Atlantic States Marine Fisheries Commission

Horseshoe Crab Management Board

August 3, 2022
10:15 - 11:45 a.m.
Hybrid Meeting

Draft Agenda

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

1.	Welcome/Call to Order *(J. Clark)*	10:15 a.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from May 2022	10:15 a.m.
3.	Public Comment	10:20 a.m.
4.	Consider Draft Addendum VIII on the Implementation of Recommended Changes from 2021 ARM Revision and Peer Review Report for Public Comment *(C. Starks)* **Action**	10:30 a.m.
5.	Update on Plan Development Team Review of Biomedical Mortality, Biologically-based Options for Setting the Threshold, and Best Management Practices for Handling Biomedical Collections (*C. Starks*) • Consider Technical Committee Recommendations *(N. Ameral)* • Consider Advisory Panel Report *(B. Hoffmeister)*	11:15 a.m.
6.	Review and Populate Advisory Panel Membership *(T. Berger)* **Action**	11:35 a.m.
7.	Elect Vice-Chair *(J. Clark)* **Action**	11:40 a.m.
8.	Other Business/Adjourn	11:45 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

MEETING OVERVIEW

Horseshoe Crab Management Board Meeting
August 3, 2022
10:15 - 11:45 a.m.
Hybrid Meeting

Chair: John Clark (DE) Assumed Chairmanship: 1/22	Horseshoe Crab Technical Committee Chair: Natalie Ameral (RI)	
Vice Chair: VACANT	Horseshoe Crab Advisory Panel Chair: Brett Hoffmeister (MA)	Law Enforcement Committee Representative: Nick Couch (DE)
Delaware Bay Ecosystem Technical Committee Chair: Wendy Walsh (FWS)	Adaptive Resource Management Subcommittee Chair: Dr. John Sweka (FWS)	Previous Board Meeting: May 3, 2022
Voting Members: MA, RI, CT, NY, NJ, DE, MD, DC, PRFC, VA, NC, SC, GA, FL, NMFS, USFWS (16 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from May 3, 2022

3. Public Comment – At the beginning of the meeting public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Consider Draft Addendum VIII: Implementation of Recommended Changes from 2021 ARM Revision and Peer Review Report for Public Comment (10:30-11:15 a.m.) Action

Background

- In October 2019, the Board directed the Adaptive Resource Management (ARM) Subcommittee to begin working on updates to the ARM Framework to revisit several aspects of the ARM model to incorporate horseshoe crab population estimates from the Catch Multiple Survey Analysis (CMSA) model used in the 2019 Benchmark Stock Assessment and the most current scientific information available for horseshoe crabs and red knots.
- In January 2022, the Board accepted the ARM Revision and Peer Review for management use, and initiated a Draft Addendum to consider allowing its use in setting annual specifications for horseshoe crabs of Delaware Bay-origin. The Horseshoe Crab PDT met multiple times throughout the spring to develop a draft addendum document for Board consideration (**Briefing Materials**).

Presentations

- Overview of Draft Addendum VIII for Board Consideration by C. Starks

Board actions for consideration at this meeting

- Approve Draft Addendum VIII for Public Comment

5. Update on PDT Review of Biomedical Mortality, Biologically-based Options for Setting the Threshold, and Best Management Practices for Handling Biomedical Collections (11:15-11:35 a.m.)

Background

- In October 2021, The Board tasked the Plan Development Team to review biomedical mortality, discuss biologically-based options for setting the threshold, and consider updates to best management practices for handling biomedical collections.
- The PDT requested advice from the Technical Committee (TC) on this issue. The TC met multiple times to discuss potential strategies for setting a biologically-based threshold for biomedical collections, and to review the 2011 best management practices. The TC provided recommendations to the PDT regarding the mortality threshold (**Briefing Materials**).
- The AP met in July to consider this Board task and the TC's recommendations, and to provide input on the best management practices for handling biomedical collections (**Supplemental Materials**).

Presentations

- Update on Task to Review Biomedical Mortality and Best Management Practices for Biomedical Collections by C. Starks

6. Review and Populate Advisory Panel Membership (11:35-11:40 a.m.) Action

Background

- Massachusetts has submitted a nomination to the South Atlantic Advisory Panel: David Meservey, an inshore commercial otter trawler (**Briefing Materials**).

Presentations

- Nomination by T. Berger

Board actions for consideration at this meeting

- Approve Advisory Panel Nomination

7. Elect Vice-Chair

8. Other Business/Adjourn

Horseshoe Crab

Activity level: Medium

Committee Overlap Score: Low (SAS overlaps with BERP)

Committee Task List

- PDT – Development of Draft Addendum VIII to consider use of the ARM Revision in setting Delaware Bay harvest specifications
- PDT – review the threshold for biomedical use to develop biological based options for the threshold and to develop options for action when the threshold is exceeded; review best management practices for handling biomedical catch and suggest options for updating and implementing best management practices (BMPs).
- TC – July 1st: Annual compliance reports due
- ARM & DBETC – Fall: Annual ARM model to set Delaware Bay specifications, review red knot and VT trawl survey results

TC Members: Natalie Ameral (RI, Chair), Jeff Brunson (SC), Derek Perry (MA), Deb Pacileo (CT), Catherine Ziegler (NY), Samantha Macquesten (NJ), Jordan Zimmerman (DE), Steve Doctor (MD), Ingrid Braun (PRFC), Adam Kenyon (VA), Jeffrey Dobbs (NC), Eddie Leonard (GA), Claire Crowley (FL), Chris Wright (NMFS), Joanna Burger (Rutgers), Mike Millard (USFWS), Kristen Anstead (ASMFC), Caitlin Starks (ASMFC)

Delaware Bay Ecosystem TC Members: Wendy Walsh (USFWS, Chair), Amanda Dey (NJ), Samantha Macquesten (NJ), Henrietta Bellman (DE, Vice Chair), Jordan Zimmerman (DE), Steve Doctor (MD), Adam Kenyon (VA), Jim Fraser (VA Tech), Eric Hallerman (VA Tech), Mike Millard (USFWS), Kristen Anstead (ASMFC), Caitlin Starks (ASMFC)

ARM Subcommittee Members: John Sweka (USFWS, Chair), Larry Niles (NJ), Linda Barry (NJ), Henrietta Bellman (DE), Jason Boucher (DE), Steve Doctor (MD), Wendy Walsh (USFWS), Conor McGowan (USGS/Auburn), David Smith (USGS), Jim Lyons (USGS, ARM Vice Chair), Jim Nichols (USGS), Kristen Anstead (ASMFC), Caitlin Starks (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

HORSESHOE CRAB MANAGEMENT BOARD

The Westin Crystal City
Arlington, Virginia

May 3, 2022

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ATTENDANCE

Board Members

Dan McKiernan, MA (AA)
Raymond Kane, MA (GA)
Sarah Ferrara, MA, proxy for Rep. Peake (LA)
Conor McManus, RI, proxy for J. McNamee (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Colleen Bouffard, CT, proxy for J. Davis (AA)
Robert LaFrance, CT, proxy for B. Hyatt (GA)
Jim Gilmore, NY (AA)
Scott Curatolo-Wagemann, NY, proxy for E. Hasbrouck (GA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Joe Cimino, NJ (AA)
Tom Fote, NJ (GA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Mike Luisi, MD, Administrative proxy
Russell Dize, MD (GA)
Pat Geer, VA, Administrative proxy
Shanna Madsen, VA, proxy for Sen. Mason (LA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Jerry Mannen, NC (GA)
Mel Bell, SC (AA)
Malcolm Rhodes, SC (GA)
Chris McDonough, SC, proxy for Sen. Cromer (LA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Hannah Hart, FL, proxy for J. McCawley (AA)
Marty Gary, PRFC
Richard Cody, NMFS
Rick Jacobson, US FWS

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

Ex-Officio Members

John Sweka, ARM Subcommittee Chair

Staff

Robert Beal
Toni Kerns
Maya Drzewicki
Tina Berger
Pat Campfield
Kristen Anstead
James Boyle
Emilie Franke
Lisa Havel
Chris Jacobs
Jeff Kipp
Sarah Murray
Caitlin Starks
Deke Tompkins

Guests

Pat Augustine, Coram, NY
Katherine Becker, FL FWC
Alan Bianchi, NC DENR
Nora Blair, Charles River Labs
Sarah Blick, ACCIUSA
Jason Bucher, NOAA
William Brantley, NC DENR
Jeff Brust, NJ DEP
Allen Burgenson, Lonza
Peter Clarke, NJ DEP
Margaret Conroy, DE DFW
Heather Corbett, NJ DEP
Deborah Cramer
Claire Crowley, FL FWC
Maureen Davidson, NYS DEC
Lennie Day, USGS
Tim Dillingham, Littoral Society
Steve Doctor, MD DNR
John Duane
Sheila Eyler, US FWS
Catherine Fede, NYS DEC
Brad Floyd, SC DNR
Matthew Gates, CT DEEP
Berlynna Heres, FL FWC
Helen Takade-Heumacher, EDF
Greg Hinks, NJ DEP
Brett Hoffmeister, AP Chair
Harry Hornick, MD DNR
Jessie Hornstein, NYS DEC
David Hu, USGS
Christian Hunt
Bill Hyatt, CT (GA)
Jeff Kaelin, Lund's Fisheries
Carrie Kennedy, MD DMR
Adam Kenyon, VMRC
Lisa Komski, Fuji Film

Guests (continued)

Christina Lecker, Fuji Film
Benjamin Levitan, EarthJustice
Tom Lilly
Loren Lustig, PA (GA)
Samantha MacQuesten, NJ DEP
John Maniscalco, NYS DEC
Genine McClair, MD DNR
Kim McKown, NYS DEC
David Meservey
Steve Meyers
Mike Millard
Thomas Newman
Derek Orner, NOAA
Willow Patten, NC DENR
Derek Perry, MA DMF
Allen Reneau, Fuji Film
Sam Robinson, DE DFW
Scott Schaffer, MA DMF
Ross Self, SC DNR
Ethan Simpson, VMRC
Jennifer Slovinski, Fuji Film
Bryan Sparrow, Fuji Film
Yoshibina Takasuga Fuji Films
Kristoffer Whitney, RIT
Meredith Whitten, NC DENR
Jordan Zimmerman, DE DFW

The Horseshoe Crab Management Board of the Atlantic States Marine Fisheries Commission convened in the Jefferson Ballroom of the Westin Crystal City Hotel, Arlington, Virginia, a hybrid meeting, in-person and webinar; Tuesday, May 3, 2022, and was called to order at 8:30 a.m. by Chair John Clark.

