Atlantic States Marine Fisheries Commission

Horseshoe Crab Management Board

May 8, 2025
8:30 - 10:15 a.m.

Draft Agenda

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

1.	Welcome/Call to Order *(E. Reid)*	8:30 a.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from February 2025	8:30 a.m.
3.	Public Comment	8:35 a.m.
4.	Consider Addendum IX on Multi-year Specifications for Male-Only Harvest of Delaware Bay-origin Horseshoe Crabs for Final Approval **Final Action** • Review Options and Public Comment Summary *(C. Starks)* • Advisory Panel Report *(B. Hoffmeister)* • Consider Addendum IX for Final Approval	8:45 a.m.
5.	Adaptive Resource Management Subcommittee Report *(J. Sweka)* • Recommendations Regarding Possible Changes to Reward/Utility Functions	9:30 a.m.
6.	Review and Populate Advisory Panel Membership *(T. Berger)* **Action**	9:55 a.m.
7.	Other Business/Adjourn	10:15 a.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.

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

MEETING OVERVIEW

Horseshoe Crab Management Board
May 8, 2025
8:30 - 10:15 a.m.

Chair: Eric Reid (RI) Assumed Chairmanship: 2/25	Technical Committee Chair: Ethan Simpson (VA)	Law Enforcement Committee Rep: Nick Couch (DE)
Vice Chair: Carrie Kennedy (MD)	Advisory Panel Chair: Brett Hoffmeister (MA)	Previous Board Meeting: February 4, 2025
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 February 2025

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 Addendum IX on Multi-year Specifications for Male Only Harvest of Delaware Bay-origin Horseshoe Crabs for Final Approval (8:45-9:30 a.m.) Final Action

Background

- The Board initiated Draft Addendum IX in November 2025, which considers adding an additional specifications tool that would allow for male-only harvest for multiple years. 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. **(Briefing Materials)**.
- Draft Addendum IX responds to a recommendation from the stakeholder workshop on horseshoe crab management in the Delaware Bay region held in July 2024. The workshop convened a group of stakeholders representing environmental NGO, fishing, biomedical, bird and horseshoe crab scientists, and management perspectives to discuss the Adaptive Resource Management (ARM) Framework and management objectives for the Delaware Bay region bait fishery. 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.
- Public hearings were held in March and written public comments were compiled **(Briefing Materials).**

- The Advisory Panel met on April 10, 2025, to review Draft Addendum IX and public comments submitted and provide input to inform the Management Board's decisions on the management action **(Briefing Materials)**.

Presentations

- Overview of Draft Addendum IX and Public Comment Summary by C. Starks
- Advisory Panel Report by B. Hoffmeister

Board actions for consideration at this meeting

- Final approval of Addendum IX

5. Adaptive Resource Management Subcommittee Report (9:30-9:55 a.m.)

Background

- In July 2024, the Commission held a stakeholder workshop on horseshoe crab management in the Delaware Bay region. One of the key recommendations produced was, "using current ASMFC processes, refine the ARM reward and utility functions with stakeholder input."
- The Board tasked the ARM Subcommittee (Subcommittee) with reviewing the reward and utility functions of the ARM Framework and discussing what input from stakeholder groups would be needed to provide direction on changes.
- The ARM The ARM Subcommittee met three times in early 2025 to address this task and develop recommendations for next steps to address the workshop recommendation **(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

- ARM Subcommittee Report by J. Sweka

6. Review and Populate Advisory Panel Membership (9:55-10:15 a.m.)

Background

- One of the consensus recommendations from July 2024 stakeholder 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**.**
- Staff requested the states review their AP membership and provide additional nominations as needed **(Briefing Materials).**

Presentations

- AP Nominations by T. Berger

Board actions for consideration at this meeting

- Consider AP nominations and potential changes to AP composition

8. Other Business/Adjourn (10:15 a.m.)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

HORSESHOE CRAB MANAGEMENT BOARD

The Westin Crystal City
Arlington, Virgina
Hybrid Meeting

February 4, 2025

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

TABLE OF CONTENTS

INDEX OF MOTIONS

1. **Move to approve Agenda** by consent (Page 1).

2. **Move to approve Proceedings of October 21, 2024** by consent (Page 1).

3. **Motion to add a new issue to Draft Addendum IX regarding the harvest caps for Maryland and Virginia established by Addendum VIII. The issue would include the following set of proposed options: Option A: Status quo. There would be no change to the current harvest caps for Maryland and Virginia. Option B: The harvest caps for Maryland and Virginia would not apply whenever male-only harvest specifications are implemented. The caps would only apply when harvest specifications include female harvest** (Page 6). Motion by Carrie Kennedy; second by Pat Geer. Motion passes by unanimous consent (Page 7).

4. **Move to approve Draft Addendum IX for public comment, as modified today** (Page 7). Motion by John Clark; second by Malcolm Rhodes. Motion passes by unanimous consent (Page 7).

5. **Move to elect Carrie Kennedy as Vice-Chair** (Page 8). Motion by Pat Geer; second by John Clark. Motion passes (Page 9).

6. **Motion to adjourn** by consent (Page 9).

ATTENDANCE

Board Members

Dan McKiernan, MA (AA)
Raymond Kane, MA (GA)
Rep. Jennifer Armini, MA (LA)
Nicole Lengyel Costa, RI, proxy for J. McNamee (AA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
David Borden, RI (GA)
Matthew Gates, CT, proxy for J. Davis (AA)
Bill Hyatt, CT (GA)
Craig Miner, CT, proxy for Rep. Gresko (LA)
Jesse Hornstein, NY, proxy for M. Gary (AA)
Joe Cimino, NJ (AA)
Jeff Kaelin, NJ (GA)
Adam Nowalsky, NY, proxy for Sen. Gopal (LA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Carrie Kennedy, MD, proxy for L. Fegley (AA)
Pat Geer, VA, proxy for J. Green (AA)
James Minor, VA (GA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Ben Dyar, SC, proxy for B. Keppler (AA)
Malcolm Rhodes, SC (GA)
Mel Bell, SC, proxy for Sen. Cromer (LA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Marina Owens FL, proxy for J. McCawley (AA)
Gary Jennings, FL (GA)
Ron Owens, PRFC
Chris Wright, NMFS

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

Ex-Officio Members

Staff

Bob Beal
Toni Kerns
Tina Berger
Caitlin Stark
Madeline Musante
Katie Drew
Jeff Kipp

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

The Horseshoe Crab Management Board of the Atlantic States Marine Fisheries Commission convened in the Jefferson Ballroom of the Westin Crystal City Hotel, Arlington, Virginia, via hybrid meeting, in-person and webinar; Tuesday, February 4, 2025, and was called to order at 12:30 p.m. by Chair Eric Reid.

CALL TO ORDER

CHAIR ERIC REID: Good afternoon, everyone. I would like to call the meeting of the Horseshoe Crab Management Board to order. My name is Eric Reid; I am from Rhode Island, and this is my first opportunity to chair anything in this new body. I apologize in advance of Robert's Rules of Order turned to Reid's Rules of Order, sorry about that.

APPROVAL OF AGENDA

CHAIR REID: With that, first approval of the agenda. Any opposition to approving the agenda?

APPROVAL OF PROCEEDINGS

CHAIR REID: Seeing none; the proceedings from October '24, any modifications to those proceedings? Seeing none; those are approved as well.

PUBLIC COMMENT

CHAIR REID: Okay, we're going to move on to Public Comment for items that are not on this agenda. We had no correspondence prior to this meeting, so I will turn to the audience. Is there any public comment? Yes, Ma'am. Items that are not on the agenda, please. I'm more than happy for you to make those comments later on, but not now. When we start the discussion about the draft for public comment, I will give the public an opportunity to speak, but not now.

It will be during the discussion. Okay, thank you. I'll be sure to call on you, but not now. Anyone else? Okay, seeing none; let's get to our first piece of business today, which is Consideration of Approval of Draft Addendum IX, and I will turn it over to Ms. Starks for the presentation.

CONSIDER APPROVAL OF DRAFT ADDENDUM IX ON MULTI-YEAR SPECIFICATIONS FOR MALE ONLY HARVEST OF DELAWARE BAY-ORIGIN HORSESHOE CRABS FOR PUBLIC COMMENT

MS. CAITLIN STARKS: I will be giving an overview of Draft Addendum IX, which is again focusing on multiyear specifications for male-only harvest in the Delaware Bay Region. In my presentation I'll give an overview of the Draft Addendum document, including the background on this Addendum, the statement of the problem, a proposed timeline, and the draft management options and then the next steps in Board action for consideration today.

There have been a few major things leading up to this Addendum. First, the ARM Framework Revision was adopted in 2022 through Addendum VIII, and that implemented changes to the ARM that were made through the 2021 revision. That was also the first year that the ARM Framework recommended a limited amount of female horseshoe crab harvest. While the Board was considering Addendum VIII, it did receive a lot of public comments expressing concern over that possibility of female harvest. That led the Commission to then hold a workshop in July of last year, with the goal of bringing together the different stakeholder groups in the Delaware Bay Region that have an interest in horseshoe crab, and generate recommendations about the management objectives for the region in the horseshoe crab bait fishery.

At that workshop, one of the key consensus recommendations was that the Board should pause female harvest while additional management changes regarding our framework could be considered. Draft Addendum IX responds to the workshop recommendations by offering an interim solution that would allow the Board to set multiyear specifications for male-only harvest.

This is in line with another recommendation from the workshop, which was that we should still use the ARM, but it removed the burden of making an annual management decision about whether or not to allow female harvest. It also reduces the workload of the ARM Subcommittee, and it opens

up more time for them to consider those other changes to the management framework to better align with stakeholder values.

This is our current timeline for Draft Addendum IX. The Board initiated this Addendum in October, and since then the PDT has met a number of times and developed the Draft Addendum document, and today the Board will consider approving that Draft Addendum document for public comment. If it is approved today, the public comment and public hearings could occur in February and/or March, and the Board can meet again in May to consider final approval of the Addendum.

Getting into the meat of the Draft Addendum, there are two issues that are addressed. The first is the issue of multiyear specifications for male-only harvest, and the second issue is really just a seasonal harvest restriction for the Delaware Bay Region. Under Issue 1, we have two main options. Option A is our status quo option, and Option B is to allow multiyear specifications for male-only harvest for up to three years at a time.

With Option B there would also be two sub-options related to the use of the annual spawning sex ratios to manage male-only harvest. The first of those sub-options would not incorporate the use of that spawning sex ratio, and the second would incorporate it as a factor in determining the no-harvest limits.

Our status quo option, Option A, would mean no change to the process that we currently use to set specifications for the Delaware Bay Region states, and Addendum VIII establishes the process, which is that the ARM Framework annually provides a harvest recommendation to the Board in the Fall, and the Board considers that in setting harvest limits for the following fishing year.

Then under Option B, this would add a new specifications tool to the toolbox that would allow the Board to set multiple years of specifications for male only harvest for the Delaware Bay Region. The Board would be able to set specifications for up to three years at a time, based on an ARM Framework recommendation for the initial year. Then in the interim years the Board would not have to use the ARM and no action would have to be taken to keep the same specifications in place for the next year. As this option is written, the provision would sunset after 2031, meaning that unless the Board initiates a new Addendum to allow it, multiyear specifications would no longer be allowed after 2031. This flowchart is to help illustrate the process that we would be using under the proposed Option B. The first three boxes here reflect our typical annual process under Addendum VIII.

We start with the ARM Subcommittee compiling all of the necessary data for the Horseshoe Crab and Red Knot Abundance Estimates, and then running the ARM Framework for a harvest recommendation, which then gets reviewed by the Delaware Bay Ecosystem TC, and recommendation is provided to the Board for harvest specifications at the annual meeting.

Then at that point the Board considers that ARM output, and decides what harvest limits will be for the following year. They have the option to go with the ARM output, which would likely include a limited amount of female harvest, or to set male-only specification. If the Board chooses to implement no female harvest, then the Board can choose if it wants to set specifications for one year only or for the next two years or three years.

For this example, let's just say the Board chooses to set multiyear specs for three years at 500,00 males. What that would mean is that in the interim years the Board would not need to take action to establish specifications again until Year 3 of that specification. In those interim years the ARM Committee would not run the ARM to provide a harvest recommendation to the Board, and instead the Delaware Bay Ecosystem TC and the Board would only review the annual survey data for horseshoe crab and red knot.

I just want to note that in an interim year, when the ARM is not run, the TC could always recommend change to the specifications, if they felt it was warranted based on the survey data. But there is

no need to change. If there is no need to change the specifications then no action is required for that year, and the same male-only specs would stay in place.

Then once the last year of those specifications is reached, the ARM would need to provide a new harvest recommendation for subsequent fishing years. As I mentioned with Option B we have two sub-options, and Option B1 is no additional changes to the process I just described, and then Option B2 would establish a management rule for male-only harvest to be reduced if the spawning sex ratio falls below three males to one female.

The sex ratio that would be used is the observed ratio during the annual spawning beach surveys int eh Delaware Bay Region, and these surveys are already an annual requirement, and the data are reviewed by the Delaware Bay Ecosystem TC every year, so no additional work would be needed to acquire that data.

The table on the right here is showing the proposed maximum allowable harvest for males under different ratios. You can see that if the ratio is greater than or equal to three-to-one, then the maximum male harvest would remain at 500,000 males and then as the ratio decreases down to two-to-one, there is a proportional decrease to the maximum allowable male harvest, and below to a two-to-one ratio the male harvest maximum is zero, so male harvest would be allowed.

The goal of this option is to have some protection in place, even under a male only harvest scenario, and in years when the ARM is not being run. The rationale behind the three-to-one ratio threshold is that male horseshoe crab is not a limiting factor to horseshoe crab reproduction in the population, unless there are fewer than two males per female.

The three-to-one ratio is actually more conservative than that, but the spawning sex ratio has never dropped below three-to-one for as long as we've been recording it. In the past five years or so it's been around five-to-one. The PDT felt that three-to-one would be an appropriate level at which to begin reducing male harvest if the spawning sex ratio was showing signs of decline.

The second issue in the Addendum pertains to the seasonal harvest closure in the Delaware Bay Region. The first option under this issue would maintain our current closure, which is what was in Addendum III. The second option would reestablish the harvest closure, which is what was in place under Addenda IV and V.

I think it's easiest to understand these two options by explaining the context, so this is our background on the situation, and our current situation. Addendum III was approved in 2004, and it created a peak spawning season closure for New Jersey, Delaware and Maryland from May 1st through June 7th.

Then in 2006, Addendum IV changed that closure so that it would apply to directed harvest, and it would extend from January 1st through June 7th for New Jersey, Delaware and Maryland, and it also prohibited landings of horseshoe crab from federal waters in Virginia during that period. Addendum V and VI maintains these seasonal closure provisions until the sunset date that was in that Addendum VI of April 30, 2013.

Then Addendum VII was adopted in 2012, but the season closure provisions weren't included in Addendum VII, and consequentially they were not included in Addendum VIII. Because Addendum V I expired, the FMP requirement reverted to the Addendum III closure period. That is all harvest and landings prohibited from May 1st through June 7, inclusive, and that is where we are now.

Because staff believe that the intention was for the January through June closure to remain in place for the Delaware Bay, based on looking back at old Board minutes, these options included in the Draft Addendum are attempting to address it. Option A again, would maintain the current closure, which is from Addendum III, and that is that New Jersey, Delaware, and Maryland shall prohibit the harvest and landing of horseshoe crabs for bait from May 1 through June 7, inclusive.

Option B would reestablish the closure in Addenda IV through VI, and that would prohibit the directed harvest and landing of all horseshoe crabs in New Jersey, Delaware, and Maryland from January 1 through June 7, and would also prohibit the landing of horseshoe crabs in Virginia from Federal Waters from January 1 through June 7.

This is what staff believes is in line with the Board's intent at the time Addendum VII was approved. That is all of the options in the Draft Addendum, and our next step today would be for the Board to consider adopting Addendum IX for public comment, and if it is approved today then we could hold public hearings again late February, early March, and the Board could consider final approval of the Addendum in May. With that, these are the two things the Board could consider today, and that is to specify any changes to the document before releasing it for comment, and then consider approval of the Addendum for public comment. I can take any questions.

CHAIR REID: Okay, before we get into comments and talking about the Addendum, let's see if there are any questions at this point. Any questions? Yes, Ma'am, Ms. Lengyel.

MS. NICOLE LENGYEL COSTA: Thank you, Caitlin, for that presentation. My question is on Section 3.2, Issue 2, the seasonal harvest restrictions, and the consistency of language used. Right now, in describing the current seasonal harvest restriction, it is specific to bait, and under Option A it is also specific to bait. But Option C it's all directed harvest of all horseshoe crabs. Should that also be specific to bait?

MS. STARKS: I believe that it is the intention that it was focused on bait harvest, given that biomedical, for example, is not considered harvest. In this case, I think we would just be looking at harvest or bait, directed harvest or bait.

