude all observations from this site. I performed this sub-setting operation before I collapsed within-year observations into zeros and ones- therefore, some birds were included in both analyses. I made it clear from the outset that I was happy to address any questions the ARM subcommittee had, but on this issue, as on others, no one from the ARM subcommittee reached out to ask such questions directly.

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Survival of red knots in the northern Gulf of Mexico

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Highly migratory shorebirds are among the fastest declining avian guilds, so determining causes of mortality is critically important for their conservation. Most of these species depend on a specific geographic arrangement of suitable sites that reliably provide resources needed to fuel physiologically demanding life histories. Long-term mark-resight projects allow researchers to investigate specific potential sources of variation in demographic rates between populations. Red Knots (*Calidris canutus*) occur in three relatively distinct regions across the northern Gulf of Mexico, and two of these areas have been experiencing episodic harmful algal blooms (red tide) with increased frequency in recent decades. Since knots are mostly molluscivorous during the nonbreeding season in the Gulf, they are potentially exposed to red tide toxins at high concentrations via their filter-feeding prey. We used long-term mark-resight data from Texas, Louisiana, and Florida (USA) to estimate apparent survival, and to assess the effects of red tides on survival of Red Knots. We also assessed effects of tracking devices deployed in conjunction with the projects over the years. While overall apparent annual survival rates were similar across the three locations (0.768 – 0.819), several red tide events were associated with catastrophically low seasonal (fall) survival in Florida (as low as 0.492) and Texas (as low as 0.510). Leg-mounted geolocators, but not temporary glued-on VHF tags, were associated with a reduction in apparent survival (~8%/year). Movement of knots between the three areas was rare and site fidelity is known to be high. Harmful algal blooms are predicted to increase in frequency and severity with climate change and increased anthropogenic degradation of coastal habitats, which may further endanger these as well as other shorebird populations around the world.

KEYWORDS

survival, shorebird, harmful algal bloom, red tide, molluscivore, red knot, Gulf of Mexico, mark-resight

1 Introduction

Understanding demographic parameters is fundamental to monitoring and managing wildlife populations, but the highly migratory nature of many shorebird species makes estimation of these parameters distinctly challenging (Faaborg et al., 2010). Species may have broad or disjunct breeding ranges, geographically distinct nonbreeding populations, and rely differentially on migratory stopovers between the two. Being able to isolate parameters (and factors that may affect them) to specific populations requires knowledge of connectivity (Webster et al., 2002; Rushing et al., 2017), since consequences of factors affecting one part of the annual cycle can have carry-over effects on subsequent ones (Goss-Custard et al., 1995; Norris, 2005; Duijns et al., 2017). Survival rates of adults and post-fledged juveniles have been demonstrated to be the most consequential to population growth rates of several migratory shorebirds (Hitchcock and Gratto-Trevor, 1997; Calvert et al., 2006). For migratory shorebirds that use different geographic areas for discrete parts of their annual cycle, changes in habitat quality in any part of the cycle can have a strong effect on survival (Johnson et al., 2006; Duriez et al., 2012).

Coastal habitats worldwide have been degraded by human activities such as shoreline development, pollution, and freshwater diversions (Kennish, 2002), decreasing their capacity to support populations of migratory shorebirds (Fernández and Lank, 2006). Beyond direct losses, anthropogenic disturbance can be functionally equivalent to habitat loss or degradation by rendering sites unusable (Gill and Sutherland, 2000). Norris and Marra (2007) demonstrated that differences in habitat quality in one part of the annual cycle can have interseasonal effects on population dynamics depending on the strength of migratory connectivity. When connectivity is strong, further habitat loss from projected sea level rise is likely to result in bottlenecks with potential consequences to populations proportionately larger than the habitat loss itself (Iwamura et al., 2013).

Harmful algal blooms (HABs) occur in aquatic environments and can be considered extreme biological events resulting in major disruption to coastal ecosystems through complex food web dynamics (Landsberg et al., 2009). HABs have occurred in the Gulf of Mexico far back into recorded history (Magaña et al., 2003). They have increased in frequency and now occur commonly on the coasts of Texas/Mexico and western Florida (Hallegraeff, 1993, van Dolah 2000, Walsh et al., 2006; Brand and Compton, 2007; Tominack et al., 2020). Blooms in the Gulf of Mexico resulting in fish kills associated with the dinoflagellate *Karenia brevis* are typically known as "red tides." The organism produces brevetoxin, a very potent neurotoxin that kills fish through absorption across gill membranes (Abbott et al., 1975) or consumption of toxic biota (Tester et al., 2000). These toxins can accumulate and result in mortalities of higher vertebrates directly and indirectly through food web dynamics (Landsberg et al., 2009). Filter-feeding molluscs – especially bivalves – readily accumulate brevetoxins in high concentrations (Bricelj et al., 2012; Van Hemert et al., 2022) and occasionally experience direct lethal effects, as well as sublethal effects that result in subsequent recruitment failure (Summerson and Peterson, 1990). However, most mollusk species survive exposure to brevetoxins, accumulating high concentrations of toxins that can then be ingested by consumers (Landsberg, 2002). In addition to effects from direct consumption, brevetoxin from lysed cells can reach extremely high concentrations that can persist in waters and sediments for several weeks after the bloom organism has dissipated (Pierce and Henry, 2008; Castle et al., 2013), exposing probe-feeding shorebirds to additional dosages through passive uptake. Despite strong evidence correlating bird mortalities with HABs (Van Hemert et al., 2021, 2022), data from experimental studies or laboratory examination of tissue samples are relatively scarce (Shumway et al., 2003). Impacts are likely underestimated due to depredation and decomposition of carcasses, and removal of carcasses through tidal action (Sutherland et al., 2012). Further, a lack of long-term demographic monitoring of affected avian species has confounded determination of population level effects, though a recent study found a relationship between HAB occurrence and survival in Gulf-wintering Piping Plovers (Ellis et al., 2021).

The Red Knot (*Calidris canutus*) is a Holarctic breeding shorebird comprising six currently recognized subspecies. In the Western Hemisphere, the *C. c. rufa* subspecies spends nonbreeding seasons in the southern US and neighboring Mexico, especially the states bordering the Gulf of Mexico (henceforth, the "Gulf"), the Caribbean, and several regions in South America from northern Brazil to Tierra del Fuego (Niles et al., 2008). Additionally, some knots wintering on the Pacific coast of southern Mexico (Oaxaca) south to Chiloé Island, Chile occur in Texas and Louisiana during migration – primarily during spring – and consist of both *C. c. rufa* and *C. c. roselaari* (Newstead, unpubl. data). Though the total population of knots that do this is not known, it is suspected to be considerably less than those wintering in the Gulf. Knots in the Gulf are concentrated primarily in three general areas: southwestern Florida, the barrier islands of Louisiana, and the coast of south Texas and Tamaulipas. These Gulf states are among the highest latitude wintering sites (~24° – 29° N) of the *C.c. rufa* subspecies, used not only during the extensive nonbreeding season but also for pre-migratory and post-breeding stages. Observations of marked individuals (Tuma and Powell, 2021, Newstead, unpubl. data) confirm high site fidelity to each of these locations, consistent with studies on other subspecies (Harrington et al., 1998; Leyrer et al., 2006; Buchanan et al., 2012; Musmeci et al., 2022).

Geolocator studies (Newstead et al., 2013, Newstead, unpubl. data) show that the Texas and Louisiana populations migrate almost exclusively through the interior of the North American continent rather than using sites along the Atlantic coast. The decline of more than 75% of the Atlantic Flyway *rufa* population over the course of two decades (Niles et al., 2008) prompted its listing as Endangered in Canada in 2007 (COSEWIC, 2007) and as Threatened under the US Endangered Species Act in 2014 (USFWS, 2014a). Recognition and understanding of the Gulf populations – particularly the Texas and Louisiana populations – have been relatively recent discoveries, and there has been no previous estimation of survival parameters that can be compared across the three locations. The Red Knot is considered primarily a molluscivore during the non-breeding season (van Gils et al., 2006; Baker et al., 2013). The species' reliance on coquina clams

(*Donax* spp.) when using Gulf beaches makes it particularly vulnerable to HABs and they have been observed exhibiting symptoms of neurotoxic shellfish poisoning during red tide events (DN, personal observation). Carcasses of knots encountered freshly dead or dying were found to have exceptionally high levels of brevetoxin in all tissues tested, with the highest levels in the liver and gastrointestinal tract (Rafalski, 2012).

New tracking technologies continue to contribute major breakthroughs in our understanding of avian life histories (Bridge et al., 2010; Robinson et al., 2010; Wilmers et al., 2015). The use of archival light-level data loggers (geolocators), radiotransmitters, GPS and cellular technologies has drastically expanded our understanding of migratory strategies and revealed previously-unknown sites of essential importance (Stutchbury et al., 2009; Newstead et al., 2013; McKellar et al., 2015; Chan et al., 2019). While these discoveries have been critical in directing further research and conservation actions to places that can best benefit the species, the effects of tracking devices on the movements, activities, and, ultimately, survival of tracked animals remains a source of concern (Barron et al., 2010; Elliott et al., 2012; Scarpignato et al., 2016). Meta-analyses on device effects on birds (survival, behavior, reproductive success and others) have revealed some significant negative consequences varying by species, device type, attachment method, migration distance, and many other factors (Barron et al., 2010; Costantini and Møller, 2013). Specific to shorebirds, most studies have reported no significant impact of leg-mounted geolocators based on metrics from the year following deployment (Conklin and Battley, 2010; Pakanen et al., 2015; Mondain-Monval et al., 2020). Reductions in one-year return rates were detected for only two of 23 Arctic-breeding shorebird populations carrying geolocators relative to individuals carrying only a unique leg marker, with no detectable effect on the Great and Red knots included in the analysis (Weiser et al., 2016). However, Pakanen et al. (2020) found that when they extended their analysis of Dunlin (*C. alpina*) tracked over multiple years, apparent survival was lower for birds carrying geolocators compared to those without. These findings suggest that negative effects may accumulate over time or result in incremental increases in mortality risk. When possible, longer-term datasets should be analyzed to determine consequences that may not be evident based on one-year return rates alone. Small VHF transmitters attached to birds tracked using direct or automated radiotelemetry have also yielded important findings for many shorebirds, especially for local movements (Green et al., 2002; Warnock and Takekawa, 2003; Rogers et al., 2006; Duijns et al., 2019). Most VHF tag deployments on shorebirds have utilized an adhesive to affix the transmitter to the back, which subsequently falls off the bird with the next molt cycle or sooner, and these studies have generally reported no short-term survival consequences (Drake et al., 2001; Barron et al., 2010; Buchanan et al., 2019; Stantial et al., 2019).

Annual survival is a key underlying demographic parameter that can vary with environmental conditions, and strongly influences population trends. When data are sufficient, annual survival can be apportioned into partial (e.g. seasonal or semi-annual) components, providing greater insight into what particular locations or processes are contributing to demographic change (Gauthier et al., 2001; Leyrer et al., 2013; Piersma et al., 2016; van Irsel et al., 2022). We used mark-resight data from three projects involving captures of Red Knots in the three main Gulf of Mexico wintering areas to compare annual (and seasonal when possible) survival rates between populations, and to assess effects of an increasingly prevalent coastal ecosystem stressor (HABs) and the use of tracking devices on survival.

2 Methods

2.1 Study area

The northern Gulf of Mexico is bordered by a fairly contiguous extent of sandy beaches punctuated by passes connecting to bays and other receiving waters. Sediment grain size composition and origin (biogenic and terrigenous) vary widely across the Gulf, which affects the character of benthic infaunal communities and consequently the distribution of shorebirds that use them. Red Knots occur regularly in three primary areas across the Gulf – Florida, where they are most concentrated in the southwestern region between Clearwater and Marco Island; Louisiana, where they occur on the beaches of Grand Isle and the adjacent Caminada Headlands as well as the offshore barrier islands of the Breton Island National Wildlife Refuge; and Texas, where they are most common on the southern half of the coast from the Corpus Christi area to the border with Mexico, and likely well into contiguous parts of Tamaulipas where habitat is very similar. These three main areas are at least 600 km from one another and are considered as separate population units for the purpose of recovery planning (USFWS, 2021). These three geopolitical states are henceforth referred to as "locations" to avoid potential confusion with conditional states related to the analysis.

2.2 Field methods

For this project, captures of Red Knots occurred in Texas on Mustang and North Padre Islands between October 2009 – October 2019, in Louisiana on Grand Isle and the Caminada Headlands from the eastern end of Elmer's Island west to Port Fourchon between April 2014 – April 2019; and in Florida from Longboat Key to Sanibel Island between October 2005 – March 2010.

All Red Knots were captured using a cannon-net (~ 9 m X 9 m, or ~10 m X 25 m) on beaches where birds were foraging or resting. Standard processing included a federal metal band on tarsus or tibia, a uniquely inscribed alphanumeric green flag on the opposite tibia, measures of bill and total head length (nearest 0.1mm), flattened wing chord length (mm), and mass (grams). A clip of the distal portion of the 6th primary covert was retained from most captured birds for isotopic analysis (carbon, nitrogen, hydrogen isotopes; for a project to assign migrants to wintering sites), and a blood sample was taken by brachial venipuncture on a smaller sample of birds for future genetic analysis.

In Florida, capture effort was concentrated between November – March (>95% of all captures) between years 2005-2010. Capture

effort in Texas was mostly focused on fall and spring periods (>90% of all captures between September-November, or April-May) with smaller catches in other months, between 2009-2019. Louisiana captures were all in April, from 2014-2019. The distribution of resights by month was similar to that of the captures, except for Florida when many resights were recorded in months before and after the main winter months which constituted the bulk of the capture efforts.

Multiple tracking projects were conducted during the course of the projects. Archival light-level dataloggers (henceforth, "geolocators"; British Antarctic Survey [BAS] Model MK10 and MK12 or Migrate Technologies Intigeo W65) were mounted on leg flags and attached to the tibiotarsus as described in Niles et al. (2010). All assemblies weighed < 1.4 g. Radiotelemetry studies in Louisiana and Texas included deployment of small VHF transmitters (Lotek NTQB-4-2, 0.9 g) glued to the intrascapular region, as described in Newstead (2014).

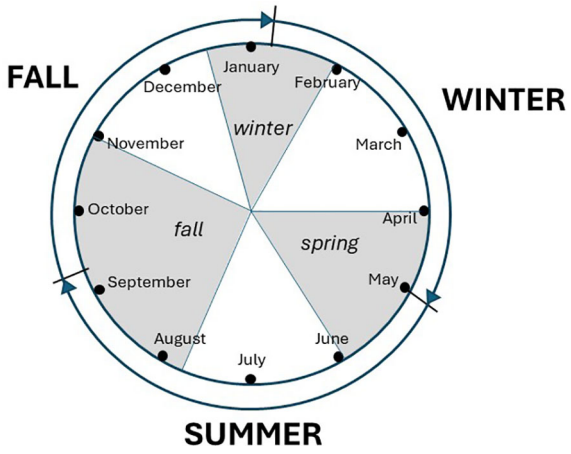

FIGURE 1
Encounter periods (grey), occasion midpoints (lines extending from outer circle), and season interval names for apparent survival analysis on Red Knots in the northern Gulf of Mexico.

2.3 Encounter histories and covariates

Encounter data were compiled from multiple resight projects and public domain records in bandedbirds.org; additional records were made available directly to the author. Encounter occasions began with the first capture effort in Florida in winter 2005/6 and ended in winter 2019/20 season.

Only records from Florida, Louisiana and Texas were used to build encounter histories. Birds were assigned to one of the three locations based on their original capture location. If an individual was encountered outside the location of initial capture (i.e., in one of the other two locations) and there were no subsequent records within the capture location it was removed from the dataset. This eliminated only a small number of birds from the dataset that may have switched wintering location or underwent atypical migrations.

Resightings were divided into three encounter occasions per year: the fall encounter (July 20 – October 31; 104 d; midpoint September 9), winter encounter (December 15 – January 31; 48 d; midpoint January 7), and spring encounter (April 1 – May 30; 60 d; midpoint May 1; Figure 1). Based on the midpoints of the encounter occasions, the year was thus divided into three intervals: (fall to winter – 120 d; winter to spring – 114 d; spring to fall – 131 d). These are referred to as the fall, winter, and summer intervals, respectively. The time range from the earliest captures to the most recent encounters spans 43 occasions (42 intervals).

As defined, the intervals generally reflect distinct and important phases in the annual cycle: during "fall" birds are returning from the Arctic and undergoing a body molt including flight feathers; during "winter" birds are managing a balance of predation risk, prey resource availability and maintaining sufficient fat reserves; during "summer" adult birds undertake a major migratory journey to Arctic breeding grounds, spend two to three months attempting to breed, and then return to nonbreeding areas. While juvenile birds nearly all remain on nonbreeding areas in their first full summer, they are exposed to factors such as extreme heat and increased human disturbance that adults mostly escape.

Individuals were grouped into one of three age classes based on age at capture. Birds that were not aged upon capture were classified as "unknown" age. Birds classified as hatch-year prior to, or second-year during, a spring occasion were classified as juvenile. Birds aged as second-year or after-hatch-year following a spring occasion (i.e., they had survived the first full oversummer interval so were > 1 year old), and all birds aged as after-second-year were classified as adult. Juveniles and birds of unknown/unspecified age were assumed to recruit into the adult age class following the first summer interval.

Since occasions are assumed to be instantaneous, the initial occasion for birds captured during intervals was assigned to be the subsequent occasion, so that estimates would not be biased by partial interval effects.

We included covariates in the dataset to test whether negative effects of tracking devices resulted in lower apparent survival. Effects of leg-mounted geolocators and glue-on VHF transmitters were assessed using a set of time-varying binary covariates for each. Once deployed, an individual with a geolocator was assumed to retain the geolocator permanently unless it was removed. VHF transmitters glued to the intrascapular region typically fall off within a few months of deployment, so the covariate was applied for only the subsequent interval.

Since HABs (especially "red tides") have been observed to result in direct mortality to Red Knots, we hypothesized that exposure to toxins could result in lower apparent survival either through additional (undetected) direct mortality or sublethal effects. Effects of red tide were assessed using several approaches. Red tide sampling occurs in Florida (inshore and offshore) with good spatial and temporal coverage through the HABSOS system (NOAA National Centers for Environmental Information, 2014). The monthly bloom severity index (BSI) developed by Stumpf et al. (2022) was used to identify intervals when red tide blooms were affecting the southwest Florida coast. Red tide effects can occur at relatively low concentrations, but generally begin having pronounced effects resulting in fish kills at concentrations

>1,000,000 cells/L. The summed BSIs for months corresponding to intervals in this study were used to classify red tide as absent/minimal (summed BSI = 0, covariate = -1), moderate (summed BSI > 0 but < 5, covariate = 0), or severe (summed BSI > 5, covariate = 1). In Texas, red tide monitoring is conducted mostly in response to known or suspected occurrences. Since events vary greatly in their range and extent of impact to marine life, fish kill reports were used as a secondary source to confirm an event to a degree that would have resulted in high likelihood of the shoreline being exposed to the effects of the bloom. For Texas, red tide events were ascribed to seasons based on Tominack et al. (2020), and severity was assigned as appropriate to the geography utilized by knots. A covariate set was thus created for each location based on red tide being absent/minimal, moderate, or severe (-1, 0, and 1, respectively) during each interval. A covariate set including all red tide events was made for each location separately, and another that included all locations together (but the red tide covariates applicable to each location separately).

Because knots are highly mobile and likely vary in their degree of exposure to harmful algal blooms depending on various environmental factors, we also tested the effect of each individual red tide season against all others. Separate covariate sets were created for each red tide season occurrence in Florida and Texas to assess the effect of red tide events independently. The covariate value of 1 was assigned to intervals when red tide was present (either moderate or severe), and 0 for all others. Based on our criteria, there were a total of 17 and 6 red tide season events for Florida and Texas, respectively, applicable to the 42 intervals of the study, so a covariate set was created for each of these.

2.4 Statistical analyses

Models were evaluated using a Cormack-Jolly-Seber (CJS) framework in Program MARK (v. 9.0, White and Burnham, 1999) to estimate apparent survival (φ) and encounter (p) probabilities. Apparent survival is the probability that a knot alive at occasion i was alive and in the study area at occasion $i + 1$. Its inverse includes mortality and permanent emigration from the study area. Goodness-of-fit testing was run on the fully time-varying model and contingency tables were examined individually to assess whether patterns indicated lack of independence in the data. The median $\hat{c}$ approach was applied to account for overdispersion in all subsequent models. Model evaluation was based on quasi-Akaike's Information Criterion adjusted for sample size ($QAIC_c$) and model weights (ω_i). We built models in an ordered 3-step process described below.

2.4.1 Step 1: determining best underlying model structures

Preliminary evaluation of the dataset indicated major differences in the distribution of encounters between locations and seasons, so model fitting began with a series of models holding φ constant by location and allowing for variation in p by location, season, and age. Using the best parameter structure for p, models incorporating variability in φ by location, season and age (and combinations thereof) were then tested to determine the best fit for a base model. Models in which covariate parameters were poorly estimated (standard errors of effect coefficient very close to zero or greater than 2.0) were removed from the resulting model set. Models within 2 ΔQAICc of the top model were considered well-supported, and the top model was carried forward for testing of the time-varying covariate datasets.

2.4.2 Step 2: building a candidate model set with red tide index and tracking device effects

We then built a candidate set of models that included covariates added to the most competitive base model. We considered the effect of tracking devices (geolocators, VHF transmitters) independently as well as combined. Given differences in habitat distribution and the character and duration of red tide events between Texas and Florida, we considered the effect of red tide on each location modeled independently, as well as together. We then considered models that included both tracking device and red tide effects. Covariates were considered predictive if the 95% confidence intervals (C.I.) of effect coefficients did not include zero. Apparent survival and encounter probabilities were reported based on the top model that did not include a red tide effect. If all parameters were well estimated in a model including seasonal variation within a location, the model including those terms and the tracking device effects was used to estimate those season-specific parameters (i.e. to provide estimates unaffected by tracking devices). To facilitate comparison with other studies, apparent seasonal survival (φ_a) estimates and 95% C.I.s were converted to apparent annual estimates using the delta method (Powell, 2007), either as a product of the three separate seasonal estimates or exponentiation of the non-season specific estimates.

