

Atlantic States Marine Fisheries Commission

Horseshoe Crab Management Board

February 4, 2025

12:30 - 2:00 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.

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|---|------------|
| 1. Welcome/Call to Order (<i>E. Reid</i>) | 12:30 p.m. |
| 2. Board Consent | 12:30 p.m. |
| • Approval of Agenda | |
| • Approval of Proceedings from October 2024 | |
| 3. Public Comment | 12:35 p.m. |
| 4. Consider Approval of Draft Addendum IX on Multi-year Specifications for Male Only Harvest of Delaware Bay-origin Horseshoe Crabs for Public Comment (<i>C. Starks</i>) Action | 12:45 p.m. |
| 5. Discuss Advisory Panel Composition | 1:45 p.m. |
| 6. Elect Vice-Chair Action | 1:55 p.m. |
| 7. Other Business/Adjourn | 2:00 p.m. |

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

MEETING OVERVIEW

Horseshoe Crab Management Board

February 4, 2024

12:30 – 2:00 p.m.

Chair: Eric Reid (RI) Assumed Chairmanship: 2/25	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: October 21, 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 October 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. Consider Approval of Draft Addendum IX on Multi-year Specifications for Male Only Harvest of Delaware Bay-origin Horseshoe Crabs for Public Comment (12:45-1:45 p.m.) Action

Background

- In July 2024, the Commission held a stakeholder workshop on horseshoe crab management in the Delaware Bay region. The workshop participants recommended the Board establish an interim solution to maintain male-only harvest while changes to the ARM Framework are explored to better align the model with stakeholder values.
- In response to one of the workshop recommendations, the Board initiated Draft Addendum IX, which will consider adding an additional specifications tool that would allow for male-only harvest for multiple years (**Briefing Materials**).
- The draft addendum includes proposed options that address multi-year male-only harvest specifications for the Delaware Bay region and reestablishing seasonal harvest restrictions for the Delaware Bay region bait fishery.

Presentations

- Overview of Draft Addendum IX for Board Consideration

Board actions for consideration at this meeting

- Approve Draft Addendum IX for public comment

5. Discuss Advisory Panel Composition (1:45-1:55 p.m.)

Background

- In July 2024, the Commission held a stakeholder workshop on horseshoe crab management in the Delaware Bay region. One of the consensus recommendations from the workshop was to evaluate the Horseshoe Crab Advisory Panel (AP) to determine if it has adequate representation across stakeholder groups.
- The current composition of the AP includes state-specific seats and two seats for non-traditional stakeholders (**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 potential changes to AP composition

7. Elect Vice-Chair (1:55-2:00 p.m.) Action

Background

- The vice chair seat is empty since Eric Reid has assumed the role of chair.

Board actions for consideration at this meeting

- Elect Vice-Chair

8. Other Business/Adjourn (2:00 p.m.)

**DRAFT PROCEEDINGS OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
HORSESHOE CRAB MANAGEMENT BOARD**

**The Westin
Annapolis, Maryland
Hybrid Meeting**

October 21, 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.

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INDEX OF MOTIONS

1. **Approval of agenda** by consent (Page 1).
2. **Approval of Proceedings of April 2024** by consent (Page 1).
3. **Motions**
Move to initiate an addendum to consider the ability to set multi-year specifications for male-only horseshoe crab harvest of Delaware Bay-origin Horseshoe Crab based on the ARM Framework or an alternative male-only harvest specification setting method (Page 10). Motion made by John Clark; second by Dan McKiernan. Motion approved by consent with 3 abstentions (South Carolina, Georgia, and Florida) (Page 13).
4. **Move to accept the 2025 Adaptive Resource Management harvest specifications with 500,000 males and no female harvest of Delaware Bay-origin crabs. In addition, the 2:1 offset will be added to MD's and VA's allocations due to no female harvest** (Page 19). Motion made by Joe Cimino; second by John Clark. Motion approved by consent with 3 abstentions (South Carolina, Georgia, and Florida) (Page 19).
5. **Move that the draft addendum initiated today also consider establishing a season start date of June 8 for the Delaware Bay region** (page 21). Motion made by John Clark; second by Ray Kane. Motion passes with abstentions from South Carolina, Georgia, and Florida (Page 22).
6. **Move to approve the Horseshoe Crab FMP Review for the 2023 fishing year, state compliance reports, and *de minimis* status for South Carolina, Georgia, and Florida** (Page 22). Motion made by Mike Luisi; second by Pat Geer. Motion passes by unanimous consent (Page 23).
7. **Move to nominate Eric Reid as Vice-Chair of the Horseshoe Crab Board** (Page 23). Motion made by Dan McKiernan; second by Mike Luisi. Motion passes (Page 23).
8. **Move to adjourn** by consent (Page 27).

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ATTENDANCE

Board Members

Dan McKiernan, MA, (AA)	Roy Miller, DE (GA)
Rep. Jennifer Armini, MA (LA)	Michael Luisi, MD, proxy for L. Fegley (AA)
Ray Kane, MA (GA)	David Sikorski, MD, proxy for Del. Stein (LA)
Nicole Costa, proxy for J. McNamee, RI (AA)	Pat Geer, VA, proxy for Jamie Green (AA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)	James Minor, VA (GA)
Dr. Justin Davis, CT (AA)	Chris Batsavage, NC, proxy for K. Rawls (AA)
Rep. Joseph Gresko (CT) (LA)	Jerry Mannen, NC (GA)
Bill Hyatt, CT (GA)	Ben Dyar, SC, proxy for Blaik Keppler (AA)
Jesse Hornstein, NY, proxy for M. Gary (AA)	Malcolm Rhodes, SC (GA)
Jim Gilmore, NY, proxy for Assy. Thiele (LA)	Mel Bell, SC, proxy for Sen. Cromer (LA)
Scott Curatolo-Wagemann, NY, proxy for E. Hasbrouck (GA)	Doug Haymans, GA (AA)
Joe Cimino, NJ (AA)	Spud Woodward, GA (GA)
Jeff Kaelin, NJ (GA)	Erika Burgess, FL, proxy for J. McCawley (AA)
John Clark, DE (AA)	Gary Jennings, FL (GA)
	Ron Owens, PRFC

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

Ex-Officio Members

Dr. John Sweka, ARM Subcommittee Chair	Nicholas Couch, LEC Representative
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Staff

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

The Horseshoe Crab Management Board of the Atlantic States Marine Fisheries Commission convened in the Capitol Ballroom via hybrid meeting, in-person, and webinar; Monday, October 21, 2024, and was called to order at 3:00 p.m. by Chair Justin Davis.

CALL TO ORDER

CHAIR JUSTIN DAVIS: Good afternoon, everybody, I am going to go ahead and call to order this meeting of the Horseshoe Crab Management Board. My name is Justin Davis; I am the Administrative Commissioner from the state of Connecticut and currently serving as Chair of this Board. First item on the agenda today is Approval of the Agenda.

APPROVAL OF AGENDA

CHAIR DAVIS: I'll look around the room to see if there are any suggested additions to the meeting agenda as posted in the meeting materials. All right, not seeing any takers, we'll consider the agenda approved by consent. Next item on the agenda is Approval of the Proceedings from the meeting of this Board earlier this year in April.

APPROVAL OF PROCEEDINGS

CHAIR DAVIS: Again, I'll look around the table and online to see if there are any suggested additions or edits to those minutes, as posted in the meeting materials. Not seeing any takers, moving right along.

PUBLIC COMMENT

CHAIR DAVIS: Our third item on the agenda today is Public Comment. As a reminder, this would be public comment related to any items that are not on today's agenda.

If there is anybody in the room from the public who is interested in providing comment, at this time you can walk forward to the public microphone over here on the corner of the table directly across from me and be recognized. As a reminder, if you come to the table to make public comment, please start off by just giving your name and affiliation. Thanks.

MS. BENJIE L. SWAN: Hello, my name is Benjie Swan; I'm with Limuli Laboratories in Cape May, New Jersey, and I did submit a written comment. My comment is general, and I decided I would read it as well. It should only take a few minutes. Dear Atlantic States Marine Fisheries Commission Board members. I want to take a moment to express my gratitude for the incredible efforts over the past 25 years in managing the horseshoe crab population.

Our collective work has led to a remarkable increase in horseshoe crabs' protections for spawning populations, significant reductions in harvest for bait, the establishment of monitoring and reporting requirements, and the implementation of best management practice for biomedical use. These efforts ensure that we maintain a healthy and sustainable horseshoe crab population for future generations. We have not only focused on horseshoe crabs, we've integrated the needs of the red knot into our management strategies, collaborating with environmental groups to develop the Adaptive Resource Modeling Plan, the ARM model, an unprecedented achievement. As part of the ARM Framework, the survey was designed to monitor the red knot population. The survey conducted by the United States Geological Service shows a stable red knot population since 2012. With 25 years of data and insights at our disposal, we are in a strong position to continue this success.

However, it's time for us to shift our focus. While we have made significant strides in Delaware Bay, we must extend our conservation efforts to other horseshoe crab populations along the coast. By directing our resources and applying the successful practices we've implemented in the Delaware Bay region, we can make meaningful impact elsewhere.

The narrative surrounding the red knot, the fate of the red knot, often overshadows our accomplishments. However, it is essential that we move beyond past debates and instead focus on proactive solutions. Let's expand our knowledge, while continuing to use the ARM model to manage the Delaware Bay population, for the sake of the

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horseshoe crabs themselves and the entire ecosystem, which includes the red knot.

Also, protecting human health should be a top priority. The production of limulus amoebocyte lysate from horseshoe crabs, used to test for bacterial endotoxin contamination and pharmaceutical drugs and medical devices must continue. While advancements in testing are important, we must be cautious.

The synthetic alternatives to LAL are unregulated and may not detect natural endotoxins reliably. The potential risk to public health is too significant to overlook, and any switch to a synthetic alternative test should be slow and risk averse, especially in light of the fact that the biomedical use of horseshoe crabs has a negligible effect on their population.

As stewards of this vital ecosystem, we must counter the sensational narratives that hinder biomedical companies in our conservative efforts. It is time to educate the public, foster collaborative approach, to continue to successfully manage the horseshoe crab population. Let's focus on the future, build on our successes, and implement proven strategies where they are most needed. Enough is enough, let's move on together. Thank you.

CHAIR DAVIS: Thank you for that comment. Is there anyone else from the public here who would like to make public comment today? Looking around the room. Do we have anybody online? Okay, we'll move along to the next item on our agenda, which will be a report out on the outcomes from a Stakeholder Workshop on Delaware Bay Management Objectives, that was conducted earlier this year. To start us off we're going to have a presentation from Dr. Kristina Weaver, who is joining us online. Dr. Weaver, if you're there, you can go ahead and take it away.

DR. KRISTINA WEAVER: Glad to be here, thank you for having me. Again, my name is Kristina Weaver, and I was the facilitator who helped to support the Horseshoe Crab Management Objective Stakeholder Workshop this past summer. I'm going to provide just a brief overview of the key attributes of this workshop, and the key findings, before passing to Caitlin Starks with ASMFC, to talk a little bit about some of the recommendations for next steps. Just really want to appreciate the incredible staff who worked with me, who I had an opportunity to work with as part of this project, in particular, Toni Kerns, Caitlin Starks and James Boyle, as well as the Board. Really enjoyed this opportunity.

For this presentation, I'll say a few words about the background context. I am not an expert in horseshoe crabs or in red knot, I am a public policy and environmental mediator, so it was very interesting for me to get to learn more about this context. Then, just toggling back to the last slide for a second. Following that we'll talk a little bit about the workshop process, and in particular the consensus building method that we used.

Then, I'll provide an overview of the key findings from the workshop, including areas where participants achieved consensus agreement, and areas of robust dialogue, where there were efforts to achieve consensus, but were not reached. Then again, we'll transition into talking about some of the next steps that were identified by the Workshop, and Caitlin Starks will be able to cover that in greater detail.

Moving into the background. As I'm sure the Board, and many if not all who were on the webinar recognize, the horseshoe crab resource is vitally important and interesting, and there is a lot of stakeholder dialogue, and at times disagreement around management. The Workshop was really an opportunity to kind of go deeper around dialogue, around those areas of disagreement, and see where there might be common ground.

