PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

HORSESHOE CRAB MANAGEMENT BOARD

Wentworth by the Sea
New Castle, New Hampshire
October 29, 2019

Approved October 21, 2020

Proceedings of the Horseshoe Crab Management Board Meeting
October 2019

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ATTENDANCE

Board Members

Dan McKiernan, MA, proxy for D. Pierce (AA)
Raymond Kane, MA (GA)
Rep. Sarah Peake, MA (LA)
Bob Ballou, RI (Chair)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Justin Davis, CT (AA)
Bill Hyatt, CT (GA)
Sen. Craig Miner, CT (LA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Maureen Davidson, NY, proxy for J. Gilmore (AA)
Emerson Hasbrouck, NY (GA)
Joe Cimino, NJ (AA)
Tom Fote, NJ (GA)
Adam Nowalsky, NJ, proxy for Sen. Andrzejczak (LA)
Stewart Michels, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Mike Luisi, MD, proxy for Bill Anderson (AA)
Russell Dize, MD (GA)
Robert Brown, MD, Governor Appointee proxy
Phil Langley, MD, proxy for Del. Stein (LA)
Bryan Plumlee, VA (GA)
Pat Geer, VA, proxy for Sen. (LA)
Steve Murphey, NC (AA)
Jerry Mannen, NC (GA)
Mel Bell, SC, proxy for R. Boyles (AA)
Malcolm Rhodes, SC (GA)
Sen. Ronnie Cromer, SC (LA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Jim Estes, FL, proxy for J. McCawley (AA)
Rep. Thad Altman, FL (LA)
Marty Gary, PRFC
Chris Wright, NMFS
Mike Millard, USFWS

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

Ex-Officio Members

Douglas Messeck, Law Enforcement Representative
John Sweka, ARM Subcommittee Chair

Staff

Robert Beal
Toni Kerns
Mike Schmidtke
Kristen Anstead

Guests

Chris Batsavage, NC DMF
Nora Blair, Charles River Labs
Robert Brown, MWA
Robert Bruce, MWA
John Clark, DE DFW
Kelly Denit, NOAA
Philip Forester, Philadelphia, PA
Lewis Gillingham, VMRC
Doug Grout, NH (AA)
Brett Hoffmeister, Assoc. of Cape Cod
Arnold Leo, E. Hampton, NY
Chip Lynch, NOAA
David Pierce, MA (AA)
Alesia Reed, NOAA
Mike Ruccio, NOAA
Sam Underwood, Assoc. of Cape Cod
Renee Zobel, NH F&G

The Horseshoe Crab Management Board of the Atlantic States Marine Fisheries Commission convened in the Wentworth Ballroom of the Wentworth by the Sea Hotel, New Castle, New Hampshire; Tuesday, October 29, 2019, and was called to order at 9:45 o'clock a.m. by CHAIR Malcolm Rhodes.

CALL TO ORDER

CHAIR MALCOLM RHODES: I'll call the meeting of the Horseshoe Crab Management Board to order. My name is Malcolm Rhodes; I'm up here at the podium with Dr. Mike Schmidtke and Dr. John Sweka, and Doug Messeck of Law Enforcement.

APPROVAL OF AGENDA AND PROCEEDINGS

CHAIR RHODES: You all had previously received the agenda and the proceedings from the August meeting, were there any changes to those? Any objections to accepting them as written? Seeing none we'll move those accepted.

PUBLIC COMMENT

CHAIR RHODES: We had a sign in sheet for public comment on issues not being brought before the Board, and I had no one signed up, but does anyone in the public need to address the management board? All right seeing no one coming up, I'm going to turn the meeting over to Dr. Sweka, it's all yours.

REVIEW DELAWARE BAY ECOSYSTEM TECHNICAL COMMITTEE AND ADAPTIVE RESOURCE MANAGEMENT SUBCOMMITTEE REPORT

DR. JOHN SWEKA: Back in September, September 11 and 12, there was a joint meeting between the Delaware Bay Ecosystem Technical Committee and the Adaptive Resource Management Subcommittee, or the ARM. The purpose of this meeting was to develop recommendations to the Horseshoe Crab Management Board for the ARM following the 2019 Horseshoe Crab benchmark stock assessment.