CHAIR REID: All set? Anybody else with a question? Okay, very good. Let's move on to see if we have any modifications to Draft Addendum IX for public comment. Mr. Clark.

MR. JOHN CLARK: Thank you for the presentation, Caitlin. As you know, I had a couple of minor changes I would like to request be done to the document. The first one is in Paragraph 3 of Option B. It's the last sentence in that paragraph. Okay, it's the one that says, 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.

I would just like to strike that sentence. I mean it does reflect reality, but the way it is worded is so vague and open-ended. I'm just afraid that it would be something that could cause there to be concern raised all the time by certain groups that raise concern all the time anyhow. But make them feel that this is the type of wording in the document itself that would give that more weight than it would have otherwise. That was my reason for wanting that removed from the document.

CHAIR REID: Does anybody have any feelings about Mr. Clark's desire? Seeing none; can we make that happen without, yes, there is no objections at the point so consider it done, Mr. Clark.

MR. CLARK: Then I would just ask, actually this is the text that Caitlin, you wrote this up, which I would like to see added to the end of the option, because just to clarify that the document allows for the three-year specifications. After the first three years the ARM will be run, and at that time, even though it is clear to many people on the Board just so everybody is clear on the fact that after the ARM is run, let's say we do set specs for three years. At the end of the three years in the ARM indicates that female harvest could be allowed, the Board could consider female harvest at that time. Like I said, it will consider whether to allow female harvest or not before setting the specifications for another three years, because the way it's written now, I just didn't want it to look like we would go a full six years without revisiting the option of harvesting females. Caitlin had written up text, I'll just read it so it's on the record.

Following a multiyear specification period, the ARM Framework would be used to provide a new harvest recommendation, and the Board would need to establish new harvest specifications for the following year or years. This would include the option to implement female harvest or male-only harvest.

CHAIR REID: Any opposition to Mr. Clark's request? Seeing none; very good, John. I'm going to go to the public. Ms. Swan, if you want to give us two minutes of your time that would be great, and then we'll come back to the Board. Two minutes, please.

MS. BENJIE L. SWAN: Actually, Mr. Clark made my comments less. I was concerned about the one sentence that said, if there was a concern that the Board could take voluntary action. That was taken out, so that was one of my comments. The other was, if this male-only specification could go on for six years, and he covered that as well.

My other comments have to do with the paragraph on Page 5, and you can follow along if you like, but I just want to confirm that if the multiyear specification package is adopted, that the current surveys and studies will be conducted yearly, and they also will have a review process as well. I wanted to make sure that that would happen.

CHAIR REID: That will happen.

MS. SWAN: Yes, so all the studies will continue, that would be the Virginia Tech, the New Jersey and Delaware Surveys, the Red Knot Mark and Recapture, the Aerial Count. It would be all the surveys that are current. Okay, that is helpful. The other concern I had was that the sentence below.

On Page 5 it talks about there will be no more population estimates. That was never discussed when we talked about this male-only harvest specification. I have a real problem with that, and I think male estimates are so essential, so that I would like something done with that.

CHAIR REID: Ms. Starks.

MS. STARKS: Just to respond to that last part. The development of the population estimate for horseshoe crab involves the use of the Catch Multiple Survey Analysis Model, and that is a big lift for our staff, and so that was one of the pieces where we were hoping to reduce the workload of the ARM Subcommittee, so they can focus on these other tasks at hand.

Like I think, hopefully I'm clear in the document. The surveys that go into that Catch Multiple Survey Analysis Model to come up with an estimate of the population. Those are still going to be completed. We are going to be seeing the trends in the Virginia Tech Trawl Survey, for example, which will give us an indication of trends in abundance. That is one of the main sources of data that go into that population estimate.

MS. SWAN: Will you be taking out that population estimate out of the wording of the sentence then? It's on Page 5, it's the second sentence, meaning the Board would not review a new horseshoe crab population estimate nor an ARM Framework recommendation.

MS. STARKS: That still is correct, because the population estimate is from the CMSA Model, and that is not going to be run on an annual basis.

MS. SWAN: There is going to be no population estimate?

MS. STARKS: Just to clarify, and maybe we chat about these offline afterwards. But the Virginia Tech Trawl Survey produces a swept area abundance estimate, that is an index of abundance not necessarily our population estimate for horseshoe crabs.

MS. SWAN: That is a little bothersome to me, so maybe you can discuss that among yourselves, because even if the Virginia Tech, if it's a catch swept, then it could still be turned into somewhat of a population estimate. I think that that is an important number that we need every year. I think without it that the management of the horseshoe crab suffers.

MR. REID: Ms. Swan, thank you very much for your comments, and we look forward to your comments on the public hearing document.

MS. SWAN: I just have two more quick ones. Under the option of the status quo, I would like you to put that the Board can still opt to choose a more conservative level, that they don't have to go strictly by the harvest recommendations. Then just a second one, that even if we did run the ARM every year that we would still be working on making changes to that ARM Model. Thank you.

MR. REID: Thank you, Ms. Swan, certainly the Board can ask for those changes if they so desire. Anybody else in the public? Anybody online? Seeing none; back to the Board. Any additional modifications? Ms. Kennedy.

MS. CARRIE KENNEDY: Yes, I would like to add a new issue to the Addendum. It is specifically regarding the harvest caps for Maryland and Virginia that were established in Addendum VIII. I can read it into the record, and then give you the justification for it. **I would like to move to add a new issue to Draft Addendum IX regarding the harvest caps for Maryland and Virginia established by Addendum VIII. The issue would include the following set of proposed options: Option A would be Status Quo. There would be no change to the current harvest caps for Maryland and Virginia. Option B would allow the harvest caps for Maryland and Virginia to not apply whenever male-only harvest specifications are implemented. The caps would only apply when harvest specifications include female harvest.**

CHAIR REID: Is there a second to this motion? Mr. Geer, are you seconding the motion? Okay, rationale, Ms. Kennedy.

MS. KENNEDY: Yes. Currently the cap, we have it, it's in Addendum VIII. It is removed by the Board during specification setting when the ARM allows for female harvest, but the Board approves male-only harvest. We believe that this would provide consistency and stability for our fisheries, and we would like to ensure that there are formal guidelines for the adaptive practice.

CHIAR REID: Thank you very much, Mr. Geer, anything additional?

MR. PATRICK GEER: Just that I think it just gives better clarity as well.

CHAIR REID: I just want to address the workload question; in case we have a workload question. Ms. Starks, could you address the workload on this?

MS. STARKS: Yes, Mr. Chair. I don't believe that this would add a significant workload. I think I can add this language almost exactly to the document with those two options, and as long as it is clear to everyone on the Board and the Board supports that, I can easily do that.

CHAIR REID: Okay, thank you, discussion on the motion. Mr. Nowalsky.

MR. ADAM NOWALSKY: While I appreciate the very detailed outlining of the options themselves, the spelling out in paragraph form of the framing of the issue, we would just have to take that today on assumption that that is going to be done to our satisfaction, by staff I would assume.

CHAIR REID: Are you questioning the staff's reliability, Mr. Nowalsky?

MR. NOWALSKY: No more than I would question the ability of the Chair.

CHAIR REID: I would question that for sure.

MR. NOWALSKY: Both cases would be absolutely zero. I'm just trying to lay out that what we're seeing on the screen is not the entirety of what would be in the document itself. In approving a document today, we would be taking a leap of faith, one that is most likely completely comfortable, just with the understanding that there is information that is going to be in the document that we're not physically seeing today.

CHAIR REID: Well, apparently the Chair can review it, which I wasn't expecting that in the job description, Adam, to be honest with you, but I think you'll probably be fine. That would be my opinion. If anybody has something different, feel free to add it now. Seeing none; are you good, Adam? Okay, thank you. Any other discussion on the motion on the board? Seeing none**; is there any opposition? Any abstentions, any null votes? Motion passes by unanimous consent.** Any other modifications to this document at this point, from the Board? Ms. Costa, sorry.

MS. COSTA: Given Caitlin's earlier response to my question, I would just propose that the word bait be added under 3.2, Issue 2, Seasonal Harvest Restrictions Option B, so it is specific to the directed harvest and landing of all bait horseshoe crabs.

CHAIR REID: Any objection? Seeing none; done. Any other modifications? Anybody online? Seeing none; I would be looking for a motion to approve. Mr. Clark.

MR. CLARK: There it is. **Move to approve Draft Addendum IX for public comment, as modified today.**

CHAIR REID: Mr. Rhodes, are you seconding that motion? Seconded by Malcolm Rhodes. Any discussion? **Any opposition? Any abstentions? Any null votes? Seeing none; the motion passes by unanimous consent**. Next item on the agenda, okay why don't we go to you for full process, how about that, that is a good idea.

MS. STARKS: Thank you, Mr. Chair, I just want to clarify on the record that my intention is to modify the document as requested today, and then I will be reaching out to all of the states to schedule public hearings, so please look out for that.

CHAIR REID: Okay, thank you, so next on the agenda, Item 5 is to Discuss the AP Composition. That is not a unique challenge to this particular Board, it is a challenge we all face, the Councils and the Commission. But I am going to turn it over to Ms. Starks to lay out a possible way forward for the Board.

DISCUSS ADVISORY PANEL COMPOSITION

MS. STARKS: I just have a few slides with some context and additional background to start off the discussion. At our July 2024 Stakeholder Workshop, one of the other recommendations of the group was to evaluate the Horseshoe Crab Advisory Panel to determine if there is adequate representation across stakeholder groups, with the understanding that we may need to add seats or change the composition for nontraditional stakeholders, which for horseshoe crab have typically been conservation interests.

Before this meeting I did send out the AP membership list to the Board, but to summarize, the current composition of the AP, the state appointed advisors include five commercial harvesters, five biomedical industry reps, one processor/dealer, and two conservation interests. Then in addition there are two nontraditional seats, and those don't represent a particular state.

But those two individuals are coming from a habitat and conservation perspective. There are four vacancies in the state appointed seats, and they are all seats that were formally commercial harvesters that have since left the AP. Just to show this another way, here are all of the current appointments by state and stakeholder group.

The bolded names are Advisors that have attended at least 50 percent of the meetings in the past few years, so we're considering them active. You can see there is a significant portion of the AP that have not been active in recent years. We think it would be good to reach out to all of these advisors directly, and find out if they are still interested in serving on the Panel.

In addition, considering the overall makeup of the AP, staff recommends aiming for an even distribution of stakeholder groups, with five advisors each for representing the commercial industry, biomedical and conservation, and with

those five conservation seats, staff thinks it would be good to have two of them representing the Delaware Bay. We think one of the issues for attendance of the full AP could be that recent meetings have been more focused on the Delaware Bay region, so moving forward we may want to target a specific subgroup at the Advisory to meet for things regarding Delaware Bay specifically. The next step we recommend is that each state reach out to your current AP appointments to determine if they would still like to be on the AP, and then provide staff with any new nominations to fill seats as needed.

Once we get those nominations from the states, the Board can approve those at the following next meeting in May, and we can go from there to see if we need to fill any back. At that point we could consider an open solicitation process if we need to. But to make this timeline work, I think it would be helpful to get these nominations from the state by the end of March. I'm just looking for the Board to provide some input on this proposed process today.

CHAIR REID: Ms. Berger, would you like to add anything? Very good, okay input from the Board. Mr. Clark and then Mr. Cimino.

MR. CLARK: Just a question right here. Is there any difference between nontraditional and conservation? If not, wouldn't that weight the Board more toward, well I guess there is what, commercial, biomed and then conservation and nontraditional are considered two different groups here, but are they one and the same?

CHAIR REID: Ms. Berger.

MS. TINA L. BERGER: When we first went about developing or establishing the AP, some states felt the need to, instead of appointing a commercial person, appoint someone who represented conservation, and so that is how they did it. When we sent out the solicitation for the nontraditional, the primary conservation group we were targeting were shore bird interest, so that those interests could be represented on the AP. The state appointed were larger conservation for horseshoe crab and shore bird, and the nontraditional were more shore bird targeted.

CHAIR REID: All set, John? Mr. Cimino.

MR. JOE CIMINO: Yes, since this is a recommendation, I support where this is going. I did have one question. Looking at New Jersey's AP members, one is a commercial representative that I thought was actually brought forward by Maryland as a Maryland rep, and that would be Sam Martin.

MS. BERGER: Without drawing down into the nomination, I can look at that and get back to you.

CHAIR REID: Ms. Kennedy.

MS. KENNEDY: Sam is initially from Maryland, but I believe his facility and where he does most of his horseshoe crab work, both for bait and biomedical, I believe is in New Jersey currently.

CHAIR REID: All set, Joe? Any other discussion. Ms. Costa.

MS. COSTA: Yes, just a clarifying question. In addition to the states reaching out to current members, would that also include states soliciting new members to fill vacancies?

MS. STARKS: Yes, if a state has a vacancy currently that you want to go ahead and fill, you will want to just provide that nomination to the Board for consideration at the next meeting.

CHAIR REID: Okay, any more discussion on the recommendations? Are we good with the path forward? Any problem? Any opposition to the recommendations Ms. Starks put forward? Seeing none; Caitlin, you're good to go. That brings us to our last agenda item, which is to elect a Vice-Chair. Mr. Geer.

ELECT VICE-CHAIR

MR. GEER: **I move to elect Carrie Kennedy as Vice-Chair.**

CHAIR REID: Do we have a second for that motion? Mr. Clark, are you seconding that motion? Discussion on the motion. Seeing none; **any opposition, null or abstentions? Seeing none; congratulations and condolences,** Ms. Kennedy, we'll see you next time.

MS. KENNEDY: Thank you.

ADJOURNMENT

CHAIR REID: Is there any other business to come before this Board today? Well, thank you very much, appreciate your efficiency. I would like to thank Ms. Starks and the rest of the staff for getting this document ready to go out to the public, and we'll look forward to seeing you next time. The meeting is adjourned.

(Whereupon the meeting adjourned at 1:07 p.m. on Tuesday, February 4, 2025)

Outlook

FW: Discrimination

From Info (ASMFC) <info@ASMFC.ORG>
Date Mon 3/31/2025 9:17 AM
To Caitlin Starks <CStarks@ASMFC.org>; Toni Kerns <TKerns@ASMFC.org>

From: Stuart Potter <stupotter444@outlook.com>
Sent: Monday, March 31, 2025 3:09 AM
To: Info (ASMFC) <info@ASMFC.ORG>
Subject: [External] Discrimination

To whom it may concern:
The Atlantic States Marine Fisheries Commission
has clearly discriminated for years against Horseshoe crab bait fisherman directly causing immense financial losses. The ASMFC has chosen to redefine the word Harvest in order to give an inequitable, biased advantage to fisherman in the biomedical fishery for horseshoe crabs. By not considering fishing for horseshoe crabs for biomedical purposes to be called a harvest they have allowed the biomedical fisherman to not follow any of the harvest restrictions bait fisherman must follow. If any fisherman were to catch live HSC's remove any portion of the crab or percentage of the blood from the crab to be used for bait then return the crabs to the water it would be a harvest. Fishing for any species removing a portion of that species, returning it to the water in a diminished state for a profit and causing mortality is without a doubt a harvest. The ASMFC has intentionally created an unfair advantage for one industry over another competing for the same species. This issue needs to be resolved immediately.
Stuart Potter

Atlantic States Marine Fisheries Commission

DRAFT ADDENDUM IX TO THE HORSESHOE CRAB FISHERY MANAGEMENT PLAN FOR PUBLIC COMMENT

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

February 2025

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Horseshoe Crab Draft Addendum IX for Public Comment

Public Comment Process and Proposed Timeline

In October 2024, the Atlantic States Marine Fisheries Commission's Horseshoe Crab Management Board initiated Draft Addendum IX to the Interstate Fishery Management Plan for Horseshoe Crabs to consider allowing for multi-year specifications for male-only harvest in the Delaware Bay region states of New Jersey, Delaware, Maryland, and Virginia. Additionally, Draft Addendum IX addresses seasonal harvest restrictions and harvest caps for Maryland and Virginia. This document presents background on the Commission's management of horseshoe crab in the Delaware Bay region, the addendum process and timeline, a statement of the problem, and management measures for public consideration and comment.

The public is encouraged to submit comments regarding the proposed management options in this document at any time during the addendum process. The final date comments will be accepted is **March 31 at 11:59 p.m**. **EDT.** Comments may be submitted by mail or email. If you have any questions or would like to submit comments, please use the contact information below.

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

Email: comments@asmfc.org
(Subject line: Horseshoe Crab Draft Addendum IX)

October 2024	Board Initiated Draft Addendum IX
February 2025	Board Approved Draft Addendum IX for public comment.
March 2025	Public Comment Period Including Public Hearings
May 2025	Board Reviews Public Comment, Selects Management Measures, Final Approval of Addendum IX
TBD	Implementation of Addendum IX Provisions

Horseshoe Crab Draft Addendum IX for Public Comment

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. Horseshoe crab are currently managed under the FMP and its eight addenda. The Delaware Bay region is the primary focus of this Draft Addendum. Bait harvest in the Delaware Bay region is managed using the Adaptive Resource Management (ARM) Framework. The ARM framework incorporates population models of horseshoe crabs and red knots and aims to balance harvest with maintaining the ecosystem and supporting shorebird migration.