CONSIDER STAKEHOLDER WORKSHOP REPORT ON DELAWARE BAY MANAGEMENT OBJECTIVES

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To just provide an overview of the history, Adaptive Resource Management is a Framework that was implemented in 2012, and allowed for setting bait harvest specifications in the Delaware Bay Region. There have been 0 Delaware Bay origin female harvest since 2013, and there still is not female harvest.

But the revision of the ARM Framework in 2021, which was adopted for management in 2022, did allow for the introduction of female harvest for the first time since 2013, and this perhaps among other factors generated considerable public input and public concern over the possibility of female harvest.

This was the impetus for a stakeholder survey that was conducted in 2023, that did really surface that there are a variety of important stakeholder perspectives on Adaptive Resource Management of horseshoe crab, in particular looking at red knot shore birds, for whom eggs are an important food source as part of their migration patterns.

Looking at the interest of commercial bait fishermen who rely on horseshoe crab. Looking at the interest of biomedical industry and the collection of blood for the creation of a clotting agent that is important to human health, and as we learned in the Workshop, also shore communities that really care about the welfare of the horseshoe crab for its intrinsic value.

A lot of the different interests around this resource, and as result of what was sort of surfaced in the survey, there was a sense that having a workshop that would bring a small group of people around the table to kind of go deeper in their dialogue, really more fully understand one another's perspectives, and see where there might be areas of common ground, was identified as the next step. We can move into the Workshop development. Again, the Board recognized the need for multistakeholder dialogue, to explore objectives and management approaches for the Delaware Bay horseshoe crab fishery. I can say as the facilitator and mediator who was brought in to support this process, there was really a very open sense of wanting to really

understand what degree of common ground or shared interest might be uncovered over a day and a half of intensive dialogue.

To support that goal there was a decision to retain a mutual third party, and that is the support that I provided as the facilitator. To say a little bit about my own background, I am a human cultural geographer, who worked for many years for about 12 years with the Institute for Engagement and Negotiation at the University of Virginia, which has a 40 plus year history in environmental mediation.

Now I do similar work as a consultant through my own LLC, but basically have worked, particularly in Virginia and the Mid-Atlantic region on a whole variety of issues. About a year ago, was selected as the mediator/facilitator to work on, sort of a similar workshop around menhaden in the Chesapeake Bay.

I have some fisheries background, but again was brought on more for my process expertise than for my subject matter expertise. One of the suggestions that I made when we started the process of designing the Workshop was to have sort of an assessment phase, which consisted of conducting some open-ended interviews with a subset of participants who could sort of represent the stakeholder interests.

The purpose of that was really to bring me up to speed further in the issues, and to inform design of the Workshop, to try and support really constructive and productive dialogue. As an overview of the stakeholder groups were convened in this Workshop, we had bait fishery, harvesters and dealers, and bait users. We had members of the environmental NGO community, the biomedical industry, horseshoe crab and shorebird biologists, and state resource managers.

We had a total of 12 stakeholders and then 8 staff around the table for a combined total of 20 voices at this Workshop. The staff who participated were there to really lend their technical assistance and expertise, and at times weighed in on some of the consensus building, and at other times abstained.

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We sort of left that to their discretion. I really just want to take a moment to thank all of the individuals who participated in the Workshop.

It really was a very robust and collegial dialogue over the day and a half that we were together, and really felt that people leaned in and did very good work together. The purpose of the Workshop, as we had defined it. This purpose was really refined in consultation with the ASMFC staff that convened the Workshop, and then with the insights from those assessment interviews I mentioned.

But we defined sort of three layers of purpose or goals for the Workshop. One was really to increase understanding of the various stakeholder perspectives and interests. There was recognition that there have been a fair amount of public input and public discourse around the issues. There has been a survey, but perhaps there had not yet been an opportunity for stakeholders to themselves ask direct questions of one another, and really be listening for deeper understanding. We also, and this was an issue that was really substantiated by the assessment interviews. We wanted to provide a contact for greater understanding of current horseshoe crab modeling. There was a recognition that the science and the way the science is described, can sometimes be difficult to explain, especially to lay audiences and to the public.

There was a desire to at least increase the collective shared understanding of the current modeling approach and the science, the scientific inputs, and data, for those who were around the table. Then the final objective was to really identify, what were concerns, what were the alternative ideas and suggestions, and what were the areas of possible common ground for horseshoe crab management that this group of 20 people could identify over a day and a half.

I had proposed, and the group took up and affirmed during the Workshop, a consensus building process, which basically can be used as a way to surface areas of agreement and disagreement, and to encourage participants to be in sort of a solutions mindset. The dialogue process, in addition to

establishing this baseline knowledge and understanding through technical presentations at its outset.

Most of the Workshop was really about building consensus through this process. The way it looked was individual participants in the group, with my support as a facilitator, would essentially bring ideas to the table, proposals or recommendations. Then we would go through an iterative process of essentially seeing where everybody in the room stood around those ideas.

I've had people put up one finger when they wanted to indicate full support for an idea, two fingers when they wanted to support an idea, or they were willing to support an idea. But they did want the group to know that they had questions and concerns. Then I think this word is actually inverted, so it would be three fingers indicated full support, two, indicated support, but with questions and concern, and one finger would indicate you cannot support, given too many questions and concerns.

It doesn't really matter, but if you do review the report that was provided, you'll see that inversion of the numbers. But basically, this consensus building process allows for this kind of gradient of agreement, where folks can see, okay how serious is the opposition to an idea, or it may be how much support might there be in the room for an idea.

Once we sort of test where people are at with a given idea, the process then became very much an iterative dialogue, where I as the facilitator would turn to those who objected to the idea, and ask them to share more about their objection, and if possible, to share how they might modify the proposal or their recommendation or the idea, to get them closer to support.

We had a really rich iterative process of kind of working through several proposals and several recommendation ideas. We arrived at several areas of common ground this way, as well as several areas where there was really robust dialogue, but common ground or consensus-based common

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ground, which indicate all threes or twos, there is nobody sort of completely opposing the idea, was not quite reached, but there was robust dialogue. At the end of each day at the Workshop we did also have public participation, public input which was captured in the report as well. From here, having explained the process, I will move into some of the key findings of that consensus building effort. There were five statements or recommendations around which the people in the room achieved consensus or broad agreement. Now, as a reminder, some people may have abstained from providing their one, two or three, kind of indication of agreement for these statements.

Typically, some of the staff may have abstained because they felt that it was not really in their purview. Like in this organic process we essentially had nobody who fully objected to these ideas. The first three are on this slide. One was that participants put out there, they would like to know whether the group could agree that the horseshoe crab population had in fact increased in the Delaware Bay since 2010, and there was consensus in the Workshop that this was in fact the case.

There was also a consensus recommendation developed that the ASMFC should conduct outreach to gather the essential concerns of key stakeholders. There was a sense that it would be important to gain a deeper understanding, especially if those stakeholder groups, communities, or networks that had greater concerns around the ARM model.

Then another area of agreement that ASMFC should devote some resources towards improving science communication about the ARM, including optimizing existing channels for engaging with the public. To give some context for that, there was robust dialogue about the need for just better science communication about this modeling, but also recognition that there might be many existing channels within the ASMFC that could be activated to do this kind of work.

Okay, so one of the really interesting outcomes, in terms of the consensus agreements, was that there

was a recommendation to use current ASMFC processes to refine the ARM reward and utility functions with stakeholder input. As I recall, this was an idea that some of the scientists around the table strongly advocated for as a very appropriate and very useful sort of sphere of influence, where stakeholders could really shape the data going into the ARM. This idea did achieve consensus.

Looking at my notes and looking at the report, we had around 7 participants who registered full support for this idea, and another 5 who registered that they would support it, perhaps with some questions and concerns. We did have, again robust dialogue around each of these. In the report that was prepared, we have an overview of each of them, and then additional sort of notes from the dialogue in the appendix.

Then the final consensus statement was that the ASMFC should continue to run the ARM by default, with a recommendation to pause female harvest in the meantime, while the other recommendations, the other consensus states recommendations are implemented, and stakeholder input is further considered.

This was probably one of the most significant areas of common ground achieved in the Workshop, essentially a decision to continue to run the ARM. There was this affirmation that Adaptive Resource Management is desired. But a default recommendation to pause female harvest for now, while these other ideas are implemented. From there we can move into areas where consensus was not reached. Each of these areas are worth mentioning and worth including because there was such robust dialogue. In the report on the Workshop, we include the sort of breakdown of votes, the three, two, one for each of these, so reviewers of the report can get a sense of how much disagreement or objection was there.

But essentially, consensus was not reached on the idea that female harvest is appropriate under some circumstances. For this one we had two participants who registered a cannot support, too many questions and concerns, which in this three,

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two, one consensus model would be a one. They cited that the case for expanding the female harvest has not been adequately justified, that there are remaining concerns with the model.

They cited an understanding that perhaps red knots really need a “super abundance” of eggs, that may exceed what will be deemed as sustainable level for horseshoe crab. Really a desire to represent the interest of NGO members that might not have been around the table was also one of the reasons.

Also, a concern that more time might be needed to fully assess data about female horseshoe crab abundance and red knot population trends. Sort of just a more cautious sense that we’ve only recently turned the corner with population of horseshoe crab, and should be cautious. Those were some of the reasons that consensus was not reached around this.

I will say that 11 participants registered full support at that first bullet. The next one was the idea that the ASMFC should revert to a Harvest Control Rule, and not use Adaptive Resource Management. This was really interesting, because we actually had all participants who participated in this consensus test, there were 12 of them who registered a 1, meaning that they cannot support this idea.

In a way it was not a consensus achieved, but it was sort of a default affirmation that there is a preference for Adaptive Resource Management. I think that that was one of the open questions going into the Workshop, so that was a very interesting finding. The next area of dialogue where consensus was not reached was around the idea that we should pause running the ARM to focus on modeling for male-only harvest, based in science.

The idea behind this recommendation was really to value the time and the resources devoted by the modelers, and recognize that perhaps if we’re not going to fully follow the sort of recommendations that come out of the model, it might make sense to kind of pause Adaptive Resource Management.

Most of the participants who consensus tested for this said that they could not support it, so that was 7. We only had 1 person registering full support of this idea. It really came down to not wanting to relinquish Adaptive Resource Management, really valuing that approach, even if there are some concerns about the implications for the recommendation of female harvest.

Then the next one captured on the screen is around a suggestion to really work on a conflict resolution process with those NGOs who have the most objection to some of the outcomes of the ARM model. There was extensive discussion about this. We did have 7 participants who fully supported, another 2 who would support with questions and concerns, but 3 participants registered that they could not support it. The primary concern really was that there would be a perception of unfairness for the ASMFC to hold private meetings with some but not all stakeholder groups or communities, and that this might discredit and undermine the rigorous external peer review process in place, to evaluate the science of the ARM Framework.

This sort of segued into, you know where we did achieve consensus, which was around finding processes and using existing channels within the ASMFC to really listen deeply to what the stakeholder concerns are. Those were the areas where consensus was achieved, and the areas of robust dialogue, where we did have efforts to craft consensus proposals, but we didn’t quite get there, in terms of full common ground.

The conclusion of the Workshop was very memorable for me as the facilitator, because we went around the room, and the participants really universally affirmed that the Workshop had met its core goals. We have achieved an increased understanding of the various stakeholder perspectives and interests. Folks have had a chance to really listen to one another and to gain new insight into the issues, and to each other’s interest and perspectives. There was also agreement echoed around the table that there was an improved and increased understanding of the current horseshoe crab modeling, thanks in large

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part to some excellent technical presentations that staff provided, and to the dialogue that ensued.

There was generally just an appreciation for the collegiality, for the professional respect, for the positive dialogue, as folks surfaced their concerns, their ideas and worked to really, worked quite earnestly to uncover where there might be areas of common ground, despite sort of a context of some conflicts around how this resource should be managed.

From here I'll segue into just at a high level introducing some of the recommendation ideas that came from the Workshop, and then Caitlin Starks will step in and provide a little more flesh on the bones, as a member of the ASMFC staff who understands better how these recommendations could be implemented.

At a high level there were many potential next steps that were discussed through the Workshop. Some of these really relate to those consensus agreements. You see the key ideas on this slide, so the first is to initiate an addendum for an interim solution, around how the ARM modeling would proceed.