2.4.3 Step 3: evaluating survival in specific red tide seasons

To evaluate the effect of specific red tide events, we used the most competitive base model and independently added each red tide season to the model as applicable to each location. We considered a red tide event to be poorly estimated if its inclusion resulted in other parameters being poorly estimated. Red tide events (seasons) were considered significant if the 95% C.I.s of the effect coefficient did not overlap zero. For significant seasons, the magnitude of the effect on φ was calculated as the percentage difference between the mean estimate of the survival probability in that season relative to the survival probability of all other seasons for that location.

To estimate survival for each significant red tide season, we ran a *post-hoc* model treating each of those seasons individually and accounted for any significant tracking device effects. If any coefficient became non-significant in this model, that covariate was removed and the reduced model run until all terms were significant.

The strength of differences between locations was assessed by whether 95% C.I.s overlapped, and covariate effects were assessed by whether the 95% C.I. included zero. C.I.s are presented in brackets following the mean, unless otherwise noted.

3 Results

Encounter histories were constructed from 2,412 knots (Florida: 1,373 captured between 2005-2010; Louisiana: 255 captured between 2014-2019; Texas: 784 captured between 2009-2019), and 4,078 resights (Florida: 3,013; Louisiana: 188, Texas, 877; Supplementary Table 1). Geolocators were deployed on 68, 49, and 114 knots in Florida, Louisiana and Texas, respectively. VHF transmitters were deployed on 18 and 115 knots in Louisiana and Texas, respectively.

There were 17 red tide seasons in Florida (8 severe, 9 moderate) during the 42 intervals since marking began. Two were in summer (one moderate, one severe). Both summer events preceded severe fall events. Of nine fall events (three moderate, six severe), six persisted into the subsequent winter interval. There were no winter events that were not preceded by a fall red tide event. In Texas, there were 6 red tide seasons (3 severe, 3 moderate) during the 31 intervals since marking began. All Texas red tide seasons were in fall.

3.1 Best underlying model structures

The goodness-of-fit test indicated some overdispersion in the data but examination of contingency tables did not suggest any systematic source of bias. Differences in resighting effort (p) between years and locations were likely responsible for high model deviance. Subsequently, all models were adjusted using median $\hat{c}$ = 1.155. The best models for the encounter parameters included location and season. All models including age resulted in multiple parameters being poorly estimated, so these were removed from further consideration. All subsequent model runs utilized the $p_{(\text{location, season})}$ parameterization.

The top base model for explaining variation in Red Knot apparent survival included a constant seasonal survival term (φ_c) for each location. A competing model allowed for season-specific (φ_f, φ_w, φ_s) parameters for Florida, but not for Texas and Louisiana. A model with constant seasonal survival across locations received the lowest model weight of the three. The two most competitive models were carried forward for model development incorporating HAB and tracking device covariates.

3.2 Assessment of candidate models including red tide index and tracking device effects

All models testing tracking device and red tide effects on the base model that included seasonal variation in survival in Florida had uniformly higher QAICc than the corresponding models based on the constant seasonal survival base model. Since the inclusion of variation in seasonal survival in Florida did not improve model fit in any case, these models were removed from the candidate model set.

The best fitting model included effects of geolocators and red tide in Florida (Table 1). The four top models each had a likelihood >0.125 (indicating support; Burnham and Anderson, 2002), and all included the geolocator covariate. The geolocator effect was negative and significant in all models that included it. VHF transmitter and red tide covariates were also all negative but non-significant when included in the models. Multiple parameters were poorly estimated in all models that included red tide in Texas only. The effect of geolocator in the top-ranked model without a red tide effect ($\hat{\beta}$ = -0.445 [-0.655, -0.236]) equates to an estimated reduction in seasonal apparent survival of 4.1%, 3.2%, and 3.8% for Texas, Louisiana, and Florida, respectively.

The top-ranked model that did not include a red tide effect was used to estimate apparent survival for each location. With tracking devices accounted for separately in the model, mean apparent seasonal survival was highest for Louisiana, intermediate in Florida, and lowest in Texas, though C.I.s overlapped (Table 2). Resighting probabilities varied between seasons within each location.

TABLE 1 Model ranking including combinations of red tide and tracking device covariates applied to the best-fitting base model (Φ_{location}, $p_{\text{location, season}}$) for Red Knots from Texas, Louisiana, and Florida populations from 2005-2019.

Model	Red tide	Tracking device	Δ QAIC$_c$	ω_i	Likelihood	K	QDeviance
1	Florida	geo	0.00	0.37	1.00	14	21295.7
2[a]	–	geo	0.33	0.32	0.85	13	21298.1
3	–	geo, VHF	1.92	0.14	0.38	14	21297.6
4	All	geo	2.33	0.12	0.31	14	21298.1
5	All	geo, VHF	3.92	0.05	0.14	15	21297.6
6	Florida	–	13.47	0.00	0.00	13	21311.2
7[b]	–	–	14.28	0.00	0.00	12	21314.0
8	–	VHF	16.14	0.00	0.00	13	21313.9
9	All	–	16.19	0.00	0.00	13	21313.9
10	All	VHF	18.03	0.00	0.00	14	21313.8

[a]Top-ranked model not including a red tide effect, on which reported seasonal survival estimates and geolocator effects are based.
[b]Base model (no covariates) from Step 1 on which subsequent model development was based.

Estimation of distinct seasonal apparent survival probabilities was only possible for Florida. When seasonal variation for Florida was added to the top-ranked model, mean apparent survival was highest during winter (0.944 [0.915, 0.963], intermediate in fall (0.914 [0.834, 0.957] and lowest in summer (0.907 [0.821, 0.954]), though C.I.s were wide and overlapping.

3.3 Individual red tide season effects

Parameters were estimable for models including individual red tide seasons on the base model for one (of six) Texas seasons, and nine (of seventeen) Florida seasons (Table 3). The 2009 fall red tide season in Texas was significant ($\hat{\beta}$ = -2.515 [-3.291, -1.739]), as were four total seasons in Florida comprising two extended events in 2012 (fall: ($\hat{\beta}$ = -1.553 [-1.742, -0.764]; winter: ($\hat{\beta}$ = -1.470 [-1.930, -1.010]) and 2018 (fall: ($\hat{\beta}$ = -2.504 [-3.169, -1.840]; winter: ($\hat{\beta}$ = -1.831 [-2.817, -0.845]). Red tide seasons with non-significant terms had higher standard errors, indicating data was insufficient to estimate an effect.

The *post-hoc* model retaining all significant covariates included the geolocator effect and four of the five significant red tide seasons (Table 4). Point estimates of seasonal survival during red tide events in Florida ranged from 0.492 (fall 2018) to 0.884 (fall 2012). Seasonal survival during the Texas fall 2009 red tide was 0.510.

4 Discussion

Our results confirm episodes of sharply reduced survival of Red Knots during red tide events, and suggest this could be a significant driver of survival in Texas and Florida. While only a red tide effect in Florida was included in the top model of the candidate set, tests on individual seasons – when all parameters were estimable – were all either strong and significant, or were weak with relatively high standard errors. This is indicative of sparseness of data in some seasons (especially low winter resight probability in Texas) which likely resulted in a failure to find an effect when one may have occurred. Instead of chronically lower annual survival, knots in these locations may be experiencing relatively high survival punctuated by acute episodes of high mortality from red tide.

Several studies on knots have demonstrated often sharply contrasting survival estimates comparing different time series (Baker et al., 2004; González et al., 2006; Leyrer et al., 2013), population segments (Harrington et al., 1998) and body condition (McGowan et al., 2011), and age (Schwarzer et al., 2012). A robust model accounting for transience, temporary emigration, persistence and food availability at a stopover site illustrated that many different processes can affect estimates of apparent survival over short timeframes (Tucker et al., 2021). Further, the focal populations of these studies often preclude simple comparison of survival estimates across studies. For example, knots captured in Delaware Bay during spring migration are primarily breeding age individuals who have already survived nearly two full years during which mortality is expected to be highest (and thus unaccounted for in estimates), whereas estimates based on populations that included those younger cohorts (including ours) would be expected to be lower. Nevertheless, our estimates of apparent annual survival rates of Red Knots from the three Gulf of Mexico locations were within the ranges of those reported by most other studies on *rufa* Red Knots. Of the three Gulf locations, mean apparent annual survival was lowest in Texas and highest in Louisiana, though differences were not significant.

An effect of age on survival was not detectable in our models, but we note that the first occasion a knot becomes "available" to our study sites follows a critical and typically very high-mortality time interval following hatching in the Arctic, including surviving to fledging and the first southbound migration (~first 3 months of life). However, we are aware of no published survival estimates for this species which include that highly sensitive period. Accurate estimation of age-specific survival in the first- and second-year periods (prior to the first return to the Arctic as a breeder for most knots) was likely related to limitations in data for these age groups.

Our study estimated apparent survival, which is the complement of both mortality *and* permanent emigration. These are the first published survival estimates for knots in Texas and Louisiana, but a relatively recent study examined true survival in

TABLE 2 Mean estimates and standard errors (SE) for apparent seasonal and annual survival and encounter probabilities of Red Knots for each location from the $\varphi_{(location,\ geolocator)}\ p_{(location,\ season)}$ base model.

Location	Φ seasonal	Φ annual	Encounter (*p*)	
Texas	0.916 (0.005)	0.768 (0.012)	spring	0.180 (0.011)
			fall	0.264 (0.012)
			winter	0.009 (0.002)
Louisiana	0.936 (0.013)	0.819 (0.033)	spring	0.331 (0.036)
			fall	0.021 (0.006)
			winter	0.071 (0.013)
Florida	0.925 (0.002)	0.790 (0.006)	spring	0.118 (0.005)
			fall	0.271 (0.007)
			winter	0.194 (0.006)

TABLE 3 Effect coefficients ($\hat{\beta}$) and 95% confidence intervals for covariates tested individually on the $\Phi_{(location)}$ $p_{(location,\ season)}$ base model for Red Knot apparent survival in the northern Gulf of Mexico.

Covariates		$\hat{\beta}$ [95% C.I.]
Tracking devices		
Geolocator		**-0.445 [-0.655, -0.236]**
VHF		-0.312 [-1.727, 1.103]
Red tide		
Red tide - all		-0.040 [-0.279, 0.199]
Red tide - Florida		-0.203 [-0.422, 0.015]
Individual red tide seasons		
Texas		
2009	**fall**	**-2.515 [-3.291, -1.739]**
2012	fall	0.113 [-1.678, 1.903]
Florida		
2006	fall	0.196 [-1.540, 1.933]
	winter	-0.361 [-0.774, 1.495]
2009	fall	-0.079 [-0.882, 0.723]
2012	**fall**	**-1.253 [-1.742, -0.764]**
	winter	**-1.470 [-1.930, -1.010]**
2015	fall	-0.246 [-1.659, 2.151]
	winter	-1.472 [-4.847, 7.792]
2016	fall	0.386 [-2.094, 2.866]
2018	**fall**	**-2.504 [-3.169, -1.840]**
	winter	**-1.831 [-2.817, -0.845]**

Significant covariates and terms are in bold. Effects could not be estimated for the covariate set "Red tide – Texas" and several individual red tide seasons (Florida – summer 2006, fall and winter 2011, fall and winter 2017, summer 2018; and Texas – fall 2011, fall 2015, fall 2016, fall 2018).

Florida. Between 2005-2010, true annual survival of Florida-wintering knots was estimated at 0.89 for adults and 0.95 for juveniles, using a Barker model (Schwarzer et al., 2012). The Barker model accounts for emigration and re-immigration based on encounters in a secondary encounter area (in this case, James Bay, Ontario, and the US Atlantic coast), resulting in annual survival estimates that separate the two processes by which an individual can leave the population (mortality or permanent emigration). Our dataset encompasses the same individuals and years of the Schwarzer et al. (2012) study, but because of the use of different modeling approaches and longer timespan of our study, we would not expect our estimates to be consistent. However, comparison may provide some insight into the potential population dynamics of the Florida winterers. We explore two potential explanations, which are not mutually exclusive: 1) during the course of the past decade the survival rate has in fact declined since the Schwarzer et al. (2012) study; and, 2) more knots formerly associated with Florida wintering areas are spending extended periods of time or the full nonbreeding period at sites along the southeast US coast, or into the Caribbean.

The significant reduction in survival associated with several red tide events in Florida provides some support for the hypothesis that mean survival rates truly have declined particularly in the past decade. It must be noted that because there were no new birds marked in Florida beyond 2010 in this analysis, it is possible that an age-related effect (i.e. senescence) could have depressed our apparent survival rates. However, the five-year timespan of the Schwarzer et al. (2012) study encompassed only four seasons (two events) that met our criteria as moderate or severe in terms of BSI. Three of these were the contiguous summer-fall-winter seasons during the bloom of 2006-7 (two of those were moderate severity), and the other was the brief and moderate bloom of fall 2009. By contrast, red tide occurred in thirteen seasons over the subsequent decade. Each bloom affected multiple consecutive seasons (including the one beginning in fall 2017 that lasted well over a year and a half), potentially compounding the effects. The years assessed in the Schwarzer et al. (2012) study (the same as the first five years of ours) represent a relative lull in red tide frequency and severity in Florida compared to the latter decade included in our study.

There is also evidence that our apparent survival estimates for Florida could be lower because of permanent shifts in wintering range outside of Florida. Lyons et al. (2018) estimated the wintering population of the southeast US (including Florida) at 10,400 individuals using data from the fall migration in 2011, while surveyors conducting the International Piping Plover Census (Elliott-Smith et al., 2015) counted 5,069 Red Knots during the 2006 count and approximately 3,900 in 2011. These numbers are not directly comparable, as they are based on different methodologies, but they reflect uncertainties as to *where* specifically Red Knots are wintering in the southeastern U.S. While there are not consistent repeated estimates from each location within this region over that time, resight data indicates

TABLE 4 Seasonal apparent survival estimates of Red Knots in each location based on the highest-supported *post-hoc* model incorporating five significant covariates – geolocators, and the four red tide events as applicable to the affected location.

Location	Intercept	Geolocator[a]	Red tide event			
			Fall 2009	Fall 2012	Winter 2012	Fall 2018
Texas	0.918	0.884	0.510	–	–	–
Louisiana	0.935	0.908	–	–	–	–
Florida	0.932	0.902	–	0.884	0.786	0.492

[a]The geolocator effect is assumed the same across locations. A model with a geolocator effect varying by location had less support.

that some birds have indeed shifted from the Florida wintering group to the Atlantic coasts of Georgia and South Carolina (USFWS 2014b, Pelton et al., 2022). The parameter estimates for fidelity and re-immigration based on the Barker model used by Schwarzer et al. (2012) indicate some support for this hypothesis. The apparent survival estimates for Florida in this study confound permanent emigration (such as a shift in wintering area from Florida to Georgia/South Carolina) with mortality, so it is possible that some portion of the decrease in apparent survival was attributable to emigration.

Apparent survival estimates for the Texas and Louisiana populations from this study could also be biased low (relative to true survival), if some proportion of those birds had also shifted to other wintering sites. However, there is currently no solid evidence to support this, and relatively minimal exchange of individuals even between the locations suggests it is unlikely.

The four significant red tide seasons in Florida were actually two prolonged events that lasted through the fall and winter intervals of the 2012 and 2018 nonbreeding season, compounding the effect on annual survival. In those years, estimated annual survival (assuming mean of non-red-tide survival for the unaffected season) would have been ~0.56 (in 2012) and ~0.33 (in 2018). While the 2009 red tide in Texas primarily affected one season (fall), it was severe enough that annual survival would have been ~0.43. These estimates indicate the loss of large proportions (~44 – 67%) of the entire population in a single year. Though there is no fixed quantitative threshold of a "catastrophe" in population dynamics, certainly the scale of these losses for a *K*-selected species are alarming. Simulation studies have demonstrated that population trends tend to be depressed when *variability* in survival is high, relative to a population where it is low, given the same arithmetic mean of survival (Boyce, 1977; Hitchcock and Gratto-Trevor, 1997). Indeed, catastrophic events, especially when combined with other environmental stressors, can drastically accelerate negative population growth rates towards extinction in closed populations (Simberloff, 1988). In this case, the effect of catastrophes on one wintering population may be tempered somewhat depending on the degree of migratory connectivity between breeding and wintering areas. As the processes by which young Red Knots recruit into a particular wintering population remain poorly understood, it is not clear that high recruitment could offset low survival years to stabilize a wintering population over the long term. Population declines documented in other wintering areas for *C. c. rufa* suggest a negative long-run population growth rate, and our results indicate red tides could be contributing to very high variability in Red Knot survival, at least in the Texas and Florida populations. Under these conditions, populations become more vulnerable to extinction especially when the frequency and magnitude of random catastrophes are increasing (Lande, 1993).

Sparse data (low encounter probability) for certain seasons in some locations likely resulted in the inability to fully estimate parameters for multiple red tide events, but is it possible that birds are able to avoid red tide effects in some years, but not in others? Knots could potentially reduce their exposure to toxins either through a shift in prey selection, or a shift in range.

There is evidence that some shorebirds avoid prey with high concentrations of algal toxins. Black oystercatchers (*Haematopus bachmani*) shifted diet to prey items that did not harbor algal toxins when those toxins were present in sea mussels – their preferred prey – and discarded mussel tissue with high toxin concentrations when they did capture it (Kvitek and Bretz, 2005), while other shorebird species tended to avoid areas where toxins were present. Red knots, however, consume bivalve prey whole and crush it in their gizzard rather than removing the flesh first (which would provide an opportunity to taste and reject), potentially making them more susceptible to accumulate high amounts of toxin. A prey selection mechanism to reduce exposure would only be viable if a suitable non-toxic alternate prey source were available. On the Gulf-facing beaches, *Donax* spp. is by far the dominant bivalve mollusk that is most likely to occur in ample densities to support knots, and it is known to concentrate HAB toxins at extremely high levels (Cummins et al., 1971). It is also possible that red tides could affect birds by negatively affecting recruitment of their bivalve prey (Summerson and Peterson, 1990; Rolton et al., 2016), which might have both immediate and long-term effects. A study comparing two red tide outbreaks (2006 and 2011) on beaches of south Texas found that one event resulted in a near complete die-off of the benthic macrofauna while that same faunal community was virtually unaffected in the other event, despite extensive fish-kills occurring in both (Lerma, 2013).

As discussed previously, permanent emigration of birds from the Florida wintering population to another site in the southeast US would be one way to avoid red tide effects. However, avoidance may not require permanent emigration. Since red tides most commonly occur during fall months, simply prolonging a southeast US stopover before moving on to Florida could reduce the degree of exposure. The abundance and duration of knots stopping at the Altamaha River delta (Georgia) varies between years and is likely influenced by availability of the dwarf surf clam (*Mulinia lateralis*; Lyons et al., 2018), so "good years" at this site might reduce the proportion of birds arriving in southwest Florida to toxic conditions, at a time when they are already under high physiological stress due to the demands of molt which is coupled with decreased immunological function (Buehler et al., 2008). If knots stay in the southeast US long enough to complete their molt, they would also likely arrive in better condition. There is isotopic evidence that some knots in the Florida wintering population do in fact complete their molt prior to arrival in Florida (Newstead, unpubl. data). Staying longer further north would also reduce the risk of exposure to tropical storms during the peak of hurricane season (Niles et al., 2012).

In Texas, knots are known to utilize the extensive tidal flats of the Laguna Madre when water levels allow (Newstead, 2014), and when red tides do occur, they tend to be most severe and extensive on the Gulf beach, only occasionally affecting the Laguna Madre. Also, the Laguna Madre complex and the interspersed flats of the Rio Grande Delta extend over 400 km from Corpus Christi, Texas southward to La Pesca, Tamaulipas, Mexico. Aerial radiotelemetry documented that knots move extensively throughout this system during the nonbreeding season (Newstead, 2014), so they could

potentially avoid red tide effects by moving to unaffected parts of the same extensive system.

Red tides typically occur beginning in late summer and often persist until early to mid-winter, though in the past decade some events have been initiated or prolonged into the spring and summer seasons (Brand and Compton, 2007; Stumpf et al., 2022). Comparing models allowing seasonal variation in survival for Florida, estimates were lower in all seasons when red tide was not included as a covariate, but within all models season-specific estimates were lower in summer relative to fall and winter. This suggests that, absent red tide, survival in Florida during the extensive nonbreeding period is higher relative to the breeding period, which includes lengthy round-trip migrations for breeding adults. This finding is in contrast to Leyrer et al. (2013) for *C.c. canutus* wintering at Banc d'Arguin in Mauritania, where survival during the migratory and breeding seasons was close to 1.0, with most mortality occurring on the wintering area. Banc d'Arguin, at roughly 20.5 N latitude, is extremely arid and hot even during the boreal winter. Leyrer et al. (2013) suggested that during the period following arrival from breeding grounds, environmental and interspecific competitive constraints may depress survival at a time when birds are already under high physiological stress due to flight feather molt (Leyrer et al., 2013). Additionally, during this phase knots tend to suppress costly immune functions which may make them more vulnerable to novel stressors (Buehler et al., 2008). Climate conditions on wintering sites are more moderate in the subtropical latitudes of this study, though birds may occasionally experience stress from short bouts of cold winter temperatures in addition to a wider array of other stressors such as disturbance from heavy recreational use of beaches. Such conditions could simultaneously increase maintenance metabolism costs and place constraints on foraging opportunity. Prey depletion, or prey toxicity, from red tide events during this time period would introduce another lethal or sublethal stressor on top of those already normally experienced by knots during the nonbreeding period.