In October 2024, the Board initiated Draft Addendum IX to consider 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. The Board initiated the draft via the following motion:

> *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.*

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 Adaptive Resource Management (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.

In July 2024, the Commission held a stakeholder workshop including representatives from environmental non-governmental organizations (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 prohibit 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, it was 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 Draft 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.

Addenda VII and VIII also include provisions that place a maximum limit on the total level of allowed harvest by Maryland and Virginia. The caps for each state were based on Addendum VI quota levels for Maryland and Virginia and are intended to provide protection to non-Delaware Bay-origin crabs when female harvest is allowed. The provision states that the harvest caps shall apply to these two states "except when the ARM Framework outputs an optimized harvest that prohibits harvest of female horseshoe crabs." If the ARM Framework output prohibits female horseshoe crab harvest, then Maryland and Virginia are allocated additional male harvest. This Draft Addendum proposes options to clarify the language in Addendum VIII regarding the harvest caps and whether they would apply if the Board voluntarily implements zero female harvest of Delaware-origin horseshoe crabs.

2.2 Background

In response to public concern regarding the horseshoe crab population and its ecological role in 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 the maximum bait harvest levels output by the ARM model to specify 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 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 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 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. Environmental researchers and advocates 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, 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 fishery[1].

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 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

[1] The final report on the July 2024 Horseshoe Crab Management Objectives Workshop can be found here: https://asmfc.org/wp-content/uploads/2024/10/HSCMgmtObjectivesWorkshopReport_Oct2024.pdf

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 three management issues:

1. Multi-year harvest specifications for male-only bait harvest
2. Seasonal harvest restrictions
3. Harvest caps for Maryland and Virginia

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 for bait. Status quo would not allow multi-year specification setting, while Option B does.

If Option B is selected, the Board would also have to select either sub option 1B-1 or 1B-2 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 1A: Status Quo

This option would maintain the current management program for setting harvest specifications 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 1B: Allow multi-year specifications for male-only bait harvest for horseshoe crabs of Delaware Bay-origin for a maximum of three 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 fall 2025, the Board would review the ARM Framework output 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 output.

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 (i.e., interim years) no Board action would be required. However, during 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, meaning the Board would not review a new horseshoe crab population estimate nor an ARM Framework output in interim years. Following a multi-year specifications period, the ARM Framework would be used to provide a new maximum harvest output, and the Board would need to establish new harvest specifications for the following year or years; this would include the option to implement female and male harvest or male-only harvest.

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.

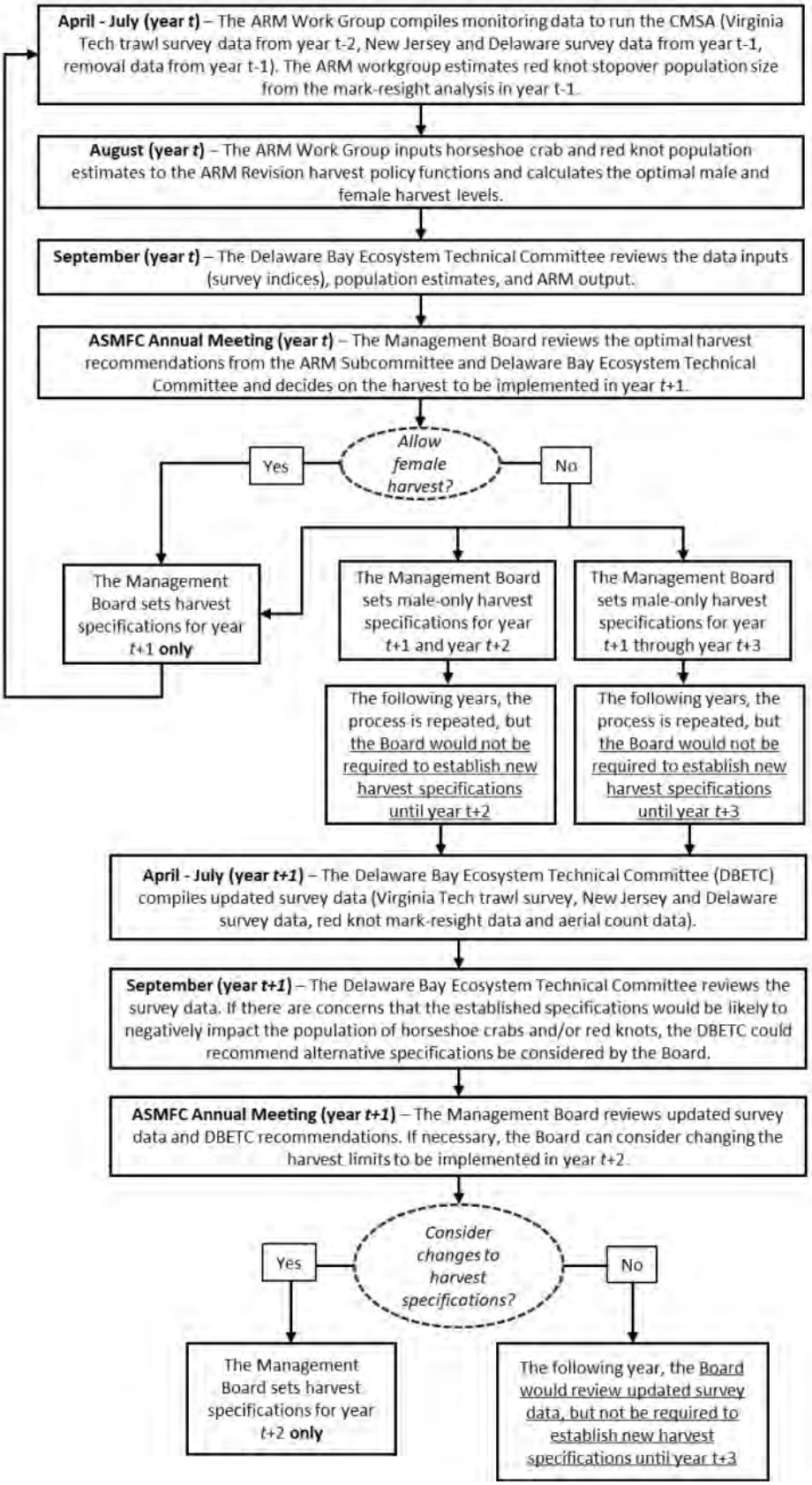


Figure 1. Proposed multi-year specifications setting process under Option B.

Sub-option 1B-1: No requirement to reduce male harvest limit based on spawning sex ratio. Under Sub-option B1, the Board would not be required to reduce male harvest in interim years of multi-year specifications based on the sex ratio of horseshoe crabs on the spawning beaches observed in the annual Delaware Bay spawning survey.

Sub-option 1B-2: 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 a new output is not provided by the ARM Framework), 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 males to 1 female and a threshold sex ratio set at 2 males to 1 female. If the sex ratio is above 3:1, the maximum harvest of 500,000 Delaware Bay origin males would be permitted. If the sex ratio is 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 (those that do not attach to a female) 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 (the mating position in which the male clasps the shell of the female) 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 spawning 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 4.2:1 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.

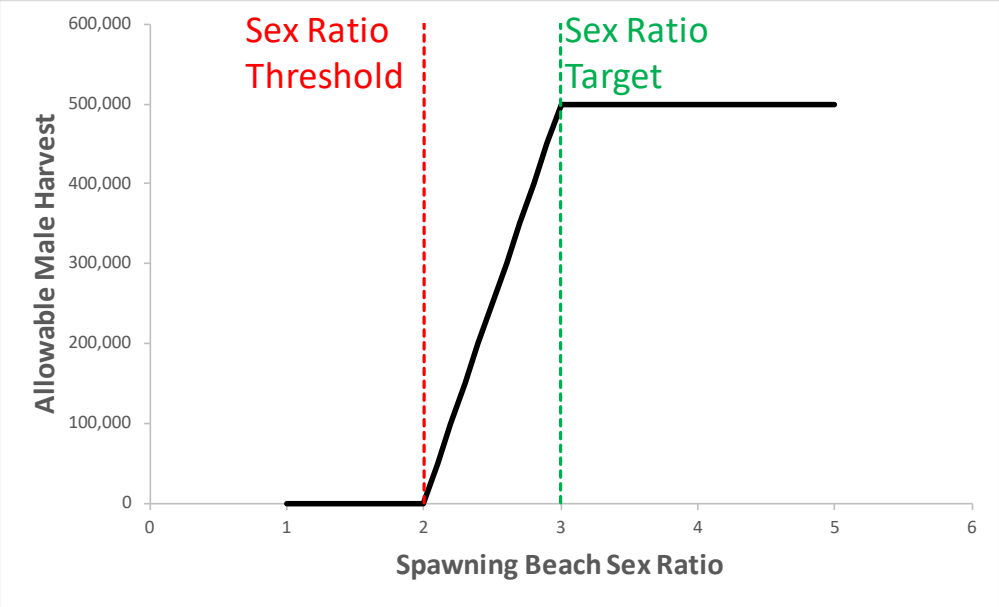


Figure 2. Harvest level of male horseshoe crabs as a function of the sex ratio (M:F) on the spawning beaches, as proposed under sub-option 1B-2. When the sex ratio is >3:1, the maximum allowable harvest of males is 500,000 Delaware Bay-origin crabs. As the sex ratio decreases below 3:1, the maximum allowable 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 1B-2.

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

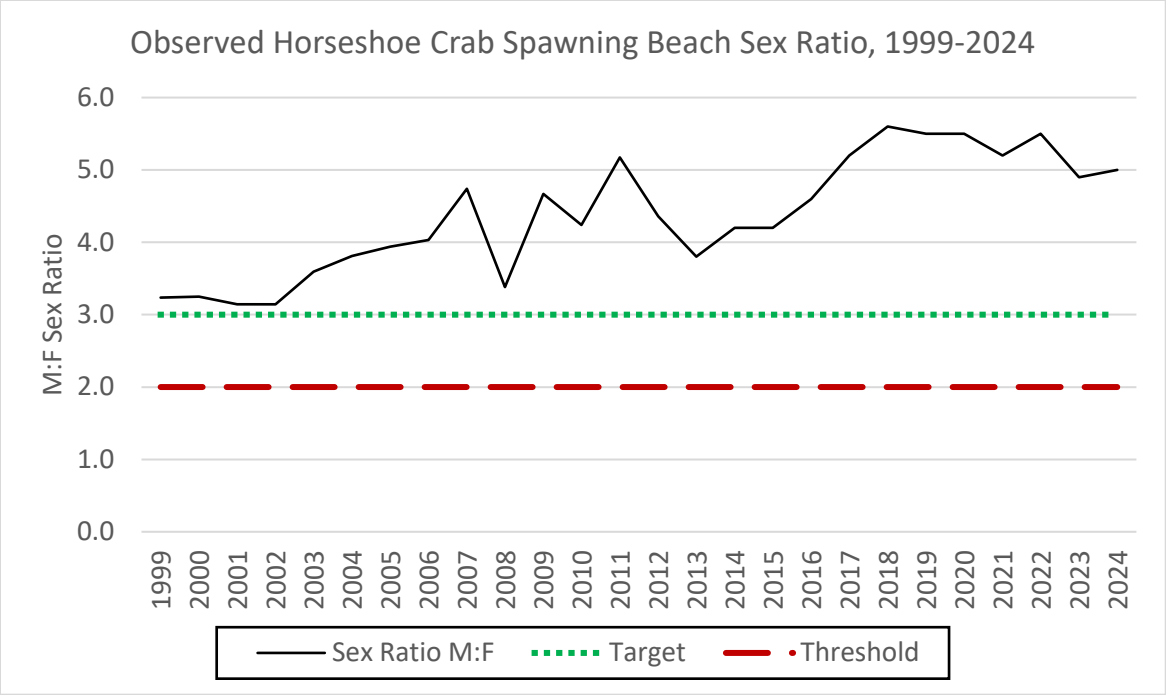


Figure 3. Average annual spawning sex ratio observed during Delaware Bay horseshoe crab spawning beach survey from 1999-2024.

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 2A: 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

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 2B: Reestablish seasonal harvest restrictions of Addendum IV-VI.
If adopted, this option would prohibit directed harvest and landing of all horseshoe crabs for bait 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.

3.3 Issue 3: Application of Harvest Caps for Maryland and Virginia

The Board is seeking public input on whether to modify the policy established in Addendum VIII to provide additional clarity on when the harvest caps for Maryland and Virginia would be applied. Status quo would not change the current requirements, while Option B would clarify that the harvest caps would not apply whenever harvest is limited to males only.

Option 3A: Status Quo
Under this option, there would be no change to the language in Addendum VIII. Addendum VIII states that the harvest caps for Maryland and Virginia (170,653 and 60,998 crabs, respectively) "apply except when the ARM Framework outputs an optimized harvest that prohibits harvest of female horseshoe crabs. In this situation, female horseshoe crab harvest in Maryland and Virginia are prohibited but a 2:1 offset of males:females applies and allows the total male harvest of Maryland and Virginia to rise above the cap level."

This language could be interpreted such that if the ARM Framework output included any female harvest, these harvest caps would apply. This means in a situation where the ARM Framework output allows for any female harvest, total harvest for Maryland and Virginia could be restricted to the harvest caps, even if the Board chooses to set female harvest at zero voluntarily.

Option 3B: Modify language for the application of harvest caps.
If adopted, this option would change the language establishing the policy for when the Maryland and Virginia harvest caps would apply. Instead of stating the "caps apply except when the ARM Framework outputs an optimized harvest that prohibits harvest of female horseshoe crabs," this proposed option would change the language to "these caps apply only when female harvest is implemented. The harvest caps for Maryland and Virginia would not apply whenever male-only harvest is implemented."

This change clarifies that the harvest caps would not apply in a situation in which the ARM Framework output includes female harvest, but the Board chooses to implement male-only harvest voluntarily.

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.

Atlantic States Marine Fisheries Commission

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

MEMORANDUM

TO: **Horseshoe Crab Management Board**

FROM: **Caitlin Starks, Senior FMP Coordinator**

DATE: **April 23, 2025**

SUBJECT: **Public Comment on Draft Addendum IX to the Horseshoe Crab Fishery Management Plan**

The following pages represent a draft summary of all public comments received by ASMFC on Horseshoe Crab Draft Addendum IX as of 11:59 PM (EST) on March 31, 2025 (closing deadline). Comment totals for the Draft Addendum are provided in the tables below, followed by summaries of the state public hearings, and written comments sent by organizations and individuals. A total of 17 written comments were received. These included six letters from organizations, and eleven comments from individual industry stakeholders and concerned citizens. Four public hearings were held (one in-person hearing in Maryland, one hybrid hearing in Delaware, and two virtual hearings). The total public attendance across the four hearings was 37, though some individuals attended multiple public hearings. Four individuals provided comment at public hearings.

The following tables are provided to give the Board an overview of the support for each of the management options contained in Draft Addendum IX. Comment totals by state for comments provided during public hearings were tallied based on the hearing attended. It should also be noted that some individuals provided comments at a public hearing and also submitted written comments, and these are counted separately in the tables below. Additional comments that did not indicate support for a particular option are included in the breakdown of total comments received. Prevailing themes from the public comments on Draft Addendum IX, including rationales for support or opposition and general considerations, are summarized below the tables.

Table 1. Breakdown of Total Comments Received by Category

Comments Received by Category	
Organization Letters	6
Individual Comments	11
Total Written Comments	**17**
Comments Provided at Public Hearings	
New Jersey	0
Delaware	4
Maryland	1
Virginia	0
Total Comments Received	**22**

Table 2. Support for Draft Addendum IX Options indicated in written comments submitted to ASMFC and provided at public hearings

	Proposed Management Options							
Issue	**1. Multi-year specifications**				**2. Season**		**3. Harvest Caps**	
Option	**1A**	**1B**	**1B-1**	**1B-2**	**2A**	**2B**	**3A**	**3B**
Organization Letters	1	5	0	5	0	6	2	1
Written Comments	3	4	1	3	2	4	3	3
Public Hearings	2							
Total	**6**	**9**	**1**	**8**	**2**	**10**	**5**	**4**

Support for Option 1A. Status Quo (annual specifications).

- Consistent annual review of the Adaptive Resource Management (ARM) Framework is important for oversight.
- Harvest specifications should be set based on the best available science.
- The Board should use the recommended harvest levels from the ARM. The recommendation for the Board to consider option 1B came from the stakeholder workshop, but the workshop did not include any bait hand-harvesters. Another workshop is needed that includes hand-harvesters.
- Female hand harvest should be allowed with the current process.

Support for Option 1B. Allow multi-year specifications for male-only bait harvest for horseshoe crabs of Delaware Bay-origin for a maximum of three years at a time.