The second is to really have dialogue with key stakeholders to identify "essential concerns." That was the phrasing that really came out of the Workshop, a sincere desire to kind of go even deeper in understanding what's really at the core of these concerns. The third, initiate a process to develop alternative reward and utility functions for stakeholder engagement.

This seemed to be a really rich opportunity where stakeholders could truly shape how the ARM Framework is implemented, in ways that are also very helpful to the scientists running the model. There were also recommendations and ideas around evaluating the membership of the Advisory Panel, and whether there might be opportunities to make the Panel even more representative of the range of stakeholder concerns. Lots of interest around efforts to improve science communication about the ARM, especially through using existing

channels that might not be fully optimized within the ASMFC. With that, I think Caitlin is going to come up and go over each of these in more detail.

MS. CAITLIN STARKS: Thanks, Kristina. Just to add a little more to these recommendations. The first suggested next step was to initiate an addendum to establish an interim solution for setting specifications, while the other workshop recommendations related to the ARM are addressed. The consensus of the Workshop participants was that the ARM should continue to be used, but that female harvest should be paused during the time needed to address those other recommendations.

To achieve this an addendum could be used to allow for setting multiyear specifications, based on the ARM as an interim solution, so that female harvest could be set to 0 for a longer period than 1 year, to allow for additional work on the ARM to be done. If the Board initiated an addendum today, it could be completed before next fall, so that it could be used during the specification setting process for 2026 harvest.

Then the next consensus-based suggestion is to begin a dialogue with stakeholders, such as the environmental NGOs and others that were not able to be at the Workshop, acknowledging that the participation of the Workshop was limited to allow for more in-depth discussion. Setting up a process for dialogue with other stakeholders would provide an opportunity to build a more holistic understanding of the ARM Framework and the key concerns that stakeholders would like to see addressed, and also space for exploring some solutions or alternative methods.

The format of this dialogue would really dictate the resources required, but as an example the Commission could start by engaging with stakeholder in a series of webinar meetings, which would not require a lot of resources. The next suggestion addresses the recommendation that the ARM reward and utility function should be refined with stakeholder input, using current ASMFC processes.

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The reward and utility functions are components of the ARM that essentially translate the management objectives into equations that solve for the recommended harvest from the ARM, given the horseshoe crab and red knot population data. The Workshop discussion concluded that these functions should be evaluated to see what changes could be made, so that they might better align with stakeholders concerns and values.

The process for doing this could take place through our typical committee meetings, if they are tasked by the Board to do that, and stakeholder engagement can be built into those meetings. I want to note that reviewing and coming up with modifications to consider for those rewarding utility functions will take time and resources, and it would probably require at least another in-person meeting, as well as multiple webinar meetings to really work through any changes. Then ultimately, if there are changes that the Board wants to pursue, a management action would be needed to adopt those changes.

Then the last two suggestions are a little bit easier to accomplish. First is the evaluating the Advisory Panel membership, to make sure there is adequate representation for all of the stakeholder groups, and this could begin any time really, so staff can work with the states to look at who is currently on the AP for each of the states, and consider any changes. Another possibility would be to consider adding additional seats to this AP that specifically would be for those nontraditional stakeholders like the environmental NGOs.

Then our last one, the Workshop participants agree that there is a need for efforts to improve the science communication around the ARM Framework, because it is a very challenging thing to explain and understand. Another area where efforts could be focused in improving communication is around the Commission's channels and processes for public engagement, to increase the general public's awareness of when and how they can provide meaningful input on management.

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This seems like it could be an opportunity, where the environmental NGOs with an interest in horseshoe crab management could collaborate with the Commission, to help disseminate some information, and also provide insight on how our communication about the ARM could be improved. With that I am done, and Kristina and I can answer questions.

CHAIR DAVIS: Thank you, Dr. Weaver, for that excellent report out on the Workshop proceedings, and thanks to Caitlin for providing some clarity on actions the Board could take, coming out of the Workshop. Let's start by looking around the room and online, to see if anybody from the Board has questions for Dr. Weaver or Caitlin about any of the information that was just presented. I'm not seeing any hands, so hallmark of a great presentation, answered all the questions. I will look around the room at this point to see if anybody has a motion or any other recommendations for action. Dan McKiernan.

MR. DANIEL MCKIERNAN: Just a brief question. If Caitlin or anyone else who was involved could explain the reward and utility functions, especially for those who don't follow the ARM so closely.

MS. STARKS: I'm going to kick this one to our Chair of the ARM Committee, John Sweka.

DR. JOHN SWEKA: Yes, the reward function in this whole scheme is essentially what we want to maximize, and we get reward from both the harvest of horseshoe crabs and the abundance of red knots. In a perfect world you have high harvest of crab and you have high abundance of red knot. How we get to the reward function is through the utility functions.

The utility function is described, how much value is placed upon harvest or bird abundance, based upon the stakeholder values. In terms of crabs, it's a proportion of maximum harvest. If we're in a state where we can harvest 210,000 females and 500,000 males, that utility is equal to 1, or 100 percent.

On the red knot side of things, the utility is 0 at our current abundance of red knot, and then once we approach 81,900 birds, which is a population threshold that was settled or agreed upon by all stakeholders' years ago. Once we hit 90 percent of that 81,900 threshold, then red knots are to have utility. Then it increases to one once you surpass that threshold. The reward function is the combination of both for utilities. Then within the ARM Framework, we have what is also known as the Harvest Policy Function. Granted there is a lot of functions here that are very confusing.

The Harvest Policy Functions are actually what we solve for. Those are mathematical equations, that tell us then what the optimal solution is, given the abundance of crabs and the abundance of birds at a particular point in time, and that is the Harvest that we should implement for our next recommendation for the next harvest season.

CHAIR DAVIS: Bill Hyatt.

MR. WILLIAM HYATT: Just a question I've been mulling over since the presentation. The last of the recommendations was a recommendation to increase science communication with sort of like the conclusion to collaborate with NGOs might be a great way to do that. In thinking about that, I said, oh that sounds like it just brings up all the issues that might be at loggerheads with some of the NGO community on.

Kind of thinking that while that was a simple statement of the solution, the concept was that that would be actually the last in line after some of those preceding recommendations, increasing stakeholder involvement, increasing membership on the Advisory Panel, et cetera, were implemented and brought to fruition. Am I kind of thinking of that correctly, or was there any discussion of how that recommendation might roll out?

MS. STARKS: Kristina, feel free to jump in if you have a better memory, but I think when these recommendations were developed and discussed at the Workshop, there wasn't really an order given to them. As we just presented them, there is not

necessarily an order there either. Up to the Board how we want to approach these things.

But I do think they are not necessarily mutually exclusive, I think you could improve the communications and those relationships with the NGOs, to try and think forward about how to better communicate these things while you're also working on solving the other questions.

DR. WEAVER: Yes, I can just add to that, Caitlin. There was a lot of creative dialogue around, you know what could be possible if there was a major investment in science communications, like hiring someone with that expertise or you know there were sort of creative brainstorming around it over the course of the Workshop really. It was a definite theme.

But you know, I think as folks recognized, really there might be existing channels within the ASMFC where this could really be shored up. One of the ways that the environmental NGOs, and I think the other stakeholders as well could be useful, is in clarifying what is confusing. What about the existing ways of explaining the science might be difficult?

In particular, even some of the scientists around the table were sort of acknowledging that they find it difficult to then explain to members of the public. Even if they have a sense of understanding, they have difficulty explaining it further, so that environmental NGOs might have a better sense of what has been difficult to grasp among their stakeholders and networks. Then the other piece related to this was not exactly the science communications, but an opportunity to broadcast more clearly to environmental NGOs and to the public, what are the existing channels for the public to engage with all of this?

That those channels may not be fully understood or utilized, and that could be a communications issue. Again, one of the ways of kind of getting at that would be to better understand for those environmental NGOs and others, where is that breakdown in understanding happening, in terms of

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really recognizing how they can engage. Hope that is helpful.

CHAIR DAVIS: Thank you, Caitlin, and Kristina. Again, I'll look around the room to see if anybody has a motion or a suggestion for how to move forward formally out of the Workshop. John Clark.

MR. JOHN CLARK: Let me use my brain power and see if I can get something up on the screen. Okay, here we go. Yes, I would like to **move to initiate and addendum to consider the ability to set multi-year specifications for male-only horseshoe crab harvest of Delaware Bay-origin Horseshoe Crab based on the ARM Framework.**

CHAIR DAVIS: I'll look around the room to see if there is a second to the motion. Dan McKiernan.

MR. CLARK: Caitlin, didn't we have a little more added to that?

MS. STARKS: Did you want to add to the end of that, John?

MR. CLARK: Yes, and as Mike pointed out, it should be, yes to the end of that I also wanted to add on there, or an alternative male-only harvest specification setting method. I guess I'm kind of doing this on the fly here, but I can speak to it after we have it set.

CHAIR DAVIS: Okay, John, does what is on the screen right now reflect the motion you wanted to make?

MR. CLARK: Yes, it does, Mr. Chair

CHAIR DAVIS: Dan McKiernan, the seconder is indicating he is good with that as well. We have a motion on the Board. I'll turn it over to John to ask if he wants to provide some rationale.

MR. CLARK: Yes, I do, thank you very much, Mr. Chair. As we heard from the report on the Workshop, which was really an excellent dialogue and much appreciation to the staff from ASMFC, John and Kristen for the great explanations of the

ARM model, and to Kristina for the great job of facilitating that.

As we, I think all understood, the question of female harvest is quite a difficult question right now for all the states that are part of the Delaware Bay resource. We thought that this way we would still have the ARM set up, but we wouldn't have to go through all the work of setting specs that would include female specs every year, and I know that just running the ARM every year is a lot of work. This way the thinking is that it will be up to the Board to set how many years in advance we could do this. But based on what we've been doing in recent years with the 500,000 quota of male horseshoe crabs that can be taken, which is what, less than 2 percent of the estimated population of males out there that we could handle this safely for several years, before we would have to run an ARM again.

During that time, it might become more apparent that perhaps female harvest could be allowed, and then we could run the ARM again. The last part of that, there are states that are harvesting some of the Delaware Bay origin horseshoe crabs, but also other horseshoe crabs. That was put on there so that perhaps the Technical Committee and the Stock Assessment Subcommittee might come up with a method just for estimating a male-only harvest and specification.

If that is what we are going to be doing, that would take into account what those states, for example Maryland and Virginia, are harvesting. That is kind of the rationale here of a way to hopefully not get us into the situation like we're getting every year now, where as soon as the recommendations come out and there is that female harvest on their recommendation.

It really sets off strong reactions from certain people, so I thought by doing this perhaps we could at least calm things down, and move ahead while we're working on the reward and utility functions, and see the next iteration of the ARM, and then get back and look at the whole package again.

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CHAIR DAVIS: Dan, I'll turn to you as the seconder of the motion to see if you want to add any rationale.

MR. McKIERNAN: No thanks, I simply seconded to support our colleague at the ground zero.

CHAIR DAVIS: I'll turn to the Board and see if there is any discussion on the motion. Joe Cimino.

MR. JOE CIMINO: I think this gets at the heart of what the Workshop kind of concluded. I think it's important to telegraph that if it is going to be male only that we have the ability to do that for multi years, so that the public has that understanding that as Caitlin said, that this is a good idea to help us move forward with the stakeholder input and other work that we need to address possible changes to the ARM in the future. It also signals to those that are working on the ARM that they have some time to work on it as we move forward. I fully support the motion.

CHAIR DAVIS: Rick Jacobson.

MR. RICK JACOBSON: I am inclined to support the motion as well. I think what I've seen over the last couple of years is a consistent sentiment toward a male harvest only, in spite of the recommendations coming out of the ARM itself. That said, in spite of my inclination to support the motion, I would want to hope that the Commission and the Board does not allow itself to be complacent in engaging with the public on this issue moving forward, that we stay engaged with the concerned constituents, NGOs et cetera, so that as we do take up a new decision point some number of years down the road, it doesn't come as any surprise to anyone, whatever our new position might be.

CHAIR DAVIS: Mike Luisi.