CALL TO ORDER

CHAIR JOHN CLARK: Good morning, everybody. Welcome to the Horseshoe Crab Management Board to all the Commissioners and public here in person, and all of those of you that are attending virtually. I'm John Clark; I'm the Administrative Commissioner for the fabulous first state of Delaware. Before we get into the agenda, Bob Beal would like to make an announcement.

EXECUTIVE DIRECTOR ROBERT E. BEAL: Great, thank you, Mr. Chairman, I think. Well, this is not the announcement I wanted to make after we've been apart for two plus years, and trying to get back together. Two Commission staff members have tested positive for COVID since last night, since we were in here yesterday. I just want to let everyone know that there are masks over on the table. You know it's kind of at this point make your own choice on how you want to react to that.

You know CDC guidelines online will kind of describe what should be done when you're around those folks. I think the two individuals that tested positive actually sent e-mails to anyone that they spent any time with in talking to directly yesterday. Just want to let folks know that if you have questions, or want to talk more about it, come over and see me or anyone, and we'll get it figured out. Just wanted to let folks know where we are, unfortunately.

APPROVAL OF AGENDA

CHAIR CLARK: Thanks, Bob, and on that cheery note we will now move on to Item Agenda 2, which is Board Consent. Everybody has had a chance to look at the agenda. Are there any revisions to the agenda as presented this morning? Seeing none; we will consider that approved by consent.

APPROVAL OF PROCEEDINGS

CHAIR CLARK: Then, the proceedings from the January, 2022 Board meeting. Any revisions to the proceedings? Okay not hearing any we will consider the proceedings approved by consent.

PUBLIC COMMENT

CHAIR CLARK: Moves us on to Agenda Item 3, which is Public Comment for items that are not on the agenda, and we do have one public comment from Mr. Brett Hoffmeister, so Brett, if you would like to step up to the public microphone, thank you.

MR. BRETT HOFFMEISTER: Good morning, my name is Brett Hoffmeister; I'm the LAL Manufacturing Manager at Associates of Cape Cod based in Falmouth, Massachusetts. I also serve on the Advisory Panel, and I have extensive experience with the oversight of horseshoe crab procurement working with local fishermen, dealers, regulators, to help maintain sustainable practices. I also oversee the horseshoe crab aquaculture program at our company. I really just want to address some recent comments in the media, because we all hear that, concerning horseshoe crabs and the maintenance of our fishery.

I really want to clarify a few points as they relate not only to the biomedical industry, but also specifically to our operation in Massachusetts. These comments often originate from private organizations, sometimes individuals, but they intend to bias public opinion with no experience in the reality of the biomedical industry, and their misdirection's are designed to elicit an emotional response.

They are factually incorrect, and in some cases completely manufactured for dramatic effect. Item Number 1, we've probably all heard about horseshoe crab being worth $15,000.00 a quart. I want to go on the record to say that this is simply not true. It's not worth $15,000.00 a quart, $15,000.00 a liter, it's not worth $60,000.00 a teaspoon or $60,000.00 a gallon as has been reported.

Crabs do not contain LAL, it's made by the manufacturers, and the manufacture of LAL is a complex process, which must be done under extremely clean conditions. The product of which is typically a freeze-dried powder in a vial. We sell a freeze-dried powder; we do not sell horseshoe crab blood. A lysate typically costs less than $20.00.

Item Number 2, there has been a group that has stated in addition to the bait crab harvest in New York, additional mortality is experienced because of biomedical collection that is transported to Massachusetts. This is also not true. There is no biomedical collection in New York that I am aware of, and there is certainly none coming to Massachusetts.

There is only a bait harvest, which is measured against the state quota. There is an organization that has stated that horseshoe crabs in New Jersey are transported to Massachusetts to be bled, and are not released back into New Jersey. This is a lie. Associates of Cape Cod is the only biomedical licensee producing lysate in Massachusetts, and I can assure you that no crabs from New Jersey have every come into Massachusetts.

That same organization is actively misinforming the public by stating, and I quote, "The state of Massachusetts has created a weakness in the control of harvest, because they have combined blood and bait harvest by bleeding crabs to death and then using them for bait." This is also not true. The state of Massachusetts allows for crabs to be harvested for bait, for the manufacture of LAL to be used first.

This is a conservation measure that is recommended and endorsed by the ASMFC, and the best management practices. All crabs that enter our facility are treated equally well, regardless of their source. There is no distinction, and no difference in the treatment when they are in our possession.

None are ever bled dry or bled to death, and all crabs are returned alive to the vendors. This Commission and fishery managers of the members states are tasked with managing a great number of fisheries, and you do so by utilizing structured, data driven decision making. Utilizing rigorous scientific methodology, and not false, incendiary claims. The misdirection initiated by some of these groups, who willfully spread knowingly incorrect information for the sole purpose of creating public outcry, or creating clickbait, should not distract this Commission nor the fishery managers from their important work.

Science and truth should not be replaced with innuendo, fiction, nor horror stories, and I encourage the Commission to continue to use sound decision making in setting policy and to continue to employ data driven methods, and not be influenced by inflammatory emotional responses to accusations that are baseless and not rooted in fact. That is all, I appreciate you taking the time for my comments today.

CHAIR CLARK: Thank you, Mr. Hoffmeister. Okay, that is the only public comment we have on the agenda.

PROGRESS UPDATE ON DRAFT ADDENDUM VIII

CHAIR CLARK: So, we will move on to Item Agenda 4, which is a Progress Update on Draft Addendum VIII. Caitlin is going to review the recommendations on the options for implementing the ARM Framework Revision, so Caitlin, if you're ready take it away.

MS. CAITLIN STARKS: I will note that it should say Draft Addendum VIII, not VII, apologies for the Roman Numeral mis-numbering. In my presentation today I'll start off with some brief background information on Draft Addendum VIII. I'll go over the potential management changes to consider based on the ARM revision, walk through the PDTs recommendations, and then put forward some questions for the Board to provide guidance to the PDT, then wrap up with next steps for the Addendum.

First, some background. The current process for establishing the horseshoe crab bait harvest quota

for the Delaware Bay was established under Addendum VII in 2012, and this Addendum implemented the current Adaptive Resource Management or ARM Framework, which recommends the annual optimal bait harvest based on the abundance of both horseshoe crabs and red knots.

REVIEW RECOMMENDATIONS ON OPTIONS FOR IMPLEMENTING THE ADAPTIVE RESOURCE MANAGEMENT FRAMEWORK REVISION

MS. CAITLIN STARKS: As you all know, the Board accepted the recent ARM Revision and Peer Review Report in January of 2022, which updated the ARM to address some of the peer review critiques that were made during the original ARM Framework review, included new data sources to improve the models, and also adopt a new modeling software to replace the previously used program, which is now obsolete.

At the January meeting the Board also initiated Draft Addendum VIII to consider use of this ARM revision in setting the annual specifications for horseshoe crabs of Delaware Bay origin, which is what we're discussing today. Based on the recommended changes to the ARM that came out of the ARM revision, there were several key issues the PDT thought should be considered during the development of Draft Addendum VIII, because they explicitly ran out in Addendum VII.

These include five items. First is the harvest packages or possible horseshoe crab harvest levels that could be recommended by the ARM for Delaware Bay. Second is the management process, which outlines the steps for setting annual harvest limits, as well as updating the ARM Framework itself. Third is the proportion of each state's total harvest that is determined to be of Delaware Bay origin. Fourth is the way that the Delaware Bay quota is allocated amongst the four states of New Jersey, Delaware, Maryland and Virginia, and then fifth is the fallback option, which is a backup plan for, if some reason the ARM is not able to recommend harvest for a year, due to a lack of required datasets.

In the next set of slides, I'm going to walk through each of these items one at a time, and go over what is currently in place under Addendum VII, and then what the PDT is recommending for changes to be considered in Addendum VIII. First off, the PDT recommended keeping the management options in Addendum VIII streamlined to just two overarching options.

Option A would be the status quo option, and Option B would be to use the revised ARM for management to set bait harvest specifications for the Delaware Bay. For Option A, it is important to note that true status quo is not an option, due to the fact that the previous software that we were using is now outdated, and the model cannot be updated in order to have true adaptive management.

Instead, what this would look like is that the original ARM model would be used to make a look up table, where you would essentially go down a row of horseshoe crab abundance and a column of red knot abundance, and it points you to what the optimal bait harvest is out of the five original harvest packages.

This means the model would stay static, and all of the new data that were incorporated into the ARM revision would not be able to be used. Option B would aim to incorporate all of the changes that were recommended in the 2021 ARM revision, in terms of data and model updates. But the general structure of how the ARM optimal harvest recommendation becomes state quotas would essentially be the same.

I'm going to go over exactly what the changes are that the PDT is recommending, including in Option B in the next slide. First, I'll talk about the harvest packages. This is what we currently use under the original ARM, established in Addendum VII. There are only five possible harvest packages that can be recommended, based on the annual inputs of horseshoe crab and red knot abundance that are fed into the ARM.

The maximum number of males that can be recommended is 500,000 and the max number of females is 210,000. An important thing to note here is that with the way the original ARM was set up, sex-specific harvest recommendations were not made independently of one another. Now this is a comparison of the current ARMs harvest recommendations for 2017 through 2019 on the top, versus the ARM revision harvest recommendations for the same years on the bottom.

For the revised ARM abundance estimates, the CSMA used the coast wide biomedical mortality in the model, rather than the region-specific biomedical mortality. I also want to note that the maximum number of male and female horseshoe crabs that can be recommended is still the same, with 500,000 males and 210,000 females. The main differences though are that first rather than only having five harvest packages to choose from, the ARM revision now makes the harvest recommendations on a continuous scale, and second, the sex-specific recommendations are independent of one another using the new model. As you can see, the current ARM only recommends Harvest Package 3, which is that 500,000 males and 0 females. While the revised ARM recommends harvest on a continuous scale, rather than in discreet packages, and in this example, it's recommending the maximum number of males and the number of females that it recommends slightly varies from year to year.