Boyd and Piersma (2001) found that relative population stability of Red Knots (*C.c. islandica*) wintering in Great Britain was maintained by alternating trends of survival and recruitment, implicating a potential role of density-dependent processes in population regulation. Knots using Delaware Bay during spring migration experienced consistently high apparent survival which was offset by consistently low recruitment between 2005-2018, resulting in a slightly positive population growth rate (Tucker et al., 2023). Using data from two large shorebird monitoring datasets, Bart et al. (2007) suggested the most likely mechanisms of North American shorebird population declines are reduction in breeding population size and poor reproduction, rather than an artifact potentially explicable by shifting distributions. This is almost certainly the case with Red Knots, as nearly all regular monitoring at key sites across the range indicate a declining trend, while no "new" sites of importance have been discovered in the meantime that balance for losses seen elsewhere. The relatively acute mortality episodes associated with red tides in this study would clearly result in reduced breeding population, but it is not known whether reproductive capacity can offset such population reductions when they occur relatively frequently.

While red tide toxins have been directly tied to the mortality of Red Knots in Texas (Rafalski, 2012) and closely related shorebirds in Florida (van Deventer et al., 2012) through necropsy and tissue sampling, only one other study has quantitatively estimated the effect of HABs on shorebird survival at the population level. Ellis et al. (2021) detected a negative effect of HABs on Piping Plover (*Charadrius melodus*) survival during the nonbreeding season along the Gulf of Mexico coast. This species is not only faithful to wintering areas generally (similar to knots) but even more highly faithful to specific individual territories with small home ranges (Drake et al., 2001; Cohen et al., 2008; Newstead, 2014) and may have a greater disinclination to move away from an area affected by red tide or other factors that may negatively affect survival. Our study provides additional evidence that HABs can negatively impact shorebird populations even when sudden mass mortality events are not observed or perhaps do not occur.

Another HAB dinoflagellate, *Aureoumbra lagunensis*, creates "brown tides" in the Laguna Madre of Texas which could be affecting knots in other ways. Though this organism does not produce potent toxins, it is considered disruptive to ecosystems because of its ability to bloom at low light and nutrient levels, and create a positive feedback mechanism that results in losses to seagrasses and benthic organisms (Gobler and Sunda, 2012). One brown tide event in the 1990s persisted in the Laguna Madre for nearly eight years, the longest HAB ever recorded (Buskey et al., 2001), and blooms have recurred intermittently and at varying spatial extents since then (DeYoe et al., 2007). Major die-offs of *Mulinia lateralis*, formerly the dominant bivalve mollusk in the Laguna Madre, have been coincident with these blooms (Montagna et al., 1993). The diet of Red Knots during the winter months in the Laguna Madre has not been described, but given that *M. lateralis* is a dominant prey item in other parts of the species' range, it is likely that these crashes in local populations would also impact prey availability, and potentially survival, for knots.

While this study focused on populations affected by HABs in the Gulf of Mexico, blooms have been suggested as a potential cause of several significant mortality events on the Atlantic coast of South America, affecting the long-distance migrant *rufa* population wintering in Tierra del Fuego. In Uruguay in April 2007, approximately 1300 knots were found dead in a single event that may have been associated with a HAB, though samples were not collected to confirm the cause of mortality (Aldabe et al., 2015). The loss of ~6% of the total *rufa* population in a single documented event, and the possibility that this may not have been a one-off event but could even occur with some regularity in remote parts of its range provides a potential partial explanation for the dramatic collapse of the Red Knot population that winters on the Atlantic coast of South America. During mortality events in 1997 and 2000 in southern Brazil, Buehler et al. (2010) described similar condition of Red Knots immediately prior to mortality – disorientation, lethargy, unresponsiveness – as witnessed in red tide events in Texas (Newstead, pers. obs.) and Florida, but pathology reports were inconclusive as to the primary cause of death.

Further, Red Knots that winter along the Pacific coasts of Central and South America (the majority of which are suspected to use the focal locations of this study as stopovers; Newstead,

unpublished data) may also be encountering increased frequency and intensity of HABs (Band-Schmidt et al., 2019), including several recent events in Ecuador (Torres, 2015; Borbor-Cordova et al., 2019) and Chile (Mardones et al., 2010; Paredes et al., 2019). Several dinoflagellate species that produce paralytic or diarrhetic shellfish poisons can reach bloom concentrations resulting in fish kills and other toxic effects in areas of Central and South America known to be important stopovers. Among these, *Gymnodinium catenatum*, the *Alexandrium tamarense* complex, and *Dinophysis* spp. produce toxins that become highly concentrated in bivalve species such as wedge clams, *Donax hanleyanus*, and blue mussels, *Mytilus edulis* (Carreto et al., 1986; Mee et al., 1986; Méndez and Carreto, 2018), both known to be favored prey items of red knots. The distribution and frequency of HABs appear to be increasing in Central and South America (Band-Schmidt et al., 2019), as well as in the Gulf of Mexico (Tominack et al., 2020).

The magnitude of the geolocator effect was a ~3% reduction in seasonal survival (or ~8% over a year). While many studies reporting tracking device effects on survival have focused on the short-term (often one-year return rates) with projects having highly variable numbers of birds with and without devices, the results of this study are consistent with others (Rodriguez-Ruiz et al., 2019; Pakanen et al., 2020) finding that negative effects of some tracking devices may be statistically undetectable in the short term but accrue to the level of significance over the course of longer-term studies. The use of tracking devices on wildlife has yielded transformative new insights into our understanding of life histories and factors affecting distribution and movements of animals, especially Red Knots (Niles et al., 2010; Burger et al., 2012; Niles et al., 2012; Newstead et al., 2013; Tomkovich et al., 2013; Piersma et al., 2021). However, consideration must be given to the potential costs of such deployments on survival, reproduction, movement, and other concerns. As new findings are added to the literature and technological advances lead to ever smaller and more efficient tracking devices, researchers should continue to assess the potential benefits to be gained for species conservation relative to the potential impacts to birds when planning new studies.

This study provides the first long-term apparent survival estimates for Red Knot populations in the Gulf, and strong evidence that HABs are negatively affecting populations in Texas and Florida. Preventing such large-scale events presents many challenges, although where their apparent causes are linked to excessive nutrients these factors can be mitigated by better managing anthropogenic landscape changes along the coast and through the watershed. Since HABs are considered a "co-stressor" associated with climate change (Griffith and Gobler, 2020), these findings indicate the impacts to knots could become even more severe in the future.

Accurate estimation of population size of these three Gulf wintering groups has not been possible, and is hindered by several factors including the potential shift of some portion of the Florida wintering population to the southeast US (Pelton et al., 2022), logistical difficulties in accessing habitats used by the Louisiana and Texas populations during winter, and the fact that some knots that pass through the northern Gulf in spring likely wintered somewhere further south. These are all surmountable obstacles provided adequate support for dedicated and coordinated monitoring programs. While we have presented estimates of one key demographic parameter (survival) for these populations, a better understanding of processes and rates of recruitment is needed to evaluate population trajectories.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical approval was not required for the study involving animals in accordance with the local legislation and institutional requirements because Researchers conducting field work were not affiliated with institutions with their own ethics review process. USFWS Recovery Permits (which were obtained for this work) require extensive explanation of capture/handling procedures and contingencies.

Author contributions

DN: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. SD: Formal analysis, Methodology, Writing – review & editing. BB: Methodology, Supervision, Writing – review & editing. LN: Conceptualization, Writing – review & editing. JB: Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fevo.2024.1375412/full#supplementary-material

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EXHIBIT C

MacDonald, A. et al. 2024
Uniting rufa Red Knot resighting data throughout the western Atlantic Flyway offers myriad opportunities for survival analysis
10th Western Hemisphere Shorebird Group Meeting. Sackville, NB, Canada
August 11-16, 2024

Uniting *rufa* Red Knot resighting data throughout the western Atlantic Flyway offers myriad opportunities for survival analysis

La unión de los datos de reencuentro de Calidris canutus rufa *en todo el hemisferio occidental ofrece múltiples oportunidades para el análisis de la supervivencia*

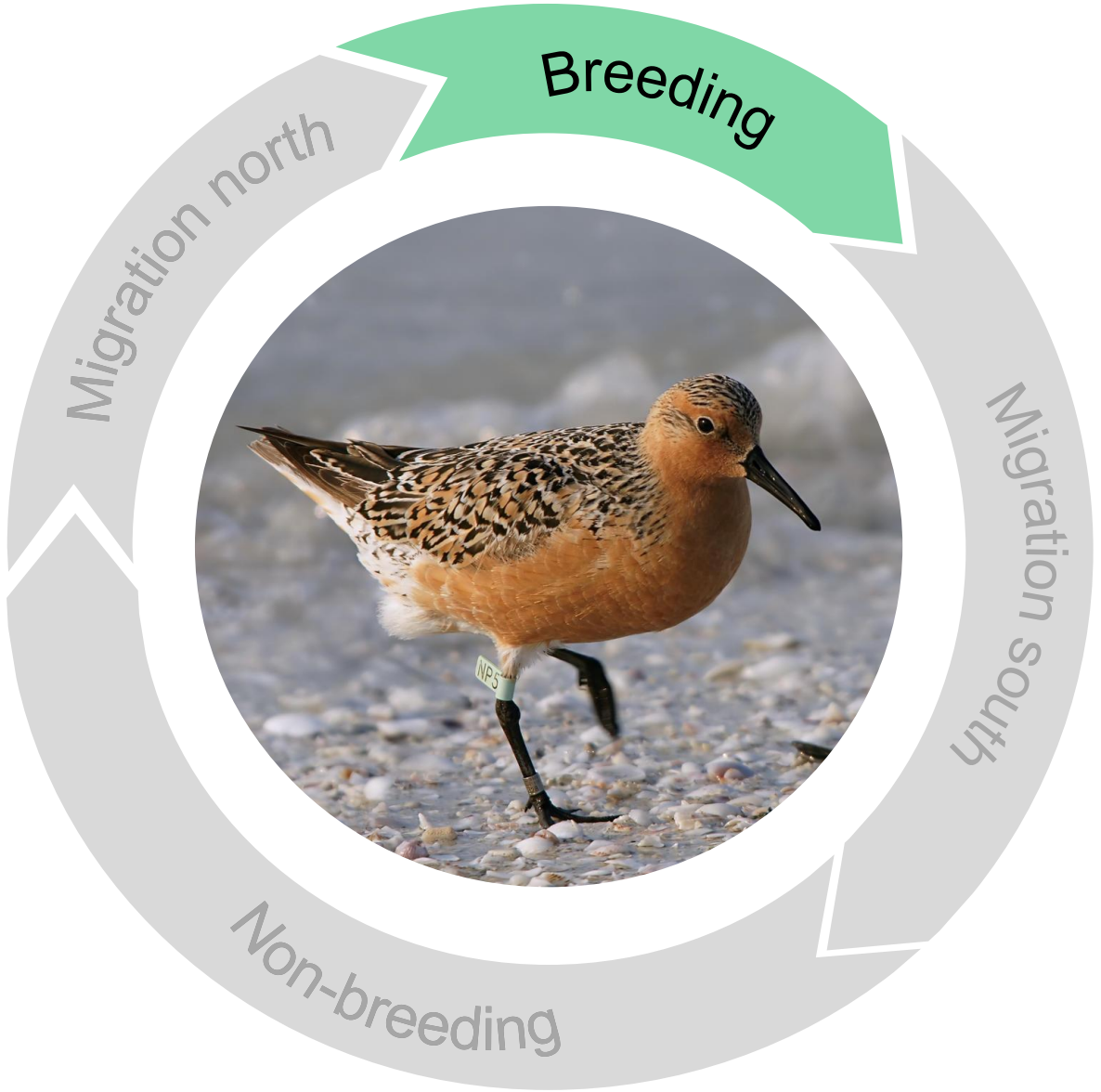
Amie MacDonald, Yves Aubry, Henrietta Bellman, Janell Brush, Christophe Buidin, Jacquie Clark, Nigel Clark, Audrey DeRose-Wilson, Amanda Dey, Theo Diehl, Stephanie Feigin, Christian Friis, Patricia González, Brian Harrington, Kevin Kalasz, Timothy Keyes, Stephanie Koch, Patrick Leary, James Lyons, Natalia Martínez Curci, David Mizrahi, Jason Mobley, David Newstead, Lawrence Niles, Erica Nol, Julie Paquet, Mark Peck, Yann Rochepault, Roberta Rodrigues, Felicia Sanders, Fletcher Smith, Bryan Watts, and Paul Smith

BIRDS CANADA
OISEAUX CANADA

Environment and Climate Change Canada
Environnement et Changement climatique Canada


NESTING RANGE
James Bay
Mingan
Delaware Bay
KEY
WINTERING
AREAS
STOPOVER
SITES

Joe Smith


Breeding
Migration south
Non-breeding
Migration north


NESTING RANGE
James Bay
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Delaware Bay
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WINTERING
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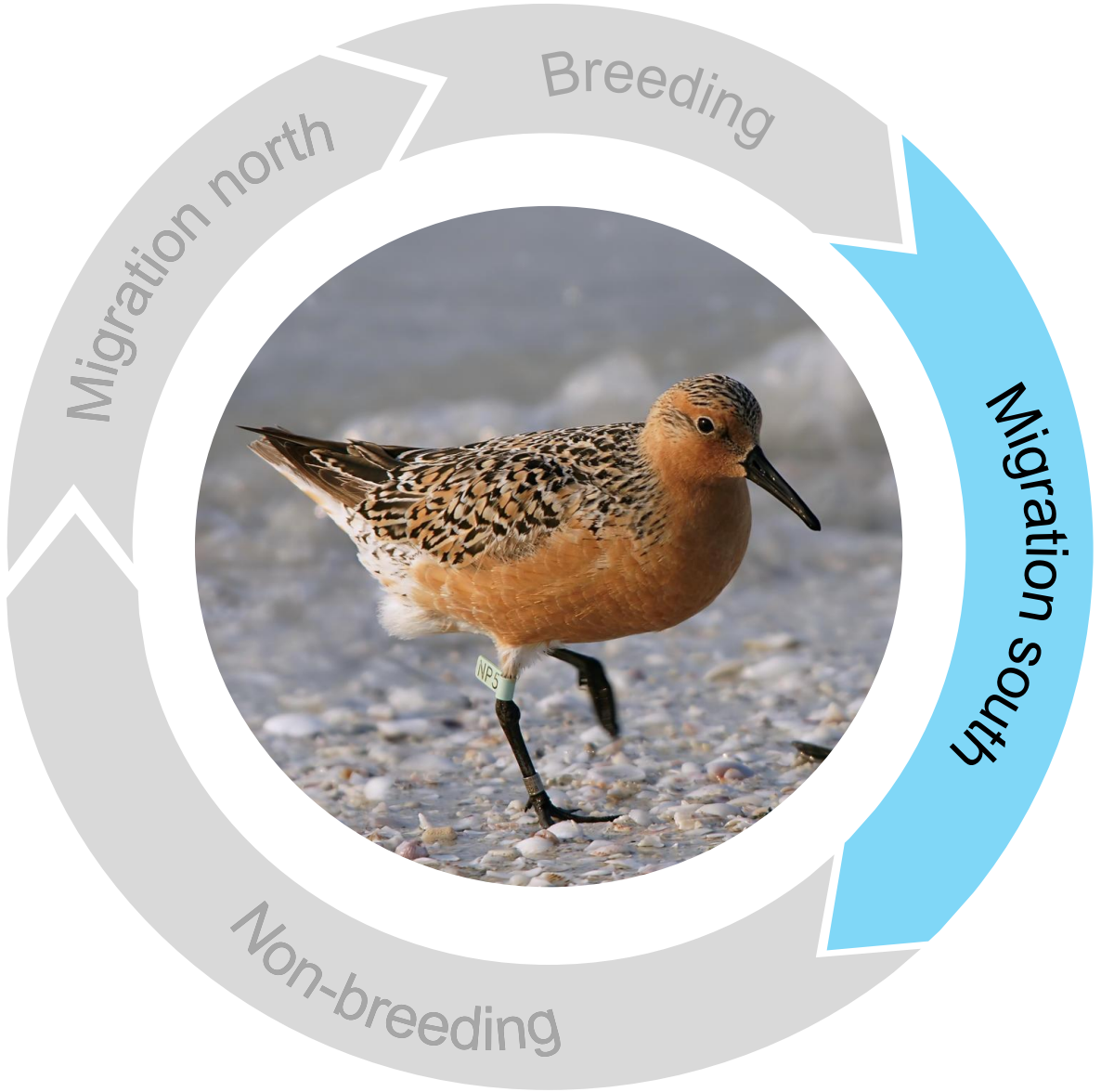
Joe Smith


Breeding
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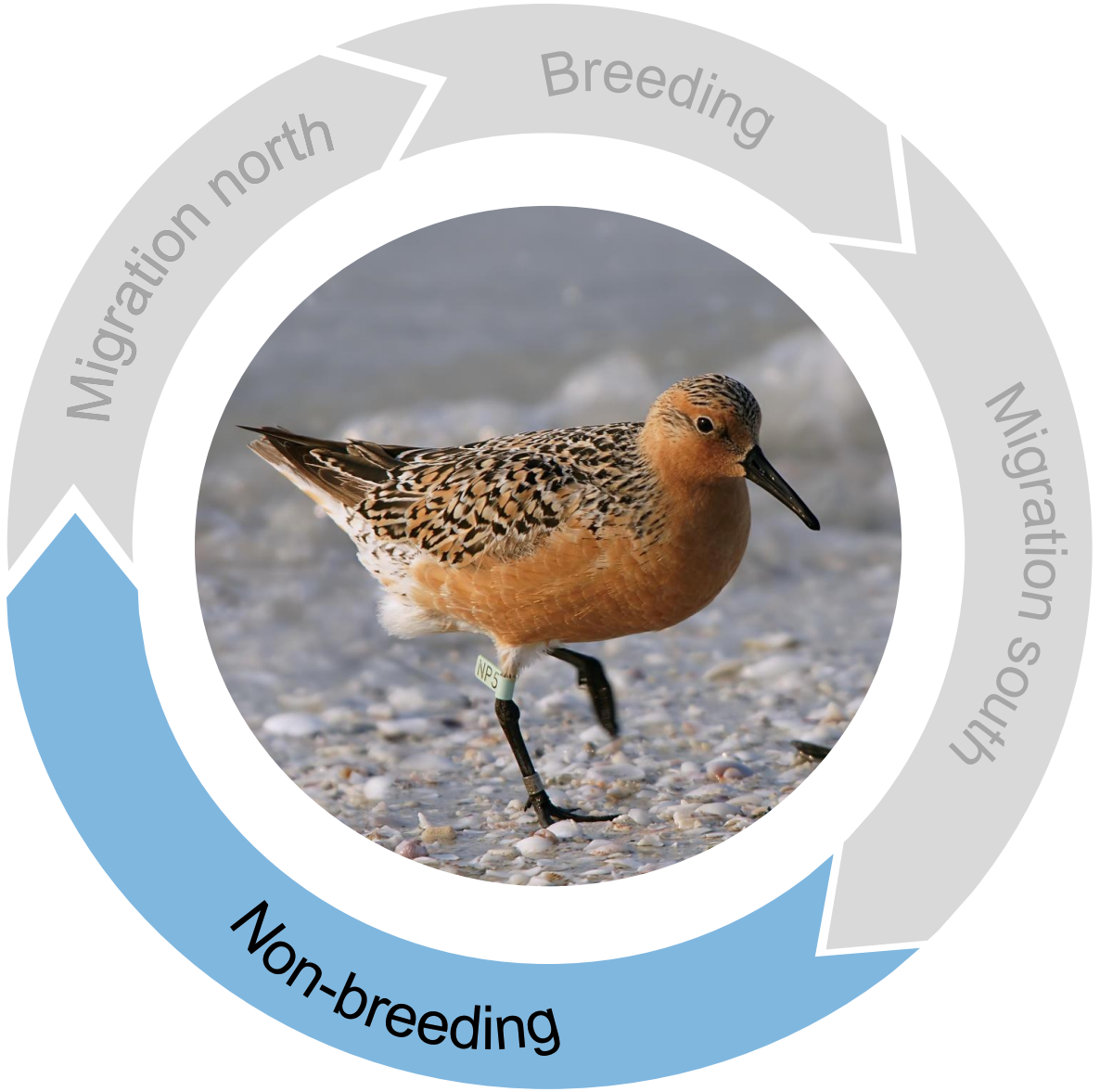
Migration north