MR. MICHAEL LUISI: I certainly support the attempt here to go forward and to initiate the addendum for multiyear specifications, it's something that I've supported in other fisheries. I think the multiyear specification setting is a cost savings, a resource savings process, that allows us to set the stage, not

only for us and the staff that work on these plans, but for the industry as well to know what's coming a few years from now. My only question, and I anticipate that if at the end of this when we are working on a multiyear specification process.

Caitlin, do you have any thoughts as to whether or not there would be any type of review? Let's say we set the specs for three years. Are we just going to ride those three years out, or do you see us checking along the way to make sure something hasn't changed enough for us to reconsider what we said. But by doing that work that would be a kind of checks and balance, does that offset all of the savings and the resource savings and staff time, does one offset the other?

MS. STARKS: I think it is up to the Board whether or not you would specify that you want the ARM to be run every year, even if you're setting specifications for three years at a time. That would be up to you all. I do think it kind of would negate the cost savings part of it, because ARM being run is resources that we have to use.

There is going to be an update every year from the Virginia Tech Trawl Survey, which is not going to be run through the ARM, if you all don't want to run the ARM every year, but it will at least provide an indication of where the trawl indices are going from year to year.

MR. LUISI: Just a quick follow up to that. That makes sense. In thinking about this though, and maybe John, maybe you can help me understand. Let's say five years pass, it's almost 2030 and we're having this discussion again. However, the red knot population and the horseshoe crab population have skyrocketed, for some reason.

We find ourselves in a position to possibly consider multiyear specifications on something beyond just male only. To continue with the addendum and to have it evolve with the change in management, is that something that would need to be specified in this motion, or would there have to be a whole new addendum if we were going to do a multiyear specification process for both male and female?

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MS. STARKS: I believe that if you specify here that you want the addendum to be male only and that is what ends up being approved down the line, if this continues going forward. Then you would be limited to male only and you would need a new addendum. It is definitely up to you how you craft this draft addendum, and how that would impact your need to do a future addendum.

CHAIR DAVIS: Toni, go ahead.

MS. TONI KERNS: I think I'm hearing folks not clearly understanding, I think, what this motion is saying. I think what this motion is saying is you're getting an additional tool in the toolbox. You have your ARM, and the process that you use to set specifications every year through the ARM right now. You are adding another tool in the tool box, or two or three tools, depending on what these alternative methods turn out to be.

The Board can then decide which of the tools you're going to use to set your specifications. If you approve something that says you can set male only for three years, then the Board would run the ARM, do your three-year specification, and then after the third year I'm assuming that this addendum is going to say, you need to run the ARM again at that time, and then you'll then again decide, am I going to use the method we have right now, or am I going to use some multiyear method that gets approved through this document?

MS. STARKS: I think the clarification maybe that Mike is looking for is about this male only part. If in three years after they set specifications with male only harvest, and hypothetically the ARM is run again and the female population, male population have exploded, and they want to set female harvest, then it would be limited to one year at a time without a new addendum.

CHAIR DAVIS: Does that clear it up, Mike?

MR. LUISI: Yes, thank you, and as long as we have the option down the road, without having to start a whole new addendum to consider the female

harvest. As John mentioned, you know some states are not harvesting 100 percent of their crabs from the Delaware Bay origin. I think the answer satisfies looking forward into the future and what tools we would have.

CHAIR DAVIS: I'll go to Eric Reid next.

MR. ERIC REID: Following on the last two speakers. The language we have now says we are going to do the ARM or male only. Does that limit us moving forward? Should it be and/or?

MS. STARKS: It says male only harvest based on the ARM Framework or an alternative male only harvest specification setting method, so both of them are only males in this particular motion, ARM or we'll do the specs for male only harvest.

MR. REID: Okay, thank you.

CHAIR DAVIS: John, did you have your hand up before?

MR. CLARK: No thanks, Mr. Chair, I was just going to respond to Mike, but Caitlin and Toni covered it beautifully.

CHAIR DAVIS: Dan McKiernan.

MR. MCKIERNAN: Will the addendum document clarify the process by which there could be a female quota in the future? I am seeing Toni nodding her head. Thanks.

MS. STARKS: We can certainly do that with your instruction.

MR. MCKIERNAN: I would recommend that.

CHAIR DAVIS: Duly noted. All right, I'll look around the table to see if anybody else from the Board has a comment. Do we have anybody online? Provide an opportunity for public comment if there is anybody in the room from the public who would like to comment on this motion, or anybody online, go ahead and raise your hand.

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All right, not seeing any more hands, we'll go ahead and move the question. I didn't hear anybody speak in opposition to this motion, so I'll start off by asking, **is anybody opposed to this motion?** Okay, not seeing any hands, **any abstentions for the record? I see Georgia and Florida abstaining and, South Carolina, Georgia and Florida, thanks. This motion passes by consent with 3 abstentions as noted.** Go ahead, John.

MR. CLARK: Caitlin, did we need a motion about asking the ARM Subcommittee to review the reward and utility functions, or is that just something we can task and ask them to do?

MS. STARKS: I think you can task the ARM Subcommittee to get together and discuss what input would be needed to think about modifying those functions, and then come back to the Board.

MS. KERNS: John, I think in speaking with members of that group, that it is not a simple task just to redo that. It takes a significant amount of time. If you are interested in understanding like, what it means to do what was in Caitlin's recommendation slide then that group can come back and give you some better understanding of that. But to actually do it is a much bigger thing.

MR. CLARK: Right, my point was just, does the ARM Subcommittee need any further motion to proceed. While we're doing the multiyear specifications, my assumption is that they will be working on the reward and utility functions with, you know we're getting input and all that. It could be a lengthy process, and just curious as to whether we have to ask for that to be done specifically, or if that is just going to proceed at this point.

MS. STARKS: The intent of the recommendation from the Workshop, I think is to get input from stakeholders and to have a better understanding of where to go with those reward and utility functions. It might be helpful for the ARM Subcommittee to meet on its own to discuss what type of guidance would help them know where to go with those.

Then if they come back to the Board with some description of that process, maybe at that point the Board could direct them to do something specific with those, or consider certain changes to those functions based on the stakeholder's input. Because there is that other recommendation for engaging with stakeholder about their key concerns.

MR. CLARK: But in other words, you don't need any specific input from the Board right now to proceed with.

MS. STARKS: If they are going to meet then yes, we would want a task for them to meet.

MR. CLARK: Well, in that case. Okay, so not a motion just a recommendation to task the ARM Subcommittee with reviewing the reward and utility functions, discuss what input from stakeholder groups would be needed to provide direction on changes.

CHAIR DAVIS: I'll look to the Board to see if there is any discussion on that idea that John brought up, or any opposition on the Board to that tasking. Not seeing any hands, I don't think we have any hands online, so we'll consider that the will of the Board. Thanks, John. Mike Luisi.

MR. LUISI: Regarding the recommendations that came from the Workshop, the other recommendations. Is there anything we need to do? Does the Board need to approve those as paths forward?

MS. STARKS: I don't think anything else requires a motion or action, but I can move forward with affirmation from the Board on looking into the Advisory Panel membership, and we can continue to think about how we would engage the stakeholders in some sort of dialogue. I guess, if that is the intent of the Board, if you want to move forward with that recommendation or the others, then it would be good to have that clear on the record.

MR. LUISI: With that could I move? Do you want another motion, or should I just say yes, that all sounded great, and hope everyone else says the same thing?

CHAIR DAVIS: I think it's more the latter than the former. Essentially, you know if anyone on the Board has any objections to those two ideas that Mike just raised and Caitlin discussed, speak now or forever hold your peace, or we'll consider that the will of the Board to move forward with exploring the Advisory Panel membership. Right, moving forward with exploring avenues for more dialogue with stakeholders. Also, if anyone has any additional thoughts or ideas along those lines, feel free to share them at this point. Okay, not seeing any hands, so we'll consider that also the will of the Board by consent to move forward with those two items. Roy Miller.

MR. ROY W. MILLER: I'm wondering if we have a definition of what success in managing these two resources looks like. Do we have a clear understanding of our ultimate goal, in terms of, let's say numbers of female horseshoe crabs, numbers of red knots, and if so, how will we know when we have achieved success or conversely? Even though we've bought some time for, I've heard the word three years thrown around here. At what point will we know we have met the concerns of the NGOs? What defines success?

CHAIR DAVIS: It's a fair question, Roy, almost seems like a question for happy hour or the hour after happy hour. I wish I had a good answer for you, I don't. I'll look to see if anyone up here at the table has some thoughts they want to share, or maybe somebody else out there on the Board has some thoughts along those lines. Mike Luisi.

MR. LUISI: I don't have an answer. I know that this was something that we discussed, you know during the time that we all spent at this Workshop, whether we were in the meeting or outside the meeting. Success and the thoughts about what success looks like, was something that we were all a bit challenged by.

Because I think no matter, depending on where you're coming from, there is a different level of success, and if you took everyone's successes and stacked them all together, and if you had to achieve that, there would be no more ocean and it would just be horseshoe crabs, and the birds would be like pterodactyls coming down and picking you up and flying you away.

There are a whole different level of what success looks like in different eyes, and that was a challenge at this group we had. We had a little bit of everybody scattered throughout. Success on the commercial industry, they would like to see some female harvest back. The red knot bird groups want to see a flourishing biomass of red knot.

It was a challenge. I don't know that we're going to ever find something that we can just check to say we've succeeded, but I think the conversations that we've had, the ability to sit with one another and learn to make adjustments to things when we are considering others' opinions about what success is. I think that is success, honestly. We've come a long way and I'm looking forward to continuing working on this process for the future. I'll stop there, thanks.

CHAIR DAVIS: Thanks for that, Mike. Does anyone else have any thoughts to share on that topic? Go ahead, John.

DR. SWEKA: Just to speak to Mr. Miller's question about what are the target numbers. I can speak to some of the numbers within the current ARM Framework, and where things have value. For red knots it is 81,900 birds. That is basically, based on how many birds there were out there in the early nineties, original aerial count numbers of birds, some fraction of that.

From the original ARM it got ramped up, so we were thinking there were approximately 90,000 birds using the Delaware Bay back in the early nineties. In the original ARM Framework it was said, okay, if we get back to half of that we will be happy. That is still based on the aerial count numbers, so half of that would have been about 45,000.

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Then we started to use the mark-resight estimate of birds, realizing that the aerial counts are less than what is actually using the Delaware Bay. Then we, using the ratios, we ramped that up to 81,900 birds, and that was when essentially the shorebirds stakeholder group would feel comfortable. In our utility functions for red knots, there is zero value to the number of birds out there. Essentially, stakeholders are unhappy when there is less than 81,900 birds. Once you hit 81,900 birds, then we're happy. That satisfies the desires of the shorebird stakeholder group. That is where the shorebird, or all stakeholders where their values are in place in the ARM is through those utility functions. But 81,900 birds, we're happy. You can kind of think of that as a success, you know where utility is equal to one. In terms of horseshoes crabs, we don't have a typical population threshold where, okay now you can harvest, now you can't harvest. We used in the previous ARM version, there was 11.2 million females.

That is when we said, okay, female harvest is now okay. Well, we've tripped that, we're beyond that, and that was one of the problems with the original ARM was that we would automatically go to the maximum harvest. The way the current revised ARM is formulated, there is not a trigger there, there is not a set number of crabs, where you can have harvest.

Essentially, what we want to do is maximize the allowable harvest, so it is proportion of maximum harvest. We can have up to 210,000 females and 500,00 males, and we assume that females are worth twice as much as males. The combination of both sex harvest, what it the proportion of the maximum value that we have from harvest.

We try to get to that, you try to maximize that, as long as it doesn't cause harm to red knots, and red knots are not limited by horseshoe crabs. There is really not a population goal for horseshoe crabs, it's more of a harvest goal, as long as it doesn't impale or impair red knot population growth. Hopefully that kind of sets us up for what we may consider a success.

MR. MILLER: Thank you, Dr. Sweka, that helps clarify it for me.

CHAIR DAVIS: All right, in the interest of time, I'm going to move on from this discussion. I want to check really quickly before we move on from this agenda item that there are no other additional actions or motions from the Board on this agenda item dealing with the Workshop. I'm not seeing any hands, so we'll go ahead and move on to our next item on the agenda, which is to set 2025 Delaware Bay Bait Harvest Specifications, and we're going to start off here with a presentation from John Sweka.