The recommendation from the PDT with regard to these harvest packages is that first of all the maximum amounts of males and females should stay the same, because they were determined through extensive stakeholder input during the development of the original ARM. The PDT does recommend allowing for independent harvest recommendations for males and females, and it also recommends using the continuous harvest recommendations from the revised ARM.

However, instead of using the exact output, the PDT recommends rounding down the optimal harvest to the nearest 25 or 50,000, and this is because of data confidentiality issues associated with the Delaware Bay specific biomedical data that are going to be fed into the model on an annual basis.

The PDT suggested this, so that it would not be possible to back calculate what that biomedical mortality data is, based on the recommended harvest output. The PDT thinks the decision between rounding by 25,000 or 50,000 is appropriate as a sub-option to be considered for public comment, and in the table on the left you have the examples of the exact optimal harvest recommended by the ARM.

Again, this is using the coastwise biomedical data. Then on the right this is what the examples would be if they were rounded down to the nearest 25,000, just to give you an idea. I'll note here that the number of males is not rounded down, because it is already capped out at 500,000, so that makes it so you can't back calculate the confidential data.

Moving on to the management process. In Addendum VII, the process for management using the ARM Framework is set up as a double loop learning process with an annual cycle and a long-term cycle. The annual cycle is the process that the Board is familiar with, in which the annual abundance estimates for horseshoe crabs and red knots are put into the ARM model, and the optimal bait harvest recommendation is generated for the following year.

The Board reviews that recommendation and sets the specifications at the annual meeting. The longer-term cycle was described as a process that would occur every three to four years, to update or revise the ARM Framework with technical improvements and stakeholder advice, and this is essentially what we just went through with the ARM revision process, and now considering in this Addendum.

The PDT recommends changing this management process slightly to more clearly describe each step of the short- and long-term management and ARM revision processes, and the language the PDT recommends is on the screen here, which describes

a three-level process, including an annual management process, and interim update process, and a revision process. The annual management process is basically the same as the annual cycle described in Addendum VII, with the ARM Framework being used to produce harvest recommendations for the upcoming year. The interim update process is recommended that every three years the model parameters, so things like red knot survival and the horseshoe crab stock recruitment relationship, would be updated based on the annual routine data that are collected for the Delaware Bay Region. Then the third level would be a more intensive process, which would occur every nine to ten years, or sooner if desired by the Board, in which the ARM Framework would undergo a revision process similar to what occurred for the 2021 revision.

The PDT thinks this amount of time is appropriate, given it allows for two of those interim updates to occur, and it encompasses one generation for horseshoe crabs. Our third issue is the proportion of state harvest that is of Delaware Bay origin for each state, and this value is called Lambda.

The table shows those Lambda values for each state that were established in the original ARM in Addendum VII. New Jersey and Delaware harvest is considered to be 100 percent Delaware Bay origin, and Maryland and Virginia are 51 percent and 35 percent respectively. These original values came from the genetic data at the time, and this was implemented in 2012.

As was recommended in the 2021 ARM revision and peer review report, the PDT recommends updating these Lambda values for each state based on the recent genetic data. This would result in decreases to the proportions of Maryland and Virginia's harvest that is assumed to be of Delaware Bay origin, where Delaware and New Jersey would remain the same.

This will come up in a few slides, but these Lambda values do impact the state-by-state allocations of the Delaware Bay overall quota. Addendum VII also established this methodology for calculating the state allocations of the total Delaware Bay harvest. The top table here shows the state allocation percentages under Addendum VII, which are calculated by multiplying the state's addendum for Addendum IV quota by the Lambda value, and then dividing that by the total number of Delaware Bay origin crabs that were allocated under Addendum IV.

To get each state's quota, you multiply the total Delaware Bay optimal harvest by the percentages shown in this table. As a note, Virginia's quota level here is referring to quota and landings occurring east of the COLREGS line, as those crabs are the ones that have been shown to be part of the mixed stock with the Delaware Bay.

In addition to the weighting scheme for the state allocations, Addendum VII also included a harvest cap for Maryland and Virginia that limits the total level of allowed harvest by those two states, in order to protect non-Delaware Bay origin crabs. The caps are shown in the bottom table, and these were based on the Addendum IV quota levels for Maryland and Virginia, which are the same in Addendum VI.

The caps do not apply when the ARM Framework outputs an optimized harvest that prohibits female harvest of horseshoe crabs, as it has in every year since the ARM was implemented. To date these caps have never come into play. Then under 3D, when no female harvest is allowed for the Delaware Bay, then this section of the Addendum comes into play, where it allows a two-to-one offset of males to females when female harvest is prohibited. What this means is that the total male harvest allegation of Maryland and Virginia is increased at a two-to-one ratio, and it's allowed to rise above that cap level. Again, we're only talking about Virginia's quota for crabs harvested east of the COLREGS line. For Addendum VIII, the PDT is recommending that the only change to the allocation scheme that should be included in Option B to implement this revised ARM is the new allocation weights that result when you update the Lambda values with the new genetics.

With this change the new state allocations of the Delaware Bay harvest limit would be those shown in this table. As you can see the allocations for New Jersey and Delaware slightly increased, and the allocations for Maryland and Virginia slightly decreased. The PDT did not recommend changes to the other two aspects of the state allocations, so the harvest cap provision and the two-to-one male/female offset provision would remain status quo in Option B.

To show you how updating those Lambda values plays out and affects the allocation, this is a comparison of the state allocations of Delaware Bay origin quota under the current Addendum VII Lambda values, and the resulting allocations on the left versus the revised allocations with updated Lambda values on the right.

In this table we're looking at a total recommended harvest of 500,000 males and 100,000 females of Delaware Bay origin. This is just an example. The key differences to note here are the slight increase in quota for New Jersey and Delaware, and slight decrease in Delaware Bay origin quota for Maryland and Virginia.

These are not the total state quotas for Maryland and Virginia, just the Delaware Bay portion of their harvest. This slide is comparing both the Delaware Bay origin and the total quotas for each state under the current allocations versus the revised allocations. When you look at the right half of the tables, the top is using the current allocations and the bottom in orange is using the revised allocations.

What you can see is that while the Delaware Bay portion of Maryland and Virginia's quotas slightly decreases, the overall quotas for those states are the same under both allocation scenarios. That is because of that harvest cap that is in place under Section 3C of Addendum VII. That limits the total level of allowed harvest by those two states to protect the non-Delaware Bay origin crabs. It's coming into play here, because in this example female harvest is allowed.

These are those same tables except showing the total quota, with sexes combined rather than separated. You can see the total quotas, which are on the right for New Jersey and Delaware under the revised allocations would be slightly increased, and the Maryland and Virginia quotas would be the same. The last issue the PDT recommended an update for is Section 3E of Addendum VII, and this outlines the fallback option for if the ARM can't produce an optimal harvest recommendation.

The ARM requires annual datasets to make that recommendation. In the event that one of those required datasets is not available, Addendum VII allows two options for setting the harvest specifications. The first option is that the quotas and management measures for those four states can revert back to what was established in Addendum VI, and the second option is to use a previous year's harvest and state allocations for the Delaware Bay. The PDT recommended keeping these two fallback options status quo. They did note that with the improvements to the Catch Multiple Survey Model it's more likely to be able to handle some more missing data now, and a situation where we need to use these is less likely to occur.

But beyond that the PDT just recommends updating the language in this section to reflect the new datasets that are required for running the revised ARM on an annual basis. That is my overview of the PDTs recommendations, and then on this slide I have a few questions the PDT is asking for some Board guidance on.

First question is whether the Board wants to consider options to further modify the state allocations of the Delaware Bay harvest limits beyond what's already in Addendum VII, and what's recommended for updating the Lambda values. As I noted, they only recommended updating those Lambda values, and that would update the allocations.

If the Board has a desire to consider any additional changes, beyond that the PDT would need some guidance. Second, are there any additional options

related to management using the ARM that the Board wants the PDT to consider or develop? Third, this came up as a result of previous discussions at the Board. The PDT would need to know if the Board wants to include any management options in this Draft Addendum related to the biomedical mortality threshold that's in the FMP.

I will note this would likely delay our timeline for the Addendum. Then lastly, they want to know if the Board is interested in adding any additional issues outside of what we've already gone over here to this Addendum. For my last slide this is just the tentative timeline for the next steps in developing Draft Addendum VIII.

We're currently in May 2022, and the plan after this meeting is to take guidance from the Board, develop the complete Draft Addendum document, which the Board could then consider for public comment at the August 2022 meeting. Then if that's approved public hearings could be held in August and September, and the Board could consider the Addendum for final approval in October of this year. That is the end of my slides, so I am happy to take any questions.

CHAIR CLARK: Thank you very much for that very clear and thorough presentation, Caitlin. Maybe we should take questions on the actual presentation before we get to the guidance questions. Does anybody have questions for Caitlin about the presentation on the Draft Addendum, or potential Draft Addendum? I see Rob LaFrance. Go ahead, Rob.

MR. ROBERT LaFRANCE: Caitlin, I just wanted to ask. You mentioned that the confidentiality might impact. Could you just explain that a little bit better for me? I'm just trying to understand how that relates to the packages. Is that basically the rounding that you're talking about? If you could just explain that in a little greater detail for me, I would appreciate that. Thank you.

MS. STARKS: Sure thing. Right now, for the ARM revision, what was used as a coast wide biomedical mortality estimate that was assumed to be all from the Delaware Bay? But what the ARM revision recommended was actually using the Delaware Bay specific biomedical data, and that is confidential. In order to do that we would have to just have staff run those confidential numbers through the ARM model every year, and then the output would be your optimal harvest. In theory, someone could take that optimal harvest, back calculate what the biomedical mortality was for the Delaware Bay, and that is a confidential number, because there are fewer than three biomedical mortality facilities in the Delaware Bay.

MR. LaFRANCE: That last piece was what I was trying to find out, thank you.

MS. STARKS: Got you.

CHAIR CLARK: Thanks, do we have any further questions? Jim.

MR. JAMES J. GILMORE: Caitlin, just so I've got this clear. If we go with the modifications, the actual harvest that would be in Delaware Bay, if you take the number, essentially Jersey is not doing any harvest, but then you've got Delaware at 100 percent and then the Virginia and Maryland at some lower percentage. The actual harvest or the actual quota would be somewhere between 3 and 400,000 crabs, is that correct?