NESTING RANGE
James Bay
Mingan
Delaware Bay
KEY
WINTERING
AREAS
STOPOVER
SITES

Joe Smith


Breeding
Migration south
Non-breeding
Migration north


NESTING RANGE
James Bay
Mingan
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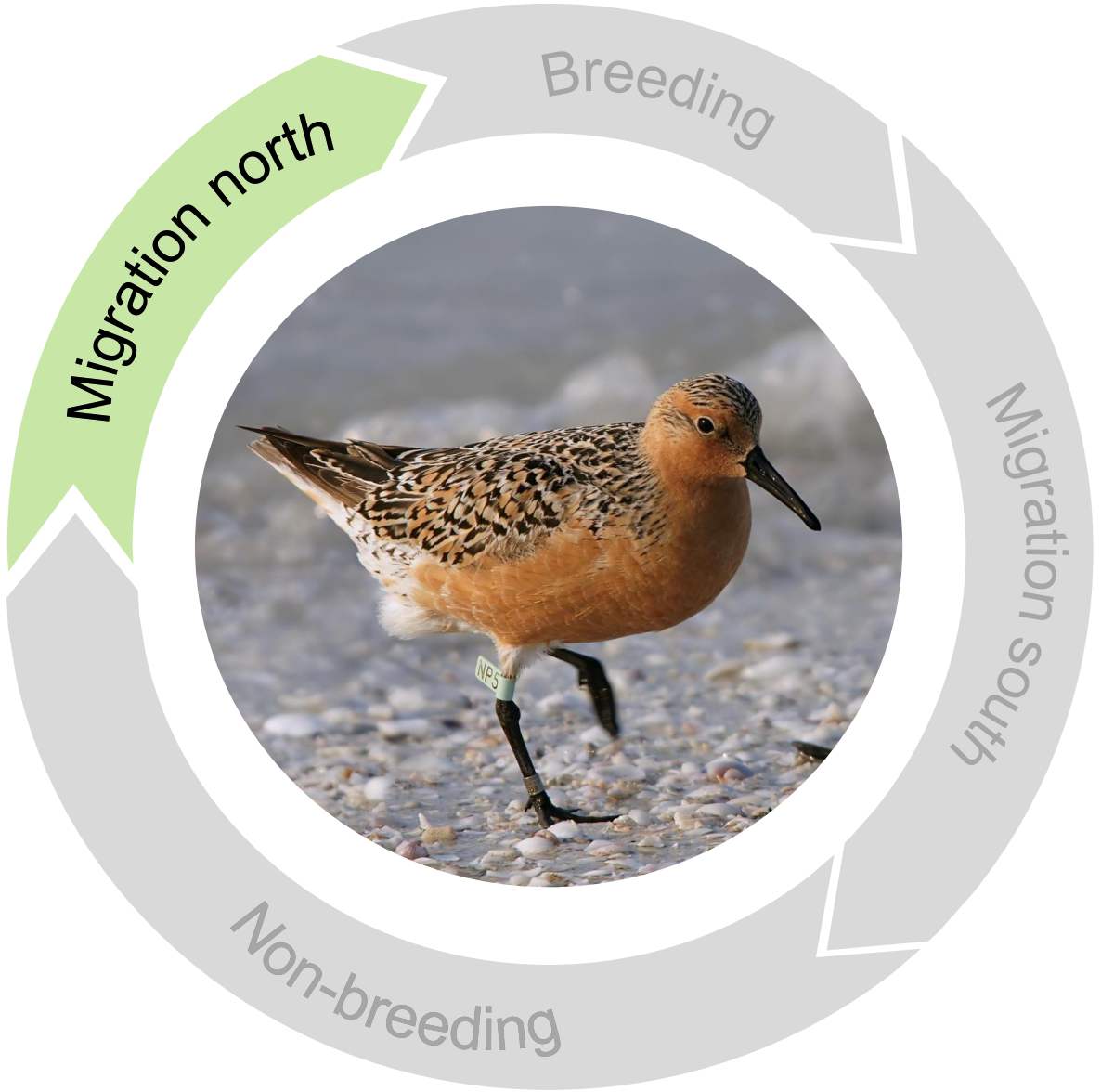
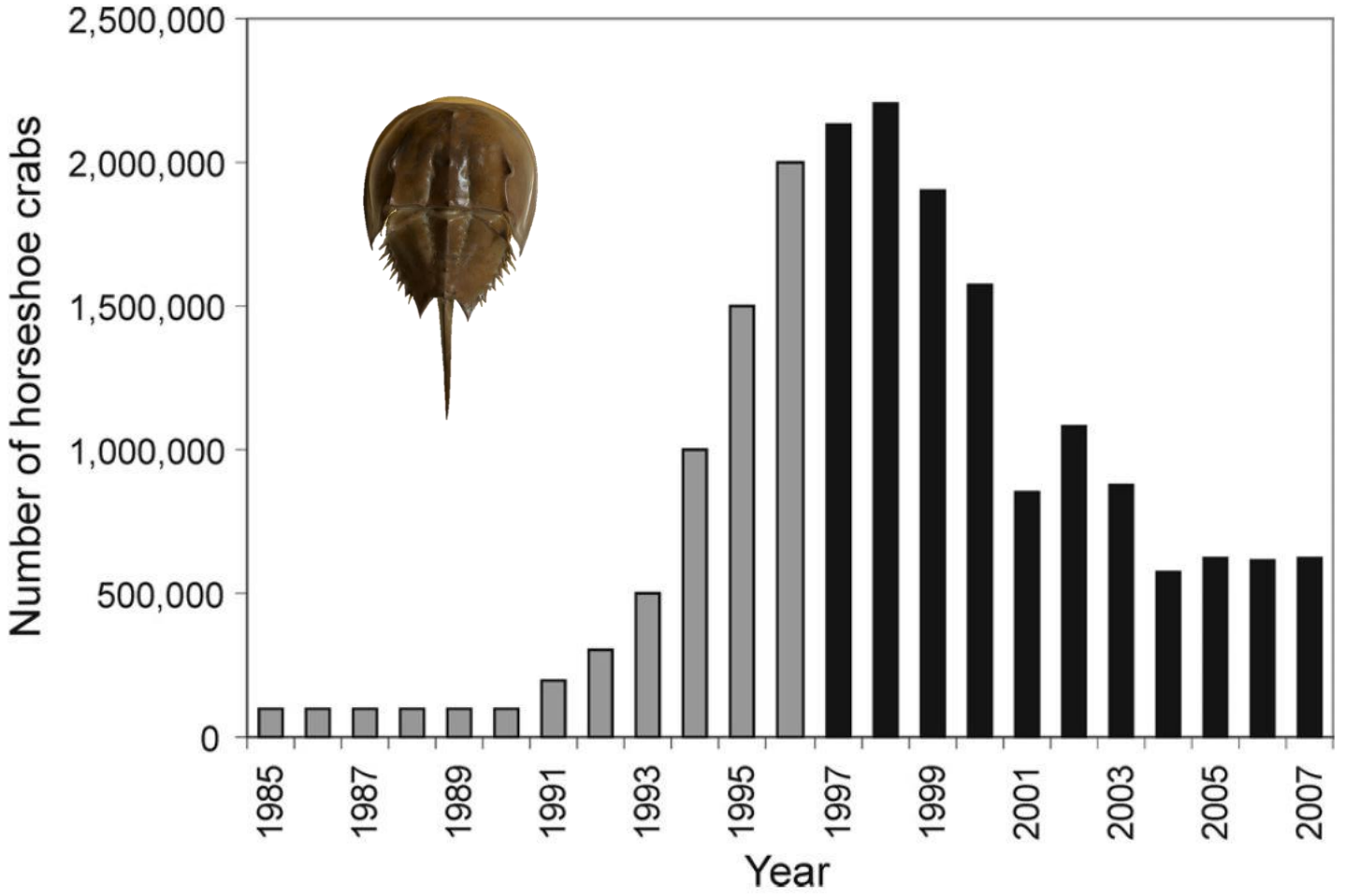
Joe Smith


Breeding
Migration south
Non-breeding
Migration north

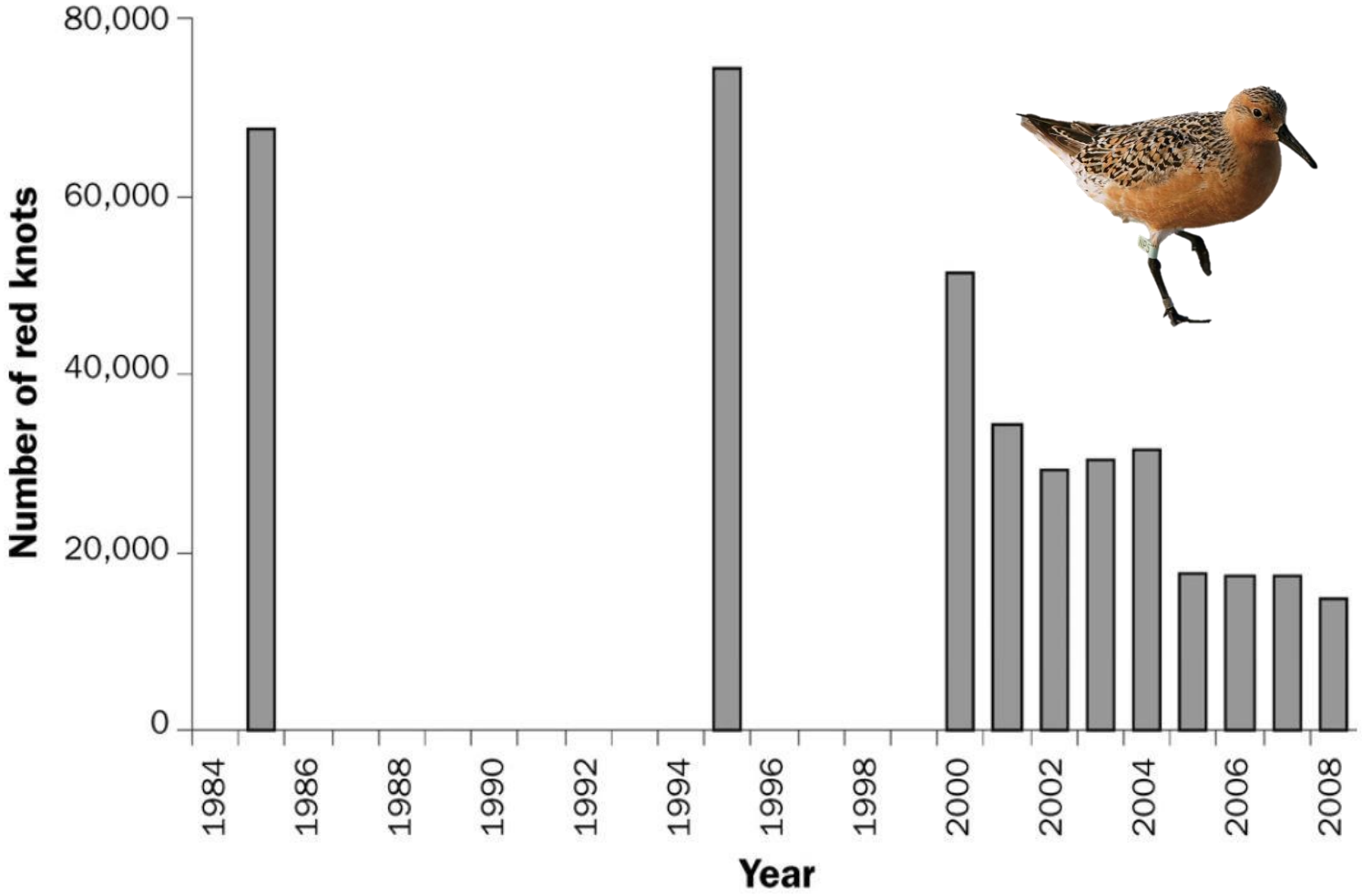
Horseshoe crabs overharvested in late 1990s



Niles et al. (2009)

Joe Smith

Red Knots declined in 2000s



Niles et al. (2009)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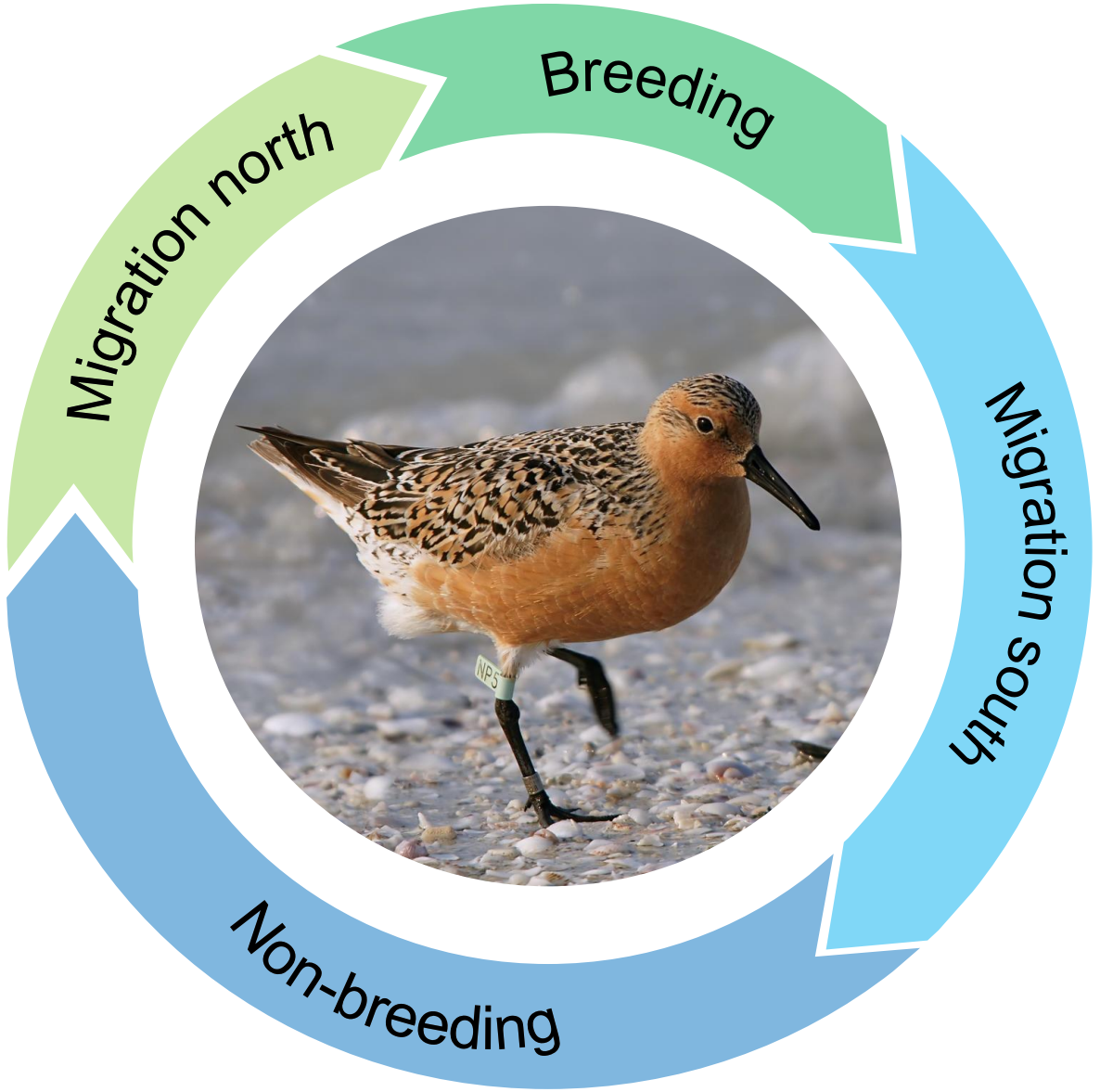
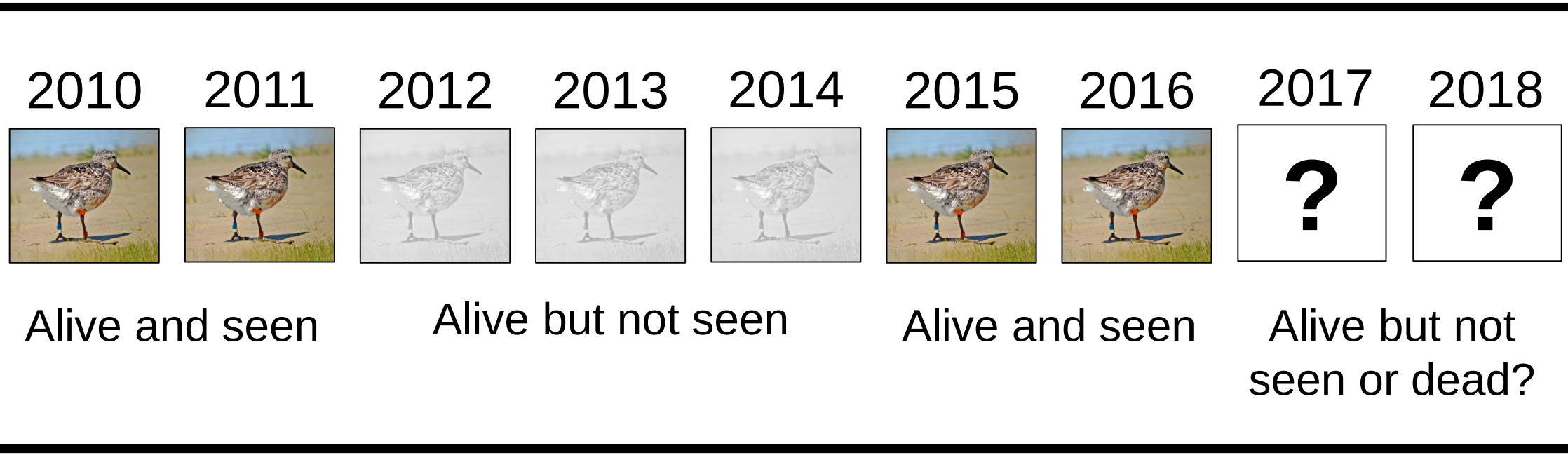

Breeding
Migration south
Non-breeding
Migration north

Many *rufa* red knots are marked with coded leg flags

Analyzing flag resighting data in mark-recapture models permits estimation of demographic parameters



Bayesian analysis offers flexibility to build models to address various questions about red knot survival

Three case studies

1. Estimate true annual survival for adult red knots staging in James Bay
2. Estimate true annual survival for juvenile red knots at the Mingan archipelago
3. Estimate seasonal survival and transition probabilities among key sites throughout the red knot annual cycle

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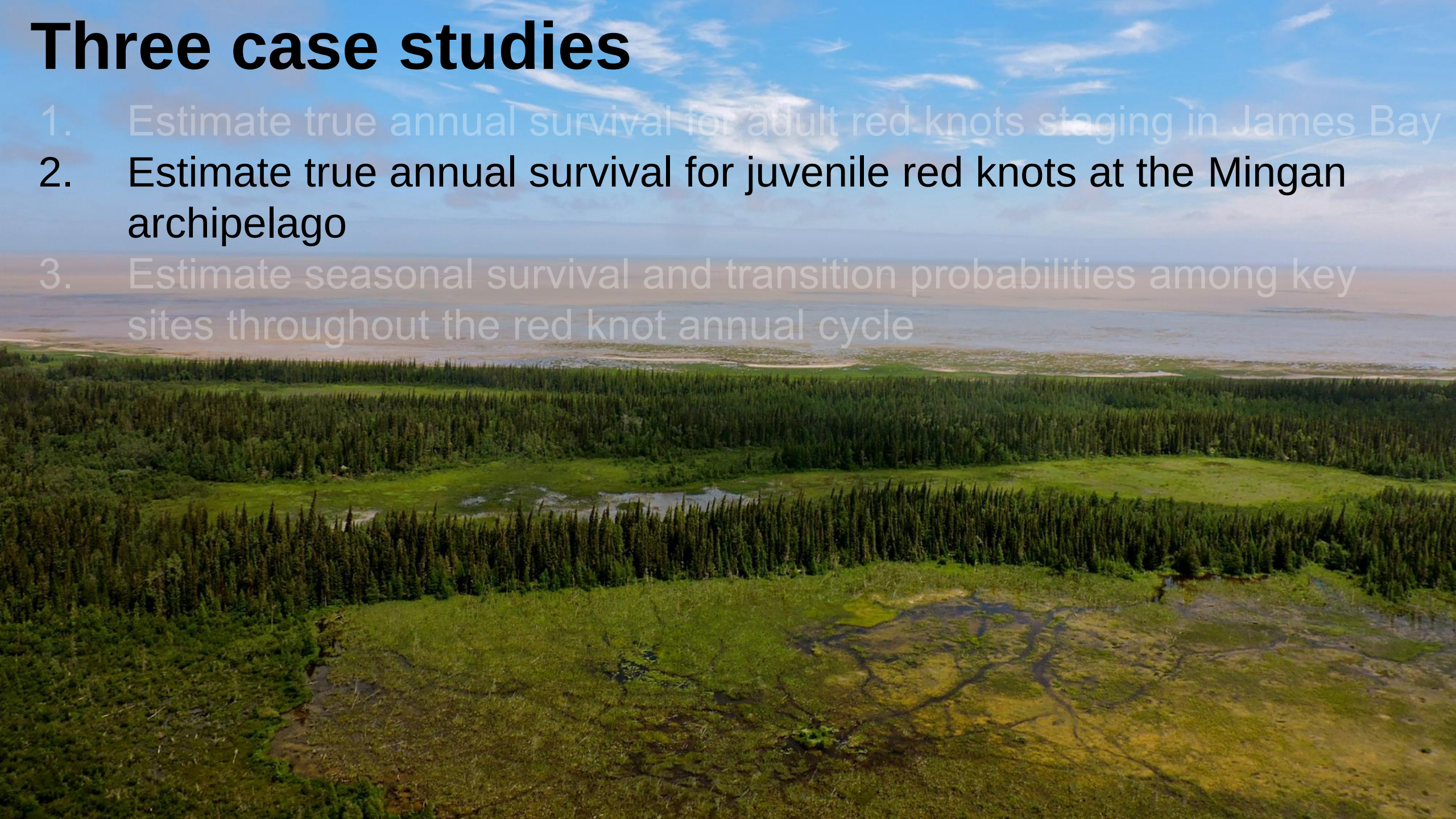