In our two groups we developed six consensus recommendations, which I'll give you some background on each one, and present each one of them today. The first recommendation is kind of a formalization of the process that we have been doing. I just want to get it formalized as to the way we do routine business each year.

The Virginia Tech Survey is conducted in the fall, and red knot abundance is estimated in the spring. Both primiparous and multiparous crabs that survive from the fall to the spring will spawn and represent the total number of crabs that can provide eggs to the shorebirds. A better estimate of the number of crabs producing eggs during the shorebird stopover period would actually decrement the abundance of horseshoe crabs estimated in the fall by half a year's worth of mortality.

RECOMMENDED UPDATES TO THE ARM MODEL

DR. SWEKA: A simple equation there, the crabs that are available in the spring when the birds are stopping over is just your primiparous plus your multiparous crabs decremented by mortality, or half of annual mortality. Our first recommendation then is for annual input into the ARM Framework. We should combine the primiparous and multiparous abundances from the Virginia Tech Trawl Survey with half a year mortality applied to the estimates. This would apply to the ARM Framework immediately. Our second recommendation pertains to the underlying horseshoe crab model, our Population Dynamics Model within the Arm Framework. It's been ten plus years since we developed the underlying horseshoe crab model. It started out from a publication back in 2007 as an age-structured model.

It was then converted into a stage-structured model in 2008, when we were developing the

ARM, and then the ARM Model was peer reviewed in 2009. The bottom line is we know a lot more now. We have more year's-worth of data, new mortality estimates coming out of our last stock assessment, estimates of dead discards, and we have a peer reviewed and approved stock assessment model., the Catch Multiple Survey Analysis or CMSA.

What we're proposing is to use the underlying model from the CMSA as the revised population dynamics model for horseshoe crabs. It is much simpler than the stage-structured model that we currently use. Here is the equation for it. It's just a function of the number of multiparous and primiparous crabs added together decremented by mortality and catch subtracted.

Again, horseshoe crabs are assessed in the fall by the Virginia Tech Trawl Survey, and will spawn the following spring. The catch would be equal to all removals from all sources. This is bait, biomedical, and dead discards all combined. One caveat with this model is somehow we need to produce the recruits, or the R in the equation there for use in the projection model, which projects the population through time, and helps us then decide what's our best management option today.

What we're proposing to do is come up with an assumed stock-recruitment relationship based on either median recruitment or hockey stick sort of stock recruitment relationship, and this is something that can be refined as we move through time. The advantages of moving to this new underlying horseshoe crab population dynamics model is Number 1, it's empirical.

It's driven by the observed data and has less emphasis on literature values for the various life history parameters. For example, the adult mortality within the current model, and also includes the actual number of removals. We don't have any need to make any assumptions about abundance of juvenile stages of horseshoe crabs.

The observed data provide an immediate feedback and model adjustment, and another big advantage is that the assessment model that we would use to estimate the abundance of horseshoe crabs, and the projection model are contained within the same modeling framework. This has been a criticism of previous peer reviewers on previous models.

Also we already have a funded USGS position under Dr. Dave Smith at the Leetown Science Center, and his Post-doc will be able to and has the funding and the time to transition the current modeling framework from ASDP that's the advanced casted dynamic programming to MDPSolve, so it's a new software that we would be developing this revised model in.

ASDP is now antiquated software, MDPSolve is newer software, and also a big advantage of moving to MDPSolve is that ASMFC staff will also be able to run the model. Another thing that we may look at in this recommendation is the utility function on female harvest of horseshoe crabs. Currently there is no value to harvesting female horseshoe crabs, unless the female horseshoe crab population estimate has reached 80 percent of the carrying capacity within the Delaware Bay, and that's 11.2 million crabs.

Then, once that threshold is reached females have value. You can see this, it's modeled as this knife-edged function. Into the future if we move forward with this new revised model, the carrying capacity might change, given the new underlying horseshoe crab population dynamics model.