MS. STARKS: I believe so. I did not add it up before this, but I can put back on the screen the total quotas here so that you can see them. Slide 16. Again, this is an overestimate, because of the coast wide biomedical being used.

MR. GILMORE: Yes, thanks, so it is generally in that vicinity. I just wanted to get what they allocate.

CHAIR CLARK: Caitlin, is anybody in the virtual sphere there have a question?

MS. STARKS: I do not see any hands.

PROVIDE GUIDANCE TO THE PDT

CHAIR CLARK: Are there any further questions here? Not seeing any. In that case, I guess at this point, Caitlin, we will consider the questions, maybe put up the slide that has the questions from the PDT for the Board. Does anybody want to weigh in as to what they would like to see considered in the Draft Addendum? Joe Cimino.

MR. JOE CIMINO: I think I may have a question first. I don't want to put Caitlin on the spot, so this may be to Bob and Toni as well. I would hate to see the ARM revisions get delayed, but it sounded like if we tried to tackle some of these other questions like three, it would delay. I know we're kind of running at capacity as is. What do you think might be a timeframe for starting an addendum behind the Addendum?

MS. STARKS: I'm happy to take a first stab. I think we could complete this one, like I mentioned, by the October meeting. If the Board was willing to wait and wanted to initiate a second addendum to deal with the biomedical mortality threshold on its own, I think that would be a pretty quick addendum. You'll see in my next presentation I don't know that there are a lot of options for us.

CHAIR CLARK: Did that answer it, Joe? Okay. Just to clarify, one of the questions from the PDT, Caitlin, you'll be addressing the one about the biomedical would be the next agenda option. Maybe if we bring up our comments to the questions 1, 2, and 4 there that would be excellent. Any other comments?

Do we have any from the virtual attendees? Okay, not seeing any there yet.

RECOMMENDATIONS FROM THE PLAN DEVELOPMENT TEAM

CHAIR CLARK: Well, at this point we have the recommendations from the Plan Development Team, correct, Caitlin? It looks like we're not getting any specific direction right now from the Board, other than it would seem to go with the modifications that they've already suggested. Is that the will of the Board here?

MS. STARKS: Mr. Chair, I guess one way you could phrase it is if anyone has any objection to moving forward with the PDTs recommendations.

CHAIR CLARK: Okay, well that's a great way to phrase it. Does anybody have any objections to moving ahead with the way the PDT has phrased it? Go ahead, Rob.

MR. LaFRANCE: I kind of have a question again, I guess. I'm just wondering, the recommendation is going to be a certain harvest level of females, based upon the new modeling. Do we want to consider continuing as an option male only harvest? I recognize that that may not be scientifically sort of where things are headed in terms of new models.

But it is something that has sort of had historically been what people had anticipated. I'm just raising that as a question as to whether or not that is something we should be thinking about when we go to public notice on this to ask that question. Just a thought, and just was wondering how the other Board members might feel about that.

MS. STARKS: That is certainly the prerogative of the Board, if you would like to add an option for male-only harvest, where the ARM only recommends male harvest. I also don't necessarily think you have to do it that way, because the way the process is set up right now, the ARM gives you an annual recommendation for harvest, and then the Board sets specifications. Through that specification setting, the Board could choose to not implement any female harvest.

MR. LaFRANCE: That answers my question, thank you.

CHAIR CLARK: Just a clarification, Caitlin. The status quo, even though the old ARM model can't even be run any more. That has to be kept in the Addendum, right, just because it was what was being used?

MS. STARKS: Yes.

CHAIR CLARK: Okay then, are there any further questions, comments on this section? Joe Cimino.

MR. CIMINO: Yes, sorry, John. I don't really want to belabor this that much, because I support the Lambda decision. It's just I'm curious. Caitlin, is there like a time set on how often they would do the genetic work to decide on that breakout, and if not, maybe we should have one.

MS. STARKS: I do not know the answer to that question. I'm not sure we have knowledge of what genetic work is being done in the future. I'm not sure when we would have the ability to update the genetics. If our science staff is on the webinar and wants to answer, please feel to jump in.

MS. KRISTEN ANSTEAD: Thank you, Caitlin, this is Kristen. Your genetic work is done periodically through work at Virginia Tech, Eric Hallerman has been doing that work. He doesn't have a schedule; it's not done by staff. I think he revisits it; you know every few years. But I don't know if it would be appropriate to set some sort of timeframe on that.

CHAIR CLARK: Does that answer your question, Joe?

MR. CIMINO: Yes, thanks. I'll take Kristen's advice on that.

CHAIR CLARK: Do we have any hands? Okay, not seeing any so, in that case. Oh, I'm sorry, Dr. Rhodes.

DR. MALCOLM RHODES: One quick question. I agree totally with what we're doing, having the PDT go forward with this plan. But are we putting a place marker in for Option 3, since we're getting ready to discuss the biomedical mortality? I mean I just wanted to make sure we had that clearly in. That may be an additional plan that we want PDT to change or alter.

MS. STARKS: Yes, I think after the next presentation if the Board's desire is to add biomedical as an issue into this Addendum, we can do that after the next agenda item.

CHAIR CLARK: Okay, seeing no other hands here, and giving direction to the PDT to continue going in the direction they were going.

UPDATE ON THE PDT REVIEW OF BIOMEDICAL MORTALITY AND BEST MANAGEMENT PRACTICES FOR BIOMEDICAL COLLECTIONS

CHAIR CLARK: We can now move on to the next item on the agenda, which is an Update on the Plan Development Team Review of Biomedical Mortality and Best Management Practices for Biomedical Collections. Caitlin, that's you again.

MS. STARKS: Thank you again, Mr. Chair. I'll just be giving this quick update. I'm going to start off with a quick overview. First, I'll go over the Board task that was requested, then I'll go over some background information on the biomedical mortality threshold, as well as biomedical data and the best management practices for biomedical collection. Then I'll summarizes the Technical Committee's discussion on this topic in the next steps for moving forward.

At the October, 2021 meeting, after receiving the FMP review, which noted that the biomedical threshold in the FMP has been exceeded for 12 of the last 13 years. The Board tasked the Plan Development Team with reviewing the threshold for biomedical use, to develop a biologically-based option or options for the threshold, and to develop some options for action when that threshold is exceeded.

They also tasked them with reviewing the best management practices for handling biomedical catch, and suggest options for updating and implementing BMPs. The PDT then tasked this over to the Technical Committee, to review the available information and provide some guidance to the PDT, as well as any recommendations on the threshold and the BMPs. The TC has had one meeting so far on this topic, and this is just going to be a general update on what was discussed in the next steps.

But first I want to provide contacts for this biomedical threshold we're discussing, and I wanted to review the language in the 1998 FMP on biomedical collection. First, I think it's important to note here that the FMP goals include the biomedical industry as one of the stakeholders for which the FMP aims to sustainably manage horseshoe crabs for continued use.

But because the number of crabs taken for biomedical use was really low, relative to bait harvest at the time, and so is the biomedical mortality rates. The FMP does not subject the biomedical harvest of horseshoe crab to the same limitations as bait harvest. It does require states to issue a special permit or authorization for biomedical harvest, and it also requires any horseshoe crab taken for biomedical purposes to be returned to the same state or federal waters from which they were collected.

As for the mortality threshold, the FMP states that if horseshoe crab mortality associated with collecting, shipping, handling or use by the biomedical industry exceeds 57,500 horseshoe crabs per year, the Commission would reevaluate potential restrictions on horseshoe crab harvest by the biomedical industry.

However, there is no language in the FMP requiring the Commission to take any action. Additionally, the FMP is not exactly clear where the 57,500 number came from, but with the information that is in there it seems it was derived from a 15 percent estimate of mortality of the biomedical collections at the time, which came out to 37,500, with an additional 20,000 crab buffer. That is a guess that the TC came up with of how that number was derived.

Some additional provisions of later addenda included prohibiting biomedical collections in the federal closure area under Addendum I, then Addendum II clarifies that bait crabs may be used by the biomedical industry or bled, and then returned to the bait market to reduce overall mortality of horseshoe crab.

It also required monthly and annual harvest reporting for biomedical collections, and then Addendum IV maintained the provision in the FMP where biomedical collections are not subject to the same restrictions as the bait fishery. Among the Atlantic coast states, Massachusetts, Rhode Island and New Jersey, Maryland, Virginia and South Carolina are the states that have had crabs collected for biomedical purposes in the past and present, maybe future, though Virginia does not currently have any biomedical collections.

For New York and Delaware there have not been any crab taken specifically for biomedical purposes only, but some crabs harvested under bait permits have been able to be bled at biomedical facilities and then returned to the bait market. Currently the estimated mortality rate that we're using is 15 percent for crabs that are bled, and this rate has been used since the original FMP.

But in the recent 2019 benchmark assessment there was a comprehensive literature review and meta-analysis conducted, which also confirmed a 15 percent mortality rate with a 95 percent confidence interval of 4 to 30 percent. Now I quickly want to go over the coast wide data that we have for biomedical mortality. On this graph the orange bars represent the annual bait harvest, and the blue portion of the bars represent the estimated biomedical mortality in each year. The purple line is showing the biomedical mortality as a percent of the total mortality, which is the sum of the bait harvest and biomedical mortality in each year.

As you can see, the biomedical mortality as a percentage of the total has increased over time, but it's never been more than 19 percent. At the same time, the total mortality has generally fluctuated around the same mean since 2004. To put this in perspective, in the table I looked at this table I looked at the total mortality as a percentage of the overall coast wide bait harvest quota in the Commission's FMP, as well as the sum of all the voluntarily reduced state bait quotas for the last few years.

What I found here is that on the bottom two rows is that when you add the biomedical mortality onto the coast wide bait harvest, total mortality has never exceeded the ASMFC bait harvest quota, and it only exceeded the combined state quotas once in 2017. I also wanted to remind the Board that the ARM Framework revision that was completed in 2021, does include biomedical mortality in the Catch Multiple Survey Model that estimates the horseshoe crab abundance.

Coastwise data had to be used for this model because of the confidentiality of the biomedical data at a smaller scale. But if that revision is adopted moving forward, the confidential Delaware Bay specific biomedical data will be used to make harvest recommendations as I just described in the last presentation.