- Opposed to harvest of female horseshoe crabs (this allows for more years of no female harvest).
- There are still concerns that the ARM model used to set the quotas is flawed.
- Female horseshoe crabs are critical to the Delaware Bay ecosystem and need protection.
- Multi-year specifications would reduce uncertainty for stakeholders.
- There should be no sunset date for using multi-year specifications.
- All aspects of the ARM Framework should be reviewed, not just the reward and utility functions.
- Even if multi-year specifications are used it would be best to look at the ARM every year.
- There should be no female harvest until red knots and horseshoe crab eggs are increasing.

Support for Sub-option 1B-2. In interim years, male horseshoe crab harvest must be reduced if spawning beach survey results indicate a male:female sex ratio below 3:1.

- This option is preferred over 1B-1, but it is suggested that instead, harvest reductions should be initiated starting when the operational sex ratio drops below 4:1, with a reduction to zero harvest at 3:1 to ensure that the sex ratio remains at or above the observed minimum for the period of record.
- For the purpose of determining the sex ratio under this sub-option, the Board should use the Virginia Tech trawl survey rather than the bay-wide spawning survey

Support for Option 2B. Reestablish seasonal harvest restrictions of Addendum IV-VI (January 1 through June 7).

- The longer season closure should be reestablished as intended.
- Option 2B would make all Delawar Bay states' seasons consistent.
- Still advocating for total HSC harvest moratorium.

Support for Option 3B. Modify language for the application of harvest caps.

- The amended language agrees with the intent of the original language.

Other Comments

- ASMFC should require biomedical harvest to come from hand harvest only, and only males. The mortality of horseshoe crabs from trawling is very high.
- There should only be male horseshoe crab harvest.
- Ideally there should be no horseshoe crab harvest.
- No horseshoe crab harvest should be allowed because it is not economically worth it and alternatives for biomedical and bait can be used.
- Horseshoe crab harvest should be land-based only. Dredging for horseshoe crab should be banned due to ecosystem damage, high dead discards, and no sex selectivity.
- It is unfair that bait harvesters cannot take a small number of female horseshoe crabs when the biomedical take of females is much larger than what bait harvesters would take.
- There should be more focus on the biomedical take and mortality, which is greater than the Delaware Bay bait harvest. The biomedical catch has steadily increased. Many of the biomedical horseshoe crabs are taken by trawls; they should use hand-harvesting instead because it is a zero-bycatch fishery, and they save females when they are out harvesting.
- The bait harvest fishery has a smaller impact than the biomedical industry, and the bait fishery is much cleaner.
- The ARM Framework should still have an objective of the horseshoe crab population reaching a specific level of carrying capacity (e.g., 80% in the original framework).
- Other migratory shorebirds besides red knots also rely heavily on horseshoe crab eggs and egg density counts remain low.
- Additional data like egg density data would strengthen the ARM Framework.

Horseshoe Crab Draft Addendum IX Public Hearings

New Jersey Webinar Hearing

March 18, 2025

4 Public Participants

Commissioners: Joe Cimino (NJ), Adam Nowalsky (NJ), Jeff Kaelin (NJ)

ASMFC & State Staff: Caitlin Starks (ASMFC), Jeff Brust (NJ), Heather Corbett (NJ), Danielle Dyson (NJ)

Public Comment Summary

No public comments were provided.

New Jersey Public Hearing Online Attendance		
First Name	**Last Name**	**Email Address**
Jeffrey	Brust	jeffrey.brust@dep.nj.gov
Joseph	Cimino	joseph.cimino@dep.nj.gov
Heather	Corbett	heather.corbett@dep.nj.gov
Jeff	Kaelin	jkaelin@lundsfish.com
Susan	Linder	susanlinder1@aol.com
Adam	Nowalsky	captadamnj@gmail.com
Benjie	Swan	swan24@verizon.net
Peter	Belasco	read.belasco@gmail.com
Nora	Blair	nora.blair@crl.com
Danielle	Dyson	danielle.dyson@dep.nj.gov

Horseshoe Crab Draft Addendum IX Public Hearings

Delaware Public Hearing
March 27, 2025
Dover, Delaware
29 Public Participants

Commissioners: John Clark (DE), Roy Miller (DE), Eric Reid (RI)

ASMFC & State Staff: Caitlin Starks (ASMFC), Richard Wong (DE), Jordan Zimmerman (DE)

Public Hearing Overview

- 16 members of the public attended the in-person hearing, and 13 were in attendance via webinar.
- Two comments supported Option 1A while two others did not specify a preferred option.
- Attendees asked questions related to the horseshoe crab population and spawning sex ratio data and were informed about the surveys that provide these data.
- An attendee asked about the reason for the harvest season closure ending on June 7 because the horseshoe crabs are still spawning throughout June. It was clarified that the end date was related to the timing of when shorebirds leave the Delaware Bay region.
- Fishermen asked why they are not able to harvest small numbers of females, when the biomedical industry's estimated mortality is much higher. They explained that females are more valuable as bait and because they cannot harvest females in the Delaware Bay region, they are more expensive to buy from other states.
- Several attendees asked about the mortality rates from biomedical use and natural mortality and noted that the estimated mortality from bait harvest is much lower than either the estimated biomedical mortality (coastwide) and the natural mortality of horseshoe crabs. They also noted concerns that the biomedical take is not restricted to a quota.

Public Comment Summary

Mike Stansky, bait hand-harvester

- Feels it is unfair that harvesters cannot take a small number of female horseshoe crabs when the biomedical take is much larger than what bait harvesters would take.

Stuart Potter, bait hand-harvester

- Supports Option 1A.
- Draft Addendum IX came out of the stakeholder workshop in July 2024, which was supposed to include all of the stakeholders of the Delaware Bay fishery, but there were no bait harvesters at that workshop. There should be a future workshop that allows all stakeholder groups a seat at the table.
- The ASMFC is obligated to promote and better utilize fisheries based on science, not the opinions of stakeholder groups.

- There should be more focus on the biomedical take and mortality, which is greater than the Delaware Bay bait harvest. Their catch has steadily increased. Many of the biomedical horseshoe crabs are taken by trawls; they should use hand-harvesting instead because it is a zero-bycatch fishery, and they save females when they are out harvesting.

Jordan Giuttari, bait harvester and buyer

- Supports Option 1A.
- The bait harvest fishery has a smaller impact than the biomedical industry, and the bait fishery is a lot cleaner.

Matthew Sarver, Ecological Society of America

- Will submit written comments on behalf of Ecological Society of America.
- Would like there to be citations of the science behind the use of the sex-ratio targets and thresholds because it would me more helpful to understand the reasoning behind the decisions.

Delaware Public Hearing Online Attendance		
First Name	**Last Name**	**Email Address**
John	Clark	john.clark@delaware.gov
Joe	Francis	jfrancismd@verizon.net
Robin	Glazer	robin.glazer@delnature.org
Kayla	Gonzon	kmgonzon7@gmail.com
Diane	Hindman	dianehndmn@aol.com
Jon	Hurdle	jonhurdle@gmail.com
Susan	Linder	susanlinder1@aol.com
Casey	Marker	casey.marker@maryland.gov
Mark	Martell	majorcasualty@gmail.com
Nivette	Perez-Perez	nperezperez@inlandbays.org
Eric	Reid	Ericreidri@gmail.com
Pat	Ruhl	patrick.ruhl@delaware.gov
Matthew	Sarver	mjsarver@gmail.com
Carol	Stephens	csbpa@hotmail.com
Regan	Todd	regantodd36@gmail.com
Melina	Vella	melina.vella@delaware.gov
Harvey	Yenkinson	vetcraft@aol.com

ATLANTIC STATES MARINE FISHERIES COMMISSION

DE Public Hearing: Draft Addendum IX

PUBLIC ATTENDEE SIGN IN

DATE: March 27, 2025

LOCATION: Dover, Delaware

NAME	ORGANIZATION	CITY, STATE
Stuart Potter	Fisherman	Milford, DE
Purnell Potter	Fisherman	Milton, DE
Ariane dlueller	ERDG	Dover, DE
GLENN GAUVRY	ERDG	DOVER, DE
Joseph Smith	Commercial Fisherman	Townsend, DE
Jordan Zimmerman	DDFW	Dover, DE
Mike Finney	Daily State News	Dover, DE
Vernon Gifftari	Fisherman	Rowe?
Jordan Gifftari	Fisherman/Buyer	
TREVOR METZ	N/A	Milford, DE
Mike Starkey	E-160	Townsend - DE
George Gehring	—	Kitts Hummock - DE
Ruby Lauter	-	Kitts Hummock - DE

NAME	ORGANIZATION	CITY, STATE
PAULINE Dermer Cannan		Kitts Hummock, Dover, DE
Roy MILLER	ASMFC	LEWES
STEVE COTTRELL	DELAWARE AUDUBON	NEWARK
LEONARD VOSS	WATERMAN	SMYRNA
Robert Piasecki	waterman	Dover

Horseshoe Crab Draft Addendum IX Public Hearings

Maryland Public Hearing
March 26, 2025
Berlin, Maryland
1 Public Participant

ASMFC & State Staff: Caitlin Starks (ASMFC), Steve Doctor (MD)

Public Comment Summary

Stuart Potter, DE Bait Harvester

- Supports 1A, status quo
- Bait harvesters were not included in the July 2024 stakeholder workshop
- Would like to see a small female harvest in Delaware given the population has rebounded
- NGOs should look into biomedical impacts. Is not sure a 15% mortality rate is the true number.

ATLANTIC STATES MARINE FISHERIES COMMISSION

MD HSC Public Hearing

PUBLIC ATTENDEE SIGN IN

DATE: 3/26/2025

LOCATION: ~~Arlington, Virginia~~ Berlin, MD

NAME	ORGANIZATION	CITY, STATE
Stuart Potter	MKMENT	Milford, DE

Horseshoe Crab Draft Addendum IX Public Hearings

Virginia Webinar Hearing

March 20, 2025

3 Public Participants

Commissioners: Pat Geer (VA), Eric Reid (RI)

ASMFC & State Staff: Caitlin Starks (ASMFC), Ethan Simpson (VMRC)

Public Comment Summary

No public comments were provided.

Virginia Public Hearing Online Attendance		
First Name	**Last Name**	**Email Address**
Arthur	Bender	harbor.rat@hotmail.com
Chantal	Garrison	cgarr211@gmail.com
Pat	Geer	pat.geer@mrc.virginia.gov
Susan	Linder	susanlinder1@aol.com
Eric	Reid	Ericreidri@gmail.com
Ethan	Simpson	ethan.simpson@mrc.virginia.gov

HORSESHOE CRAB RECOVERY COALITION

Comment on Horseshoe Crab Draft Addendum IX
March 28, 2025

Dear Commissioners:

As members of the Horseshoe Crab Recovery Coalition, a diverse group of more than 50 conservation and healthcare organizations dedicated to ensuring the future of the American horseshoe crab, we are writing to strongly encourage the adoption of the following options in Draft Amendment IX:

- **Option 1B:** Allow multi-year specifications for male-only bait harvest for horseshoe crabs of Delaware Bay-origin.
  - **Sub-option 1B-2:** In interim years, male horseshoe crab harvest must be reduced if spawning beach survey results indicate a male to female sex ratio below 3:1.
- **Option 2B:** Reestablish seasonal harvest restrictions of Addendum IV-VI.

While we appreciate the effort involved in proposing Draft Addendum IX, the Coalition remains concerned that the Adaptive Resource Management model used to set quotas is flawed. Any resumption of the female harvest should depend on documented evidence that horseshoe crab numbers are increasing, and that egg density data – the truest measure of the health of the species – shows signs of durable long-term recovery. The coalition's ongoing concerns with the ARM framework have been documented in detail and echo those made by Earthjustice on behalf of New Jersey Audubon and Defenders of Wildlife, two influential coalition partners, in a September 25, 2023, letter to the Horseshoe Crab Management Board.

Current indicators monitored by the coalition continue to show that that both horseshoe crab populations and the population of red knots, a shorebird that depends on horseshoe crab eggs as a source of food, are well below recovery thresholds.

The ongoing use of horseshoe crabs for bait and increased use for biomedical purposes jeopardize their recovery to historic population levels. Rufa red knot populations also remain near all-time lows from both a changing climate and the increasing scarcity of the food needed to fuel their 9,000-mile migration. The 2025 State of the Birds Report lists the red knot as an

“orange alert” tipping point species due to ongoing population loss with recent accelerated declines.

As we have long maintained, the relationship between horseshoe crab egg availability, red knot feeding behavior, mass gain and overall fitness is clear. During the Delaware Bay stopover period, red knots track horseshoe crab egg availability on sandy beaches bay-wide and little in the way of alternative food resources are available (Botton et al. 1994, Karpanty et al. 2006). Importantly, alternative food resources available during the Delaware Bay stopover (e.g., blue mussels, coquina clams) do not provide the necessary nutritional substrates that support rapid and significant mass gain (Haramis et al. 2007). Importantly, red knots departing from Delaware Bay in higher relative body condition migrated south up to a month later than individuals in lower condition, suggesting that the former were more likely to have bred successfully (Duijns et al. 2017). Moreover, individuals leaving Delaware Bay with a lower relative body condition had a lower probability of being detected in autumn, suggesting greater mortality compared to individuals with higher relative body condition (Duijns et al. 2017).

Many of our conservation organizations have sounded the alarm about the global biodiversity crisis and the specific threats facing shorebird populations, which have plummeted more than 70 percent over the past 50 years. Allowing the killing of female horseshoe crabs at this critical moment further imperils recovery of shorebirds like the red knot.

The joint collapse of red knots and horseshoe crabs is not inevitable. The Coalition welcomes a multi-year ban on the taking of female horseshoe crabs as a necessary step in the right direction. We support this action while continuing to advocate for a total moratorium on horseshoe crab harvest.

Respectfully signed by members of the Horseshoe Crab Recovery Coalition,

- American Bird Conservancy
- Birds Georgia
- Capt. Paul Eidman, Owner/Operator, Reel Therapy Fishing Charters (NJ)
- Center for Biological Diversity
- Coastal Expeditions Foundation (South Carolina)
- Delaware Audubon
- Delaware Nature Society
- Humane World for Animals
- League of Women Voters of NJ
- Maya K. van Rossum, the Delaware Riverkeeper, Delaware Riverkeeper Network
- National Wildlife Federation
- New Jersey Audubon
- New York State Ornithological Association
- Maryland Ornithological Society

- Mass Audubon
- North Carolina Wildlife Federation
- Dr. Carl Safina and the Safina Center
- reTURN the Favor
- Save Coastal Wildlife
- Saw Mill River Audubon
- Upstream Alliance (Maryland)
- The Wetlands Institute
- Wildlife Restoration Partnerships

References:

Duijns, S, L.J. Niles, A, Dey, Y. Aubry, C. Friis, S. Koch, A.M. Anderson, and P.A. Smith. 2017. Body condition explains migratory performance of a long-distance migrant. Proceedings of the Royal Society B 284: 20171374. http://dx.doi.org/10.1098/rspb.2017.1374.

Harramis, G.M., W.A. Link, P.C. Osenton, D.B. Carter, R.G. Weber, N.A. Clark, M.A. Teece and D. S. Mizrahi. 2007. Stable isotope and pen feeding trial studies confirm the value of horseshoe crab Limulus polyphemus eggs to spring migrant shorebirds in Delaware Bay. Journal of Avian Biology. 38: 367376. doi: 10.1111/j.2007.0908-8857.03898.x.

Karpanty, S.M., J.D. Fraser, J. Berkson, L.J. Niles, A. Dey and E.P. Smith. 2006. Horseshoe crab eggs determine Red Knot distribution in Delaware Bay. Journal of Wildlife Management 70:1704-1710.

Botton, M.L., R.E. Loveland and T.R. Jacobsen. 1994. Site selection by migratory shorebirds in Delaware Bay and its relationship to beach characteristics and abundance of horseshoe crab (*Limulus polyphemus*) eggs.

Outlook

[External] Horseshoe Crab Draft Addendum IX

From Steve Cottrell <stevecottrell5@gmail.com>
Date Fri 3/28/2025 8:16 AM
To Comments <comments@asmfc.org>

Greetings,

On behalf of Delaware Audubon, I wish to comment on Draft Addendum IX for horseshoe crabs.

Of the different options, Delaware Audubon supports the following:

Option 1B
Sub-option 1B-2
Option 2B
Option 3A

Thank you.

Steve Cottrell

Delaware
Ornithological
Society

PO Box 4247
Wilmington, DE 19807

March 31, 2025

Caitlin Starks, Senior FMP Coordinator
1050 N. Highland Street
Suite 200A-N
Arlington, VA 22201
Email: Comments@asmfc.org

RE: Comment on Horseshoe Crab Draft Addendum IX

Dear Ms. Starks:

The Delaware Ornithological Society (DOS) is an all-volunteer, 501(c)3 nonprofit representing hundreds of members in Delaware and adjacent states. Our mission is the promotion of the study of birds, the advancement and diffusion of ornithological knowledge, and the conservation of birds and their environment. Our small grassroots organization has helped lead collaborative conservation efforts for Delaware's coastal bird habitat since 2007, raising over $750,000 in private matching funds for habitat acquisition through our annual Delaware Bird-a-Thon fundraiser. We work with our State and NGO partners to leverage these funds to help purchase habitat along the Delaware Bayshore.