Remember, our estimate of carrying capacity within the Delaware Bay is not an empirical estimate; it's based on theoretical modeling with the age-structured model that we currently use. Another question we might ask and explore is some proportion of K a suitable threshold, or should we move to some just absolute number of horseshoe crabs?

These things remain to be further discussed. The second recommendation is to move forward with using the Catch Multiple Survey Analysis Model for estimation and projection as the underlying horseshoe crab population model within the ARM Framework, and to reassess the ARM utility of female horseshoe crab harvest as a function of female abundance.

Recommendation 3 pertains to the red knot portion of the ARM Framework. McGowan et al in 2011, their published paper quantified the relationship between horseshoe crab abundance and red knot mass gain and survival. This paper then used data that was available from 1997 through 2008. Over time we've now doubled the amount of available data for this analysis.

It makes sense that it would be a good idea to go back, reanalyze that data, see if those relationships still hold, or if the parameters have changed. Also, within the ARM Framework we have three models describing the relationship between red knots and horseshoe crabs. The first model is horseshoe crabs do not limit red knots.

The second model is horseshoe crabs limit red knot fecundity, and the third model is horseshoe crabs limit red knot fecundity and survival. Within the ARM Framework we can apply weights to each one of these models; you know which one do we believe in the most? The current weight on each is 0.2, 0.4, and 0.4.

The third recommendation from our groups is to update the red knot survival mass gain model with the most recent data, and also to evaluate the red knot model weights. Recommendation 4 pertains to incorporation of biomedical data. We've been previously tasked by the Board to come up with options on how best to incorporate biomedical mortality into the current ARM Framework.

By moving to the Catch Multiple Survey Analysis as our assessment model, the biomedical mortality is accounted for in the population estimate, because that is one of the direct inputs of removals of horseshoe crabs. Biomedical mortality can also be modeled in projections of the horseshoe crab population dynamics model, while making optimum bait harvest recommendations on into the future. We can assume an average of the past few recent years, assume that would continue to take place from the biomedical industry, and put that into our projections. The Catch Multiple Survey Analysis use does not alter the harvest packages that could be recommended, so it does not require a new addendum. Recommendation 4 is use of CMSA accounts for biomedical mortality in the ARM Framework, which is a previous Board task, so we can consider that accomplished.

Recommendation 5 pertains to data confidentiality issues, which have been discussed over and over, you know at all levels within horseshoe crab management. Again we have our Rule of 3, and within Delaware Bay there are more than three biomedical companies, but if we disclose the number of biomedically bled crabs within Delaware Bay, then the companies in the northeast and the southeast would then be able to figure out what each other had bled on an annual basis.

The annual population estimates from the Catch Multiple Survey Analysis could be used to back calculate the biomedical mortality in the Delaware Bay. That is where we run into our confidential issue. We're still stuck with a conundrum of a black box assessment with real data versus non-confidential data assessment that is less accurate.

Our recommendation to handle this, and there is quite a few words on this slide, first we would request disclosure of confidential biomedical data for use in the base run of the CMSA estimate. If the Board does not agree with making the request or the companies say no to the disclosure, then we should run the CMSA with the confidential biomedical data with 15

percent mortality applied, run it without biomedical data, and run it with non-confidential coastwide biomedical data with 15 percent mortality applied.

The harvest package will be made based on the population estimates from the CMSA that includes confidential data, as it represents the best dataset available. But we would also publish 0 percent biomedical and coastwide biomedical population estimates to represent population balance.

Recommendation 6 pertains to Delaware Bay origin crabs. What is a Delaware Bay Crab? Our working definition for the last several years has been a crab that could spawn within Delaware Bay during some portion of its life. Here is how we like to think about it. We have the map here on the left showing the area that's covered by the Virginia Tech Trawl Survey.

With the VIMS diagram there you can think of the Virginia Tech crabs that are encountered by the Trawl Survey are all crabs that can spawn within Delaware Bay. But some portion of them you have crabs that occur in Maryland waters and crabs that occur in Virginia waters. What proportion of each one of those could spawn in Delaware Bay at some point in their life?