REVIEW HORSESHOE CRAB AND RED KNOT ABUNDANCE ESTIMATES AND MODEL RESULTS FROM THE ARM FRAMEWORK

DR. SWEKA: The Adaptive Resource Management Model was revised and accepted by the Board for management use in 2022, and it formulated the most recent Addendum VIII for fisheries management plan, and it's used annually to produce a bait harvest recommendation for the Delaware Bay area.

Maximum, as we said previously today, the maximum harvest that could be recommended is 210,000 females and 500,000 males. Last year the ARM recommendation was 175,000 females and 500,000 males, but the Board elected to implement a 0 female harvest. The objective statement of the ARM Framework is to manage harvest of horseshoe crabs in the Delaware Bay to maximize harvest but also maintain ecosystem integrity, provide adequate stopover habitat for migrating shorebirds, and ensure that the abundance of horseshoe crabs is not limiting red knot stopover populations or slowing recovery.

The data that is used in the ARM annually, to make a harvest recommendation, is the red knot population estimates from the mark-resight analysis that is conducted by USGS, Jim Lyons in particular. Then also, the horseshoe crab population estimates from the Catch Multiple Survey Model. Input to this model include the Virginia Tech Trawl Survey, the

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Delaware Adult Finfish Trawl Survey, New Jersey Ocean Trawl and bait landings, discard estimates and biomedical mortality. Here we have the red knot population estimates through time. You can see there has been some fluctuation. In the most recent years, 2023 and 2024, we've gone from 39,361 birds up to 46,127, so a slight increase in 2024.

I will note that when we make our annual recommendations, we look backwards two years, so we're using the 2023 mark-resight estimates, in order to make harvest recommendations for 2025. We would be using that 39,361 number, but we show the 2024 estimates here just for your reference.

The actual bait landings or total landings of females, which are comprised of bait, dead discards from other fisheries, as well as coastwide biomedical mortality is depicted in this draft through time. You can see that the number of females that were harvested for bait decreased after the initial ARM or the original ARM was implemented in 2012. We've been at low levels since.

The reason why there are still some bait landings is because some of Virginia's crabs are assumed to be of Delaware origin, but still much less than the historic numbers. The dead discards from other fisheries have fluctuated and varied from year to year. We've put a lot of effort into trying to estimate dead discards from other fisheries, but again, the data is highly variable. Coastwide biomedical mortality has tended to increase through time.

Here we have the same time series but for males, and you can see once the original ARM was implemented the bait landings of males went up slightly. Although we're allowed upwards of 500,000 Delaware Bay origin males, you can see from this graph that even the actual number that are harvested by the bait industry is still less than 500,000 in the Delaware Bay area. Again, discards and biomedical mortality on this graph. Here is a graph of our female indices of abundance, and you can see that the Virginia Tech

mature crabs and the New Jersey Ocean Trawl crab females have greatly increased through time. In fact, the New Jersey Ocean Trawl has recorded its two highest catches of female horseshoe crabs in the last two years.

The Delaware Adult Trawl Survey, females from that survey have increased up until about 2018, and then have shown a slight decrease since then. The circled area here is somewhat problematic, and I'll discuss this further. In the Virginia Tech Trawl Survey over the past four years there has been a very low abundance of newly mature crabs.

These are crabs that are also known as primiparous crabs. They have just become mature and will spawn the following spring, and they've been low for the past four years. Moving on to our male indices of horseshoe crab abundance, again Virginia Tech, New Jersey Trawl, both have increased in recent years, and again from the New Jersey Trawl Survey, the two highest recorded catches have come in the last two years.

Like the females, the Delaware Adult Trawl peaked in 2018 and has been a bit lower since. But the interesting thing is with Virginia Tech newly mature males. They don't show the same decrease as the newly mature females have in the most recent four years; in fact, they are at their highest abundance yet. This newly mature problem from Virginia Tech, we saw 0 female newly matures in 2022, so this presents a huge problem for our Catch Multiple Survey Analysis Model that ultimately estimates the abundance of horseshoe crabs. The CMSA is a simple stage-based model that sums the newly mature and mature crabs and subtracts harvest and natural mortality, and predicts a population next year. It simply will not run if you have an estimate of 0 newly mature individuals going into the model as input.

We've discussed possible reasons for these low numbers of newly mature females from Virginia Tech for a number of years now. The three possible hypotheses we've discussed in the past, could be catchability, maybe it differs between newly mature males and newly mature females now. A

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recruitment failure event, which would mean just no recruitment for multiple years, starting at about 2010.

This seems unlikely because we still see newly mature males' recruitment. The third hypothesis is an identification issue. Perhaps these newly mature females are being classified as some other life stage, or some other state of female. Last year we developed a method to correct for this possibility of misidentification.

Historical data indicated that newly mature females comprised approximately 20 percent of the total mature females, and when I say total mature, I'm talking the newly mature plus mature. What we did was we saw the newly mature and mature Virginia Tech estimates for 2019 to 2021, assumed that 20 percent were newly mature and 80 percent were mature, and then just reportion the total mature numbers.

We used the adjusted female numbers in the Catch Multiple Survey Analysis to then estimate the total female population size. Since that time, through conversations with Virginia Tech staff, as well as the boat captain that actually conducts the survey, we realized that newly mature females were most likely being misclassified as immature, not as mature.

We saw this increase in mature crabs, or fully mature female crabs through time were double. Perhaps the reason why it's increasing so much is because newly matures are getting misclassified as fully matures. Turns out this really wasn't the case when we dived more deeply into the issue and discussed it with Virginia Tech staff and the boat captain.

What is likely happening is the increase in abundance of crabs makes processing a representative subsample more difficult. Not as many nonmature female crabs were probed for the presence of eggs as probably should have been in most recent years. The staff that are collecting the crabs on the boat, they just get a lot of crabs and have to process them as quickly as they can. Perhaps they are missing the newly mature crabs.

At the end of the day we've come to the conclusion that our correction method for 2023 was actually wrong.

We pulled the newly matures out of the mature group, when they should have been pulled out of the immature group. How do we correct for this? We know our method that we used last year is wrong, but based on the biology of the crab, how do we get an increase in mature females, but yet get this absence of newly mature females? It's just mathematically and biologically impossible. We put it to question, can we infer female newly matures from the male newly matures? If we think about the life history of horseshoe crab, after hatching there is really no reason to believe that natural mortality would differ between the sexes during the immature stages. Males will mature earlier than females, and the newly mature stage only lasts one year. Since the newly mature males in Year t , and the newly mature females in Year $t + 1$, represent the same cohort of crab, there should be some positive relationship between the two.

Also, the number of newly mature females in Year $t + 1$ should be somewhat less than the number of newly mature males in Year t , because they would have one more years' worth of natural mortality prior to becoming newly mature. When we look back through the time series of data from Virginia Tech up to 2018, prior to when we see this big decrease in newly mature females. We actually do see that positive relationship. Here we have plotted the number of newly mature females at time $t + 1$ versus the number of mature males at time t .

We see that there is a strong positive relationship between the two, and also the slope of that line is slightly less than 1, which is indicative of an additional years' worth of natural mortality before the females become newly mature. If we use this relationship band to correct the newly mature estimates coming from the Virginia Tech Trawl Survey it does change numbers, and it does actually increase numbers.

The columns here on the far left in yellow, these are what are actually observed and estimated by

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Virginia Tech. For example, these are in millions of horseshoe crabs, so for example in 2019, we would have 240,000 newly mature females. By using our new corrected method for correction, this would then increase to 2.72 million newly mature females.

Now, it does increase the total number of crabs that we think that are out there, which some may view as biasing the numbers, and certainly we don't like to do this. But we have to recognize that what we're observing from Virginia Tech seems to be biologically impossible. In an ideal situation we would revert back to using Virginia Tech estimates as they are provided by the trawl survey directly. You know, that would be a priority.

But in the interim, we do need to use some sort of a correction. I will also note that this correction will need to be made next year, because Virginia Tech estimated 0 newly mature females again in the fall of 2023, it was the same time it was the highest number of total mature females over any time. Again, it doesn't make sense that we're getting no newly matures, but yet our matures are at an all-time high.

If we use our corrected numbers in the Catch Multiple Survey Analysis, these are the results in our population estimates of mature females. I have both the CMSA runs with and without coastwide biomedical mortality, and you can see that the biomedical mortality really makes no difference at all. The two projections or two predictions of total abundance of female horseshoe crabs are nearly identical between their two scenarios.

In our last year here the Virginia Tech Trawl Survey population estimate from the swept area abundance was 11.54 million females, and our CMSA estimate is 16.6 million females in 2023. For mature males, again similar to females were at pretty high abundance. We don't have to use any kind of newly mature adjustment for males. The Virginia Tech population estimate was 25.4 million males in the terminal year and 30.4 million males from the Catch Multiple Survey Analysis. Once again, essentially no difference at all between inclusion or exclusion of biomedical mortality.

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Given these estimates of birds and crabs, our harvest recommendation is based on our Harvest Policy Functions that were optimized in the ARM revision. As per Addendum VIII, we then round down our recommended harvest to the nearest 25,000 crabs. This is an effort to further protect confidential biomedical data. For 2025, the recommended ARM harvest would be 500,000 males and 175,000 females.

Then when we also account for Maryland and Virginia crabs not being of total Delaware Bay origin, these are the final total quotas, according to the Allocation Scheme within the Addendum. You can see that in the end, the total quota ends up being slightly higher than the Delaware Bay origin quota. In total it would be 513,000 males and 185,000 females. At this time, I'll turn it over to Caitlin, who can discuss setting the specifications.

SET 2025 SPECIFICATIONS

MS. STARKS: Thank you, John. My part is very brief. This is the Board action for consideration today, so you are considering setting harvest specifications for 2025 harvest for the Delaware Bay origin crabs. I did want to put up a table of what exactly the Board did last year, just so you have this as a point of comparison. Last year the Board implemented 0 female harvest as opposed to the recommended 175,000, and 500,000 males. This is the breakdown with the allocations that are in Addendum VIII.

CHAIR DAVIS: Thank you, John, and Caitlin. Start off by looking around to see if anybody has any questions for John and Caitlin about the information that was presented. Okay, I'm not seeing any hands, so I'll ask if anybody has a motion relative to specifications. Joe Cimino.

MR. CIMINO: I'll move that Dr. Davis has to stick around for at least another three years, so status quo on Dr. Davis. **Move to accept the 2025 Adaptive Resource Management harvest specifications with 500,000 males and no female harvest of Delaware Bay-origin crabs. In addition, the 2:1 offset will be added to MD's and VA's allocations due to the no-female harvest.**

CHAIR DAVIS: Thank you, Joe, I see John Clark raising his hand to second. I'll turn back to Joe to see if you want to provide any rationale as the maker of the motion.

MR. CIMINO: I personally believe that we need to continue to express caution. I am very supportive of revisiting; you know what we were trying to seek out of the ARM model. I'm encouraged. I think we're seeing some positive trends. But I think we've got a long way to go.

CHAIR DAVIS: John, any additional rationale?

MR. CLARK: No, I think we'll just continue doing what we've been doing, thanks.

CHAIR DAVIS: I'll look to the Board, see if there is any discussion on the motion. No hands online, I take it. Okay, we'll go ahead and move the question. I'll start by asking, **are there any objections to this motion?** Not seeing any hands, I'll ask if there are **any abstentions for the record.** Okay, I'll see if I can get this right this time. **Florida, Georgia, and South Carolina abstaining. All right, so this motion passes by consent with 3 abstentions as noted.** I'll look to Caitlin, but I believe that concludes the business on that agenda item.

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

CHAIR DAVIS: Okay, moving on to the next item on our agenda, Considering Approval of Fishery Management Plan Review and State Compliance Reports for 2023. I'll turn it over to Caitlin.

MS. STARKS: I'll go through this somewhat briefly. This is the management history for the Horseshoe Crab FMP. The FMP was originally approved in 1998, and it has been modified by eight addenda, and the most recent of those is Addendum VIII, which was approved last year to adopt the ARM revision for setting the Delaware Bay harvest specifications, which was just used.