As expressed in previous letters, DOS opposes harvest of female horseshoe crabs (HSC) due to stagnant population recovery in recent years and the fact that the HSC population remains far below historic levels that supported abundant migrating shorebirds at their critical Delaware Bay stopover habitats.

We appreciate the Horseshoe Crab Management Board's decision to pause consideration of female harvest while additional stakeholder engagement is conducted including evaluating the ARM framework's reward and utility functions. Our organization looks forward to participating in those discussions.

Issue 1. Multi-Year Specifications

DOS finds Option 1B, Suboption 1B-2 to be the least problematic of the options presented in the Draft Addendum, however we submit the following concerns.

As the Draft Addendum indicates, the lowest operational sex ratio of males to females observed during the period of record from 1999-2024 in the Delaware Bay population was 3.1:1. The Draft Addendum sets the lowest allowable operational sex ratio (OSR) at 2:1, with incremental harvest reductions beginning at 3:1. This is concerning because the lag time associated with incremental harvest reductions in response to a declining sex ratio may allow the OSR to drop considerably lower than the long-term observed minimum of 3.1:1 as a result of the long maturation period of the species. We suggest instead initiating harvest reductions starting when the OSR drops below 4:1, with a reduction to zero harvest at 3:1. This would ensure that the OSR remains at or above

the observed minimum for the period of record. We feel that allowing the ratio to drop below the range of variation observed over the past 25 years before significant corrective action is taken is imprudent.

In addition to simply attempting to retain the OSR within the observed range of variation as a matter of prudent management, there are compelling biological reasons that the decline below a 3:1 OSR could impact HSC population recovery. Chief among these is the maintenance of sufficient levels of heterozygosity and genetic diversity within the population. Secondly, there is evidence for female choice in the species and both male quality and male-female compatibility affected egg development, with considerably more of the eggs of polyandrous females developing successfully when fertilized by satellite males (Brockmann et al. 2015). Thus, at low OSR many females may experience lower reproductive success due to lack of sufficient high quality or compatible males.

As Brockmann et al. state, "some females may attract satellite males when the male to which they are paired is of low quality or incompatible. This behavior means that unattached males are not 'excess males' but an important part of the mating system of this species." Considering the complexity of the HSC mating system, we urge the Board to adopt a higher threshold for reduction in male harvest in order to maintain the OSR at or above 3:1 at all times.

Issue 2. Seasonal Harvest Restrictions

DOS supports Option 2B, Reestablish seasonal harvest restrictions of Addendum IV-VI. We encourage the Board to re-adopt the longer harvest closure that was inadvertently left out of Addenda VII and VIII.

Issue 3. Application of Harvest Caps for Maryland and Virginia

DOS has no position on Issue 3 at this time, as it is a matter of administrative clarification rather than policy.

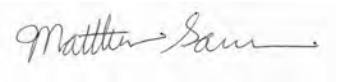
General Comments

We reiterate comments made in our letter regarding the previous Draft Addendum, and hope that the reevaluation of stakeholder values currently being considered will include the following concerns:

1. The current management approach is not based upon a management objective to grow the Delaware Bay HSC population toward any metric related to an estimate of ecological carrying capacity, as the original ARM had done. While we appreciate that the prior carrying capacity estimate from the original ARM was based on limited data, we find it extremely concerning that the objective of meeting 80% of an estimated carrying capacity for DE bay area HSCs has been abandoned.

2. Other migratory shorebirds of conservation concern heavily utilize HSC eggs on migration stopover, including Semipalmated Sandpiper, Sanderling, and Ruddy Turnstone (Tsipoura and Burger 1999). Since the threatened *rufa* Red Knot is just one of many severely declining shorebird species that rely on Delaware Bay HSC eggs, and egg density counts remain much lower than historic levels, a conservative approach to HSC population management is warranted, especially given recent apparent stagnation of HSC population recovery.

Sincerely,



Matthew Sarver, DOS Conservation Chair

Literature Cited

Brockmann, H.J., Johnson, S.L., Smith, M.D., Sasson, D. (2015). Mating Tactics of the American Horseshoe Crab (*Limulus polyphemus*). In: Carmichael, R., Botton, M., Shin, P., Cheung, S. (eds) Changing Global Perspectives on Horseshoe Crab Biology, Conservation and Management. Springer, Cham. https://doi.org/10.1007/978-3-319-19542-1_19

Tsipoura, N., & Burger, J. 1999. Shorebird diet during spring migration stopover on Delaware Bay. *The Condor*, *101*(3), 635-644.

Outlook

[External] New public comment for Horseshoe Crab Draft Addendum IX

From ASMFC <info@asmfc.org>
Date Fri 3/28/2025 1:17 PM
To Comments <comments@asmfc.org>

Horseshoe Crab Draft Addendum IX

Action Title

Horseshoe Crab Draft Addendum IX

Action URL

https://asmfc.org/actions/horseshoe-crab-draft-addendum-ix/

Name

Glenn Gauvry

Email

erdg@horseshoecrab.org

State

Delaware

Comment

Although we appreciate the intent behind Option 1B to reduce unnecessary oversight—specifically, that “the full ARM process would not occur, meaning the Board would not review a new horseshoe crab population estimate nor an ARM Framework output in interim years”—we believe that the consistent review process serves an important purpose. It signals to all user groups that active oversight is ongoing, discouraging any inclination to exploit perceived inattention or complacency.

Draft Addendum IX considers three management issues:
1. Multi-year harvest specifications for male-only bait harvest - Option 1A: Status Quo
2. Seasonal harvest restrictions - Option 2B: Reestablish seasonal harvest restrictions of Addendum IV-VI.
3. Harvest caps for Maryland and Virginia - Option 3B: Modify language for the application of harvest caps.

ERDG
Ecological Research & Development Group Inc.
www.horseshoecrab.org

190 Main Street, Little Creek
Dover, DE. 19901

Phone: 302 236-5383
Glenn Gauvry, Founder / President of ERDG
Trade, Industry, Use, Working Group Chair, IUCN Horseshoe Crab Specialist Group

EARTHJUSTICE

March 28, 2025

Horseshoe Crab Management Board
Atlantic States Marine Fisheries Commission
1050 N. Highland Street, Suite 200 A-N
Arlington, VA 22201
comments@asmfc.org

VIA ELECTRONIC MAIL

Re: Support for Multi-Year Specifications for Male-Only Harvest in the Delaware Bay Region

Dear Members of the Horseshoe Crab Management Board:

New Jersey Audubon and Defenders of Wildlife strongly support allowing the Horseshoe Crab Management Board to set multi-year specifications for a male-only bait harvest, as proposed in Draft Addendum IX to the Horseshoe Crab Fishery Management Plan.[1] Multi-year specifications would extend critical protections for horseshoe crabs, the federally threatened red knot shorebird, and many other species that inhabit Delaware Bay. They would also provide reassurance and certainty for public stakeholders, including the more than 34,000 people who submitted comments to the Atlantic States Marine Fisheries Commission ("ASMFC" or the "Commission") opposing the resumption of a female horseshoe crab harvest.[2] To help establish a solid foundation for ecosystem recovery, New Jersey Audubon and Defenders of Wildlife also support the options to require a reduction in the male bait harvest if the male:female sex ratio falls below 3:1 and to reestablish the seasonal harvest restrictions of Addendum IV-VI.

In previous comments, New Jersey Audubon and Defenders of Wildlife detailed the extraordinary connection between horseshoe crabs and red knots.[3] Each year, red knots make an epic, continent-spanning migration that for many individuals extends 17,000 miles from the southern tip of South America to their breeding grounds in the Arctic and back again. Historically, vast numbers of red knots have stopped at Delaware Bay on their journey north,

[1] ASMFC, Draft Addendum IX to the Horseshoe Crab Fishery Management Plan for Public Comment 4-6 (Feb. 2025) ("Draft Addendum IX").
[2] Memorandum from Caitlin Starks on Public Comment on Draft Addendum VIII to the Horseshoe Crab Fishery Management Plan 1 (Oct. 20, 2022), *in* ASMFC, Materials for the 2022 Annual Meeting of the Horseshoe Crab Management Board.
[3] New Jersey Audubon and Defenders of Wildlife submitted comments and independent expert analysis in 2022 and 2023 opposing the adoption and utilization of the revised Adaptive Resource Management model and urging the continued prohibition on the female horseshoe crab bait harvest. These materials are available in a combined file at https://earthjustice.org/wp-content/uploads/2023/09/nj-audubon-defenders-of-wildlife-2023-comments-to-hsc-board.pdf. In 2024, New Jersey Audubon and Defenders of Wildlife submitted additional comments and independent expert analysis addressing ASMFC's response to the earlier submissions. The 2024 materials are available at https://earthjustice.org/wp-content/uploads/2025/03/nj-audubon-defenders-of-wildlife-comments-to-hsc-mgmt-bd-2024.pdf.

arriving in the spring just as millions of horseshoe crabs emerge from the ocean to spawn on the beach. Under the right conditions, horseshoe crabs lay a superabundance of eggs sufficient to sustain their population while also serving as an energy-rich buffet for hungry red knots and many other species.[4] In less than two weeks at Delaware Bay, red knots can nearly double their body weight and depart with sufficient energy reserves to improve their odds of reaching the Arctic and breeding successfully.[5]

In the late twentieth century, horseshoe crabs at Delaware Bay were significantly overharvested for use as bait in other fisheries. As their numbers plummeted, so too did the number of red knots stopping at Delaware Bay. From 1981 to 2002, the peak red knot count in Delaware Bay usually exceeded 40,000 and twice surpassed 90,000.[6] Over the past five years, the peak count has fluctuated between 22,266 in 2023 and the all-time low of 6,880 in 2021.[7] In 2024, the peak red knot count was 14,225.[8] The federal government listed red knots as "threatened" under the Endangered Species Act in 2015, with "[r]educed food availability in Delaware Bay due to commercial harvest of the horseshoe crab . . . considered a primary causal factor in red knot population declines in the 2000s."[9]

Today the Delaware Bay ecosystem remains significantly depleted, with substantial clear evidence of ecological decline in key indicators and other troubling signs of broader problems. Red knot numbers are languishing well below their historical abundance, and the availability of horseshoe crab eggs on the beach remains an order of magnitude below prior levels.[10] Metrics for assessing the health of the horseshoe crab population further suggest adverse trends—e.g., survey data persistently demonstrate declines in the female:male sex ratio and female prosomal width. These circumstances justify a precautionary approach that affords a more sustained opportunity for ecosystem recovery.

I. The Board Should Allow Multi-Year Specification-Setting for Male-Only Harvest.

To contribute to restoring the Delaware Bay ecosystem, the Board should adopt Option 1B in Draft Addendum IX to allow multi-year male-only harvest specifications. Female horseshoe crabs play an irreplaceable role at Delaware Bay because they lay the eggs consumed by red

---

[4] Lawrence Niles et al., *Effects of Horseshoe Crab Harvest in Delaware Bay on Red Knots: Are Harvest Restrictions Working?*, 59 BioScience 153, 155 (2009).
[5] *Id.* at 154; *see also* Allan J. Baker et al., *Rapid Population Decline in Red Knots: Fitness Consequences of Decreased Refuelling Rates and Late Arrival in Delaware Bay*, 271 Proceedings of the Royal Society of London B 875, 876 (2004).
[6] U.S. Fish & Wildlife Service ("FWS"), *Rufa Red Knot Background Information and Threats Assessment* 100 tbl. 12 (2014).
[7] J. E. Lyons, *Red Knot Stopover Population Size and Migration Ecology at Delaware Bay, USA, 2024* 10 (Draft), *in* ASMFC, Materials for the 2024 Annual Meeting of the Horseshoe Crab Management Board.
[8] *Id.*
[9] FWS, "Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Rufa Red Knot," 79 Fed. Reg. 73706, 73707 (Dec. 11, 2014).
[10] Joseph A. M. Smith, *Horseshoe Crab Egg Availability for Shorebirds in Delaware Bay: Dramatic Reduction After Unregulated Horseshoe Crab Harvest and Limited Recovery After 20 Years of Management*, 32 Aquatic Conservation: Marine and Freshwater Ecosystems 1913, 1920 (2022).

knots, as well as many other species of shorebird, finfish, and sea turtles. Their eggs are a major reason that horseshoe crabs are a keystone species, and the abundance of females must be sufficient to sustain the horseshoe crab population and to fulfill the species' larger ecological role.

A. Female Horseshoe Crabs Are Critical to the Delaware Bay Ecosystem and Need Protection.

The ecological health of Delaware Bay hinges significantly on a thriving population of female horseshoe crabs. Since 2013, ASMFC has prohibited the bait harvest of female Delaware Bay-origin horseshoe crabs—the most important step it has taken to stabilize conditions for horseshoe crabs and red knots. For fishing years 2013 through 2022, the Commission utilized a version of the Adaptive Resource Management ("ARM") model that never recommended a female bait harvest due to the low abundance estimates of horseshoe crabs and red knots. Beginning with fishing year 2023, ASMFC utilized a revised version of the ARM model that is virtually certain to recommend a substantial female harvest. New Jersey Audubon and Defenders of Wildlife were among the tens of thousands of commenters who opposed ASMFC's adoption of the revised ARM model and opposed the model's recommendation for a female harvest, and they maintain that the model contains fatal defects making it an inappropriate tool for managing the ecosystem. While they continue to oppose ASMFC's approval of the model for management use, they appreciate that ASMFC listened to public concern and has continued to prohibit the bait harvest of female Delaware Bay-origin horseshoe crabs rather than implement the model's recommendations.

In prior comments to ASMFC, New Jersey Audubon and Defenders of Wildlife presented independent analysis demonstrating that red knots are highly dependent on female horseshoe crabs in ways that the revised ARM model disregards. Contrary to extensive research and the premise of the ARM Framework's objective statement,[11] the ARM model assumes that there is scarcely any correlation between female horseshoe crab abundance and red knot survival.[12] But independent analysis found that red knot survival is tightly correlated with the availability of horseshoe crab eggs on the beach—a metric that the ARM model entirely omits.[13] The ARM model also vastly overestimates red knot survival rates and thus fails to recognize the species' vulnerability to periods of low egg availability.[14] ASMFC's defense of these high survival rates depends on likely misreads of red knot tagging data and serious misinterpretations of relevant scientific literature.[15] And in recent years, ASMFC has struggled to cope with what appears to be pervasive misclassification of female horseshoe crab ages in survey data.[16] The Commission has attempted to backfill missing empirical data with mathematical estimates, but with key data

[11] ASMFC, *Revision to the Framework for Adaptive Management of Horseshoe Crab Harvest in the Delaware Bay Inclusive of Red Knot Conservation* (Draft for Board Review) 25 (2022).
[12] New Jersey Audubon and Defenders of Wildlife's 2022 Comments 3-4, 2022 analysis by Dr. Kevin Shoemaker 6-12; 2024 Comments 2-3, 2024 Shoemaker analysis 5-8.
[13] New Jersey Audubon and Defenders of Wildlife's 2023 Comments 8-10, 2023 Shoemaker analysis 19-27.
[14] New Jersey Audubon and Defenders of Wildlife's 2023 Comments 8-11, 2023 Shoemaker analysis 8-14.
[15] New Jersey Audubon and Defenders of Wildlife's 2024 Comments 3-6, 2024 Shoemaker analysis 11-15.
[16] Memorandum from Delaware Bay Ecosystem Technical Committee and Adaptive Resource Management Subcommittee re: Delaware Bay Horseshoe Crab Harvest Recommendation for 2025, at 2 (Sept. 23, 2024), *in* ASMFC, Materials for the 2024 Annual Meeting of the Horseshoe Crab Management Board.

missing, the ARM model cannot be run in the manner that its creators intended and the Board approved.

Moreover, while trawl surveys have appeared to indicate increasing female horseshoe crab abundance in recent years, these data mask underlying concerning trends in the population. The surveys also reveal that the sex ratio of females to males is declining, and that female body size is decreasing.[17] These trends would not be expected in a recovering population and suggest that important aspects of horseshoe crab physiology and population dynamics have been overlooked or poorly understood. The persistently low availability of horseshoe crab eggs, noted above, raises additional concerns about the status of horseshoe crabs.

Female horseshoe crabs are also threatened by the rapidly accelerating biomedical harvest along the Atlantic Coast, which increased from fewer than 700,000 horseshoe crabs in 2020 to more than 1.1 million in 2023.[18] Many stakeholders believe that ASMFC underestimates the deleterious impacts (both lethal and sublethal) of the biomedical harvest, but even by the Commission's estimate, coastwide biomedical mortality exceeded 178,000 in 2023.[19] The Horseshoe Crab Fishery Management Plan directs ASMFC to consider restrictions on the biomedical harvest if mortality exceeds 57,500[20]—a figure that was exceeded more than three times over in 2023—but the Commission has yet to act. Females are especially valuable to the biomedical industry because their larger body size means more blood can be drained from them. The increasing biomedical pressure is all the more reason not to roll back protections from the bait harvest.