Now I'm going to switch gears over to the best management practices. These best management practices were developed in 2011, or completed in 2011 by a workgroup comprised of Technical Committee representatives and Advisors from the biomedical industry, and the product was a list of recommendations or BMPs for each step of the process, including collection, transport, holding, bleeding, return to sea.

I won't go through all of them, but this document can be found on the Commission's horseshoe crab web page. The document also recommended dual use for bleeding and bait, when possible, as a way to reduce overall mortality. However, all these BMPs that were developed were just recommendations, and there is no requirement to implement them at the Commission level.

Some states do use some of them as requirements for permitting, or allowing collections of biomedical crabs. After reviewing all this information, the TC discussed some potential issues to note for the Board. First the TC noted that in that 2019 stock assessment an analysis was done to gauge the impact of the biomedical mortality on the Delaware Bay population, and it assumed that all of the coast wide biomedical mortalities were losses from the Delaware Bay.

The results of that were that the levels of biomedical mortality through 2017, which was the terminal year of the assessment, did not have a negative impact on the Delaware Bay stock abundance, indicating that those levels are sustainable for the Delaware Bay stock. However, the TC noted that for other regions we don't have population or abundance estimates, and because we don't have those estimates and the Delaware Bay population is considered to be relatively large, compared to the other regions. The results of the Delaware Bay analysis are not necessarily applicable to those other regions. That is to say other regions might be more at risk of impacts from biomedical mortality if the populations are smaller. With regard to the Board task of developing a biologically-based biomedical mortality threshold, the TC agreed that without population estimates at the coast level or for the other regions besides the Delaware Bay, it's not really possible to establish a mortality threshold based on biological reference points for the coast.

Additionally, due to the region-specific biomedical data being confidential under state and federal laws, we can't publicly review biomedical mortality at the regional level. The TC recommended that one additional analysis that could be done is to run population simulations using the Delaware Bay ARM model, with different levels of biomedical mortality and biomedical sex ratios, and this could be used to evaluate the potential for some kind of biological threshold for the coast, using the Delaware Bay population as a proxy.

However, the TC did emphasize the caveat that the impact of biomedical mortality is likely to vary at the regional and state scales, and using that Delaware Bay population as a proxy for the coast might not be appropriate. For next steps the TC is going to meet with the Stock Assessment Subcommittee, to review the analysis that I just described.

Based on that discussion that the TC had, they're not confident in this producing any technically sound methods for developing a coast wide biomedical mortality threshold, because of the

uncertainty in the impacts at the scale of the coast and other regions. Regarding the best management practices.

The Technical Committee is working on compiling information from all of the states about the permit requirements that they have for biomedical collections and facilities, to see how much of the BMPs are being used as requirements at the state level, and potentially suggest any changes. Then once these two items are wrapped up, the TC will provide their recommendations back to the PDT and the PDT will bring their final recommendations back to the Board at the next meeting. That's all my slides, so I can take any questions.

CHAIR CLARK: Thank you for that excellent summary, Caitlin. Do we have any questions for Caitlin? Okay, not seeing any here, do we have any from the virtual? We're not seeing any questions there. Seeing that Caitlin, at this point we will wait for the further report from the PDT on the biomedical mortality.

Okay, that looks like that is where we are then. That brings us to our final agenda item, which is Other Business. Is there any other business to be brought before the Board? I'm not seeing any. Oh, thank you, Caitlin. I skipped ahead. If you recall there was a question about Draft Addendum VIII, regarding biomedical mortality. Does anybody on the Board want to make a request that something be added to Draft Addendum VIII regarding biomedical mortality? I'm not seeing any hands here.

MR. LaFRANCE: Just a question.

CHAIR CLARK: Oh, I'm sorry, yes, Rob.

MR. LaFRANCE: I think I understood because of timing you don't want to do it in this current draft, but we would be looking at it for a report back to the Board at the next meeting, and then figure out what to do with it at that point in time. Is that correct?

MS. STARKS: That is certainly a way we could do it. I also would say I don't know that it really fits into the Draft Addendum VIII, since this is a coast wide issue, and Draft Addendum VIII is more focused on the Delaware Bay. Happy to wait until the next Board meeting to consider.

MR. LaFRANCE: I guess all I'm saying is, from what I saw in your presentation, the PDT and the Technical Committee are going to be doing some work. They're going to bring that work back to us at the next Committee, and we can then evaluate what we want to do with it at that time. I just wanted to make sure that I understood that clearly.

MS. STARKS: Yes, that is correct.

CHAIR CLARK: That could well be Draft Addendum IX then, right, Caitlin? It would just be focused on biomedical mortality, if the Board decides to go that route. Okay, thank you. Did I Miss anything else? Okay, good. Okay so that was it. We don't have any other business, therefore we.

MS. BERGER: Mr. Chair, I see a couple of hands raised.

CHAIR CLARK: Oh, okay, sorry about that. We have Colleen Bouffard. Go right ahead, Colleen.

MS. COLLEEN BOUFFARD: I wanted to take this opportunity to update the Board on the status of Connecticut's horseshoe crab regulations. We will be implementing recently approved regulations that will further curtail the commercial harvest of horseshoe crabs in Connecticut for bait, improve horseshoe crab spawning success, and establish regulatory consistency with New York. These changes were made to address the depleted state of horseshoe crab in Long Island Sound, and also in response to a request made earlier by the Board.

Specifically, our new regulations will move the opening of the Connecticut horseshoe crab commercial season from May 22, to the calendar date three days after the last full or new moon in May. There will also be a new five-day closure centered on the first moon phase in June. Also, our

daily possession limit for the commercial hand harvest will be reduced from 500 to 150 crabs. I appreciate the opportunity to update the Board.

CHAIR CLARK: Thank you, Colleen. We have another question or comment? Okay, I guess the hand went down there.

ADJOURNMENT

CHAIR CLARK: All right, in that case the only thing left to do is to adjourn, and we are now adjourned. Thank you.

(Whereupon the meeting adjourned at 9:20 a.m. on Tuesday, May 3, 2022)

From:	Robert E. Rutkowski
To:	info; Robert Beal
Cc:	Keith Abouchar
Subject:	[External] Delaware Bay red knot shorebird numbers remain historically low despite modest increase
Date:	Wednesday, July 6, 2022 1:09:19 PM

Robert E. Beal, Executive Director
Board and Commissioners
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Re: Delaware Bay red knot shorebird numbers remain historically low despite modest increase

Dear Director, Board and Commissioners:

The Delaware Bay Shorebird Project, which has assessed shorebird numbers in the region for 26 years, found that the threatened red knot shorebird's numbers remained at historically low levels in 2022. The red knots modestly increased from 6,800 in 2021 to over 12,000 this year, but that number is less than half the 2019 peak count of 30,000 and a fraction of the peak population of over 94,000 in 1989.

The simple fact is that red knots are starving to death. With extinction now a real possibility, the decision to further reduce protections in Delaware Bay is incomprehensible. The ASMFC needs to reverse course before the red knot passes the point of no return.

Delaware Bay is a critical resting point for most red knots as they complete their epic migration from as far south as Tierra del Fuego to their breeding grounds in the Arctic Circle. Red knots rely on horseshoe crab eggs to replenish and renourish before finishing their journeys, but due to the overharvesting of crabs in recent decades both egg availability and red knot numbers have suffered. In 2015, red knots were listed as "threatened" under the Endangered Species Act.

The reason for this eyes wide-open destruction of one of the most important natural features in the U.S. is not complicated. Simply put, the agencies allow the killing of too many crabs leaving only enough to spawn when sea conditions are perfect, and then blame the less than perfect conditions for the collapse of the stopover. If crabs were allowed to recover to historic numbers, birds would have abundance in any conditions.

The Atlantic States Marine Fisheries Commission (ASMFC) advanced a proposal earlier this year that poses a significant threat to both horseshoe crabs and red knots. The proposal, advanced by the body's Horseshoe Crab Management Board in January, would almost certainly result in renewed killing – or "harvesting" – of female crabs for use as fishing bait, reversing a longstanding prohibition. New Jersey Audubon, Defenders of Wildlife, and Earthjustice have warned that the proposal

threatens to cause a violation of the Endangered Species Act by further depleting the horseshoe crab eggs that red knots rely upon. ASMFC could make a final decision on the proposal as soon as October and set new horseshoe crab bait harvest quotas for the 2023 fishing year at that time.

The ASMFC's horseshoe crab management policy over the last two decades has adversely affected the entire near-shore tidal ecosystem of Delaware Bay. Shorebirds arriving from South America to feed as they prepare to continue their journey to the Arctic to breed, forage fish, and the young of several sportfish like weakfish and striped bass all depend on horseshoe crab eggs in abundance, which has been lacking over the last 20 years.

With red knot numbers in Delaware Bay remaining at historically low levels, ASMFC's proposal is a huge risk to the birds' survival and recovery. ASMFC should be restoring horseshoe crabs and red knots in Delaware Bay, not making the situation worse.

Horseshoe crab egg density in Delaware Bay was approximately 7,000 eggs per square meter in May 2022, well below the 10,000 egg per square meter density seen in recent years. In the 1990s, before the overharvesting of horseshoe crabs, eggs reached nearly 50,000 per square meter. Researchers from the Delaware Bay Shorebird Project have concluded that the overharvesting of horseshoe crabs has directly impacted red knot shorebird numbers in the region.

As horseshoe crab numbers languish in Delaware Bay, satellite transmitters have shown birds bypassing the region as a stopover altogether, even though alternatives do not provide a sufficient food supply. With a spottier distribution of horseshoe crabs and shorter spawning periods that last only a few days during lunar tides, rather than weeks, egg resources on the bay are no longer reliable to the birds.

Yours sincerely,
Robert E. Rutkowski

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Atlantic States Marine Fisheries Commission

DRAFT ADDENDUM VIII TO THE HORSESHOE CRAB FISHERY MANAGEMENT PLAN

Implementation of the 2021 ARM Revision

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

August 2022

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

1.0 Introduction

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

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

Draft Addendum VIII considers implementing the 2021 Revision to the Adaptive Resource Management (ARM) Framework originally established under Addendum VII.

2.0 Overview

2.1 Statement of the Problem

The Board initiated Draft Addendum VIII in January 2022 to consider use of the recent 2021 Revision of the ARM Framework (ASMFC 2021) in setting annual bait harvest specifications for horseshoe crabs of Delaware Bay-origin. Delaware Bay horseshoe crab management using the ARM Framework was originally established under Addendum VII for use during the 2013 fishing season and beyond. The Framework considers the abundance levels of horseshoe crabs and shorebirds in determining the optimal harvest level for the Delaware Bay states of New Jersey, Delaware, Maryland, and Virginia (east of the COLREGS).