This next figure shows the annual values of reported horseshoe crab bait harvest in orange, biomedical collections in light blue, and the estimated biomedical mortality in dark blue. These are in millions of crabs. You'll see the bait landings since about 2003 have fluctuated around the same levels, and in the last eight years or so, there has been an increasing trend in the biomedical collection, which is light blue bars, and the mortality, which is the dark blue.

The total reported bait harvest for 2023 was 738,789 crabs, excluding the confidential landings for Florida and the 2023 landings represent a 29 percent increase from the 2022 landings. They are still well below the Commission's coastwide quota for horseshoe crabs, which is 1.59 million crabs, as well as the total state-imposed quota, which is 1.03 million crabs.

The states of Maryland, Delaware, Massachusetts, New York, and Virginia make up 99 percent of the 2023 coastwide landings, and Maryland, Delaware and Massachusetts harvest the highest numbers. For biomedical in 2023, the number of crabs collected for the sole purpose of LAL production in the biomedical industry was 1,113,644 crabs.

This is a 22 percent increase from the 2022 numbers. The estimated biomedical mortality was 178,232 crabs, and this number includes the observed mortalities that are reported by each state, plus 15 percent of the total number of crabs bled. The biomedical mortality represents about 19 percent of the total directed mortality for horseshoe crab in 2023, which is about 917,000 crabs.

Compared to 2022, in 2023 there was an increase to the overall mortality, including both state harvest and biomedical mortality. Here you can see the overall mortality as a total area of this graph, with the orange area representing the mortality from bait harvest and the blue area representing the estimated biomedical mortality, so you can see how these two relate to each other at scale.

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For de minimis status, states can qualify if their combined average bait landings for the last two years are less than 1 percent of the coastwide state landings for the same two-year period. South Carolina, Georgia, and Florida requested and meet the criteria for de minimis status. The Plan Review Team had a few notes to highlight from the Compliance Report reviews.

First, the Delaware state bait landings exceeded the state quota in 2023, so their 2024 quota was decreased to account for that. Connecticut also, as of October 1, 2023, the state prohibited all hand harvest of horseshoe crab and their eggs. In addition, the New York State Legislature is currently considering a bill that would prohibit all commercial and biomedical harvest of horseshoe crabs. The status of that bill is that it passed the state Senate and next would be considered by the Governor if my information is still correct. Then lastly, for 2023, Massachusetts also reduced their state-imposed quota to 140,000 crabs.

Additionally, while they were reviewing the state compliance reports, the PRT Noted that Maryland regulations allow horseshoe crab harvest starting May 1, whereas no harvest of Delaware Bay origin crabs is allowed by other states from January 1 to June 7 in the Delaware Bay Region. The PRT had some concerns that this, is creating a little bit of an inconsistency within the Delaware Bay Region, and additionally, that January 8 to June closure provision for New Jersey, Delaware, and Maryland, it came from Addendum VI. But according to Addendum VI, the season closure provision expired in April, 2013, so I'm not bringing this up because Maryland has incorrect regulations, but just as a note from the PRT that it's inconsistent with the other states. But Addenda VII and VIII do not contain any seasonal provision.

The PRT is really just looking to the Board to clarify whether this season closure provisions were intentionally or unintentionally excluded from the latter addenda, and if anything needs to be considered regarding those seasons. For the PRT recommendations, this relates back to the last slide, the first one relating back to the issue of the

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seasonal harvest closures for the Delaware Bay Region.

The PRT also continues to recommend the Commission prioritize finding long-term funding for the Virginia Tech Trawl Survey, since this is providing critical data for our current management program. It's currently ongoing this year. Then the last recommendation here is that we should be working toward getting annual estimates of horseshoe crab discards, dead discards from other fisheries.

Then with regard to the state compliance, there is only one minor issue that the PRT noted, and that is that the compliance report for Massachusetts was not submitted by the July 1st deadline. Other than that, all of the states and jurisdictions appear to be in compliance with the requirements of the FMP. The PRT recommends approval of the state compliance reports and de minimis requests, and the FMP review for the 2023 fishing year.

CHAIR DAVIS: Any questions from the Board on FMP Review and state compliance reports for the 2023 fishing year? John Clark.

MR. CLARK: Thank you, Caitlin, for that great report. I am just curious to the point about the closure from January 1st to June 7th. To put that back in the FMP could that be made part of the Addendum we are considering about setting the multi-year specs?

MS. STARKS: Yes, I think that would be within the Board's purview.

MR. CLARK: May I make a motion to make that recommendation?

CHAIR DAVIS: Go ahead, John.

MR. CLARK: Yes, I would like to move that the closure dates for horseshoe crab harvest for Delaware Bay origin horseshoe crabs from January 1 to June 7 be put into the proposed addendum that we will be starting as of today. I don't know how you want to word that, but just wanted to put that

back in. If I can get a second for that I'll just speak to it.

CHAIR DAVIS: I'm going to wait until we have the motion up on the board, and make sure it reflects your intent. Sure, while we're waiting, go ahead, Dan.

MR. McKIERNAN: While we're waiting, maybe John could explain to me, if Maryland is having a season outside of the prescribed closure, and that closure is designed to protect Delaware Bay origin crabs. If those crabs are coming on the beach in Maryland, does that suggest that they are not Delaware Bay origin? What is the concept of Delaware Bay origin, and how does that work, relative to the adjacent states?

MR. CLARK: I don't mean to speak for Maryland, but from what I understand from Maryland, they don't allow beach harvest. But this is just there could have been harvest of females that would be coming from other methods, dredges, trawls, I don't know what might be used. But once I get a second, I can speak more to it.

CHAIR DAVIS: John, I'm going to ask you to go ahead and read this motion into the record, if it reflects your intent.

MR. CLARK: Sure, **move that the draft addendum initiated today also consider establishing a season start date of June 8 for the Delaware Bay region**, and yes, that does capture it.

CHAIR DAVIS: I see Ray Kane seconding. John, do you want to provide any additional rationale?

MR. CLARK: Thank you, yes. I know that I'm sure the harvest coming from Maryland before June 7 is probably minimal, but it is a perception issue. You know the more any harvest of mature female horseshoe crabs before the birds, the red knots get here and while the red knots are here, of course. There are that many less sweet, sweet horseshoe crab eggs on the beach for the red knots. We want to leave as many of them as we can, and so by

having a uniform June 7 start date to the harvest season, I think it would help.

CHAIR DAVIS: I'll turn to Ray and see if you want to provide any additional rationale.

MR. RAYMOND W. KANE: No, I seconded for the purpose of discussion, thank you.

CHAIR DAVIS: Mike Luisi, go ahead.

MR. LUISI: I guess the question is, if by supporting this are we, John, are you suggesting that the May 1st harvest period for which crabs could be harvested from non-Delaware Bay origin. Not that we can determine that by looking at the crab, but in practice Maryland, Virginia, as you get further away from the epicenter from the center of Delaware Bay there are fewer and fewer crabs that are from that origin. They are coming from other places. Is this saying that that May 1st start date is off the books entirely?

MR. CLARK: Well, Mike, this would just put an option into the Addendum, to do this to create a uniform date. I think during the process we could have a lot more discussion about it. But I just would like to see it at least considered in the Addendum.

CHAIR DAVIS: Is that good, Mike?

MR. LUISI: Yes, I'll support it as far as it going into the Addendum, as long as it's just the option. We can have a time to talk about how that fleshes itself out.

CHAIR DAVIS: Look around the table to see if there are any additional hands. Joe Cimino.

MR. CIMINO: I'm supportive of the motion. I'm also curious if it would be more accurate to say reestablishing. But I would hope that without going too far down a rabbit hole that there could be some explanation on whether or not it was ever intended to be dropped in the first place, as we start to look back to it.

CHAIR DAVIS: Any additional discussion on the motion? I take it we don't have any hands online. I'll ask if there are any objections to this motion. Go ahead, Dan.

MR. McKIERNAN: Point of clarification. I think June 7th is the last of the closed period, as opposed to the open date. Is there some confusion about the June 7th date?

MR. CLARK: Good catch, Dan. Yes, actually, June 7 is the last closure date, season is open on June 8.

CHAIR DAVIS: Okay, so you want to modify the motion to June 8, I'll look to Ray Kane, see if he is okay with that. John, do you want to reread the motion into the record?

MR. CLARK: With pleasure. **Move that the draft addendum initiated today also consider establishing a season start date of June 8 for the Delaware Bay region.**

CHAIR DAVIS: Again, I'll turn to the Board to see if there are any objections to this motion. Not seeing any abstentions for the record. I'm seeing **abstention from Florida, South Carolina and Georgia. This motion passes by consent with 3 abstentions as noted.** Okay, so we still need a motion to approve the FMP Review and Compliance Reports. Mike Luisi.

MR. LUISI: I would be happy to make that for you, Mr. Chairman, since it is on the board. **Move to approve the Horseshoe Crab FMP Review for the 2023 fishing year, state compliance reports, and *de minimis* status for South Carolina, Georgia, and Florida.**

CHAIR DAVIS: Thanks, Mike, and I see a second from Pat Geer. Any discussion on this motion? Okay, not seeing any hands, any objections to this motion? Any abstentions for the record? None, so this **motion passes by unanimous consent.**

ELECT VICE-CHAIR

CHAIR DAVIS: Okay, so I think we are on to our final item on the agenda, which is to elect a Vice-Chair for this Board. I see Eric Reid's hand up.

MR. REID: I have a point of order, Mr. Chairman. Mr. Cimino had a motion to make sure that you stayed for three years in your position. I didn't get the disposition of that particular motion, which I would be happy to second at this point.

CHAIR DAVIS: I'm going to use my prerogative as Board Chair and not entertain that motion at this time. We are looking for a Vice-Chair for this Board. As Joe was alluding to, I will be stepping down as the Chair of this Board after this meeting, so this is an exciting opportunity for rapid advancement here, folks. I'll look to see if somebody has a motion and wants to nominate somebody as the Vice-Chair of this Board. Dan McKiernan.

MR. McKIERNAN: **I would like to nominate Eric Reid as the next Chairman of this Board.**

CHAIR DAVIS: Very good, do I have a second for that motion? Mike Luisi. Any discussion on the motion whatsoever? Okay, not seeing any hands, any objections? All right, seeing none; congratulations, Eric, and thank you.

MR. REID: I was going to have to run my own personal success model, because I think it might have to change from what it was when I got up this morning. But thank you.

ADJOURNMENT

CHAIR DAVIS: That brings us to the end of our agenda. I'll ask if there is any other business to come before this Board? All right, not seeing any hands, I'll entertain a motion to adjourn. So moved by a bunch of folks, this Board stands adjourned. Thank you.

(Whereupon the meeting adjourned at 4:44 p.m. on October 21, 2024)

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The Board will review the minutes during its next meeting.

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Atlantic States Marine Fisheries Commission

**DRAFT ADDENDUM IX TO THE HORSESHOE CRAB FISHERY
MANAGEMENT PLAN**

Multi-Year Specifications for Male-only Harvest in the Delaware Bay Region



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

January 2025



Sustainable and Cooperative Management of Atlantic Coastal Fisheries

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1.0 Introduction

The Atlantic States Marine Fisheries Commission's (ASMFC) Horseshoe Crab Management Board (Board) approved the Interstate Fishery Management Plan for Horseshoe Crabs (FMP) in October 1998. The goal of the FMP includes management of horseshoe crab populations for continued use by current and future generations of the fishing and non-fishing public, including the biomedical industry, scientific and educational researchers, migratory shorebirds, and other dependent fish and wildlife, including federally listed sea turtles. ASMFC maintains primary management authority for horseshoe crabs in state and federal waters. The management unit for horseshoe crabs extends from Maine through the east coast of Florida.

Additions and changes to the FMP have been adopted by the Board through eight addenda. The Board approved Addendum I (2000), establishing a coastwide, state-by-state annual quota system to reduce horseshoe crab landings. Addendum I also included a recommendation to the federal government to create the Carl N. Shuster Jr. Horseshoe Crab Reserve. The Board approved Addendum II (2001), establishing criteria for voluntary quota transfers between states. Addenda III (2004) and IV (2006) required additional restrictions on the bait harvest of horseshoe crabs of Delaware Bay-origin and expanded the biomedical monitoring requirements. Addenda V (2008) and VI (2010) extended the restrictions within Addendum IV. The provisions of Addendum VI were set to expire after April 30, 2013. Addendum VII (2012) replaced the Addendum VI requirements by establishing a management program for the Delaware Bay Region (i.e., coastal and bay waters of New Jersey and Delaware, and coastal waters only of Maryland and Virginia), the Adaptive Resource Management (ARM) Framework. Addendum VIII (2022) implemented the 2021 Revision to the ARM Framework.