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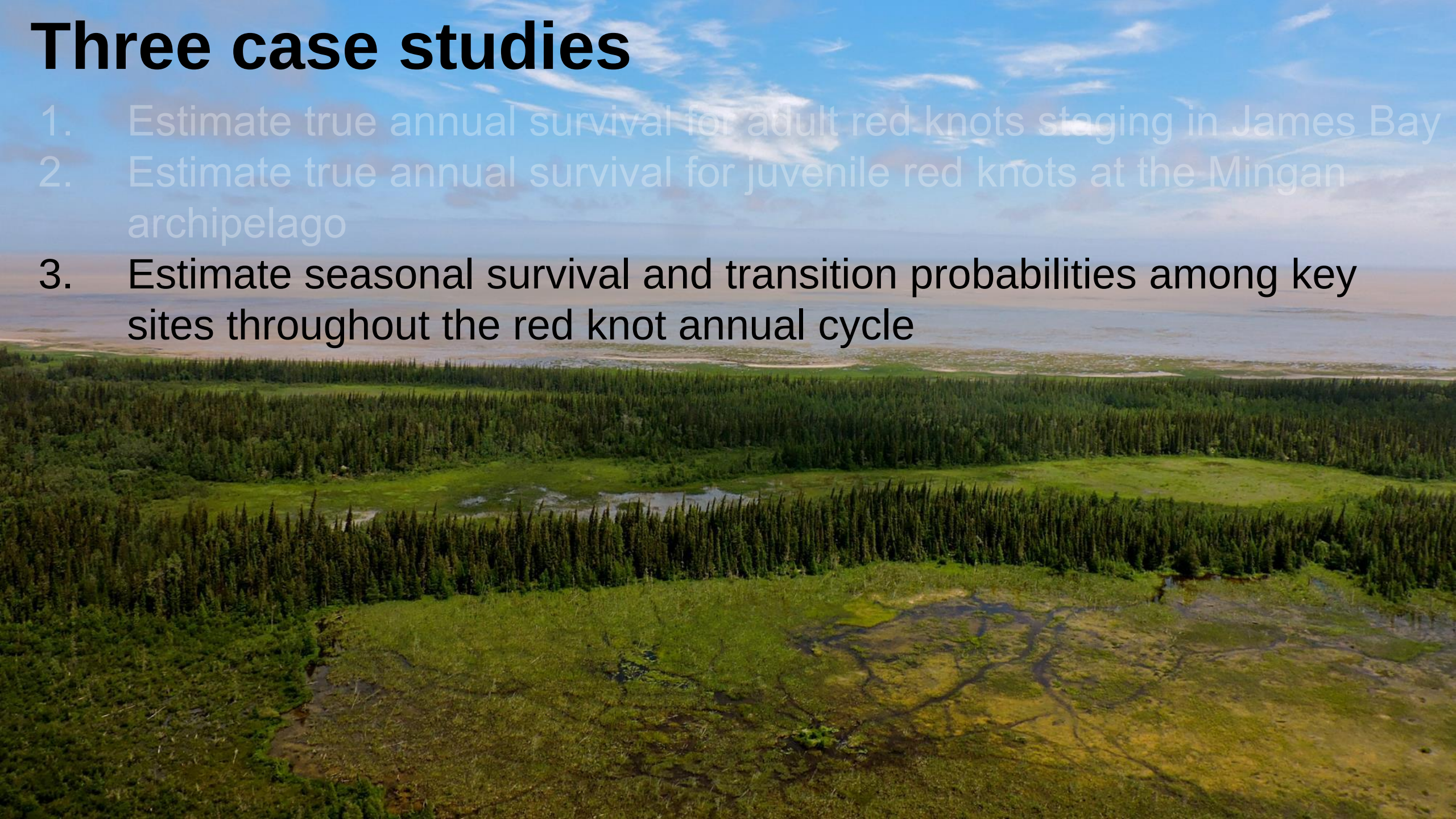


Survival rates of Red Knots staging in James Bay

Resights from James Bay + Resights from outside James Bay

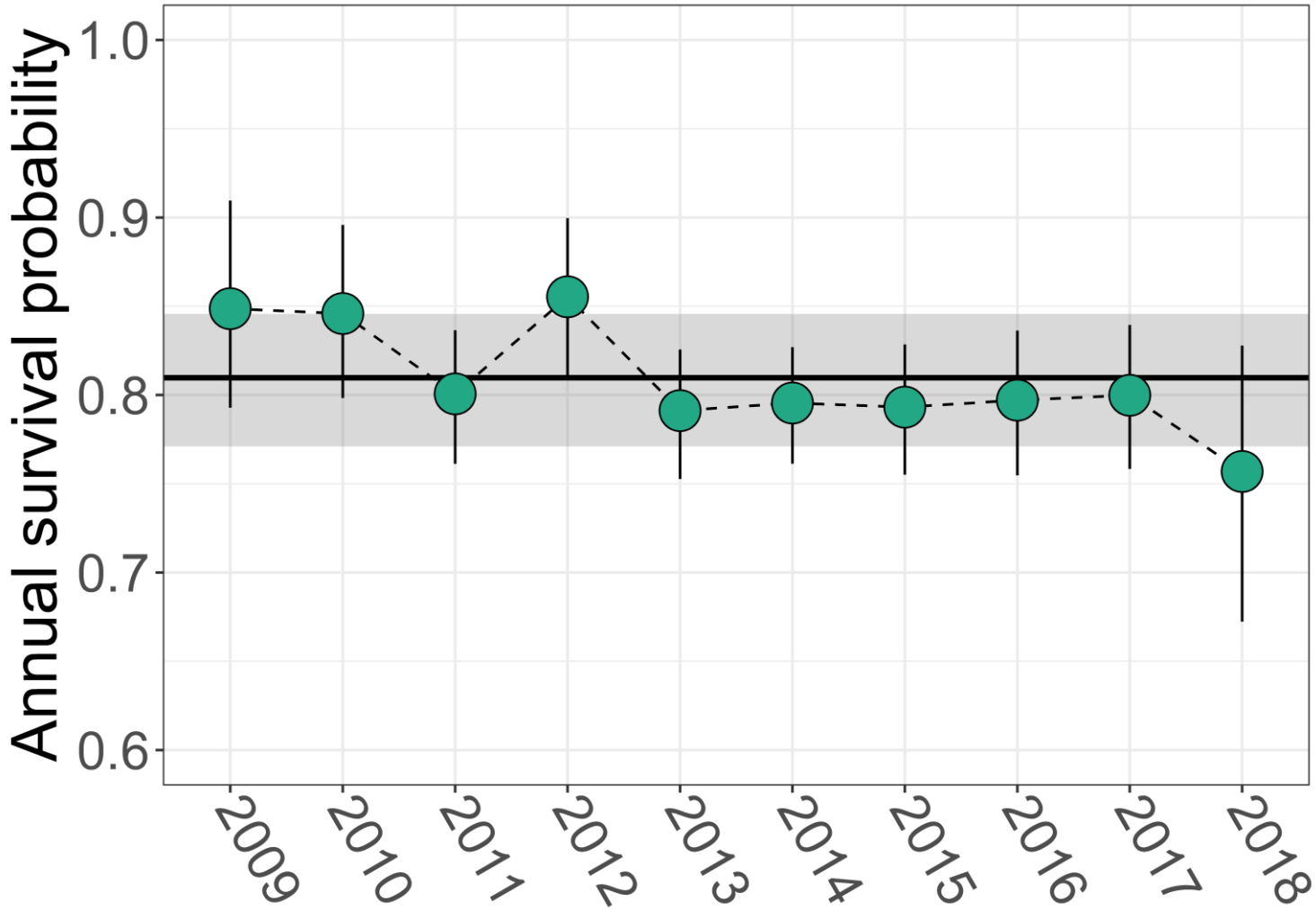
↓

Barker model

↓

True adult survival

Survival rates of Red Knots staging in James Bay



Resights from James Bay

+

Resights from outside James Bay

↓

Barker model

↓

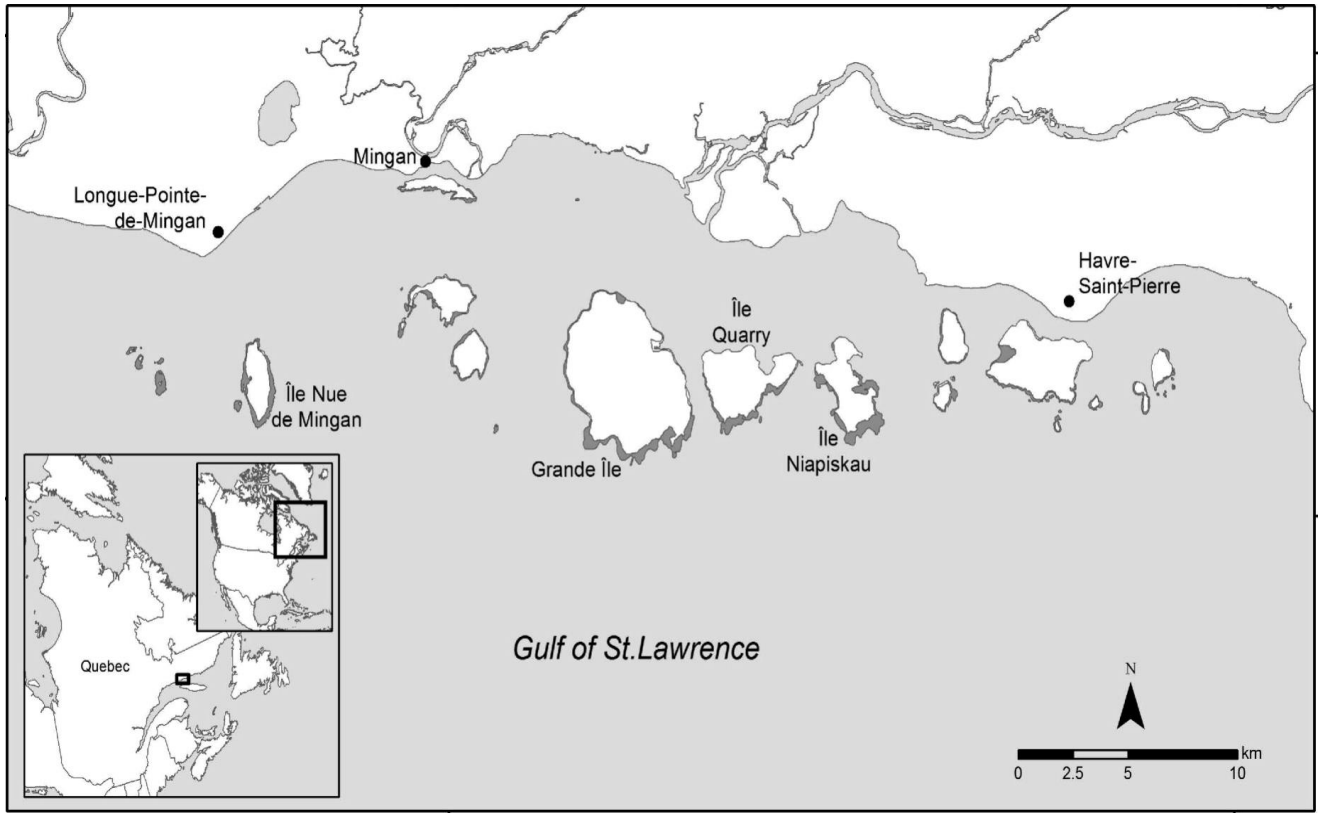
True adult survival = **0.810 (0.771 – 0.846)**

Survival rates of juvenile Red Knots at the Mingan Archipelago

Juvenile banding records + Resights from Mingan

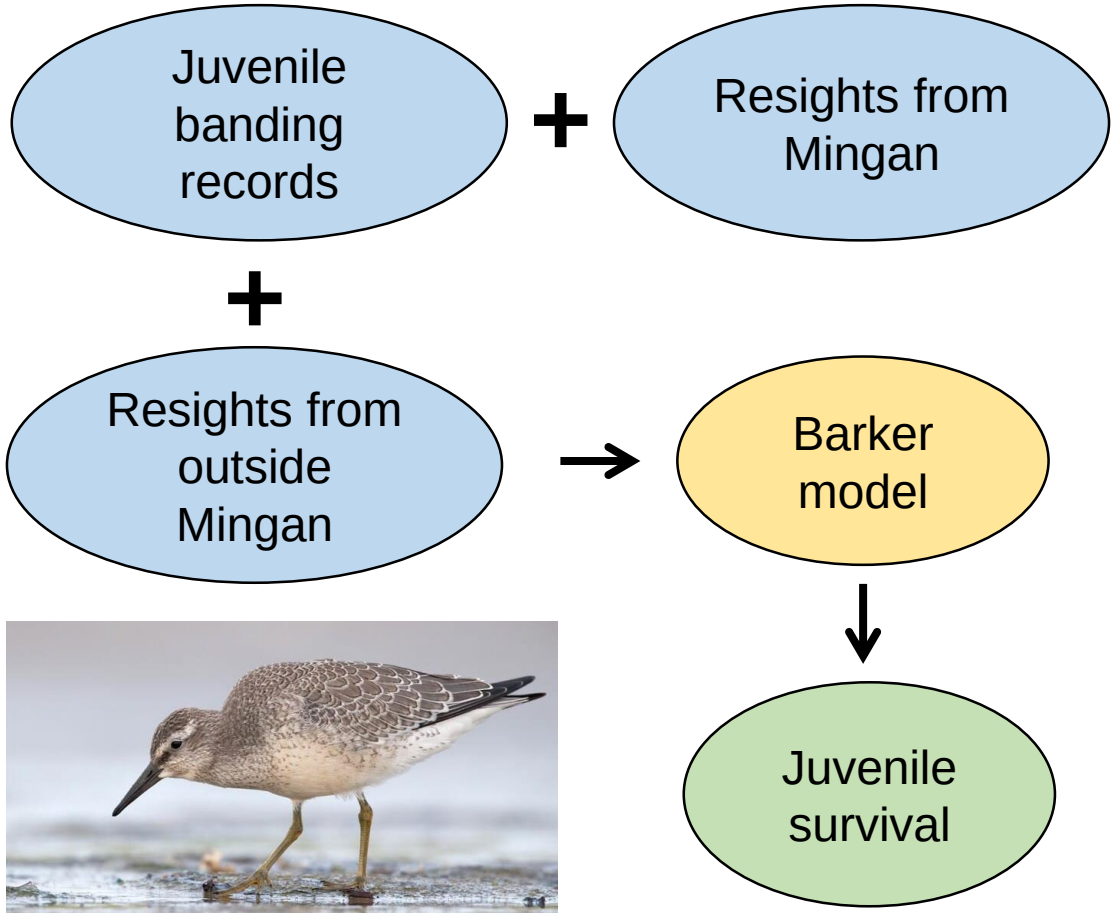
+ Resights from outside Mingan → Barker model → Juvenile survival

Ian Davies

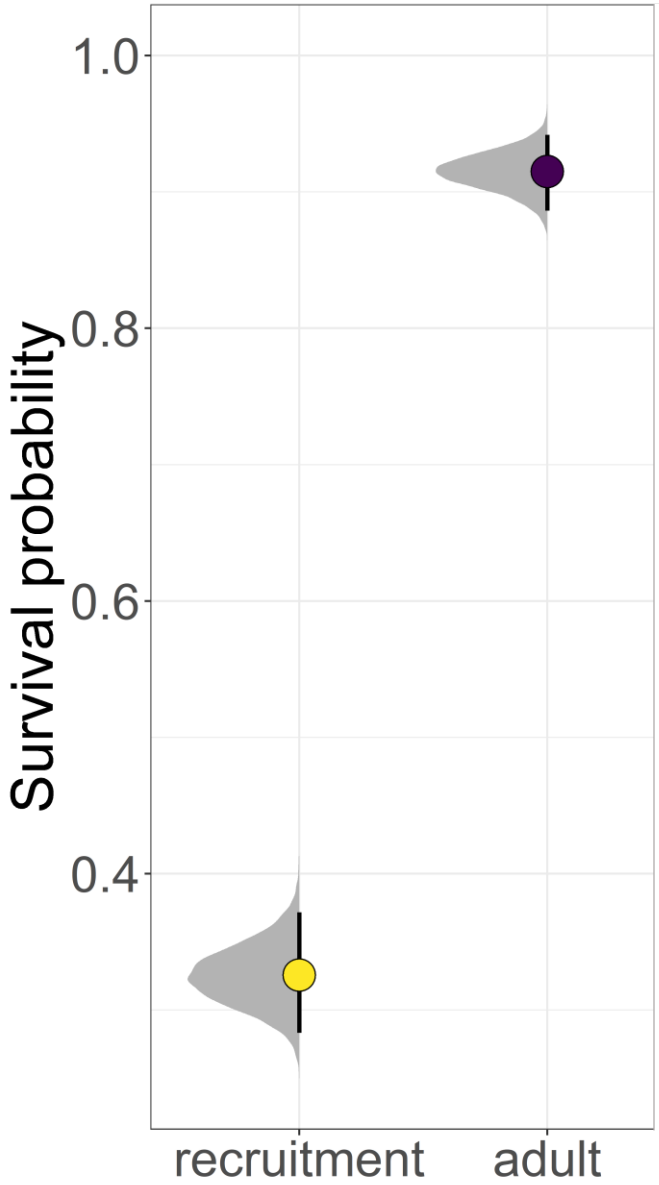


Lyons et al. (2017)

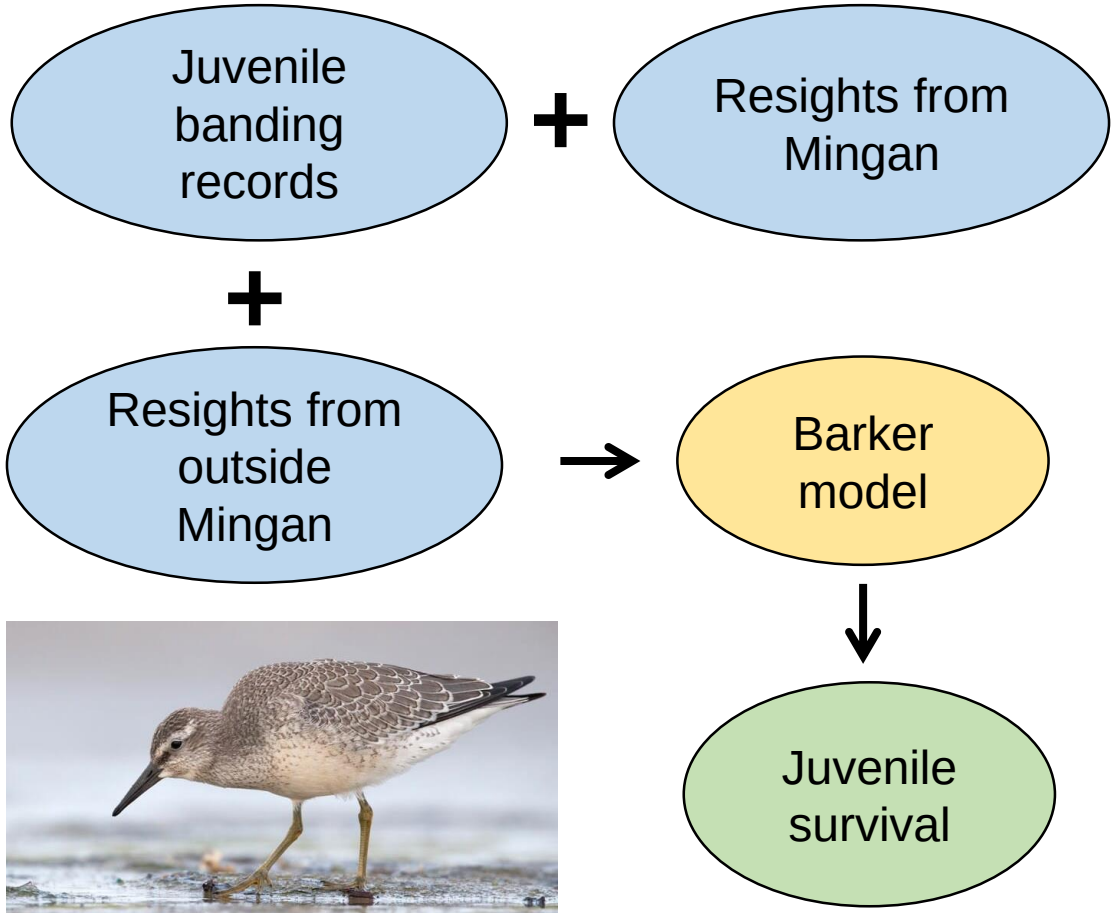
Survival rates of juvenile Red Knots at the Mingan Archipelago