In the past decade, more data has been collected on shorebirds and horseshoe crabs and modeling software and techniques have advanced. Additionally, the original ARM Framework used software that is now antiquated, not supported, does not run on current computer operating systems, and is limited in its capacity to incorporate uncertainty when determining optimum harvest strategies. Thus, the ARM Subcommittee was tasked with revising the ARM

Framework to address critiques from the previous peer review panel, include newly available data, and transition to new modeling software.

Following the recommendations of the independent peer review panel, which endorsed the ARM Revision as the best and most current scientific information for the management of horseshoe crabs in the Delaware Bay Region, the Board reviewed and accepted the ARM Revision in January 2022. Draft Addendum VIII considers incorporating the recommended changes in the ARM Revision into the management program for bait harvest of Delaware Bay-origin horseshoe crabs.

2.2 Background

The original ARM Framework and Addendum VII were developed in response to public concern regarding the horseshoe crab population and its ecological role in the Delaware Bay. While the stock assessment at that time (ASMFC 2009a) found increases in the Delaware Bay horseshoe crab abundance, the red knot (*rufa* subspecies), one of many shorebird species that feed on horseshoe crab eggs, was at low population levels. To address these concerns, an effort began to develop a multi-species approach to managing horseshoe crabs by employing the tools of structured decision making and adaptive management. In 2007, the Horseshoe Crab and Shorebird Technical Committees met and endorsed the development of a structured decision making (SDM) framework and adaptive management approach. An ARM subcommittee was formed including representatives from state and federal partners, as well as horseshoe crab and shorebird biologists. The subcommittee produced a framework for adaptive management of horseshoe crabs in the Delaware Bay that was constrained by red knots. It was peer-reviewed with a coastwide benchmark stock assessment for horseshoe crab in 2009 (ASMFC 2009a, 2009b).

Addendum VII, approved in February 2012, implemented 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 in determining the optimal harvest level for the Delaware Bay states of New Jersey, Delaware, Maryland, and Virginia (east of the COLREGS). Since 2013, the Board has annually reviewed recommended harvest levels from the ARM Subcommittee, who run the ARM model, and specified harvest levels for the following year in New Jersey, Delaware, Maryland, and Virginia.

2.3 Original ARM Framework

A goal of the ARM Framework is to transparently incorporate the views of stakeholders along with predictive modeling to assess the potential consequences of multiple, alternative management actions in the Delaware Bay Region. The ARM process involved several steps: 1) identify management objectives and potential actions, 2) build alternative predictive models with confidence values that suggest how a system will respond to these management actions, 3) implement management actions based on those predictive models, 4) monitor to evaluate the population response to management actions, validate the model predictions, and provide

timely feedback to update model confidence values and improve future decision making, 5) as necessary, incorporate new data into the models to generate updated, improved predictions, and 6) revise management actions as necessary to reflect the latest state of knowledge about the ecosystem. The ARM Framework is an iterative process that adapts to new information and success of management actions.

Underlying the original ARM model are population models for both red knots and horseshoe crabs. The optimization routine in the ARM model determines the best choice among five potential harvest packages (numbers of male and females that can be harvested) given the current abundance of each species in order to maximize the long-term value of horseshoe crab harvest. The ARM model values female horseshoe crab harvest only when the abundance of red knots reaches 81,900 birds (a value related to the historic abundance of red knots in the Delaware Bay) or when the abundance of female horseshoe crabs reaches 80% of their predicted carrying capacity (11.2 million assuming a carrying capacity of 14 million; ASMFC 2009b). On an annual basis, the ARM model is used to select the optimal harvest package to implement for the next year given the current year's estimate of horseshoe crab abundance from the swept area estimate from the VA Tech trawl survey and a mark-resight estimate of red knot abundance.

Within this ARM Framework, a set of alternative multispecies models were developed for the Delaware Bay Region to predict the optimal strategy for horseshoe crab bait harvest. These models accounted for the need for red knot stopover feeding during migrations through the region. These models incorporated uncertainty in model predictions and are meant to be updated with new information as monitoring and management progress.

On an annual basis, the ARM model is used to select the optimal harvest package to implement for the next year given the current year's estimate of horseshoe crab abundance from the swept area estimate from the VA Tech trawl survey and a mark-resight estimate of red knot abundance. The current harvest packages for horseshoe crab bait harvest that can be selected by the ARM model are:

Package 1) Full harvest moratorium on both sexes
Package 2) Harvest up to 250,000 males and 0 females
Package 3) Harvest up to 500,000 males and 0 females
Package 4) Harvest up to 280,000 males and 140,000 females
Package 5) Harvest up to 420,000 males and 210,000 females

The numbers of horseshoe crabs in the packages listed above are totals for the Delaware Bay Region, and not per state. Since its implementation in 2013, neither the 81,900 red knot threshold nor the 11.2 million female horseshoe crab thresholds have been met and harvest package 3 has been selected every year by the Framework and specified by the Board for the Delaware Bay bait harvest limit.

2.4 Allocation of the ARM harvest output

The ARM Framework incorporates horseshoe crabs from the Delaware Bay Region as one unit. The modeling and optimization portions of the Framework do not address distribution and allocation of the harvest among the four Delaware Bay states. Allocation of the overall Delaware Bay harvest allowance was established in Addendum VII. Based on tagging and genetic analysis (ASMFC 2019, 2021), there is very little exchange between Chesapeake Bay and Delaware Bay horseshoe crab populations. However, there is movement of horseshoe crabs between coastal embayments (from New Jersey through Virginia) and Delaware Bay.

An allocation model for the four Delaware Bay states was developed to allocate the optimized harvest output by the ARM Framework, which is described in Section 2.4 of Addendum VII, and summarized below.

Each state's allocation of the total Delaware Bay-origin harvest recommended by the ARM Framework was determined by multiplying the state's quota under Addendum VI by the proportion of the state's total harvest that is of Delaware Bay-origin (lambda, λ), then dividing this value by the sum of the values for each of four states (Table 1). The state lambda values established in Addendum VII were based on the genetic data available at the time. Virginia's quota level and landings refer to those quota and landings that occur east of the COLREGS line, as these crabs have been shown to be part of a mixed stock.

Table 1. Calculation of State Allocations of Delaware Bay Harvest Established in Addendum VII

State	Lambda	Addendum VI Quota	Delaware Bay-Origin Quota	Add VII Allocation of Delaware Bay-Origin Quota
NJ	1.00	100,000	100,000	32.4%
DE	1.00	100,000	100,000	32.4%
MD	0.51	170,653	87,033	28.2%
VA (east of COLREGS)	0.35	60,998	21,349	7.0%

Along with the state allocation percentages, Addendum VII also established two additional provisions impacting the state quotas for Maryland and Virginia. First, it established a harvest cap for Maryland and Virginia, which set a maximum limit on the total level of allowed harvest by Maryland and Virginia to provide protection to non-Delaware Bay-origin crabs. The cap is based on Addendum VI quota levels for Maryland and Virginia; the Maryland cap is 170,653 crabs, and the Virginia cap is 60,998 crabs. These caps apply except when the ARM Framework recommends a package that prohibits harvest of female horseshoe crabs. When female harvest is prohibited, a second provision allows for a 2:1 offset of males:females for Maryland and Virginia, which allows the total male harvest of Maryland and Virginia to rise above the cap level. Note again that Virginia's quota only refers to the number of crabs that can be harvested east of the COLREGS line.

3.0 Management Options

Draft Addendum VIII considers two management options:

- Option A: No action
- Option B: Implement the ARM Revision for setting bait harvest specifications for Delaware Bay-origin horseshoe crabs

Option B includes additional sub-options to specify how annual harvest recommendations will be made based on the output of the ARM model.

Option A: No Action
Because the ARM Framework adopted under Addendum VII can no longer be updated due to its obsolete software, under this option, the management program would revert back to the provisions implemented under Addendum VI. These include the following harvest quotas and limitations for New Jersey, Delaware, Maryland, and Virginia.

Addendum VI prohibits directed harvest and landing of all horseshoe crabs in New Jersey and Delaware from January 1 through June 7, and female horseshoe crabs in New Jersey and Delaware from June 8 through December 31. It also limits New Jersey and Delaware's harvest to 100,000 horseshoe crabs per state per year.

Addendum VI prohibits directed harvest and landing of horseshoe crabs in Maryland from January 1 through June 7 for two years, from October 1, 2006 to September 30, 2008. It also prohibits the landing of horseshoe crabs in Virginia from federal waters from January 1 through June 7.

Addendum VI mandates that no more than 40% of Virginia's annual quota may be harvested east of the COLREGS line in ocean waters. It also requires that horseshoe crabs harvested east of the COLREGS line and landed in Virginia must be comprised of a minimum male to female ratio of 2:1.

Table 2. Commercial horseshoe crab bait harvest quotas for the Delaware Bay states under Addendum VI.

Jurisdiction	Addendum VI ASMFC Quota
NJ*	100,000
DE*	100,000
MD	170,653
VA**	152,495
DELAWARE BAY TOTAL	523,148

*Male-only harvest
**No more than 40% of Virginia's annual quota may be harvested east of the COLREGS line in ocean waters. Horseshoe crabs harvested east of the COLREGS line and landed in Virginia must be comprised of a minimum male to female ratio of 2:1.

Option B: Implement the ARM Revision for setting bait harvest specifications for Delaware Bay-origin horseshoe crabs

This option would adopt the updates to the ARM Framework recommended in the 2021 Revision and incorporate them into the process for setting specifications for bait harvest of Delaware Bay-origin horseshoe crabs. Changes to the ARM Framework are described in detail in the 2021 Revision to the Adaptive Resource Management Framework and Peer Review Report, and include:

- Catch multiple survey analysis (CMSA) to estimate male and female horseshoe crab population estimates using all quantifiable sources of mortality (i.e., natural mortality, bait harvest, coastwide biomedical mortality, and commercial dead discards) and several abundance indices from the Delaware Bay Region
- Integrated population model (IPM) to quantify the effects of horseshoe crab abundance on red knot survival and recruitment based on data collected in the Delaware Bay
- Transition to new modeling approach which can be implemented through readily available R software and incorporates uncertainty on all life history parameters for both horseshoe crabs and red knots
- Harvest recommendations based on a continuous scale rather than discrete harvest packages as in the previous Framework
- Female harvest decoupled from the harvest of males

Harvest Recommendations

Harvest recommendations under the ARM Revision are based on a continuous scale rather than the discrete harvest packages in the previous Framework. Therefore, any harvest number between zero and the maximum allowable harvest could be recommended, not just the fixed harvest packages. Harvest of females is decoupled from the harvest of males so that each are determined separately. The maximum possible harvest for both females and males are maintained as in Addendum VII at 210,000 and 500,000, respectively.