Draft Addendum IX considers adding an additional specifications tool for the Delaware Bay region that would allow the Board to set specifications for male-only harvest for multiple years. It also considers reestablishing seasonal harvest restrictions for the Delaware Bay region bait fishery.

2.0 Overview

2.1 Statement of the Problem

The Board initiated Draft Addendum IX in October 2024 to consider allowing for multi-year specifications for male-only harvest in the Delaware Bay Region states of New Jersey, Delaware, Maryland, and Virginia. Since 2013, the first year the ARM Framework was used to set specifications for harvest of Delaware-bay origin horseshoe crabs, the Board has maintained zero female harvest. When the 2021 ARM Framework Revision was adopted for management use in 2022 through Addendum VIII (ASMFC 2024), the possibility of female harvest elicited widespread public concern. Acknowledging these concerns, the Board has continued to establish zero female harvest annually despite the ARM Framework output including a limited amount of female harvest since 2022.

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In July 2024, the Commission held a stakeholder workshop including representatives from environmental NGOs, fishing industry, biomedical industry, bird and horseshoe crab scientists, and resource managers to generate recommendations for Board consideration regarding horseshoe crab management in the Delaware Bay region. A key consensus recommendation developed at the workshop was to continue running the ARM Framework but pause female horseshoe crab harvest while several additional recommendations are considered and implemented. Multi-year specifications for male-only harvest in the Delaware Bay Region states would alleviate concerns about female harvest while the Board considers possible changes to the Delaware Bay management program.

Additionally, state staff recently identified that seasonal harvest restrictions established for the Delaware Bay states under Addenda IV-VI were not included in Addendum VII. Based on review of Board discussions during the development of Addendum VII, it appears the omission of the seasonal provisions, which prohibited the directed harvest of horseshoe crabs of Delaware Bay-origin from January 1 through June 7, was an oversight. Therefore, this Addendum also considers whether to reestablish the provisions of Addendum IV-VI that would restrict directed harvest during the beginning of the year and the spawning season.

2.2 Background

In response to public concern regarding the horseshoe crab population and its ecological role in the Delaware Bay, the Board adopted a multi-species approach to managing the commercial horseshoe crab bait fishery in the region. Addendum VII was approved in February 2012, implementing the Adaptive Resource Management (ARM) Framework for use during the 2013 fishing season and beyond. The Framework considers the abundance levels of horseshoe crabs and shorebirds (specifically, the rufa red knot) in determining the appropriate harvest level for the Delaware Bay states of New Jersey, Delaware, Maryland, and Virginia (east of the COLREGS). Since 2013, the Board has annually reviewed recommended harvest levels from the ARM Subcommittee, who run the ARM model, and specified harvest levels for the following year in New Jersey, Delaware, Maryland, and Virginia.

In 2021, a revision to the ARM Framework was completed and peer reviewed. 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. Addendum VIII was approved in 2022 to allow the use of the 2021 Revision of the ARM Framework (ASMFC 2021) in setting annual bait harvest specifications for horseshoe crabs of Delaware Bay-origin.

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 because 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 since ARM implementation. In response to the widespread concern, the Board chose to implement zero female horseshoe crab harvest for the 2023 season, despite the ARM model output including limited female harvest. Given the

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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 confirmed that the various stakeholder groups hold divergent values and perspectives related to horseshoe crab management. 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 discuss management objectives for the Delaware Bay region horseshoe crab fishery¹.

The main purpose of the workshop was to increase understanding of various stakeholder perspectives and identify essential concerns and areas of common ground for horseshoe crab management. An important finding from the workshop was that participants from all stakeholder groups affirmed a preference for adaptive management over other approaches. However, it is clear there is a need to engage stakeholders in a process to evaluate and reconsider aspects of the ARM Framework to better address stakeholder concerns and values. Following the workshop recommendations, the Board agreed to move forward with considering potential changes to the ARM Framework with stakeholder input.

The workshop discussions also emphasized the need for an interim management approach while the Board gathers information from stakeholders and considers modifying the ARM Framework. Although the workshop participants all agreed the ARM should continue to be used while additional recommendations are addressed, they expressed a desire for more certainty around future harvest levels. Specifically, the participants agreed it would be preferable to set the female harvest quota to zero for the time needed to address other recommendations. The management program does not currently allow for horseshoe crab bait harvest specifications to be set for multiple years. Draft Addendum IX aims to address the workshop recommendations by allowing for male-only harvest of Delaware Bay-origin horseshoe crabs to be established for multiple years based on the ARM Framework.

3.0 Management Options

Draft Addendum IX considers two management issues:

1. Multi-year harvest specifications for male-only harvest
2. Harvest season restrictions

¹ The final report on the July 2024 Horseshoe Crab Management Objectives Workshop can be found here: https://asmfc.org/uploads/file/6736403aHSCMgmtObjectivesWorkshopReport_Oct2024.pdf

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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.

3.1 Issue 1: Multi-year Specifications

The Board is seeking public input on whether to allow multi-year specification setting for male-only harvest of Delaware Bay-origin horseshoe crabs. Status quo would not allow multi-year specification setting, while Option B would allow for specifications to be set for multiple years.

If Option B is selected, the Board would also have to select either sub option B1 or B2 to establish whether the maximum allowable male-only harvest would be managed based on the male:female sex ratio of horseshoe crabs on spawning beaches. This method would allow the Board to control male-only harvest based on annual fishery-independent surveys, without requiring the ARM Framework to be used.

Option A: Status Quo

This option would maintain the current management program established under Addendum VIII. The Board would continue to annually consider the output of the ARM Framework and set bait harvest specifications for the next year, as detailed in Section 3.0 of Addendum VIII.

Option B: Allow multi-year specifications for male-only bait harvest horseshoe crabs of Delaware Bay-origin for a maximum of 3 years at a time

This option would allow the Board to set harvest specifications based on the ARM Framework for male-only bait harvest of horseshoe crabs for the Delaware Bay states (New Jersey, Delaware, Maryland and Virginia) for multiple years at a time. Under this option the Board could choose to set specifications for up to three years. Multi-year specifications would only be allowed for male-only harvest; if any female harvest were included then specifications could only be established for a single year.

The process for setting specifications would remain similar to the current process established under Addendum VIII. Specifically, the Board would review the output of the ARM Framework in the fall of a given year and set harvest limits for the following year, or years. For example, in 2025, the Board would review the ARM Framework output recommendation for 2026 harvest. The Board would then consider whether to adopt the ARM Framework output for males and females for the following fishing year or set different harvest limits, such as adopting zero female harvest instead of the ARM-recommended female harvest limit. If the Board does not choose to allow any female harvest, then it could opt to set specifications for male-only harvest for either the 2026 fishing year only, the 2026 and 2027 fishing years, or the 2026-2028 fishing years based on the ARM Framework recommendation in the fall of 2025.

If multi-year specifications are adopted, the process would differ in interim years. For example, if the Board sets specifications for three years, then in years one and two no Board action

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would be required to establish specifications for years two and three. In the interim years, the Board would review updated data from the Delaware Bay horseshoe crab and shorebird surveys (i.e., the Virginia Tech Trawl Survey, horseshoe crab spawning surveys, red knot aerial and ground surveys). The full ARM process would not occur in interim years, meaning the Board would not review a new horseshoe crab population estimate nor an ARM Framework recommendation in interim years. If there were concern that the established specifications would be likely to negatively affect the population of horseshoe crabs and/or red knots, then the Board could take voluntary action to change the harvest limits for the following year.

If selected, the provisions of this option would be in place through 2031, and a new addendum would be required to set multi-year specifications after 2031. However, the Board may choose to replace Addendum IX with another addendum or amendment to the FMP prior to 2031. If Addendum IX expires and the Board does not take management action to follow Addendum IX, then harvest specifications setting would revert to the process established in Addendum VIII and specifications would be set annually based on the ARM Framework.

The flowchart in Figure 1 outlines the process for setting harvest specifications if this option is adopted.

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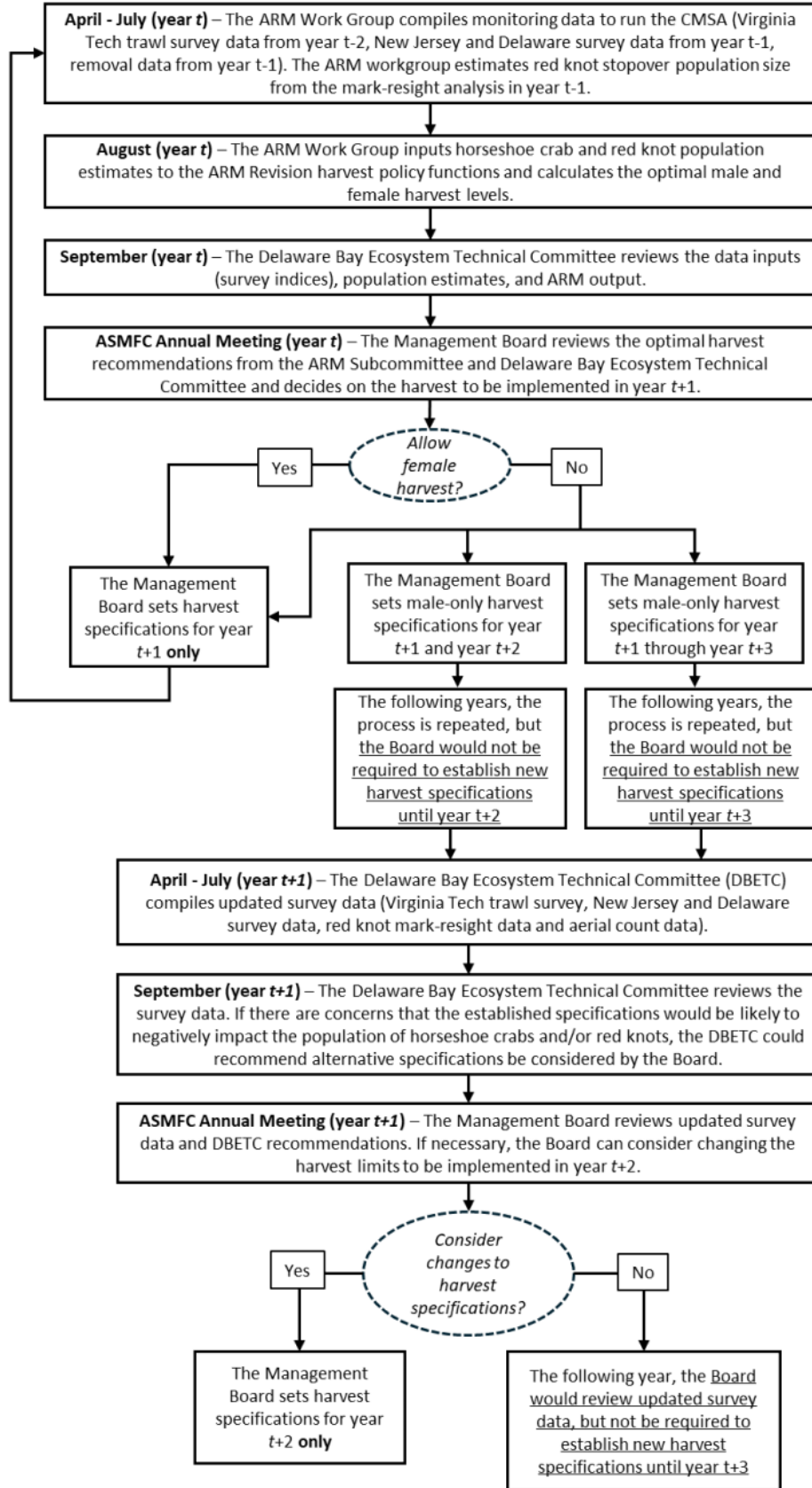


Figure 1. Proposed multi-year specifications setting process.