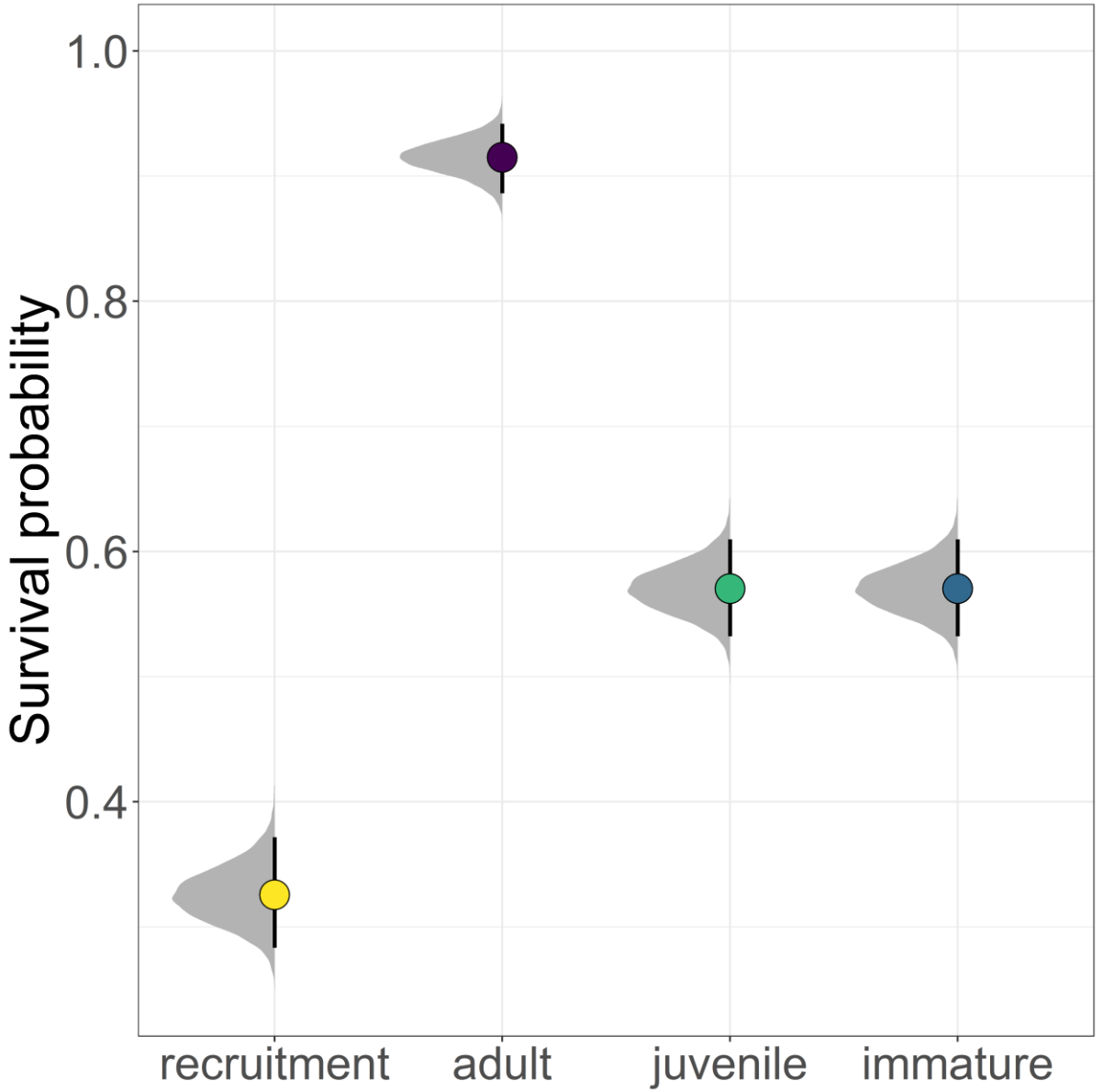

Ian Davies



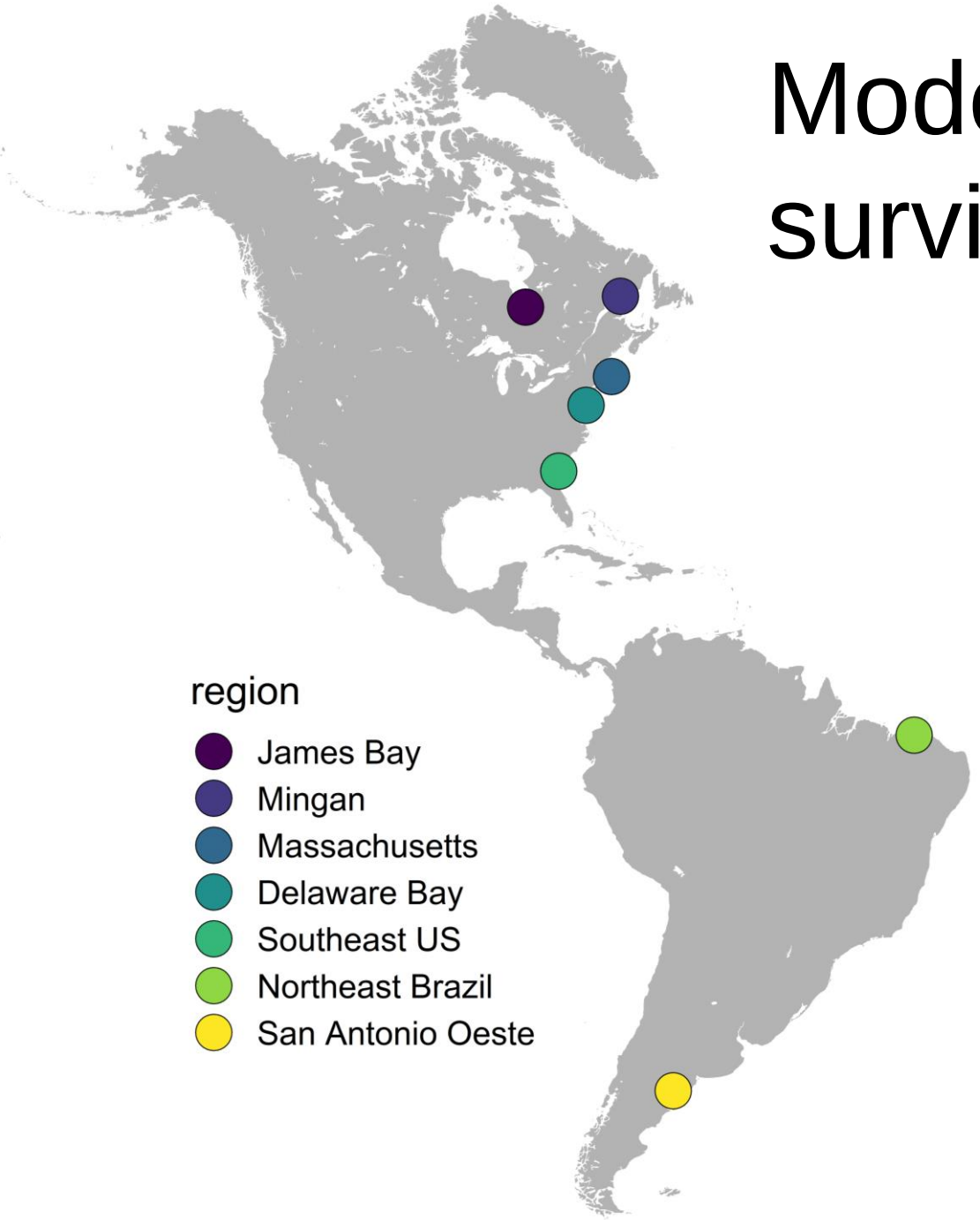
Survival rates of juvenile Red Knots at the Mingan Archipelago

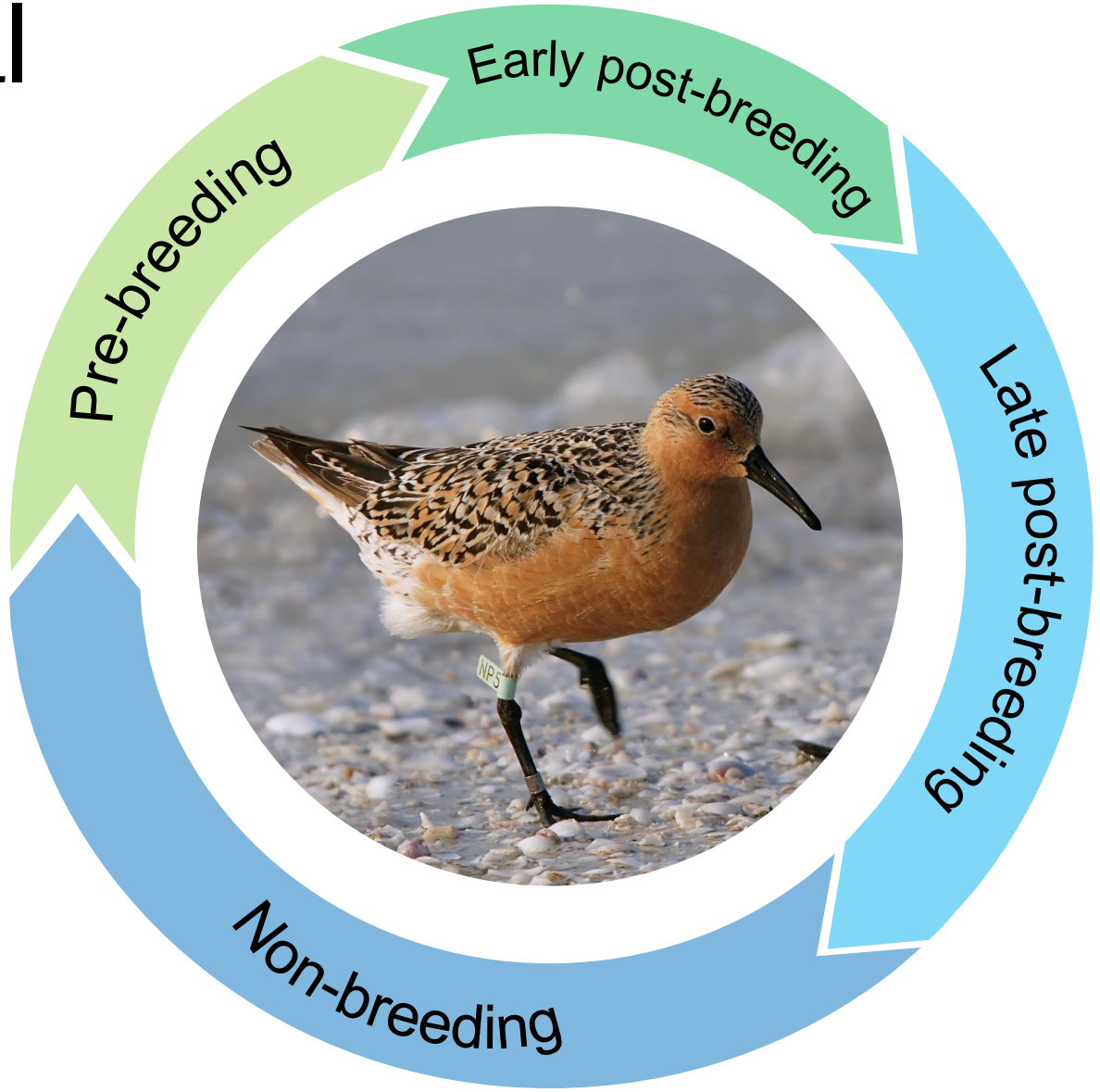



Ian Davies

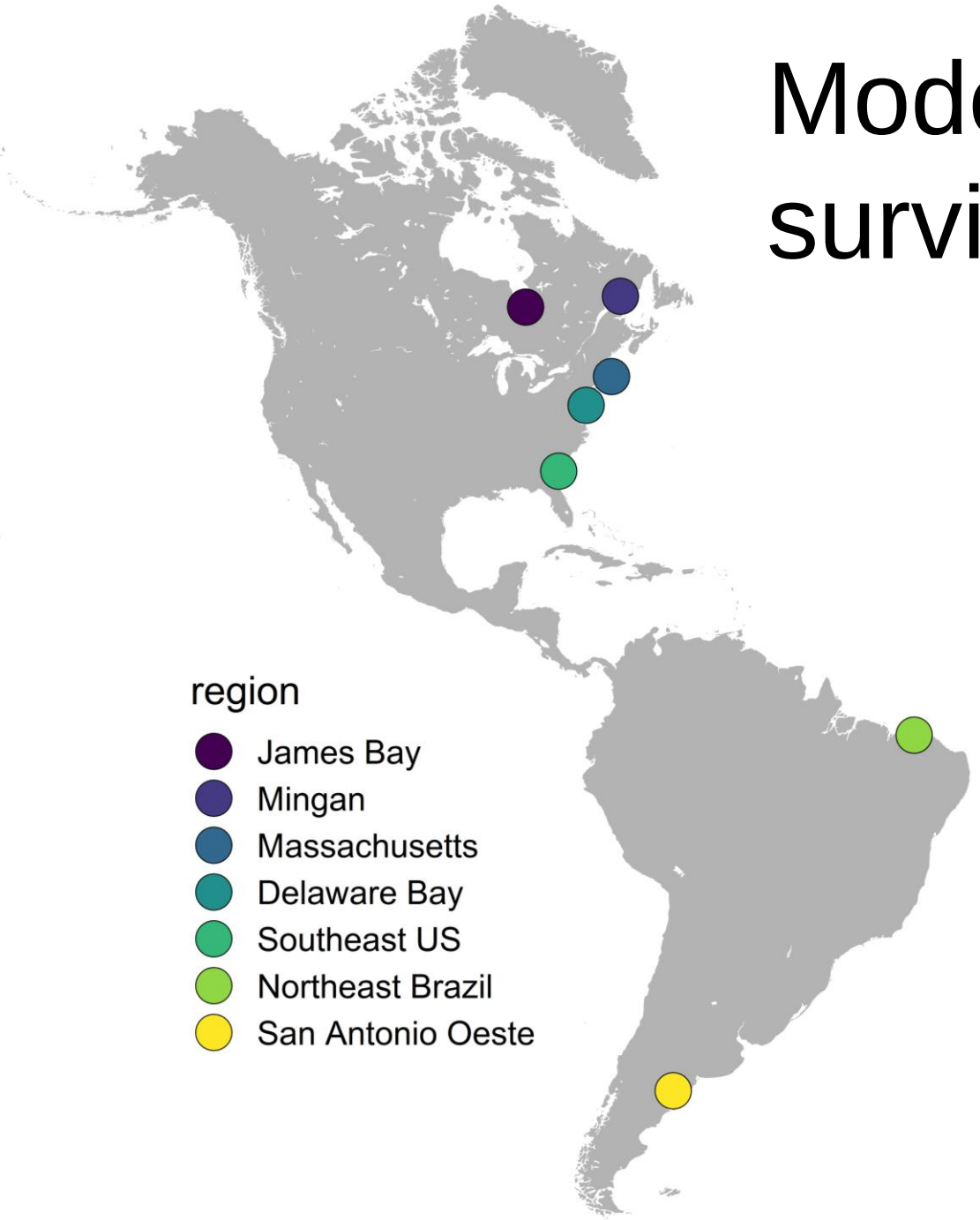


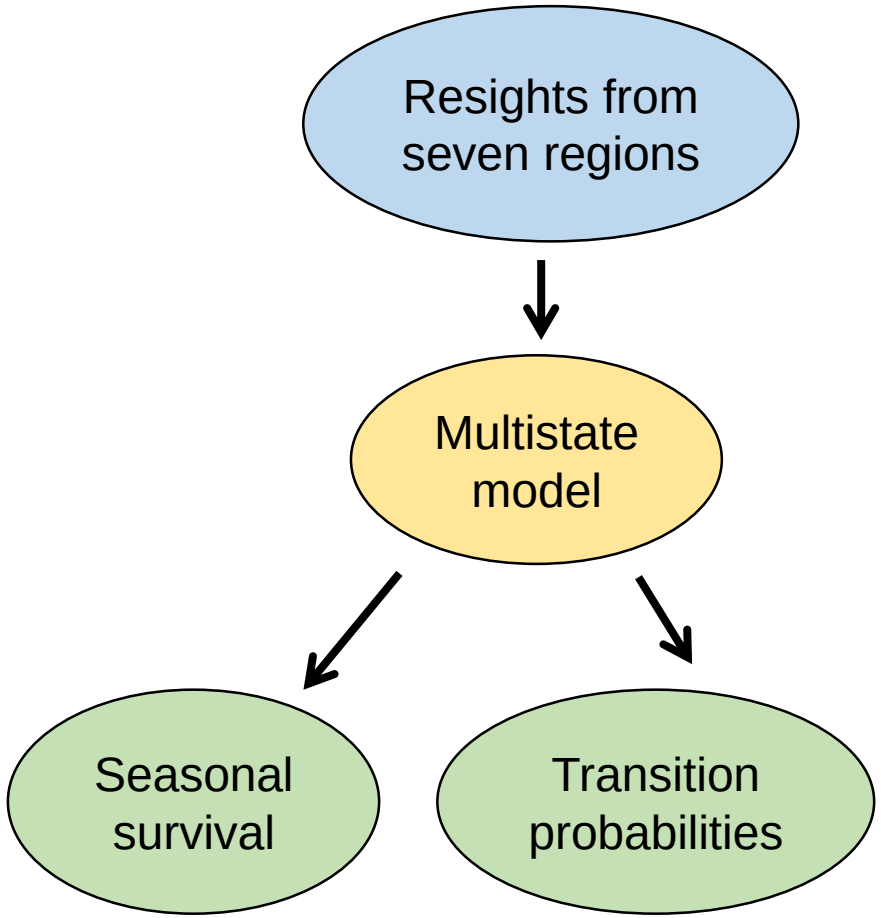
Modelling Red Knot seasonal survival





Modelling Red Knot seasonal survival





In summary:

7 locations

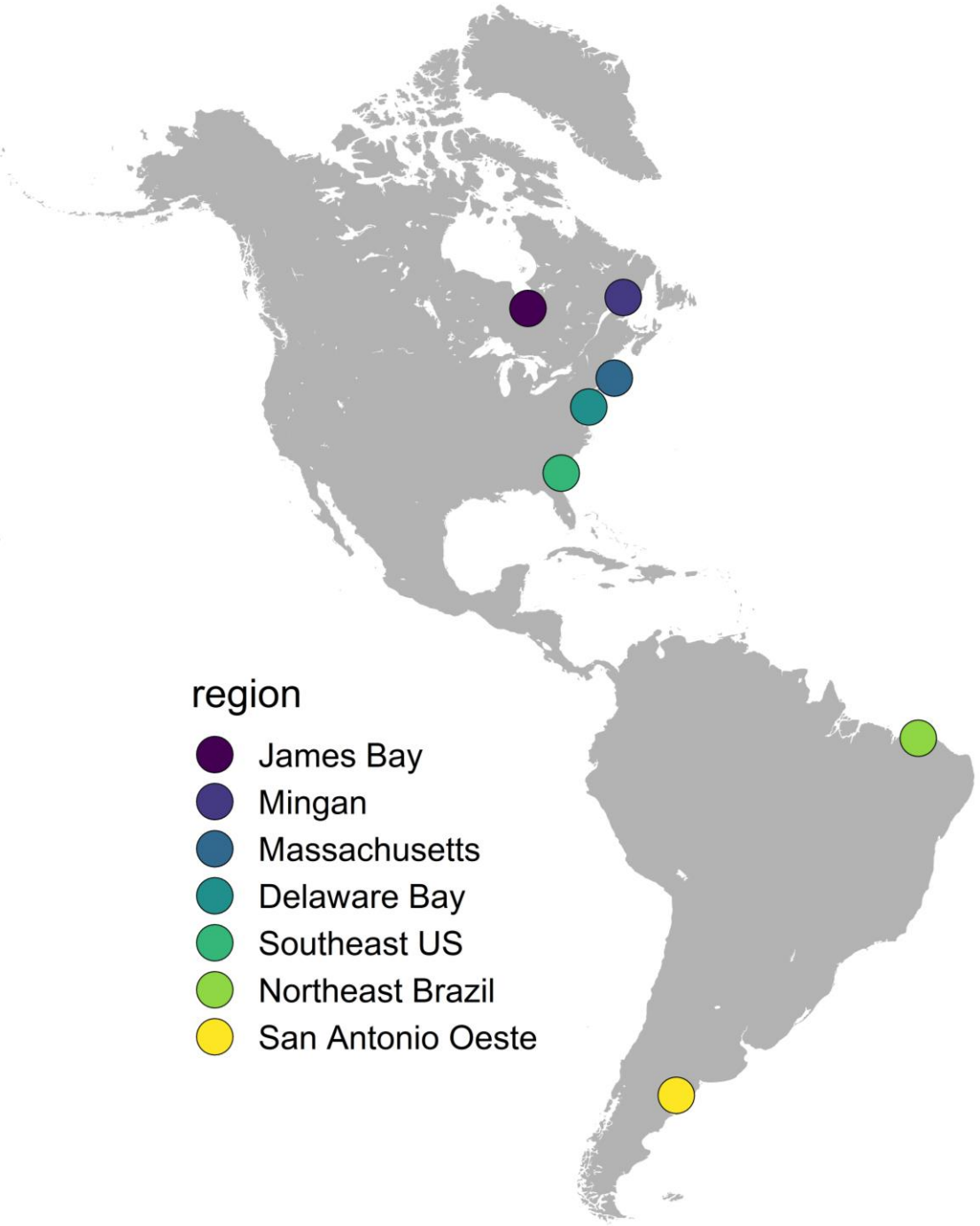
4 seasons

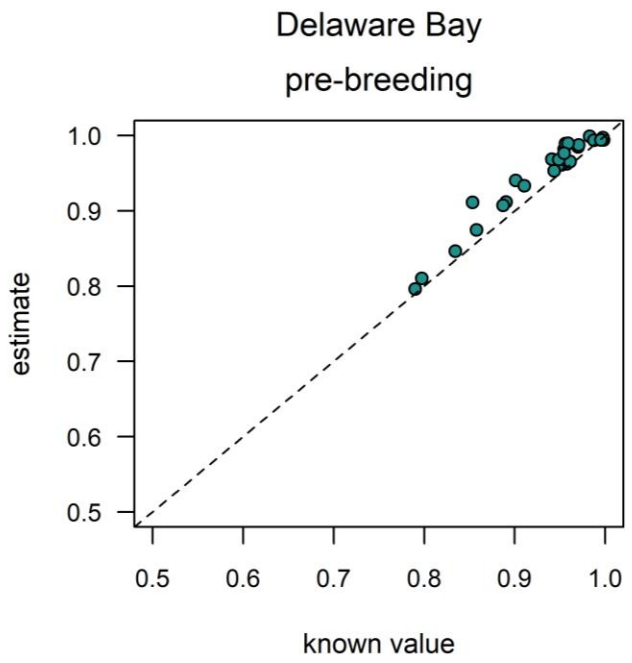
15 survival probabilities

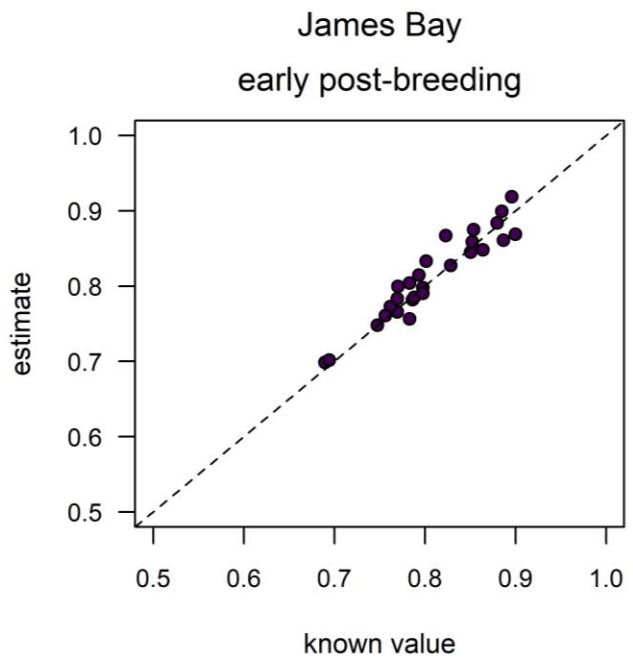
47 transition probabilities

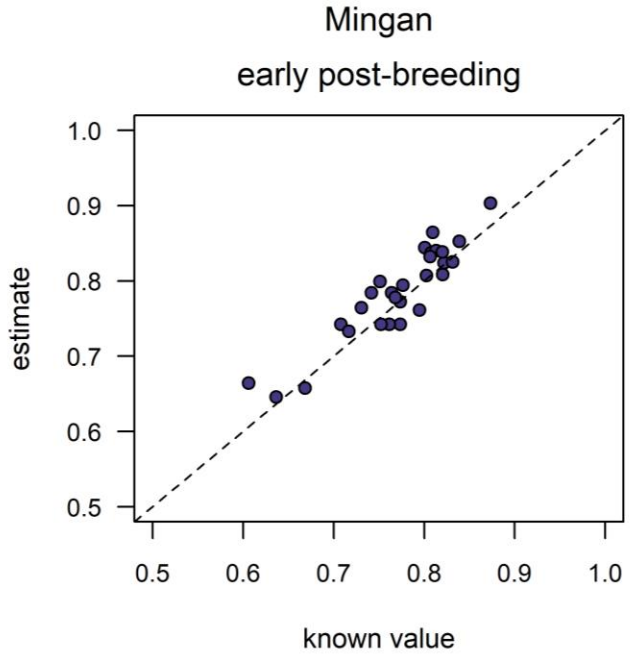
15 resighting probabilities

Karl Bardon

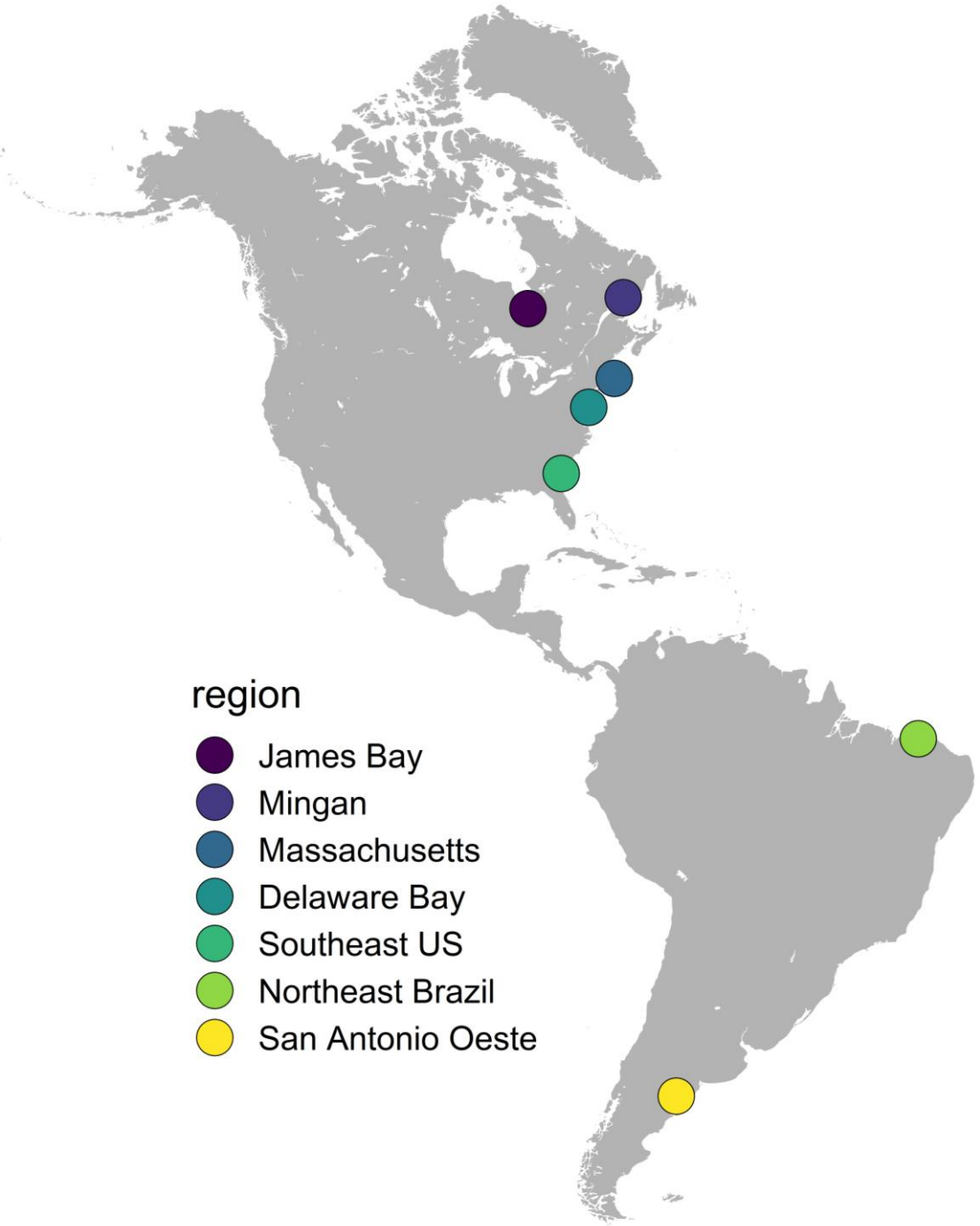


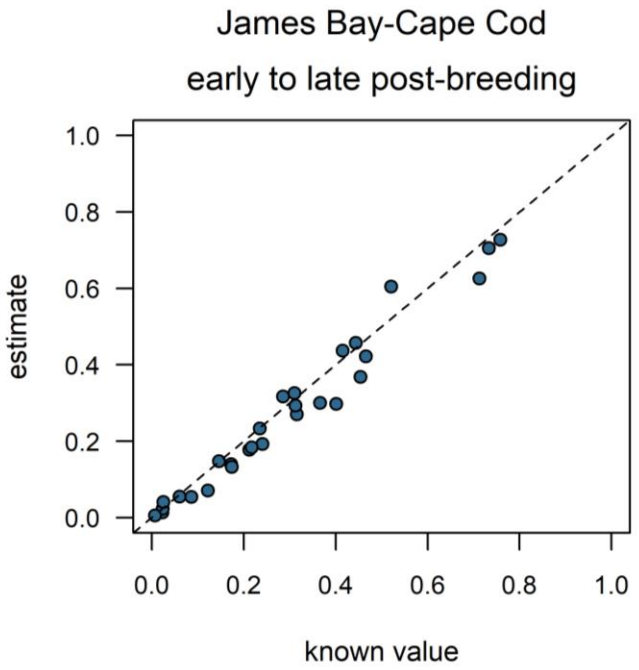


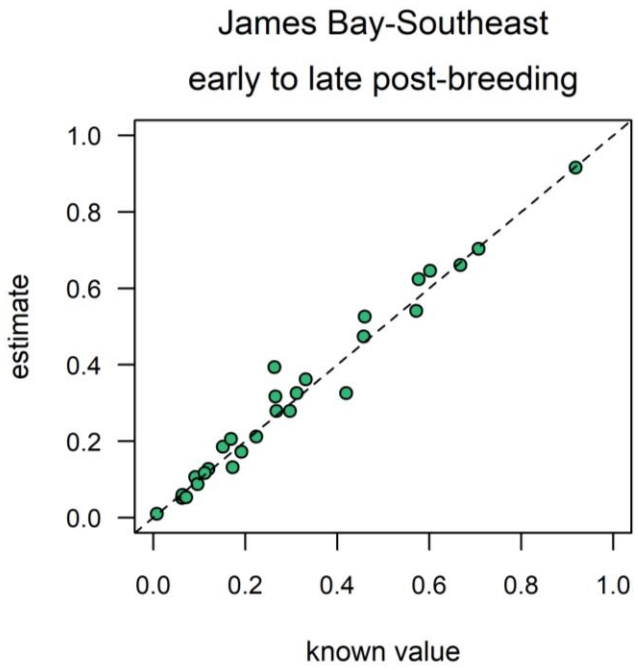


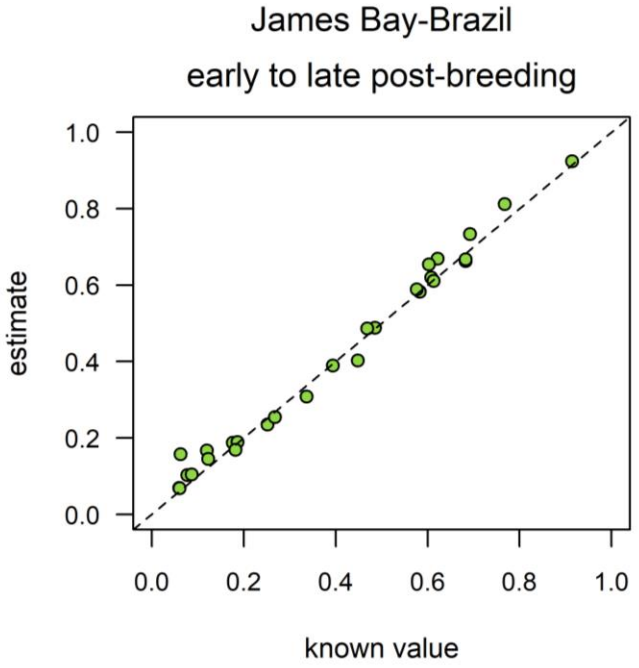


Max mean difference = **4%**







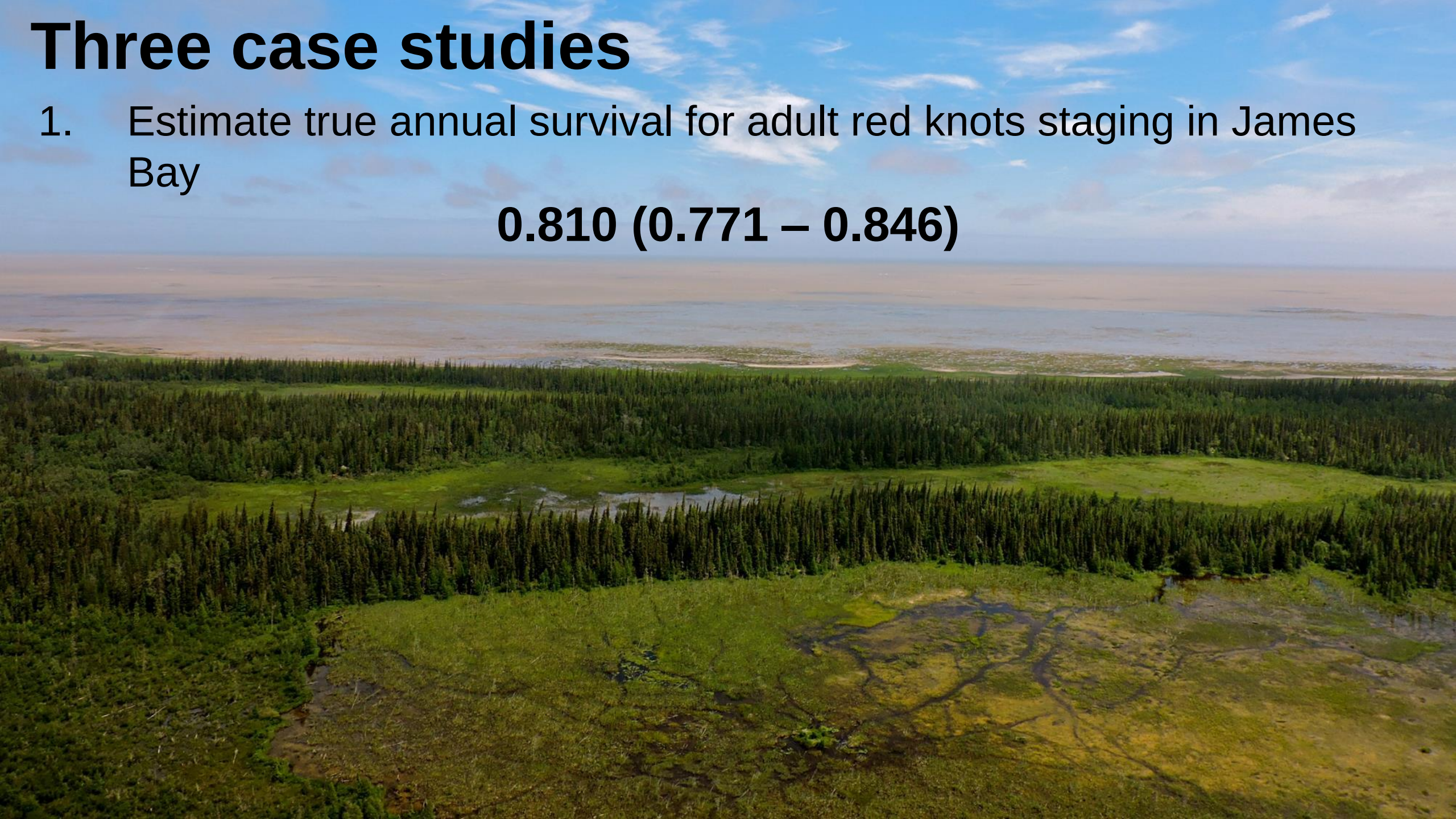


Max mean difference = **6%**

Three case studies

1. Estimate true annual survival for adult red knots staging in James Bay

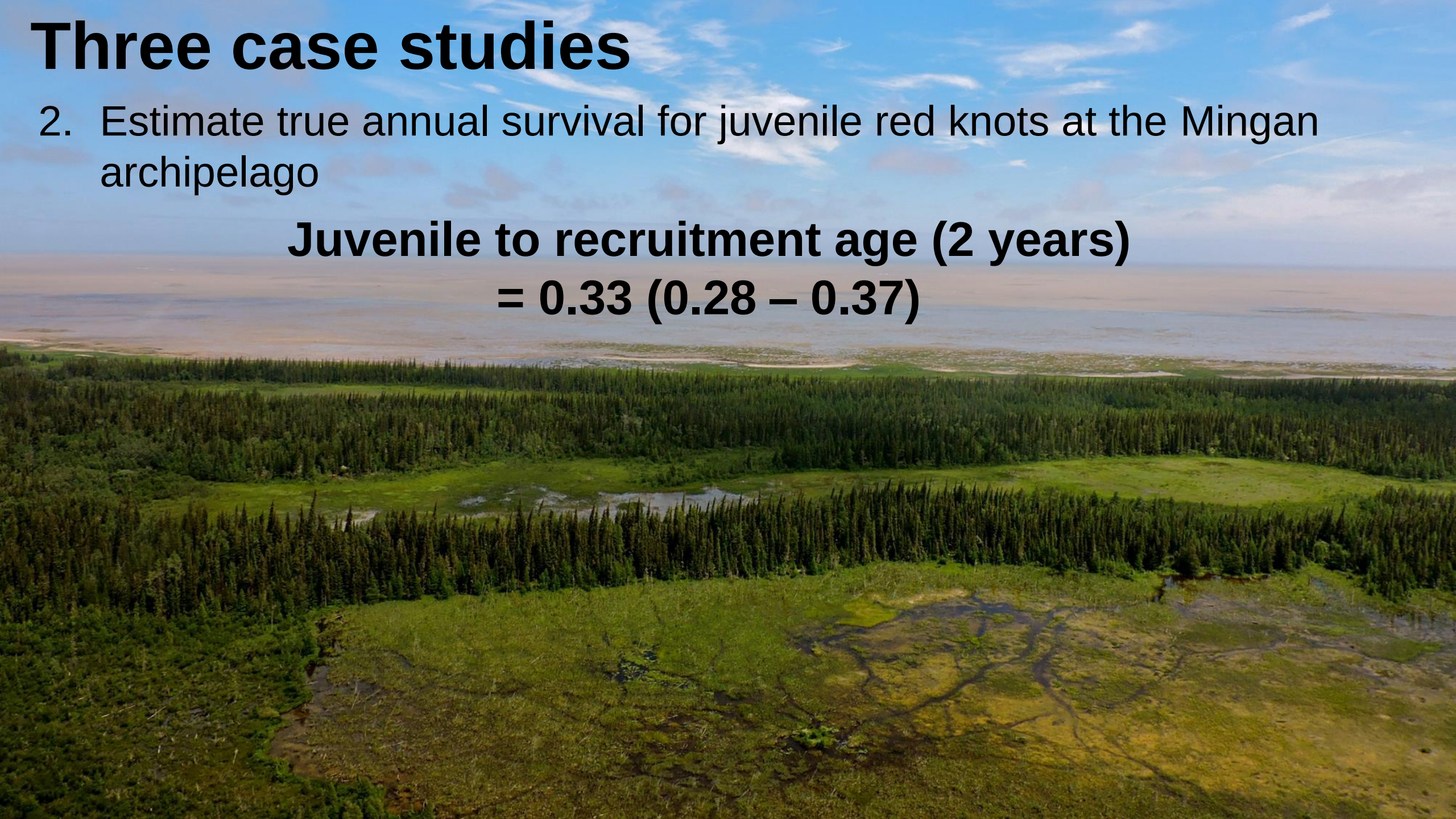
0.810 (0.771 – 0.846)



Three case studies

2. Estimate true annual survival for juvenile red knots at the Mingan archipelago

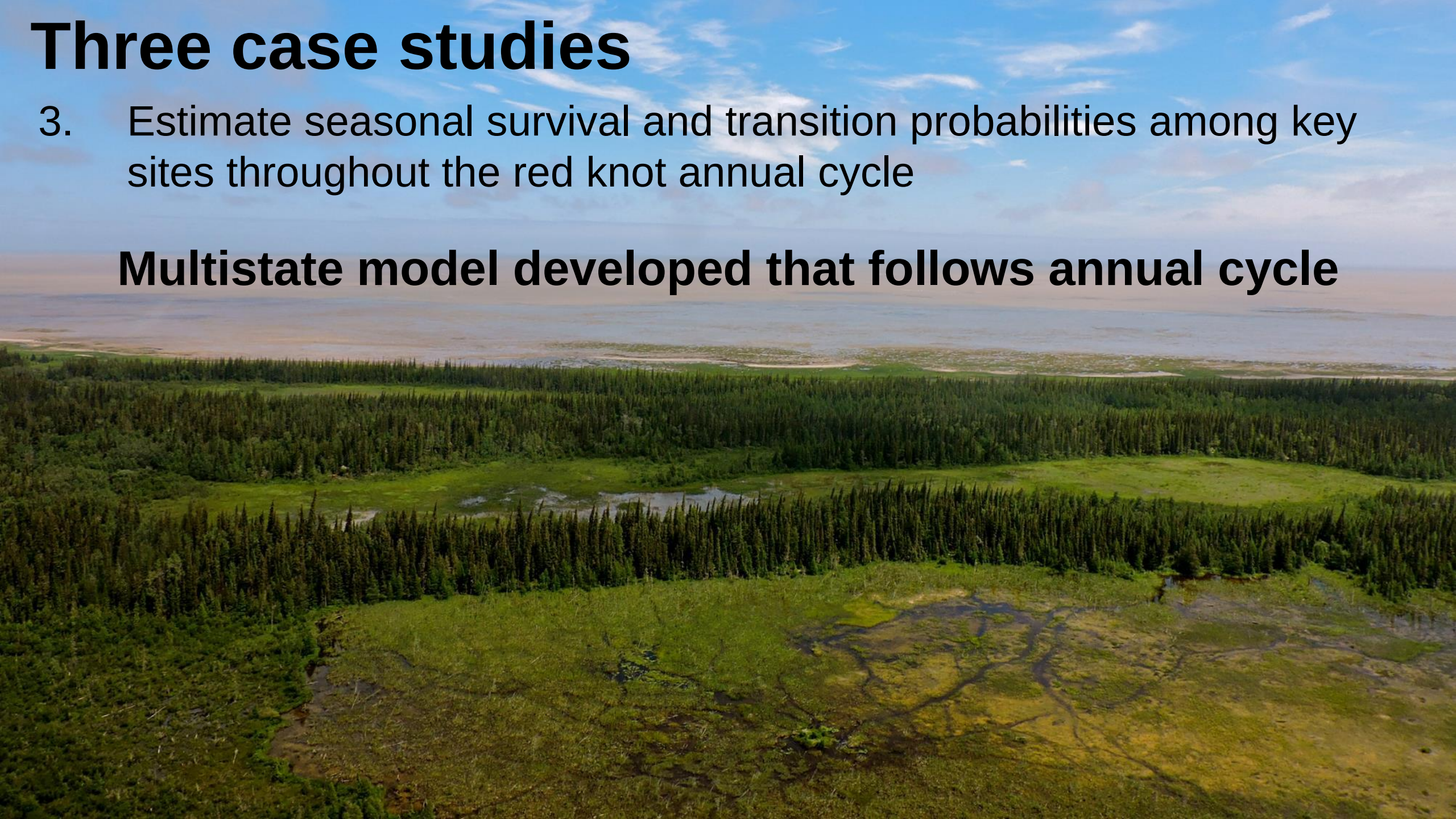
Juvenile to recruitment age (2 years)
= 0.33 (0.28 – 0.37)



Three case studies

3. Estimate seasonal survival and transition probabilities among key sites throughout the red knot annual cycle

Multistate model developed that follows annual cycle



Acknowledgements

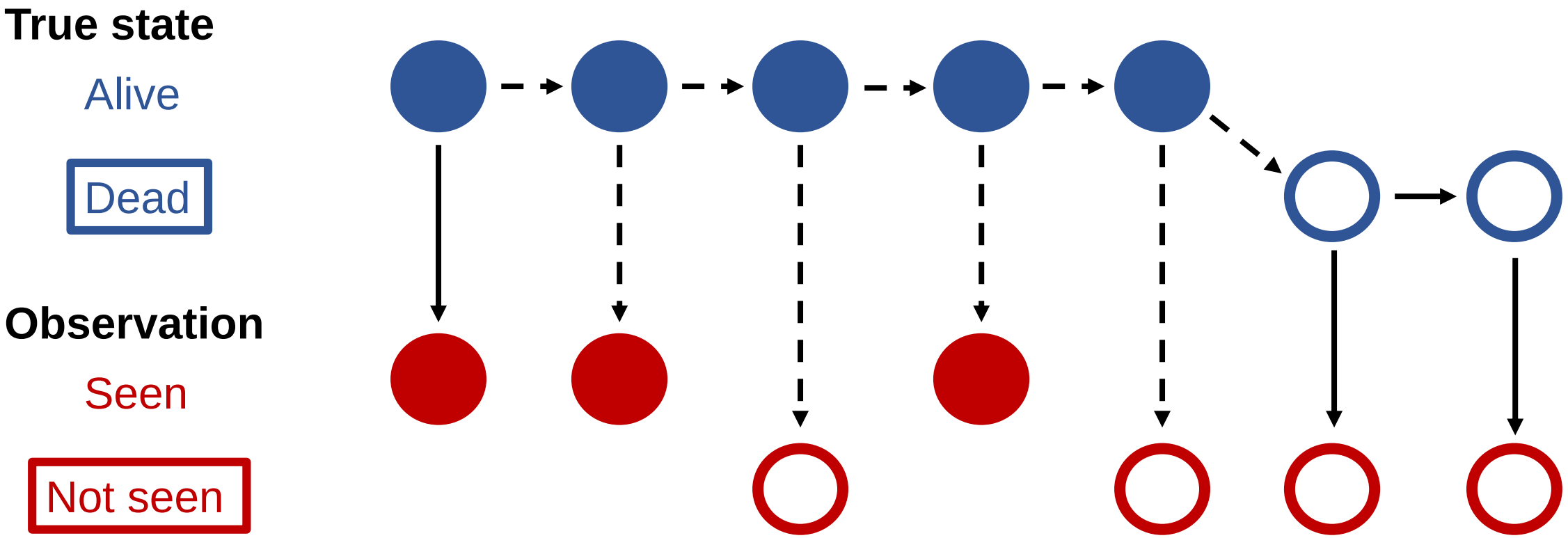
Lena Usyk (bandedbirds.org)
Jim Hines
Many, many red knot banders and surveyors
All collaborators supporting various red knot banding and resighting programs
Joseph Smith

Thank you!