Although harvest is treated as continuous in the new ARM Framework, if the continuous harvest recommendations were made public, it would be possible to back-calculate the biomedical mortality input, which is confidential. Therefore, it is necessary to round the continuous sex-specific harvest outputs to obscure the confidential biomedical data, unless the maximum sex-specific harvest is recommended. There are two sub-options for rounding the harvest output from the ARM Framework:

- **Sub-option B1:** Round down continuous optimal harvest recommendation to nearest 25,000 horseshoe crabs. For example, if the continuous optimal harvest recommendation is 135,000 males and 96,000 females, these values would be rounded down to 125,000 males and 75,000 females.

- **Sub-option B2:** Round down continuous optimal harvest recommendation to nearest 50,000 horseshoe crabs. For example, if the continuous optimal harvest recommendation is 135,000 males and 96,000 females, these values would be rounded down to 100,000 males and 50,000 females.

The Board is seeking public input on the level of rounding of the optimal harvest recommendation. Sub-option B2 would be more conservative, but sub-option B1 would yield harvest levels closer to the optimal harvest.

Adaptive management cycle

Under this option the adaptive management cycle would include three tiers of short and longer term management, update, and revision processes for the ARM Framework, as follows:

1. **Annual management process:** The annual specification of harvest will occur at the ASMFC annual meeting in calendar year *t* for the harvest to be implemented the following season (year *t*+1). The CMSA requires multiple indices of abundance and removals from multiple sources. Because the necessary data take time to be finalized, and final data for a given year would not be available by the time of the annual meeting, the results of a run of the CMSA in year *t* will be based on data obtained from the previous two years. Inputs to the CMSA will include the Virginia Tech trawl survey that is conducted in the fall of year *t*-2; Delaware and New Jersey trawl surveys from year *t*-1; and removals from year *t*-1. To match the abundance estimates of horseshoe crabs with red knot mark-resight population estimates, horseshoe crab abundance estimates from year *t*-1 and red knot population estimates from year *t*-1 will be used as input to the ARM Revision harvest policy functions in year *t*. Optimal harvest recommendations can then be implemented in year *t*+1. The two year time lag between data availability and implementation of optimal harvest was incorporated in the ARM Revision modeling when determining what the optimal harvest would be based on horseshoe crab and red knot abundance.

   Each annual step is identified in the timeline below:
   - April - July (year *t*) – The ARM workgroup compiles monitoring data to run the CMSA (Virginia Tech trawl survey data from year *t*-2, New Jersey and Delaware survey data from year *t*-1, removal data from year *t*-1). The ARM workgroup estimates red knot stopover population size from the mark-resight analysis in year *t*-1.
   - August (year *t*) – The ARM workgroup inputs horseshoe crab and red knot population estimates to the ARM Revision harvest policy functions and calculates the optimal harvest.
   - September (year *t*) – The Delaware Bay Ecosystem Technical Committee reviews the ARM Revision results and optimal harvest recommendations.
   - ASMFC Annual Meeting (year *t*) – The Management Board reviews the optimal harvest recommendations from the ARM workgroup and decides on the harvest to be implemented in year *t*+1.

2. **Interim update process:** Every three years, an update process would occur in which the model parameters (e.g., red knot survival and recruitment, horseshoe crab stock-recruitment relationship) are updated based on the annual routine data collected in the region.
3. **Revision process:** every 9 or 10 years (or sooner if desired by the Board), the ARM Framework should undergo a revision process similar to what occurred for the 2021 ARM Revision. This amount of time is appropriate given it allows for two updates to occur, and encompasses one generation for horseshoe crabs. This should incorporate the following components:
    - Solicit formal stakeholder input on ARM Framework to be provided to the relevant technical committees
    - Technical committees review stakeholder input and technical components of ARM models and provide recommendations to the Board
    - At the ASMFC Spring Meeting, Board selects final components of the ARM Framework, and tasks technical committees to work with ARM Working Group to run models /optimization
    - Merge with the annual management process
        - In August, ARM Subcommittee runs models/optimization
        - At the ASMFC Annual Meeting, the Board revisits harvest decision

If Option B is selected, implementation of the ARM Framework Revision would likely occur for the 2023 fishing season, with Board review and decision-making likely to occur at the Board's 2022 annual meeting.

Allocation of the Delaware Bay-origin harvest recommendation

Under this option, the allocation methodology established in Addendum VII would be modified to update state lambda values as recommended in the 2021 Revision based on more recent genetic data analysis. Lambda indicates how much of a state's harvest is of Delaware Bay-origin (i.e., has spawned at least once in Delaware Bay). Lambda shall be assumed to be 1.00 for New Jersey and Delaware and based upon the recent genetics data and analysis (ASMFC 2021), 0.45 for Maryland, and 0.20 for Virginia.

State	Lambda, λ
NJ	1.00
DE	1.00
MD	0.45
VA	0.20

Allocation values will be calculated using the same formula as Addendum VII. Lambda will be multiplied by the state's Addendum VI quota. The resulting value will be divided by the sum of values for all four states to provide the percent of the Delaware Bay harvest recommendation that will be allocated to each state. Virginia's quota level and landings refer to those quota and

landings that occur east of the COLREGS line, as these crabs have been shown to be part of a mixed stock (Shuster 1985).

State	Allocation of Delaware Bay Harvest (%)
NJ	34.6%
DE	34.6%
MD	26.6%
VA	4.2%

Harvest cap for Maryland and Virginia

Under this option the harvest cap for Maryland and Virginia established under Addendum VII will be maintained. The harvest cap places a maximum limit on the total level of allowed harvest by Maryland and Virginia, providing protection to non-Delaware Bay-origin crabs. The cap is based on Addendum VI quota levels for Maryland and Virginia. Note again that Virginia's quota only refers to the amount able to be harvested east of the COLREGS line.

MD Cap	VA Cap
170,653	60,998

These caps shall 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 will be prohibited but a 2:1 offset of males:females shall apply and allow the total male harvest of Maryland and Virginia to rise above the cap level.

2:1 Male:female offset for female crabs below the Addendum VI levels

When a female harvest moratorium output by the ARM Framework restricts female crab harvest in Maryland and Virginia below the Addendum VI quota levels, male harvest would be increased at a 2:1 ratio. These increases are the only allowable increases above the designated harvest cap above. The offsets assume an allowed harvest under Addendum VI in Virginia of 20,333 female crabs and in Maryland of 85,327 female crabs.

Fallback option if ARM Framework cannot be used

As part of the 2021 ARM Framework Revision, the models are dependent on annual data sets for the yearly harvest setting, and include the following:

- Horseshoe crab abundance estimates from the Virginia Tech Horseshoe Crab Trawl Survey
- Horseshoe crab relative abundance indices from Delaware and New Jersey fishery-independent surveys
- Total horseshoe crab removals (bait harvest, biomedical mortality, and estimated commercial discards)

- Horseshoe crab spawning beach sex ratio from the Delaware Bay Horseshoe Crab Spawning Survey
- Red knot abundance estimates, including stopover counts and re-sightings

The absence of these annually-collected data sets could inhibit the use of the ARM Framework depending on which data sets were missing. If model results were not available for the fall harvest decision, the Board, via Board action and after consultation of the relevant Technical Committees and Advisory Panels, may set the next season's harvest by one of the following methods:

- Based upon Addendum VI quotas and management measures for New Jersey, Delaware, and Maryland, and Virginia coastal waters; or,
- Based upon the previous year's ARM Framework harvest level and allocation for New Jersey, Delaware, and Maryland, and Virginia coastal waters. Harvest could be more conservative than the previous year's ARM Framework harvest level and allocation for New Jersey, Delaware, and Maryland, and Virginia coastal waters.

4.0 Compliance

TBD

5.0 Literature Cited

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Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2007. Adaptive management: the US Department of the Interior technical guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

Appendix A. Example Allocation of Delaware Bay Horseshoe Crab Harvest

Table 1. Horseshoe crab and red knot population estimates and resulting harvest recommendation for 2017-2019 based on the 2021 ARM Revision. Coastwide biomedical mortality was used for model development, so actual Delaware-Bay specific values will result in slightly lower population estimates. Source: Supplemental Report for ARM Revision, Table 11.

Year	CMSA Estimates		Red knots	Optimal HSC Harvest (revised ARM)	
	Female HSC	Male HSC		Female	Male
2017	10,967,100	31,664,430	49,405	154,483	500,000
2018	9,735,690	24,715,290	45,221	146,792	500,000
2019	9,357,400	21,897,920	45,133	144,803	500,000

Table 2. Example allocation of the Delaware Bay optimal horseshoe crab harvest using the 2019 Optimal HSC Harvest (see Table 1). Top: Example allocation under Option B, sub-option B1. Bottom: Example allocation under sub-option B2. Total quota includes crabs of non-Delaware Bay Origin.