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Sub-option B1: No requirement to reduce male harvest limit based on spawning sex ratio

Under Sub-option B1, the Management Board would not be required to reduce male harvest based on the sex ratio of horseshoe crabs on the spawning beaches observed in the annual Delaware Bay spawning survey.

Sub-option B2: In interim years, male horseshoe crab harvest must be reduced if spawning beach survey results indicate a male:female sex ratio below 3:1.

If this option is selected, in interim years of multi-year specifications (i.e., years when the ARM Framework is not run) the Board would adjust male-only harvest specifications based on the male:female sex ratio of spawning horseshoe crabs on beaches observed in the bay-wide spawning survey. A target sex ratio would be set at 3:1 and a threshold sex ratio set at 2:1. If the sex ratio is above 3:1, the maximum harvest of 500,000 Delaware Bay origin males would be permitted. Between the target and threshold, the maximum allowable male harvest would be reduced as the ratio decreases and would be zero if the sex ratio were to decrease to 2:1 or less (Figure 2). Maximum male harvest levels based on the spawner sex ratio are defined in Table 1.

There is no direct link between male horseshoe crab abundance and red knot population dynamics. The only way male abundance could limit red knot population growth would be if the operational male:female sex ratio on the spawning beaches dropped to a point at which not all eggs were fertilized. Although satellite males can fertilize as many eggs as attached males (Brockman et al. 2000), 96 – 100% of eggs are fertilized whether or not satellite males are present (Brockman 1990). Some males are not capable of amplexus because of their condition (Brockman and Smith 2009) and females will tend not to nest unless they are in amplexus with a male. Therefore, an operational sex ratio skewed toward males is needed to ensure fertilization of eggs. If the operational sex ratio should drop below 2:1, there is a chance of incomplete fertilization of the eggs deposited by females and future recruitment of horseshoe crabs could decline. As long as the sex ratio on the spawning beaches remains greater than 2:1, there is no biological mechanism for male abundance to limit red knot population growth. Given this effect of male crabs on the population dynamics of both species, a simple harvest control rule could be used to manage male-only harvest as a function of the spawning beach sex ratio.

Sex ratio data is collected and reported annually through the bay-wide horseshoe crab spawning survey. The average sex ratio on the spawning beaches was 4.2 from 1999 – 2019 (Figure 3). The lowest sex ratio over that period was 3.1 males to 1 female, and it has generally showed an increasing trend through time despite male-only harvest since 2013.

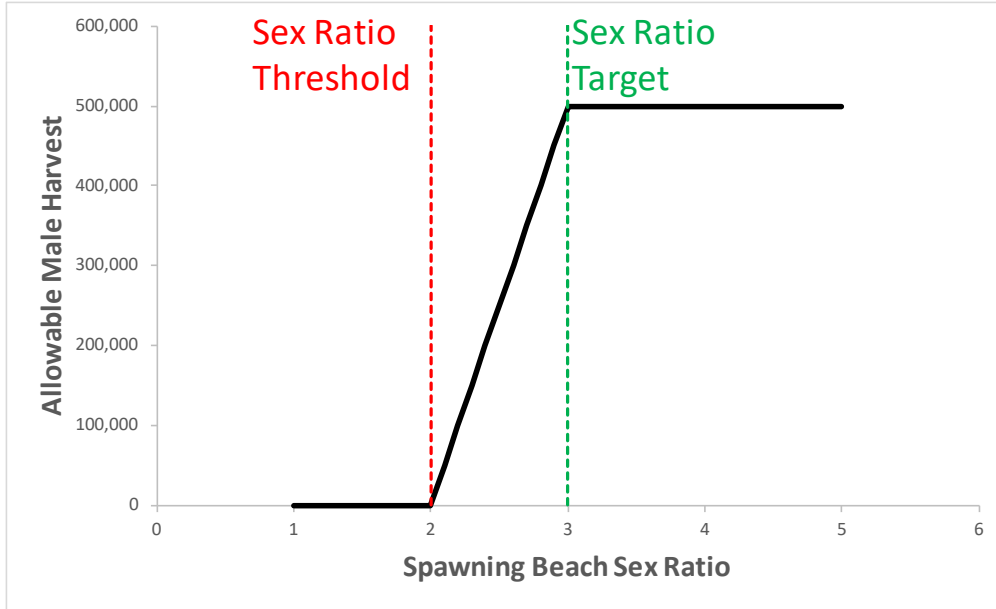


Figure 2. Harvest level of male horseshoe crabs as a function of the sex ratio (M:F) on the spawning beaches, as proposed under sub-option B2. When the sex ratio is >3:1, the maximum allowable harvest of males is 500,000 Delaware Bay-origin crabs. As the sex ratio decreases below 3:1, the maximum allowable male harvest would decrease. If the sex ratio declines to 2:1 or less, no male harvest would be permitted.

Table 1. Maximum harvest level of male horseshoe crabs based on the sex ratio (M:F) on the Delaware Bay spawning beaches, as proposed under Sub-option B2.

Observed Male:Female Sex Ratio	Maximum Allowable Male Harvest
≤2.0:1	0
2.1:1	50,000
2.2:1	100,000
2.3:1	150,000
2.4:1	200,000
2.5:1	250,000
2.6:1	300,000
2.7:1	350,000
2.8:1	400,000
2.9:1	450,000
≥3.0:1	500,000

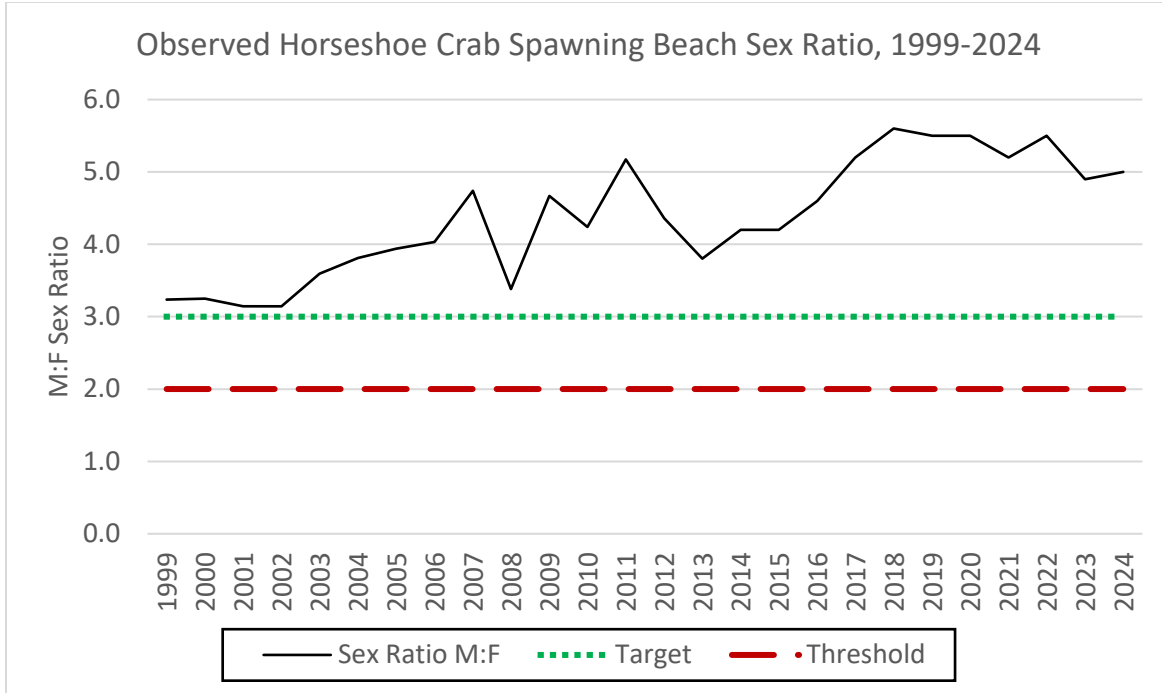


Figure 3. Average annual spawning sex ratio observed during Delaware Bay horseshoe crab spawning beach survey.

3.2 Issue 2: Seasonal Harvest Restrictions

The Board is seeking public input on whether to reestablish seasonal harvest restrictions for directed harvest of Delaware Bay-origin horseshoe crabs. Addenda IV-VI included provisions to restrict horseshoe crab harvest in the Delaware Bay states during the beginning of the year and the spawning season. Specifically, the provision prohibited directed harvest from January 1 through June 7, inclusive, for New Jersey, Delaware, and Maryland, and prohibited the landing of horseshoe crabs in Virginia from federal waters from January 1 through June 7. These seasonal provisions expired after April 30, 2013, and were not included in Addendum VII. However, based on Board discussions during the development of Addendum VII it appears there was intent to include the same seasonal harvest provisions in Addendum VII, but they were inadvertently omitted. Currently, the harvest season for the directed bait fishery in the Delaware Bay region is as established in Addendum III, which states, “New Jersey, Delaware and Maryland shall prohibit the harvest and landing of horseshoe crabs for bait from May 1 through June 7, inclusive” (ASMFC 2004).

Status quo would not change the current requirements, while Option B would prohibit directed harvest in of Delaware Bay-origin horseshoe crabs from January 1 through June 7, as was specified in Addenda IV-VI.

Option A: Status Quo

Under this option, there would be no change to the current regulations regarding seasonal restrictions. Therefore, if adopted this option would maintain a closed season for bait harvest

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of horseshoe crabs in and around Delaware Bay during peak horseshoe crab spawning. New Jersey, Delaware and Maryland would be required to prohibit the harvest and landing of horseshoe crabs for bait from May 1 through June 7, inclusive. This includes all landings for bait, whether directed or as bycatch.

Option B: Reestablish seasonal harvest restrictions of Addendum IV-VI

If adopted, this option would prohibit directed harvest and landing of all horseshoe crabs in New Jersey, Delaware, and Maryland from January 1 through June 7. It would also prohibit the landing of horseshoe crabs in Virginia from federal waters from January 1 through June 7.

4.0 Compliance

TBD

5.0 Literature Cited

- ASMFC. 2004. Addendum III to the Fishery Management Plan for Horseshoe Crab. Fishery Management Report of the Atlantic States Marine Fisheries Commission. Arlington, VA. 14 pp.
- ASMFC. 2019. 2019 Horseshoe Crab Benchmark Stock Assessment. Arlington, VA. 271 pp.
- ASMFC. 2021. 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. 2022. Addendum VIII to the Fishery Management Plan for Horseshoe Crab. Fishery Management Report of the Atlantic States Marine Fisheries Commission. Arlington, VA. 12 pp.
- Brockmann HJ (1990) Mating behavior of horseshoe crabs, *Limulus polyphemus*. Behaviour 114:206–220.
- Brockman, H.J., C. Nguyen, and W. Potts. 2000. Paternity in horseshoe crabs when spawning in multiple male groups. Animal Behavior 60:837-849.
- Brockman, H.J. and M.D. Smith. 2009. Reproductive competition and sexual selection. In: Tanacredi, J.T, M.D. Smith (eds.) Biology and Conservation of Horseshoe Crabs. Springer, New York, pp. 199- 221.

Horseshoe Crab Advisory Panel

Bolded names await Board approval

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Appt Confirmed 8/3/22

Participation: Active; 100% attendance

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Appt. Reconfirmed 8/18

Participation: Active; 100% attendance

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Appt Reconfirmed 5/10

Participation: Inactive; 43% attendance rate since 2016; absent the last two meetings, with 2019 being the last meeting attended

Vacancy – commercial pot

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Sam Martin (comm. mobile tending gear/bomedical harvest)
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Appt. Confirmed 2/4/98

Appt. Reconfirmed 10/02; 10/06; 5/10
Participation: Inactive; 14% attendance rate since 2016; last meeting attended was in 2016

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past chair
Participation: Active; 100% attendance

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Appt. Confirmed: 2/9/00
Appt. Reconfirmed 1/2/06; 5/10
Participation: Inactive; 29% attendance rate since 2016; last meeting attended was in 2017

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1 vacancy - comm/pot/conch

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Appt. Confirmed 5/1/19

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Appt. Confirmed 8/2018
Participation: 50% attendance rate since appointment; did not attend 2024 meeting