The current state of the ecosystem demonstrates that prohibiting the female bait harvest is necessary and will remain so for the next several years. In particular, considering red knots' listing under the Endangered Species Act and their continued low abundance at Delaware Bay, it is critical not to dismantle their fragile path to potential recovery. ASMFC should approve Option 1B to enable multi-year male-only harvest specifications.

B. Multi-Year Harvest Specifications Would Reduce Uncertainty for Stakeholders.

Establishing a multi-year male-only bait harvest would provide the important additional benefit of alleviating stakeholders' uncertainty and confusion about the Board's management intentions. As noted above, the current version of the ARM model is overwhelmingly opposed by the public

[17] Yan Jiao et al., *Results of the 2023 Horseshoe Crab Trawl Survey: Report to the Atlantic States Marine Fisheries Commission Horseshoe Crab and Delaware Bay Ecology Technical Committees* 4 (Aug. 2024), *in* ASMFC, Materials for the 2024 Annual Meeting of the Horseshoe Crab Management Board; New Jersey Audubon and Defenders of Wildlife's 2022 Comments, 2022 analysis by Dr. Romuald Lipcius 6-8, 10-11.
[18] ASMFC, Review of the Interstate Fishery Management Plan: Horseshoe Crab (*Limulus polyphemus*): 2020 Fishing Year 6 (Oct. 2021), *in* ASMFC, Materials for the 2021 Annual Meeting of the Horseshoe Crab Management Board; ASMFC, Review of the Interstate Fishery Management Plan: Horseshoe Crab (*Limulus polyphemus*): 2023 Fishing Year 7 (Oct. 2024), *in* ASMFC, Materials for the 2024 Annual Meeting of the Horseshoe Crab Management Board. Due to limitations in the data reported by ASMFC, biomedical data cannot be broken down by sex or geography.
[19] ASMFC, Review of the Interstate Fishery Management Plan: Horseshoe Crab (*Limulus polyphemus*): 2023 Fishing Year 7, *in* ASMFC, Materials for the 2024 Annual Meeting of the Horseshoe Crab Management Board.
[20] ASMFC, Interstate Fishery Management Plan for Horseshoe Crab 27 (Dec. 1998).

because it is virtually certain to recommend a substantial female bait harvest. While the Board has not implemented that recommendation to date, the public is in the difficult position of having to guess whether resuming the female harvest is under serious consideration in any given year. The public has no indication of whether a resumption of female harvest is a serious threat such that it is necessary to advocate for maintaining existing protections.

Resuming the female bait harvest would be the most consequential reversal of horseshoe crab protections in the twenty-seven years since ASMFC issued the horseshoe crab Fishery Management Plan. Such a step should not be considered without full public notice and transparency. At the same time, if the Board is not considering reversing the prohibition on female bait harvest, advocacy to maintain that prohibition is a resource-intensive distraction for both the public and the Commission. Multi-year male-only harvest specifications would facilitate public engagement that is responsive to the options that are actually under consideration by the Board.

C. Suggestions for Improving Option 1B

Of the options presented in Draft Addendum IX, New Jersey Audubon and Defenders of Wildlife strongly urge the Board to approve Option 1B over maintaining the status quo. They also offer two suggestions regarding the language and implementation of Option 1B.

First, ASMFC should remove limitations on the duration of multi-year specifications. The precarious condition of the Delaware Bay ecosystem, together with unresolved defects in the ARM model, demonstrate that circumstances would need to improve significantly before any resumption of the female bait harvest should be seriously considered. As currently drafted, Option 1B limits multi-year male-only harvest specifications to three years, and the ability to set multi-year specifications would expire after six years (barring a new addendum). These temporal limitations are unnecessary, and they are arbitrarily untethered to whatever the ecological conditions may be at the time of expiration. Instead, ASMFC should allow for multi-year specifications that remain effective until the Board affirmatively—and with adequate public notice—changes them.

Second, while multi-year specifications are in effect, the Board should consider improvements to all aspects of the ARM model. Draft Addendum IX appropriately indicates that the Board will consider changes to the ARM model while multi-year male-only harvest quotas are in effect, based on stakeholders' recommendation at the July 2024 Horseshoe Crab Management Objectives Workshop.[21] However, the recommendation in the Workshop Report is confined to considering changes to the ARM model's reward and utility functions.[22] While such changes may be appropriate, the defects identified in previous comments from New Jersey Audubon and Defenders of Wildlife pertain to other aspects of the model. It is critical for the Board to comprehensively evaluate the ARM model and make all necessary improvements while the ARM model is undergoing review.

[21] Draft Addendum IX 3-4.

[22] ASMFC Staff & Weaver Strategies LLC, *Report on the July 2024 Horseshoe Crab Management Objectives Workshop* 12 (Oct. 7, 2024), *in* ASMFC, Materials for the 2024 Annual Meeting of the Horseshoe Crab Management Board.

II. The Board Should Require Harvest Reductions if the Male:Female Sex Ratio of Horseshoe Crabs Falls.

The Board should adopt Sub-option 1B-2 requiring a reduced male horseshoe crab bait harvest for years when the ARM model is not run if the male:female sex ratio falls below 3:1. For the reasons described in Draft Addendum IX, this is a commonsense precaution that will help ensure an abundance of males sufficient to fertilize the eggs laid by females. It is a straightforward and efficient way for ASMFC to respond to unpredicted volatility in male abundance.

Along with their support for Sub-option 1B-2, New Jersey Audubon and Defenders of Wildlife offer the following suggestion and observation.

For the purpose of determining the sex ratio under this sub-option, the Board should use the Virginia Tech trawl survey rather than the bay-wide spawning survey. The spawning survey has long been plagued by concerns about accuracy and reliability. While the notion of counting males on the beach to determine whether there is an adequate number to fertilize the eggs may hold intuitive appeal, a spawning survey is particularly inappropriate for determining sex ratio. Results can be skewed by females buried under spawning males and out of sight of the surveyor. Moreover, males are known to spawn with every tide, whereas females spawn only once or twice, further skewing male numbers upwards. The Virginia Tech trawl survey provides a ratio unbiased by these challenges.

In addition, while a significant decline in sex ratio would be an important reason to reduce the male-only harvest specification, the same holds true for a significant decline in *any* aspect of the horseshoe crab population. For example, it would also be necessary to reduce harvest levels if the total abundance of horseshoe crabs declined, regardless of the sex ratio. Even a decline in female abundance may counsel in favor of reducing the male harvest due to unanticipated or unintended effects of the male harvest such as female bycatch. The Board should be prepared to reduce harvest levels if conditions warrant, regardless of whether the precise scenario was contemplated in Addendum IX.

III. The Board Should Readopt the Seasonal Harvest Restrictions of Addenda IV-VI.

The Board should adopt Option 2B, reaffirming its intent to prohibit, from January 1 through June 7: (a) directed harvest and landing of all horseshoe crabs for bait in New Jersey, Delaware, and Maryland, and (b) the landing of horseshoe crabs in Virgina from federal waters.

As Draft Addendum IX explains, these restrictions were in place under Addenda IV-VI and later dropped, apparently inadvertently, beginning with Addendum VII. New Jersey Audubon and Defenders of Wildlife commend the Board for identifying this oversight and strongly support reestablishing seasonal harvest restrictions as described in Option 2B.

IV. Conclusion

Multi-year male-only harvest specifications offer an opportunity to maintain a stable horseshoe crab management regime and address shortcomings in the current version of the ARM model. Ecological conditions at Delaware Bay reinforce the need to maintain the prohibition on the female bait harvest for at least the next several years. The Board should adopt Option 1B, along with Sub-option 1B-2 and Option 2B.

Respectfully submitted,

Benjamin Levitan
Senior Attorney
Earthjustice Biodiversity Defense Program
(202) 797-4317
blevitan@earthjustice.org

Outlook

[External] New public comment for Horseshoe Crab Draft Addendum IX

From ASMFC <info@asmfc.org>
Date Mon 3/31/2025 9:42 AM
To Comments <comments@asmfc.org>

Horseshoe Crab Draft Addendum IX

Action Title

Horseshoe Crab Draft Addendum IX

Action URL

https://asmfc.org/actions/horseshoe-crab-draft-addendum-ix/

Name

Lisa Ferguson

Email

lferguson@wetlandsinstitute.org

State

New Jersey

Comment

The Wetlands Institute has a long history stewarding the Delaware Bay population of horseshoe crabs (Limulus polyphemus) through programs in research, conservation, and education. Since 1991, our staff and volunteers have contributed annually to the Delaware Bay spawning surveys and, since 2013, we have organized hundreds of volunteers to rescue over one million stranded horseshoe crabs on Delaware Bay beaches in New Jersey through the reTURN the Favor program. Through our investment in this work, we are helping to recover the Delaware Bay population of horseshoe crabs and the species that rely on them.
As stakeholder participants in the ASMFC Horseshoe Crab Management Objectives Workshop in 2024, we recommended the maintenance of a zero-female harvest for the Delaware Bay population while revisions to the Adaptive Resource Management (ARM) model are determined.
We write with appreciation for the chance to weigh in on Draft Addendum IX, in support of:
Option 1B2: Allow for multiyear specifications for male-only bait harvest, with reduced harvest limits if the sex ratio from spawning surveys falls below 3:1.
Option 2B: Reestablish seasonal harvest restrictions.
Option 3A: Maintain the harvest caps for Maryland and Virginia.
The horseshoe crab population plays a critical role in the resiliency of the Delaware Bay ecosystem. Threatened and at-risk species from near and far rely on the eggs deposited by spawning horseshoe crabs amassed on Delaware Bay beaches during critical life history stages. Famously, red knots (Calidris canutus rufa) make a hemispheric journey to

nesting grounds in the Arctic aided by a stopover on the Delaware Bay to gorge on abundant and accessible crab eggs. Local breeding fish, crabs, birds, and reptiles consume these eggs, creating ecological linkages of impact that extend far beyond the Delaware Bay. Though the connection and value of horseshoe crabs to a multitude of species is clear, the extent and repercussions from a reduced population of horseshoe crabs are not fully understood. Incorporating additional data, particularly annual measures of horseshoe crab egg densities, would strengthen the models for multiple species.

Lisa Ferguson, PhD
Director of Research and Conservation
The Wetlands Institute

Outlook

[External] New public comment for Horseshoe Crab Draft Addendum IX

From ASMFC <info@asmfc.org>
Date Fri 3/21/2025 9:38 AM
To Comments <comments@asmfc.org>

Horseshoe Crab Draft Addendum IX

Action Title

Horseshoe Crab Draft Addendum IX

Action URL

https://asmfc.org/actions/horseshoe-crab-draft-addendum-ix/

Name

Chris Crolley

Email

capt.cmc@gmail.com

State

South Carolina

Comment

Dear Commissioners:
As members of the Horseshoe Crab Recovery Coalition, a diverse group of more than 50 conservation and healthcare organizations dedicated to ensuring the future of the American horseshoe crab, we are writing to strongly encourage the adoption of the following options in Draft Amendment IX:
• Option 1B: Allow multi-year specifications for male-only bait harvest for horseshoe crabs of Delaware Bay-origin.
o Sub-option 1B-2: In interim years, male horseshoe crab harvest must be reduced if spawning beach survey results indicate a male to female sex ratio below 3:1.
• Option 2B: Reestablish seasonal harvest restrictions of Addendum IV-VI.
• Status Quo
While we appreciate the effort involved in proposing Draft Addendum IX, the Coalition remains concerned that the Adaptive Resource Management model used to set quotas is flawed. Any resumption of the female harvest should depend on documented evidence that horseshoe crab numbers are increasing, and that egg density data – the truest measure of the health of the species – shows signs of durable long-term recovery. The coalition's ongoing concerns with the ARM framework have been documented in detail and echo those made by Earthjustice on

behalf of New Jersey Audubon and Defenders of Wildlife, two influential coalition partners, in a September 25, 2023, letter to the Horseshoe Crab Management Board.

Current indicators monitored by the coalition continue to show that that both horseshoe crab populations and the population of red knots, that depend on their eggs as a source of food, are well below recovery thresholds.

The ongoing use of horseshoe crabs for bait and increased use for biomedical purposes jeopardize their recovery to historic population levels. Rufa red knot populations also remain near all-time lows from both a changing climate and the increasing scarcity of the food needed to fuel their 9,000-mile migration. The 2025 State of the Birds Report lists the red knot as a tipping point species due to ongoing population loss with recent accelerated declines.

Many of our conservation organizations have sounded the alarm about the global biodiversity crisis and the specific threats facing shorebird populations, which have plummeted more than 70 percent over the past 50 years. Allowing the killing of female horseshoe crabs at this critical moment further imperils recovery of shorebirds like the red knot.

The joint collapse of red knots and horseshoe crabs is not inevitable. The Coalition welcomes a multi-year ban on the taking of female horseshoe crabs as a necessary step in the right direction. We support this action while continuing to advocate for a total moratorium on horseshoe crab harvest.

Respectfully signed by,
Chris Crolley
Member of the Horseshoe Crab Recovery Coalition

References:

Duijns, S, L.J. Niles, A, Dey, Y. Aubry, C. Friis, S. Koch, A.M. Anderson, and P.A. Smith. 2017. Body condi8on explains migratory performance of a long-distance migrant. Proceedings of the Royal Society B 284: 20171374. h\p://dx.doi.org/10.1098/rspb.2017.1374.

Harramis, G.M., W.A. Link, P.C. Osenton, D.B. Carter, R.G. Weber, N.A. Clark, M.A. Teece and D. S. Mizrahi. 2007. Stable isotope and pen feeding trial studies confirm the value of horseshoe crab Limulus polyphemus eggs to spring migrant shorebirds in Delaware Bay. Journal of Avian Biology. 38: 367376. doi: 10.1111/j.2007.0908-8857.03898.x.

Karpanty, S.M., J.D. Fraser, J. Berkson, L.J. Niles, A. Dey and E.P. Smith. 2006. Horseshoe crab eggs determine Red Knot distribution in Delaware Bay. Journal of Wildlife Management 70:1704-1710.

Bo\on, M.L., R.E. Loveland and T.R. Jacobsen. 1994. Site selection by migratory shorebirds in Delaware Bay and its relationship to beach characteristics and abundance of horseshoe crab (Limulus polyphemus) eggs.

Outlook

[External] New public comment for Horseshoe Crab Draft Addendum IX

From ASMFC <info@asmfc.org>
Date Mon 3/31/2025 7:56 PM
To Comments <comments@asmfc.org>

Horseshoe Crab Draft Addendum IX

Action Title

Horseshoe Crab Draft Addendum IX

Action URL

https://asmfc.org/actions/horseshoe-crab-draft-addendum-ix/

Name

George Gehring

Email

gehr1234@yahoo.com

State

Delaware

Comment

I attended the recent meeting at the Little Creek Wildlife office and would like to make my preferences known for the Addendum IX management plan.

I support 3.1, 1-B sub-option 1B-2

I support 3.2, 2B

I support 3.3, option 3B

Thank you for your presentation.

Outlook

[External] New public comment for DE Horseshoe Crab Draft Addendum IX Hearing

From ASMFC <info@asmfc.org>
Date Thu 3/27/2025 3:16 PM
To Comments <comments@asmfc.org>

DE Horseshoe Crab Draft Addendum IX Hearing

Action Title

DE Horseshoe Crab Draft Addendum IX Hearing

Action URL

https://asmfc.org/events/de-horseshoe-crab-draft-addendum-ix-hearing/

Name

Lani Hummel

Email

lanihummel@aol.com

State

Maryland

Comment

There should be male-only horseshoe crab harvests for the foreseeable future. The red knot population has not rebounded to the point where female horseshoe crabs should be included in the harvests. That said, my hope is that sooner rather than later, there will be a ban on harvests of all horseshoe crabs, male and female. There is a viable substitute for horseshoe crab blood used for medical purposes and there are other, less vulnerable animals that can be used for bait in the whelk and eel fisheries.

Outlook

[External] Horseshoe Crab Draft Addendum IX

From RUBY LAUFER <rubyl@comcast.net>
Date Fri 3/28/2025 10:02 AM
To Comments <comments@asmfc.org>

Hi Caitlin,

I am a resident of the NJ shore and also have a home at Kitts Hummock beach in Dover, Delaware. I am writing to comment on the Horseshoe Crab Addendum 3.0 for the Management Options for horseshoe crabs.

For Issue 3.1, Multi Year Specifications, I support Option 1B and sub option 1B-2. I feel it is crucial to protect our female horseshoe crabs as well as the male/female ratio.

For Issue 3.2 Seasonal Harvest Restrictions I support option 2B.