State	DE Bay Origin Quota			Total Quota		
	Sexes Combined	Male	Female	Sexes Combined	Male	Female
DE	207,617	173,014	34,603	207,617	173,014	34,603
NJ	207,617	173,014	34,603	207,617	173,014	34,603
MD	159,437	132,864	26,573	170,653	142,211	28,442
VA	25,328	21,107	4,221	60,998	50,832	10,166
Total	**600,000**	**500,000**	**100,000**	**646,885**	**539,071**	**107,814**

State	DE Bay Origin Quota			Total Quota		
	Sexes Combined	Male	Female	Sexes Combined	Male	Female
DE	216,268	173,014	43,254	216,268	173,014	43,254
NJ	216,268	173,014	43,254	216,268	173,014	43,254
MD	166,080	132,864	33,216	170,653	136,522	34,131
VA	26,384	21,107	5,277	60,998	48,798	12,200
Total	**625,000**	**500,000**	**125,000**	**664,187**	**531,349**	**132,837**

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **Horseshoe Crab Plan Development Team**

FROM: **Horseshoe Crab Technical Committee**

DATE: **June 29, 2022**

SUBJECT: **Technical guidance to PDT on biomedical mortality threshold**

Background

In October 2021, the Board assigned the following task to the Plan Development Team (PDT): review the threshold for biomedical mortality to develop biological based options for the threshold and to develop options for action when the threshold is exceeded; also, review the best management practices (BMPs) for handling biomedical catch and suggest options for updating and implementing BMPs. The PDT tasked the Technical Committee with reviewing available information to address this task and recommending potential methods for developing biologically based options for the biomedical mortality threshold. They also requested the TC review the BMPs and recommend any updates.

The TC met in April and June to discuss this task and provide guidance to the PDT. The TC's discussion and recommendations are summarized below.

Technical Committee Recommendations on Biomedical Mortality Threshold

The TC's direct response to the PDT's task to develop biologically based options for the biomedical mortality threshold is that given the available data, it is not possible to recommend a scientifically based threshold for biomedical mortality. The TC evaluated all available information on horseshoe crab populations and biomedical collections. The key issue that prevents the TC from recommending a biologically based threshold is the lack of population estimates for the coast and all regions except for the Delaware Bay. It should be underscored that without such population estimates, it is not possible to recommend coastwide mortality limits from any source, not just biomedical mortality.

To examine the effects of biomedical mortality for the Delaware Bay only, a sensitivity analysis was conducted using varying levels of biomedical mortality in the existing catch multiple survey analysis (CMSA) and projection models for the region. The results of this analysis are included in the attached memo to the TC and Stock Assessment Subcommittee dated April 21, 2022. The analysis indicates that, on average, the Delaware Bay population estimate was not very sensitive to increasing the biomedical harvest in the region by assuming all biomedical mortality was on female crabs in the Delaware Bay. The projection model showed that increasing biomedical removals to larger quantities (e.g., 200-300 thousand female crabs) over time can lower the equilibrium values of the population in the future. While these analyses can inform the TC and SAS discussions about the influence of removals on population estimates, it should be noted that levels of biomedical mortality vary at a regional level along the coast and the Delaware Bay region may not be an appropriate proxy for the Atlantic coast. Biomedical mortality can have different impacts regionally, depending on the size and condition of a particular stock as well as the level of biomedical mortality.

As there is no technical basis for the coastwide biomedical mortality threshold, the TC recommends focusing on the best management practices for handling of horseshoe crabs for biomedical use. Improving upon the existing BMPs and/or developing some standard requirements states could implement for biomedical operations may provide an avenue for reducing lethal and sublethal effects on horseshoe crabs. The TC will convene again to discuss this issue in more detail and develop recommendations for the PDT to consider related to the BMPs.

Atlantic States Marine Fisheries Commission

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MEMORANDUM

June 8, 2022

To: **Horseshoe Crab Management Board**

From: **Tina Berger, Director of Communications**

RE: **Advisory Panel Nomination**

Please find attached a nomination to the Horseshoe Crab Advisory Panel – David Meservey, an inshore commercial otter trawler from Massachusetts. David replaces Jay Harrington, who served on the Panel since 1998. Please review this nomination for action at the next Board meeting.

If you have any questions, please feel free to contact me at (703) 842-0749 or tberger@asmfc.org.

Enc.

cc: Caitlin Starks

HORSESHOE CRAB ADVISORY PANEL

Bolded names await approval by the Horseshoe Crab Management Board

June 8, 2022

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Appt Confirmed 2/3/16
Appt. Reconfirmed 8/18

Rhode Island
Vacancy (comm/otter trawl)

New York
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Phone (eve): 516.797.9786
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Appt Reconfirmed 5/10

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Appt. Confirmed 4/7/98
Appt. Reconfirmed 10/02
Appt. Reconfirmed 10/06
Appt Reconfirmed 5/10
Participation: Inactive; attended last meeting in 2010

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Delaware
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Appt. Confirmed 10/24/18

2 vacancies - dealer/processor & conservation/environmental

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Appt. Confirmed 5/16

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Appt. Confirmed 2/4/98
Appt. Reconfirmed 10/02; 10/06; 5/10

William R. Legg (comm/pot/eel)
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Appt. Confirmed 4/7/98
Appt. Reconfirmed 10/02; 10/06; 5/10
Participation: Inactive; attended last meeting in 1998

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Appt. Confirmed 8/21/08

HORSESHOE CRAB ADVISORY PANEL

Bolded names await approval by the Horseshoe Crab Management Board

June 8, 2022

past chair

Virginia
Richard B. Robins, Jr. (processor/dealer)
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Appt. Confirmed: 2/9/00
Appt. Reconfirmed 1/2/06; 5/10

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Appt. Confirmed 10/21/2020

1 vacancy - comm/pot/conch

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Nora Blair (biomedical)
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Appt. Confirmed 5/1/19

Cindy Sires (comm/pot/trawl)
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Appt. Confirmed 8/5/10
Participation: Inactive; never attended meeting since appt in 2010

Nontraditional Stakeholders
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Appt. Confirmed 8/2018

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Cell: 910.619.6244
walker@coastallandtrust.org
Appt. Confirmed 8/2018

ATLANTIC STATES MARINE FISHERIES COMMISSION

Advisory Panel Nomination Form

This form is designed to help nominate Advisors to the Commission's Species Advisory Panels. The information on the returned form will be provided to the Commission's relevant species management board or section. Please answer the questions in the categories (All Nominees, Commercial Fisherman, Charter/Headboat Captain, Recreational Fisherman, Dealer/Processor, or Other Interested Parties) that pertain to the nominee's experience. If the nominee fits into more than one category, answer the questions for all categories that fit the situation. **Also, please fill in the sections which pertain to All Nominees (pages 1 and 2). In addition, nominee signatures are required to verify the provided information (page 4), and Commissioner signatures are requested to verify Commissioner consensus (page 4). Please print and use a black pen.**

Form submitted by: Daniel McKiernan (your name) State: MA

Name of Nominee: David S. Meservey

Address: Box 128

City, State, Zip: South Chatham, MA 02659

Please provide the appropriate numbers where the nominee can be reached:

Phone (day): 508-237-4366 Phone (evening): _____

FAX: _____ Email: dmese@yahoo.com

FOR ALL NOMINEES:

1. Please list, in order of preference, the Advisory Panel for which you are nominating the above person.
   1. Horseshoe Crab Advisory Panel
   2. _____
   3. _____
   4. _____
2. Has the nominee been found in violation of criminal or civil federal fishery law or regulation or convicted of any felony or crime over the last three years?

   yes_____ no NO
3. Is the nominee a member of any fishermen's organizations or clubs?

   yes _____ no NO

   If "yes," please list them below by name.

4. What kinds (species) of fish and/or shellfish has the nominee fished for during the past year?

Horseshoe Crabs

Fluke

Conch

5. What kinds (species) of fish and/or shellfish has the nominee fished for in the past?

Horseshoe Crabs

Striped Bass

Dogfish

Fluke/Sea Bass

Sea Scallops

Quahogs/Soft Shelled Clams

FOR COMMERCIAL FISHERMEN:

1. How many years has the nominee been the commercial fishing business? 30 (12 P&D) years
2. Is the nominee employed only in commercial fishing? yes_____ no No
3. What is the predominant gear type used by the nominee? Otter Trawl
4. What is the predominant geographic area fished by the nominee (i.e., inshore, offshore)? Inshore Nantucket Sound, Massachusetts

FOR CHARTER/HEADBOAT CAPTAINS:

1. How long has the nominee been employed in the charter/headboat business? 30 (12 P&D) years
2. Is the nominee employed only in the charter/headboat industry? yes _____ no_____

   If "no," please list other type(s)of business(es) and/occupation(s):_____

3. How many years has the nominee lived in the home port community? _____ years

   If less than five years, please indicate the nominee's previous home port community.

FOR RECREATIONAL FISHERMEN:

1. How long has the nominee engaged in recreational fishing? _____ years

2. Is the nominee working, or has the nominee ever worked in any area related to the fishing industry? yes yes _____ no _____

   If "yes," please explain.

_____

_____

_____

FOR SEAFOOD PROCESSORS & DEALERS:

1. How long has the nominee been employed in the business of seafood processing/dealing?
   30 (12 P&D) _____ years

2. Is the nominee employed only in the business of seafood processing/dealing?

   yes _____ no NO _____ If "no," please list other type(s) of business(es) and/or occupation(s):

   Commercial Fisherman _____

   Commercial Fisherman _____

   Commercial Fisherman _____

3. How many years has the nominee lived in the home port community? 43 _____ years

   If less than five years, please indicate the nominee's previous home port community.

_____

FOR OTHER INTERESTED PARTIES:

1. How long has the nominee been interested in fishing and/or fisheries management? 14 _____ years

2. Is the nominee employed in the fishing business or the field of fisheries management?
   yes yes _____ no _____

   If "no," please list other type(s) of business(es) and/or occupation(s):

   Commercial Fisherman _____

   Commercial Fisherman _____

   Commercial Fisherman _____

FOR ALL NOMINEES:

In the space provided below, please provide the Commission with any additional information which you feel would assist us in making choosing new Advisors. You may use as many pages as needed.

See Attached

Nominee Signature: David Meservey Date: 5/6/22

Name: David Meservey
(please print)

COMMISSIONERS SIGN-OFF (not required for non-traditional stakeholders)

Daniel J McKiernan
State Director

Sarah M. Peake
State Legislator

Raymond McKay
Governor's Appointee

Growing up on Nantucket Sound, I realized at a young age that I wanted to work on the water. For 15 years I worked as a shell fisherman and frequently crewed on gillnet and fish weir boats. In 2007 as the shellfish beds dried up I switched focus to horseshoe crabs and dogfish. Over the next few years I developed a passion for the horseshoe crab fishery.

My interest was peaked. I discovered there were many aspects to consider; science, commercial fishing, and politics. As a result I developed a horseshoe crab business. I catch and purchase crabs throughout the year using various harvest methods. In addition, I supply a biomedical industry as well as conch fishermen with crabs as needed. Working closely with the industry has offered me a unique perspective on the resource.