¡Gracias!

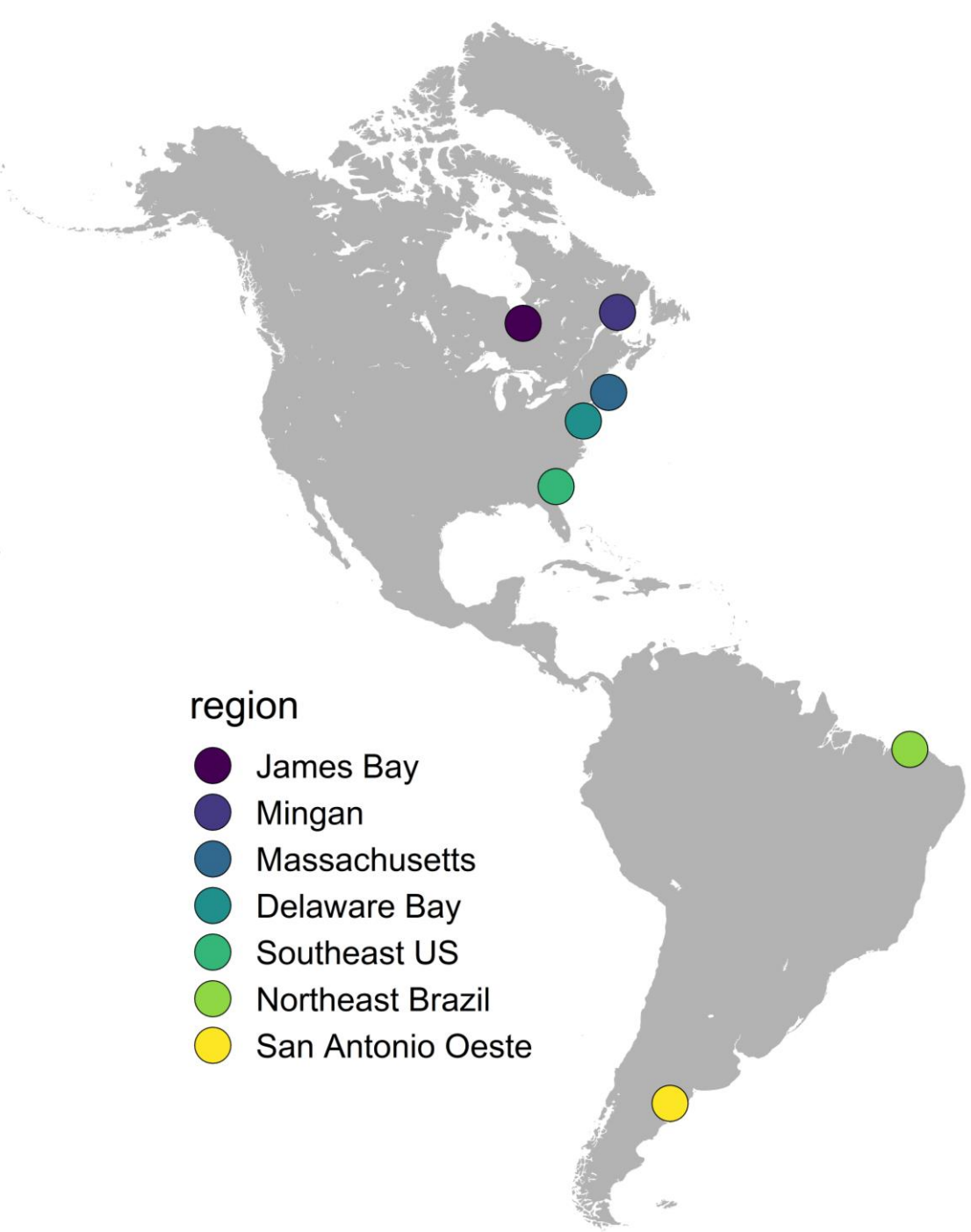
amacdonald@birdscanada.org

Analyzing flag resighting data in mark-recapture models permits estimation of demographic parameters

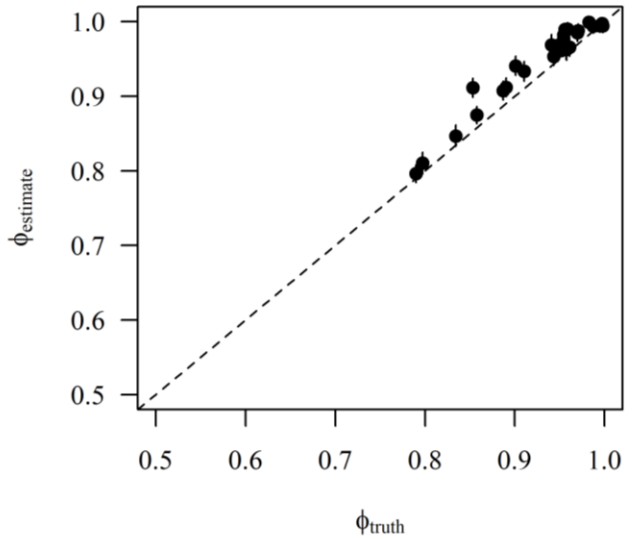


Kéry and Schaub (2012)

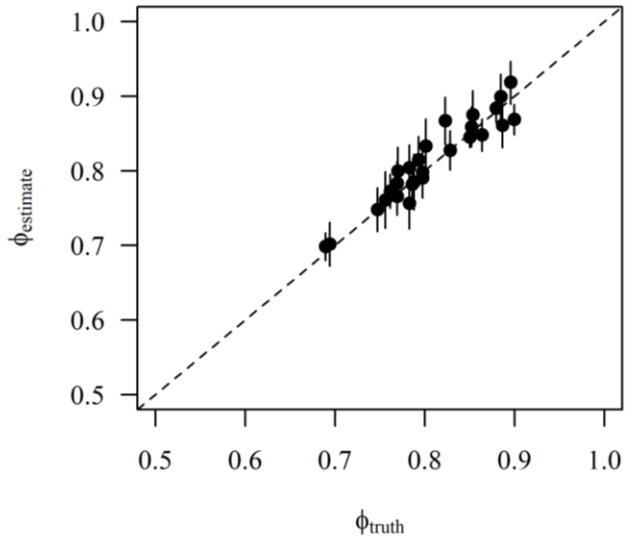
Bayesian analysis offers flexibility to build models to address various questions about red knot survival



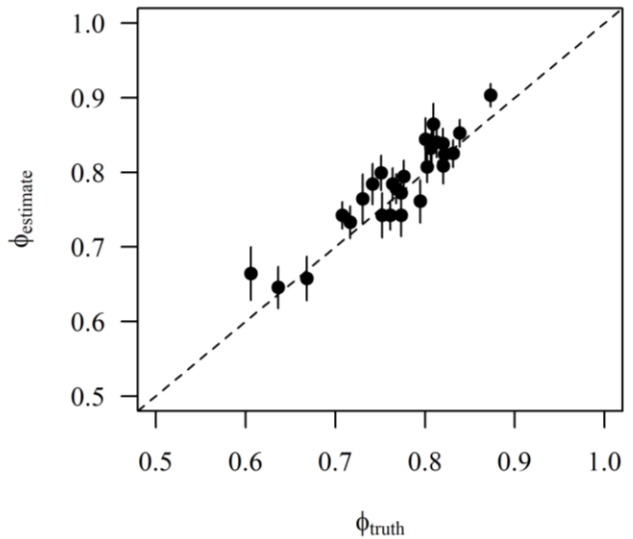
Delaware Bay
pre-breeding

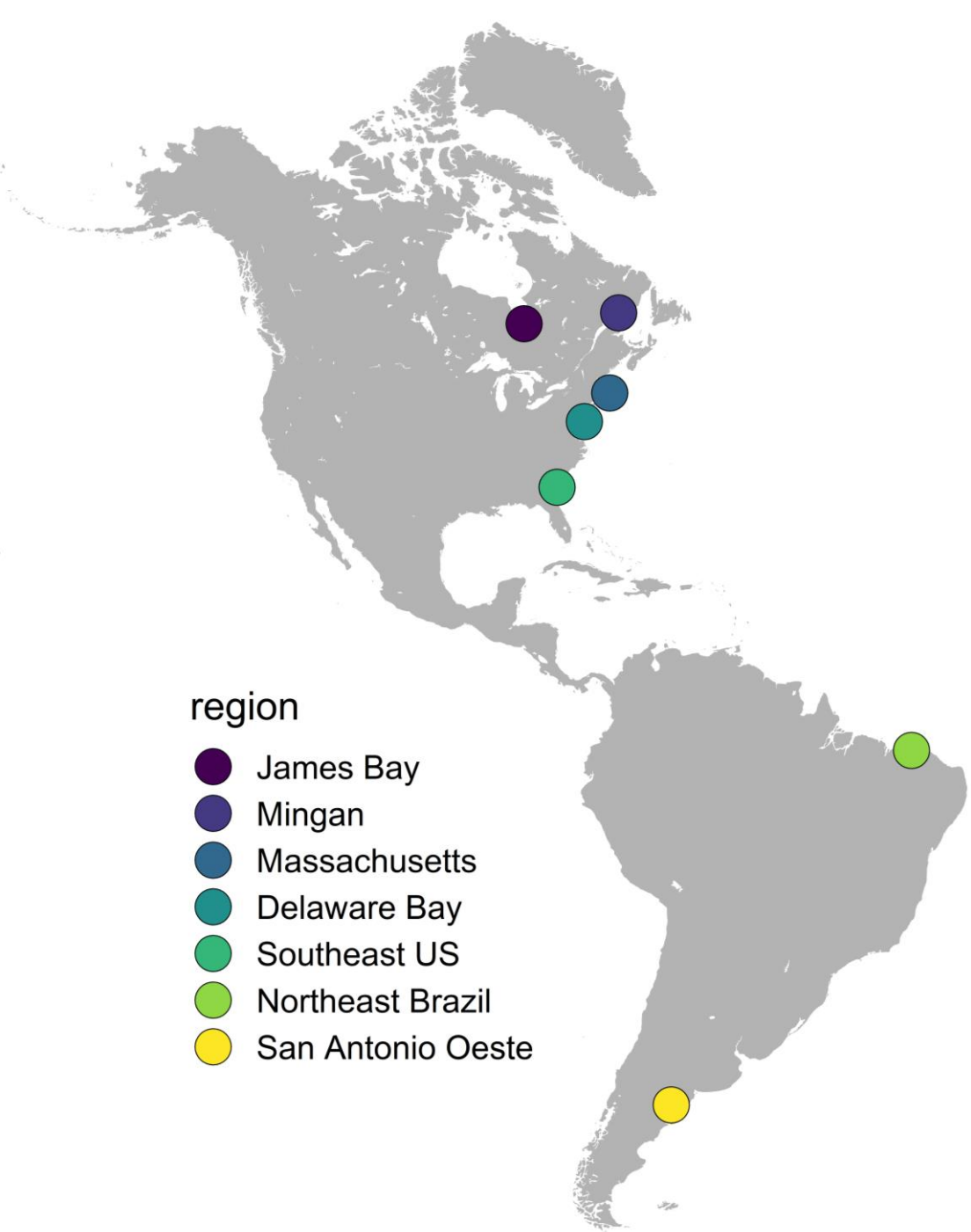


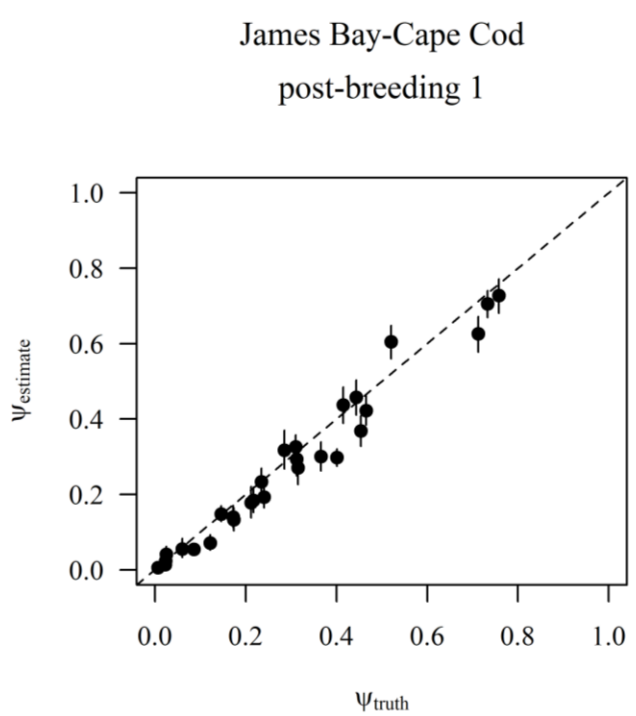
James Bay
post-breeding 1

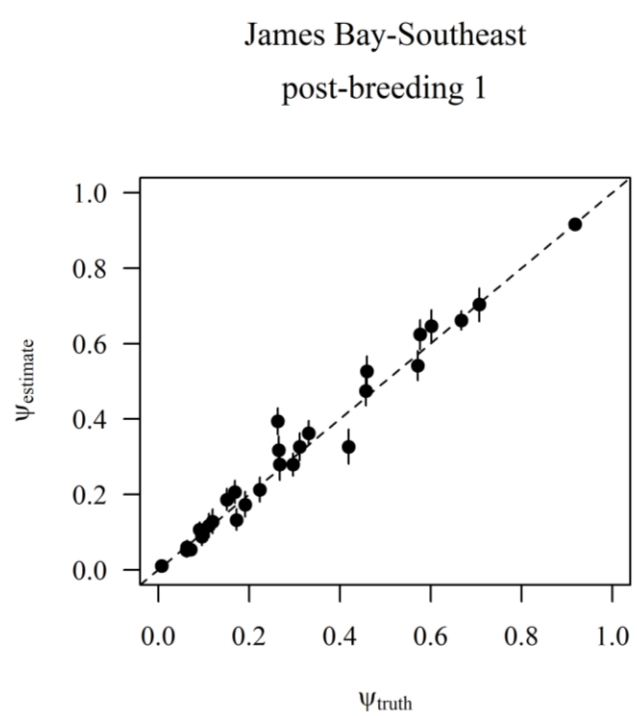


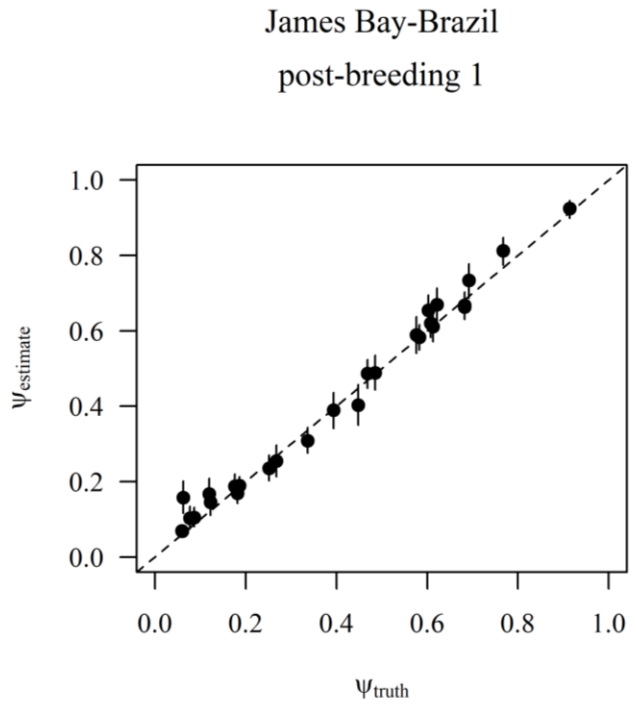
Mingan
post-breeding 1




region
James Bay
Mingan
Massachusetts
Delaware Bay
Southeast US
Northeast Brazil
San Antonio Oeste


James Bay-Cape Cod
post-breeding 1
ψestimate
ψtruth
0.0
0.2
0.4
0.6
0.8
1.0


James Bay-Southeast
post-breeding 1
ψestimate
ψtruth
0.0
0.2
0.4
0.6
0.8
1.0


James Bay-Brazil
post-breeding 1
ψestimate
ψtruth
0.0
0.2
0.4
0.6
0.8
1.0

8/2/2024

To: ASMFC Horseshoe Crab Management Board

Let me call to your attention a report titled:

Spring migration patterns of red knots in the Southeast United States disentangled using automated telemetry

The report found at *https://www.nature.com/articles/s41598-023-37517-y* include these excerpt from its abstract:

- *"Most Red Knots migrating north from the Southeast United States **skipped or likely skipped Delaware Bay** (73%) while 27% of the knots stopped in Delaware Bay for at least 1 day.*
- *A few knots used an Atlantic Coast strategy that **did not include Delaware Bay**, relying instead on the areas around Chesapeake Bay or New York Bay for stopovers.*
- *Most knots tracked in our study traveled north through the eastern Great Lake Basin, without stopping, thus making the Southeast United States the last terminal stopover for some knots before reaching boreal or Arctic stopover sites."*

This points out a problem when using only the Delaware Bay (DB) area counts[1] to determine the size of the red knot population in a model that determines the allowable harvest of horseshoe crabs. This study from the southeast Atlantic coast of the United States shows that at least 73% of the knots passing through the SE. U.S.A. area "*likely skipped*" traveling to the DB area and therefore are not included in the estimate of the size of the red knot population used in the model.

The fact is: Red knot flocks that once flew to the DB area may now be using the Southeast United States coastline as a stopover on their migration to the Arctic, completely bypassing the DB area. Since a major proportion (73%)of the knots that stop in the SE. U.S.A. are "*most likely*" by-passing the DB area, a reduced count of knots in the DB area may not indicate a reduction in the actual population of red knots. Therefore: Using only the DB count in the model leads to a total distortion of reality.

My point is made clear on Page 9 of the report where it states:

"*Population estimates and trends for red knots using the Western Atlantic Flyway are determined by spring surveys of Delaware Bay and Virginia. This study shows a portion of knots do not use either of these regions, highlighting the need to expand the geographic regions included in these estimates. The diversity of spring stopover sites used by red knots must be incorporated in survival and recruitment estimates as well as ongoing population monitoring.*"

[1] *Jim Lyons* report referred to by Dr. Sweka on page 2 of the Oct 2024 (?) Proceedings of the Horseshoe Crab Management Board. This report can ONLY be found at:

https://documents.dnrec.delaware.gov/fw/Shorebirds/Lyons-2023-REKN-Stopover-Pop-Size-at-Del-Bay.pdf

To base the management (modeling) of horseshoe crab harvest on the estimated HC population and **only** the count of red knots that pass through a small area (DB) compared to the total area in which red knots are found is clearly *myopic*.

I am not an expert of constructing population models, however, it is should be obvious that one at least needs to use correct data.

The Old Fisherman
Walter Chew ..... >(((">
wdchew@comcast.net

P.S. Why weren't the *graphs* that Dr. Sweka used in his presentation available thru ASMFC??