For Issue 3.3 Application of Harvest Caps for Maryland and Virginia, I support 3B.

Thank you so much for the work that you all do in protecting our horseshoe crabs!

Ruby Laufer

Outlook

[External] 'Horseshoe Crab Draft Addendum IX'

From Gmail <majorcasualty@gmail.com>
Date Mon 3/31/2025 9:17 PM
To Comments <comments@asmfc.org>

My name is Mark Martell and I served as President of the Delaware Audubon Society for many years and have been involved in the horseshoe crab and migratory shorebird conservation fight since the 1980's.

I understand that my comments are only supposed to deal with the management options being offered. I find none of the management options palatable. Even a male only harvest option for the Delaware side of the Bay makes no sense.

We are better than this.

We have the science to recognize that we no longer need the horseshoe crab blood to test products for human product testing. We've developed an alternative and should migrate to it.

In terms of using the crab as bait for whelk and eel? We don't need it. Male or female. On the Delaware side of the Bay our agencies inform us that there is minimum economic value for the male crab. Depending on who you talk to, the bait is worth 15-25 cents per crab. For a ballpark of 150,000 male crabs harvested, less than $100,000 a year worth of value is derived. The professional fishermen themselves complain about the minimum value a male only limited harvest provides.

Anyone who has taken the time to witness the migratory shorebird relationship over decades knows full well that the extreme over harvesting of crabs going back to the 1980's is principally responsible for the decline of our plover, red knot and sanderling species. While limiting these harvests over the last decade or three have been helpful, the threatened species numbers have merely flatlined and not fully recovered.

The Delaware taxpayer will not be impacted at all over the cessation of harvesting horseshoe crabs. So the question begs - what's the value proposition for any harvest whatsoever? Shut it down. There is far more economic value to the ecotourism associated with Delaware's unique role on the Great Atlantic Flyway than there is in the appeasement of a handful of permitted fishermen using a seasonal only bait to catch conch and eel.

We are better than this. Aren't we?

Sincerely,

Mark B Martell
Bear, DE
302-229-7352

Outlook

[External] New public comment for DE Horseshoe Crab Draft Addendum IX Hearing

From ASMFC <info@asmfc.org>
Date Sat 3/29/2025 8:50 AM
To Comments <comments@asmfc.org>

DE Horseshoe Crab Draft Addendum IX Hearing

Action Title

DE Horseshoe Crab Draft Addendum IX Hearing

Action URL

https://asmfc.org/events/de-horseshoe-crab-draft-addendum-ix-hearing/

Name

Stuart Potter

Email

stupotter444@outlook.com

State

Delaware

Comment

The Atlantic States Marine Fisheries Commision has an obligation to promote the better utilization of fisheries along the Atlantic coast through facts and studies based in science and not be influenced by any outside stakeholder groups however invested in this issue. If ASMFC Horseshoe Crab Board can't follow the Commission's recommendations based on all the very expensive studies and calculations done by the technical committee than maybe some changes need to be made to the HSC board itself. Delaware losing the harvest of female HSC's for 2023, 2024 and now 2025 from the board going against the Commission's recommendations has caused the fisherman involved in Delawares bait harvest to suffer huge financial loses. The workshop in Lewes Delaware did not have one person from Delaware's bait harvest fishery and two of the members supposed to be representing the fishing community from the DE bay region are heavily involved in the biomedical industry giving the biomedical industry four representatives. The other supposed to be representing the fishing community is on the ASMFC horseshoe crab board as a proxy. There was no true representation of bait fishermen and it appears to be intentional. On issue #1 I support option 1A: status quo. On issue #2 I support option 2A status quo. On issue #3 I support option 3A status quo and insist that another workshop be held this summer were all stakeholder groups have a seat at the table before the HSC board meets in the fall of 2025. Please allow the technical committee's recommendation for the small harvest of female HSC's in Delaware.

Outlook

[External] New public comment for MD Horseshoe Crab Draft Addendum IX In-Person Hearing

From ASMFC <info@asmfc.org>
Date Sat 3/29/2025 7:07 AM
To Comments <comments@asmfc.org>

MD Horseshoe Crab Draft Addendum IX In-Person Hearing

Action Title

MD Horseshoe Crab Draft Addendum IX In-Person Hearing

Action URL

https://asmfc.org/events/md-horseshoe-crab-draft-addendum-ix-in-person-hearing/

Name

Stuart Potter

Email

stupotter444@outlook.com

State

Delaware

Comment

The definition of harvesting when it refers to animals:
1. a quantity of animals caught or killed for human use
2. to catch or kill (animals) for human use or consumption
The Atlantic States Marine Fisheries Commision has allowed the Biomedical industry to change the wording of the English language when talking about fishing for horseshoe crabs using Bottom Trawling methods. Any method of fishing for horseshoe crabs is a harvest biomedical or not. Bottom trawling for any live species whether it is for consumption, bait or biomedical research is fishing and is a harvest. It doesn't matter what percentage survives the process and it is the literal definition of fishing and harvesting. During this fishing practice the Atlantic States Marine Fisheries Commision doesn't even add in the estimated amount of Horsehoe Crabs that are crushed, mangled and killed on the bottom of the ocean floor that do not come up in the trawlers nets. This alone proves that the estimated mortality is not accurate. If they were not fishing/harvesting these crabs from bottom trawling or dredging this added underestimated mortality would not be happening. The Atlantic States Marine Fisheries Commision should require that the majority of Horseshoe Crabs harvested for biomedical purpose be taken from the zero bi catch fishery of hand harvesting (male only). This method is not only zero bi catch but much less stressful on the crabs because of the gentle manner at which they can be handled. No female crabs should be harvested for biomedical purpose just because it's more cost effective.

Outlook

[External] New public comment for Horseshoe Crab Draft Addendum IX

From ASMFC <info@asmfc.org>
Date Mon 3/31/2025 11:55 PM
To Comments <comments@asmfc.org>

Horseshoe Crab Draft Addendum IX

Action Title

Horseshoe Crab Draft Addendum IX

Action URL

https://asmfc.org/actions/horseshoe-crab-draft-addendum-ix/

Name

Purnell Potter

Email

purnpotter4@gmail.com

State

Delaware

Comment

I support option A status quo on issues 1,2,& 3. The potential harvesting of female horseshoe crabs through hand collecting in Delaware needs more attention. The science clearly shows there's no reason it shouldn't be considered. There have been zero females harvested for well over a decade in Delaware. It's time to take a more reasonable approach. I'm pushing for the board to take a closer look into Delaware's clear disadvantage. Females are collected in Delawares surrounding states for biomedical purposes. Hand harvesting is the cleanest and least invasive way to harvest horseshoe crabs. Once again I support option A status quo on issues 1,2,& 3.

Thanks
Purnell Potter IV

Outlook

[External] New public comment for Horseshoe Crab Draft Addendum IX

From ASMFC <info@asmfc.org>
Date Fri 3/21/2025 12:32 PM
To Comments <comments@asmfc.org>

Horseshoe Crab Draft Addendum IX

Action Title

Horseshoe Crab Draft Addendum IX

Action URL

https://asmfc.org/actions/horseshoe-crab-draft-addendum-ix/

Name

Kurt Schwarz

Email

krschwa1@verizon.net

State

Maryland

Comment

I support the proposal to limit all harvest to males only. Ideally, all harvest should be ceased until both horseshoe crabs and Red Knots and other shorebirds species recover. But one step at a time. Since females only produce eggs, which feed the shorebirds, it makes sense to end the harvest of females. I lead annual trips to Delaware Bay to see Red Knots and other shorebirds. They have become decidedly scarce in late May, nor have we seen many horseshoe crabs.

It should be noted that Maryland has the highest quota for the Mid-Atlantic states. I have been advocating to curtail, indeed, eliminate the Maryland harvest for the last decade and half. At least some of the horseshoe crabs harvested in Maryland originate in Delaware Bay.

The end of female harvest makes sense to me. But we should go further, and end all bait harvest, while encouraging the switch to the alternative for horseshoe crab blood in the medical field.

Atlantic States Marine Fisheries Commission (ASMFC)

Horseshoe Crab Management Board

Date: March 31, 2025

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

I am in support of Option 1A. to continue to run the ARM Model every year and have the results presented to the ASMFC Horseshoe Crab Management Board for their consideration and review. The Board's decision would be based on "the best available science" and would be transparent. Putting the ARM Model on a shelf and providing no population estimates for three years does not benefit the horseshoe crab nor the Red Knot. It halts our knowledge of the two species and prevents us from improving and moving forward with our data collection and analysis.

The ARM plan along with the population estimates are the most important gauges for managing the horseshoe population. The ARM incorporates all the horseshoe crab data from the Delaware Bay States and determines the appropriate level of harvest based on the data. The population estimates add relevance to the numbers. The ARM results coupled with the population estimates guide the decisions of fishery managers.

At a time when the public is becoming more aware of the importance of horseshoe crabs, and influencing management decisions, these numbers are more important than ever. Fishery managers and the public should be provided the "best available science" in a way that is easily presentable and understandable.

Addendum IX puts the "the best available science" on a shelf. The facts will be obscured within State Reports and Independent Surveys, less straightforward, less subject to scrutiny, and less accessible than the ARM results and population estimates. After years of intense criticism, the modeling and the population analysis could not be more transparent.

Addendum IX is not a management tool. It deters us from focusing on the horseshoe crab, and steers us away from understanding the Red Knot population.

Sincerely,

Benjie Swan

Limuli Laboratories

Leonard Voss, Jr.
2854 Big Oak Rd
Smyrna, DE 19977
Phone: 302-423-6564

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

Subject: Horseshoe Crab Draft Addendum IX

Dear Ms. Starks:

Thank you for the opportunity to comment on Draft Addendum IX of the Horseshoe Crab Fishery Management Plan.

I am commercial fisherman from Delaware. I prefer sub-option 1B-1 (no requirement to reduce male harvest limit based on spawning sex ratio) as it allows for a multi-year approach. I feel that nothing would be gained by the HSC Management Board ignoring the science every year, specifically the results of the Adaptive Resource Management Model. I feel the best way to stay on top of horseshoe crab management is to have the results of the ARM calculated and disseminated annually.

Regarding Issue 2, I support option 2B as I feel this would bring all Delaware Bay states under the same seasonal harvest restrictions.

Regarding Issue 3, I favor option 3B as I feel the amended language is in agreement with the intent of the original language.

Respectfully,

Leonard H Voss Jr

Leonard Voss Jr.

Outlook

[External] New public comment for DE Horseshoe Crab Draft Addendum IX Hearing

From ASMFC <info@asmfc.org>
Date Fri 3/21/2025 11:03 AM
To Comments <comments@asmfc.org>

DE Horseshoe Crab Draft Addendum IX Hearing

Action Title

DE Horseshoe Crab Draft Addendum IX Hearing

Action URL

https://asmfc.org/events/de-horseshoe-crab-draft-addendum-ix-hearing/

Name

Dr Harvey Yenkinson

Email

vetcraft@aol.com

State

New Jersey

Comment

I am hopeful the commission will consider a land based harvest only and disallow dredging for horseshoe crabs. Land based harvest is 100% selective for harvesting females only. It is also environmentally friendly and creates no harm to the environment.

In contrast, the heavy dredges used are extremely damaging to the bottom ecosystem. Also dredging introduces dead discards into the equation, and is not selective for sex harvest.

Atlantic States Marine Fisheries Commission

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

MEMORANDUM

TO: **Horseshoe Crab Management Board**

FROM: **Horseshoe Crab Advisory Panel**

DATE: **April 21, 2025**

SUBJECT: **Advisory Panel Report**

A Horseshoe Crab Advisory Panel (AP) meeting was held on Thursday, April 10 from 3:00 - 4:30 p.m. The purpose of the meeting is to review Draft Addendum IX to the Horseshoe Crab FMP as well as public comments submitted and provide input to inform the Management Board's decisions on the management action.

AP Attendance

Brett Hoffmeister, Chair (MA)
Nora Blair (SC)
Allen Burgenson (MD)
Christina Lecker (VA)
David Meservey (MA)
Matthew Sarver (DE)
Benjie Swan (NJ)
George Topping (MD)

Draft Addendum IX is specific to the Delaware Bay region horseshoe crab bait fishery. It considers allowing the Board to set specifications for male-only harvest for multiple years. It also considers options for managing male-only harvest limits, seasonal harvest restrictions, and when to apply harvest caps for Maryland and Virginia. The AP's discussion is summarized below and is separated by issue in the Draft Addendum.

Section 3.1: Multi-year specifications

Consensus on a preferred option was not met; the majority of advisors supported Option 1A, which would continue to require specifications to be set annually using the Adaptive Resource Management (ARM) Framework. Rationales for supporting this option were provided, including a desire for a transparent process every year where data are reviewed, and a harvest limit is set based on the most up to date outputs of the ARM. They also commented that the ARM Framework as implemented has been working based on the significant increases to the population of horseshoe crabs in the Delaware Bay region since 2013, and therefore they do not see a change to the process as necessary. One advisor was concerned that if multi-year specifications were allowed, it would become the new norm and the data and surveys for the ARM could be perceived as less important and possibly terminated. It was also noted that the Board can still opt to implement male-only harvest under status quo.

One advisor supported Option 1B, citing the need to give the ARM Subcommittee time to focus on improvements to the ARM, which would likely take years to accomplish. They also noted that the reward and utility functions of the ARM are not completely objective and exploring modifications to these functions is important for stakeholder buy-in to the ARM Framework. This advisor also supported sub-option 1B-2 but stated that a 4:1 male to female ratio would be a more appropriate point below which to start reducing the male harvest limit due to the long

generation time for horseshoe crabs. Some members supporting Option 1A also stated they could live with Option B, and would prefer Sub-option 1B-1.

Section 3.2: Seasonal Restrictions

Consensus on a preferred option for the season closure was not met; however, the advisors did not express strong support or opposition for either option. Several did not have a preference. Several advisors supported Option 2A because it would provide more of an opportunity for harvesters. George Topping stated this is a non-issue. The current regulations in Maryland only allow for 25 horseshoe crabs to be harvested as bycatch per day, or 150 crabs per day for permit holders, before May 1.

One advisor supported Option 2B because that reflects the intention of the Board at the time of Addendum VII's development. They also stated that depending on the significance of the harvest between May 1 and June 8, they could be willing to reconsider support for Option 2A.

Section 3.3: Harvest Cap Policy for MD and VA

The AP discussed this section of the draft addendum briefly and a few advisors supported Option 3B as a way to clarify the current policy. One advisor said status quo is working fine. Others abstained from providing input on this topic.

Atlantic States Marine Fisheries Commission

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

MEMORANDUM

TO: **Horseshoe Crab Management Board**

FROM: **Adaptive Resource Management Subcommittee**

DATE: **April 18, 2025**

RE: **Recommendations for Reviewing Reward, Utility, and Harvest Policy Functions of the ARM Framework**

Background

In October 2024, the Horseshoe Crab Management Board (Board) reviewed the final report from the July 2024 Stakeholder Workshop on Delaware Bay Management Objectives. The workshop convened a group of stakeholders representing environmental NGO, fishing, biomedical, bird and horseshoe crab scientists, and management perspectives to discuss the Adaptive Resource Management (ARM) Framework and management objectives for the Delaware Bay region bait fishery. Through a consensus-building process designed to surface core issues and concerns, gauge existing areas of common ground, and identify new areas of agreement, the workshop aimed to generate recommendations for Board consideration regarding horseshoe crab management in the Delaware Bay region.

One of the key recommendations produced was, "using current ASMFC processes, refine the ARM reward and utility functions with stakeholder input." The Board supported this recommendation and tasked the ARM Subcommittee (Subcommittee) with reviewing the reward and utility functions of the ARM Framework and discussing what input from stakeholder groups would be needed to provide direction on changes. The ARM Subcommittee met three times in early 2025 to address this task and develop recommendations for next steps to address the workshop recommendation.

Recommendations on Possible Changes to the Reward, Utility, and Harvest Policy Functions

The Utility, Reward, and Harvest Policy (U/R/H) Functions of the ARM Framework are the three functions within the ARM Framework that reflect values placed on horseshoe crabs (HSC) and red knots, and associate harvest levels with population abundance levels of both species. The utility functions for red knots and HSC were developed in 2021 by the Modeling Subcommittee based on their interpretation of earlier stakeholder input provided during development of the 2009 ARM Framework. These functions consider goals for each species that management is aiming to achieve. In the case of horseshoe crab harvest, maximum utility is achieved when the economic value of recommended harvest equals the economic value of the maximum allowable harvest of both sexes. For red knots, maximum utility is achieved when the population exceeds 81,900. The reward function reflects the combination of both horseshoe crab harvest and red knot abundance utilities and the objective is to maximize the total reward with the ideal

scenario for stakeholders being a red knot population above 81,900, and maximum HSC harvest allowed. The harvest policy functions establish how much HSC harvest would be allowed under different population abundance levels of red knots and horseshoe crabs.

The Subcommittee identified several aspects of these functions that could be modified to better reflect stakeholder values. These are summarized below.

1. ***Male and female relative harvest values in the horseshoe crab utility function***
   The current HSC utility function assumes one female harvested is worth twice as much as one male harvested. These values could be changed if current values are different.
2. ***Maximum harvest levels (500,000 males, 210,000 females)***
   The maximum possible harvest levels for males and females from the ARM Framework were negotiated and determined as acceptable to the industry during the original ARM Framework development process. It has been over ten years since these values were established and different maximum harvest limits may be more appropriate given current conditions.
3. ***The target and threshold abundance in the red knot utility function***
   The target population of 81,900 red knots was based on estimates of historic red knot abundances observed in Delaware Bay. A new target could be developed based on a historical reference period and more available survey data. A proposal was submitted by the US Fish and Wildlife Service (USFWS) New Jersey Field Office for consideration by the ARM SC, which links red knot utility both to a more explicit historic reference value and to the 2023 USFWS red knot recovery plan.
4. ***Including population growth rate as a factor in the red knot utility function***
   This would mean the reward value of red knots would depend on both population abundance and population growth rate. Growth rate could be derived from the red knot population model projections or the observed temporal change in annual mark-resight population estimates.
5. ***The slope and shape of the red knot utility function***
   The Subcommittee noted that a more gradual increase could be explored, and that the shape of the curve could be altered to create a more sigmoid-shaped curve. The current curve results in an abrupt increase in utility after the threshold abundance with a straight slope up to the maximum utility level. A sigmoidal curve would allow changes in utility to occur more gradually when red knot the abundance is near the threshold or target. There was also discussion about conditioning red knot utility on the population size of red knots relative to the population size of horseshoe crabs to ensure that a growing population of red knots would continue to have adequate food supply.
6. ***Weights assigned to red knots and horseshoe crabs in the reward function***
   The current function assigns equal reward value to red knots and HSC harvest. If it would better fit current stakeholder values, red knots and HSC could be assigned different reward value weights. Methods to determine appropriate weights of each term based on stakeholder values could be explored with experts in this type of exercise.

7. ***Harvest policy functions that intersect with zero***
   This would result in the possibility of a zero-harvest output for either sex. The current harvest policy functions do not intersect with zero based on the adaptive management optimization process because population simulations never resulted in a situation where horseshoe crab abundance decreased to a level that would significantly impact red knot survival.

Recommended Process for Stakeholder Engagement

The ARM Subcommittee discussed what type of process would be required to engage stakeholders in identifying and developing possible changes to the U/R/H functions. The group agreed that a series of meetings would be needed, including educational sessions, stakeholder meetings to elicit technical information to inform the U/R/H functions, and Subcommittee meetings to develop alternative U/R/H functions. The group emphasized the value of third-party facilitation to improve stakeholder buy-in and reduce the potential for bias. The Subcommittee recommends the Commission contract with a structured decision-making (SDM) expert to guide the development and execution of this process.

The Subcommittee proposes the following general process for conducting the review and revision of the U/R/H functions of the ARM Framework but notes that if an external SDM facilitator is contracted, they should be given the opportunity to design and structure the meetings as needed to achieve the goals of revising the U/R/H functions.

- ***Step 1: Educational Meetings***
  A series of educational sessions would be needed to increase the collective understanding of the U/R/H functions of the ARM Framework. These meetings could be conducted virtually, but they should allow for a dialogue between the technical experts on the Subcommittee and the stakeholders with an interest in providing input on the ARM Framework functions. Specifically, there should be dedicated question and answer sessions during these meetings to ensure stakeholders can gain the background knowledge needed to provide effective input. These meetings should focus on the technical functions of the ARM Framework and explain the differences between the 2009 and 2021 Frameworks. The ultimate purpose of these sessions (revising the ARM Framework U/R/H functions to better align with stakeholder values) and next steps in the process should be explained to attendees.
- ***Step 2: Stakeholder Meetings***
  A meeting or series of meetings should be convened with stakeholders representing different interest groups with the goal of eliciting information on values to inform revisions of the U/R/H functions. Stakeholders involved in these meetings should be provided with specific questions to elicit the necessary information. Particularly, the meetings should provide information on what conditions must be met for stakeholders to accept female horseshoe crab harvest, and how to phase it in. These meetings will require an SDM expert for designing and implementing a formal elicitation process.

- ***Step 3: ARM SC and TC Meetings***
  Once stakeholder input on the U/R/H functions is gathered, the Subcommittee will need a series of meetings to review the information provided by stakeholders and perform the technical work to develop alternative U/R/H functions that address their values. The Delaware Bay Ecosystem Technical Committee would also need to meet to review and approve any changes proposed by the ARM SC. These meetings could be conducted virtually.
- ***Step 4: Board Meeting to Consider Proposed Changes to the U/R/H functions***
  After alternative U/R/H functions are developed the Subcommittee would re-run the ARM model optimization and present proposed changes to the Board. If the Board wishes to pursue the recommendations at that time, it would need to initiate an Addendum to consider adopting any changes to the U/R/H functions.

Additional Considerations

The Subcommittee noted a number of issues that should be carefully considered in the development of this process. The first is the level of engagement with a contracted SDM expert. The Subcommittee believes it would be most valuable for the consultant to be involved throughout the entire process, including the early educational sessions. This would allow them to gain a foundational understanding of the biology of the species, the ARM Framework, U/R/H functions, and stakeholders. However, it is absolutely critical for an SDM expert to guide the second step of stakeholder meetings.

Second, the Subcommittee noted that during the public comment period on Addendum VIII to adopt the 2021 ARM Revision, public opposition to the revised ARM Framework went beyond just the U/R/H functions. While the Subcommittee believes reviewing the U/R/H functions could help bring management more in line with stakeholder values, it warns there may still be objections to the outcome and underlying population dynamics models for each species.

Third, the Subcommittee emphasized the importance of thoughtful design regarding stakeholder participation. With a variety of stakeholder groups, it will be important to ensure different perspectives are heard and valued throughout this process. Some stakeholder groups are much larger than others, so it will be important to dedicate time to each group. At the same time, concerns have been expressed about limiting participation to too small a small number, so it will be necessary to find the appropriate balance.

One member also raised concern about the differences in meeting accessibility for various stakeholders. Some stakeholders are more likely to be able to participate than others; for example, for some, workshop or meeting attendance is considered part of their job, but for others, attending a workshop precludes work. This concern could be partially addressed by offering stipends for meeting attendance. It would also be important to consider timing and geographic location of meetings. It can be especially difficult for those who work in the fishing industry to attend meetings during peak fishing seasons.

Atlantic States Marine Fisheries Commission

Horseshoe Crab Adaptive Resource Management Subcommittee & Delaware Bay Ecosystem Technical Committee Conference Call

Call Summary

Tuesday, January 7, 2025
2:00 – 4:00 PM

Attendance:
Horseshoe Crab Adaptive Resource Management Subcommittee: John Sweka (Chair), Jim Lyons (Vice Chair), Jason Boucher, Kat Christie, Steve Doctor, Bryan Knuse, Conor McGowan, Wendy Walsh
Delaware Bay Ecosystem Technical Committee: Wendy Walsh (Chair), Francesco Ferretti, Yan Jiao, Jordan Zimmerman, Steve Doctor, Kat Christie, Sarah Karpanty
ASMFC Staff: Caitlin Starks
Additional Attendees: Eric Reid, Will Harlan, Ben Levitan, Susan Linder

The Adaptive Resource Management (ARM) Subcommittee (SC) met via webinar to address a Board task from its October 2024 meeting. The Board tasked the ARM SC to review the ARM Framework reward and utility functions and discuss what input from stakeholder groups would be needed to provide direction on changes.

John Sweka presented a refresher on the three functions within the ARM Framework that reflect values placed on horseshoe crabs (HSC) and red knots, and associate harvest levels with population abundance levels of both species: the utility, reward, and harvest policy functions. The utility functions for red knots and HSC were developed based on stakeholder input and consider goals for each species that management is aiming to achieve. For red knots, utility is maximized when the Delaware Bay stopover population of red knots is greater than 81,900 birds. The HSC utility function reflects the economic value of HSC harvest, and it is maximized when the maximum number of male and female crabs (500,000 and 210,000) is harvested. It also assumes the value of female harvest is twice that of males. The reward function reflects the ideal scenario for stakeholders with the maximum reward occurring when the red knot population is above 81,900, and the maximum HSC harvest is allowed. The harvest policy functions establish how much HSC harvest would be allowed under different population abundance levels of red knots and horseshoe crabs and were derived through an optimization routine aiming to maximize the average total reward over 10,000 simulations. The female harvest policy function factors in female HSC abundance and red knot abundance; the male harvest policy function factors in only male HSC abundance.

The ARM SC discussed potential modifications that could be made to these functions to better reflect stakeholder values. The group noted that “knife edge” functions essentially equate to

harvest control rules, are not adaptive management, and should be avoided. Regarding the reward function, it was noted that the current function gives equal reward value to red knots and HSC harvest. It would be possible to assign different weights to red knots and HSC; there are methods to determine appropriate weights of each term based on stakeholder values that could be explored, and some of the ARM SC members have experience in this type of exercise.

Regarding the horseshoe crab utility function, the ARM SC noted that the assumption of female value being twice that of males could be reconsidered. Additionally, the maximum harvest levels (210,000 females and 500,000 males) could be reconsidered. The maximum harvest levels were negotiated and determined as acceptable to the industry during the original ARM Framework development process. At that time, the populations of male and female HSC were smaller than they are now, and the value of bait may have changed since then. It was noted that the maximum allowed harvest values established in the ARM Framework have a significant impact on the optimization results based on sensitivity runs using different maximum harvests. One person suggested that perhaps female harvest could not be allowed until after a certain red knot population is reached. It was also suggested that there could be a threshold horseshoe crab population level below which no HSC harvest would be allowed; this could also be considered as a separate management tool outside the ARM Framework as a backstop if the HSC population were to drop to very low levels.

Regarding the red knot utility function, the ARM SC discussed the target red knot population of 81,900 birds (where maximum red knot utility is reached) and whether that number should be reconsidered. Wendy Walsh suggested that value could be modified because it does not reflect current biological information, and that the function could use the red knot recovery plan and updated historical population estimates to derive lower and upper bounds for the utility range. It was also noted that the current red knot utility function does not consider that as the red knot population increases, more horseshoe crab eggs are needed to sustain the population. Another idea was to consider other metrics for determining red knot utility, such as the population growth rate in addition to abundance alone.

On the topic of the harvest policy function, one issue the group noted was that the current optimized functions do not have a zero intercept, meaning zero horseshoe crab harvest (male or female) would never be recommended. This is because extremely low levels of horseshoe crab abundance were outside the bounds of simulated HSC abundances in the optimization of the harvest policy functions (i.e., simulated HSC abundance never approached zero crabs under the maximum allowable harvest). The ARM SC modelers could explore methods to force the harvest policy functions to have a zero intercept.

The ARM SC agreed that one or more additional meetings would be needed before it would be beneficial to seek stakeholder input. The ARM SC members will meet again to continue discussing the ideas raised, what potential modifications are feasible, and recommend a process for involving stakeholders to provide input on potential changes.

Atlantic States Marine Fisheries Commission

Horseshoe Crab Adaptive Resource Management Subcommittee

Call Summary

Tuesday, January 21, 2025
9:00 – 11:00 AM

Attendance:
Horseshoe Crab Adaptive Resource Management Subcommittee: John Sweka (Chair), Jim Lyons (Vice Chair), Jason Boucher, Kat Christie, Margaret Conroy, Steve Doctor, Bryan Nuse, Conor McGowan, Wendy Walsh
Additional Attendees: Jordan Zimmerman, Francesco Ferretti, Sarah Karpanty, Andre Lai

The Adaptive Resource Management (ARM) Subcommittee (SC) met via webinar to address a Board task from its October 2024 meeting. The Board tasked the ARM SC to review the ARM Framework reward and utility functions and discuss what input from stakeholder groups would be needed to provide direction on changes. The ARM SC focused on the utility, reward, and harvest policy functions, which are the three functions within the ARM Framework that reflect values placed on horseshoe crabs (HSC) and red knots, and associate harvest levels with population abundance levels. The ARM SC identified specific components of these functions for which changes should be explored to reflect stakeholder values.

Red Knot Utility Function

The ARM SC discussed several aspects of the red knot utility function that could be explored. The first idea is to consider including growth rate as part of the function, thereby making the value of red knots dependent on both population abundance and growth rate. Growth rate could be derived from the red knot population model (IPM) projections. The growth rate varies from year to year, in part because each year some portion of the red knot population bypasses the Delaware Bay stopover area. Therefore, the group agreed using an average growth rate over several years would be preferable to the annual point value to smooth out normal variance in the data.

Another area that could be changed is the slope of the utility function; a more gradual increase should be explored as opposed to the current slope, which is relatively steep. The ARM SC could explore changing the population values in the utility function associated with zero utility (around 75,000 red knots) and maximum utility (81,900 red knots). The abundance associated maximum utility could be updated based on more current historical population estimates. Wendy Walsh suggested the threshold abundance for zero utility should be based on the red knot recovery plan and the minimum population that needs to be reached for delisting the species. She will provide the ARM SC with a written draft process for establishing new abundance reference points for minimum and maximum utility.

Lastly the ARM SC noted that the shape of the curve could be altered to create a more sigmoid-shaped curve. The current curve results in an abrupt increase in utility after the threshold abundance with a straight slope up to the maximum utility level. A sigmoidal curve would allow changes in utility to occur more gradually when the abundance of red knots is near the threshold or target.

Horseshoe Crab Utility Function

The ARM SC agreed that the main component of the HSC utility function that could be reevaluated is the value of males versus females. The current function assumes females have twice as much value as males. Given changes in the fishery since the original implementation of the ARM Framework, this assumption may no longer be accurate. Stakeholder input could inform potential changes to this component.

Another component of the HSC utility function is the maximum possible harvest for males and females (500,000 and 210,000 crabs, respectively). These values were negotiated as part of the development of the original ARM Framework. While it would be possible to change these maximums based on stakeholder input, the ARM SC noted it may be difficult to reach a new consensus among stakeholder groups. The stakeholder survey completed in 2022 indicated there is a desire to have some level of female harvest, but not necessarily to increase the maximum. The ARM SC also discussed the idea of changing the maximum harvest to equal a certain percentage of the Delaware Bay horseshoe crab population, instead of a static number of males and females.

Reward Function

One idea discussed was to change the reward function so that reward could only be earned if both red knot and HSC had utility greater than zero. However, the group did not agree that this should be explored, as it would create the possibility of no HSC harvest (even male-only) if the red knot population fell below the minimum utility level, even if the horseshoe crab population was booming and clearly not limiting red knots; red knots could decline for reasons other than HSC harvest. It was also noted that this could have a negative impact on the optimization routine in the model.

The ARM SC agreed that adding weights to the terms in the reward function could be explored. This would allow red knots and horseshoe crabs to have different levels of influence on the reward, and consequently the harvest outcome. Weighting the terms would be a values-based decision and would require stakeholder input.

Harvest Policy Function

The ARM SC discussed the possibility of changing the harvest policy functions (HPCs) so that the curves intersect with zero. Currently the male and female HCPs do not intersect with zero, meaning there is no set of abundance conditions for red knots and horseshoe crabs that would result in a zero harvest output for either sex. The reason for this is that the harvest curves were

optimized based on the data available, and under the range of conditions in the data set the ARM Framework never concludes that zero harvest would be the optimal outcome. This occurs because the simulations of the population dynamics of each species over which the harvest policy functions are optimized never resulted in a female horseshoe crab population decreasing to such a degree whereby red knot survival was extremely compromised. The harvest policy functions are optimized over the expected range of abundances of both species. The group agreed the idea of forcing the harvest policy functions to intersect zero should be explored but noted a number of concerns with this path. First, hardwiring a moratorium (zero harvest) option into the HPCs could create problems for the optimization routine by constraining the function. Second, some members were worried that it would essentially create a harvest control rule, which was not a preferred path forward based on the July 2024 stakeholder workshop. The ARM SC noted that making such changes might also require a new peer review because of how it could impact the optimization procedure.

Another idea that could be explored would be to create a management structure external to the ARM Framework that would control when the ARM Framework could be used to set harvest limits. For example, if the HSC population were to fall below an established threshold, then the Board would implement a moratorium, rather than basing the harvest limit on the ARM Framework recommendation.

The ARM SC agreed that it might make the most sense to explore changes to the utility functions before considering changes to the HCPs because forcing the HCPs to adopt a preconceived shape somewhat defeats the purpose of solving for an optimal harvest strategy give the data and current understanding of how the system functions.

Next Steps

The ARM SC will meet again to discuss processes for engaging stakeholders to provide input on possible changes to these functions. It was noted that it would be good to consider the value of third-party facilitation. The group is concerned that stakeholders could perceive the process as biased if the ARM SC leads discussions about changing the functions.