The harvest allocations under Addendum VII were based on genetic information that was available at the time. We now have new genetic information, and we also have new tagging analysis coming out of our 2019 stock assessment that quantifies movement rates from into and out of the Delaware Bay area.

Recommendation 6 is just to more formally reevaluate the definition of Delaware Bay crabs, and the implications towards the population estimates and harvest allocations that come from the ARM. Just to recap all of our recommendations. The first one is for input into the ARM combined primiparous, multiparous crabs and decrement it by half a year's mortality. The second recommendation was to move forward using the Catch Multiple Survey Analysis model for estimation and projection, and reassess the utility function of female crabs.

The third recommendation is to update red know survival mass gain, and evaluate red knot model weights. The fourth one is to use the CMSA, because it accounts for biomedical mortality within the ARM Framework. The fifth recommendation outlines a path forward to deal with the confidential data issue.

We can request access and public disclosure of the confidential data, and if not we run the Catch Multiple Survey Model with the real confidential data, but then put bounds on the resulting population estimate based on either 0 biomedical, or the coastwide biomedical harvest. Finally, recommendation 6 was to reevaluate the definition of Delaware Bay crabs and what implications it has towards population estimates and harvest allocations.

Implementation of these recommendations, first we would need a formal charge by the Management Board to the ARM Workgroup to incorporate these recommendations. After that we would have obviously several in-person meetings or webinars, you know maybe not the entire ARM Workgroup, maybe it's just a subset of us that are actually doing the hard computer program coding.

I want to reiterate that we do have a funded USGS Post-doc position for model coding, and we could be fully moving forward by March of 2020, and have this completed by March of 2021 or by the end of 2021. After that we would, you know like any stock assessment process, we would present the results to the Delaware Bay Ecosystem Technical Committee. Because this is such a radical change to the ARM modeling framework, it would require an external peer review.

After that a presentation to the Management Board, and approval for management use. In

reality from this point, we're probably looking at an approximate two-year timeframe before implementation of all these recommendations could be implemented. Until then the current ARM Framework would continue as is as we've been doing for the past number of years. With that I'll take any questions.

CHAIR RHODES: I want to thank you for the presentation. You hit a lot of points that we've talked at in here over the years, and you clarified them well, and brought them down to those six working points, which was I thought very helpful. I'll turn it over to the Board, any questions, yes, Mr. Hyatt?

MR. BILL HYATT: I've been hearing from a number of people who are expressing the opinion that egg density on spawning beaches can somehow be figured into this assessment over time. Their argument is largely based upon data that they say has accumulated over time showing that the egg densities are nowhere near what they were in the 1990s on many of these beaches. I was wondering if you could just speak to that a little bit. I believe I've seen in some of the materials that that issue has come up at your meetings. I don't know if it's ever been discussed or brought up before this group at all, but I appreciate if you could just lend some insight to that.

DR. SWEKA: We've talked about egg densities and the use of that data in our stock assessment very extensively, you know ever since before the stock assessment in 2009. The problem with the egg density data is that it's highly variable. Methodologies have changed, even the comparison to the egg densities that were in the literature back in the '80s and '90s, you know methodologies have changed. The data is highly variable.

The state of Delaware a few years ago stopped doing their egg surveys because we weren't using them for any stock assessment purposes, so now it's just New Jersey that's continuing to do the egg density estimation. Also there were differences in methodology between Delaware and New Jersey, just differences in the methods of processing the egg samples.

The egg density information, I mean it is a check. It could be viewed as kind of a qualitative check on abundance, but the Stock Assessment Subcommittee, the ARM Workgroup, overall we've just considered it not reliable enough to use as an index of what is available for horseshoe crabs.

Also at the same time, Conor McGowan's work relating, you know we already showed a direct relationship between red knot mass gain and survival, and abundance of adult female horseshoe crabs. We already have that direct linkage there that we don't have to add another step in there with eggs.

CHAIR RHODES: Roy Miller.

MR. ROY W. MILLER: Dr. Sweka, thank you for the presentation. A question concerning that graph you showed with the knife-edged utilization of female horseshoe crabs. Did you say there has been consideration given to some harvest of females that would not be knife edge, but be gradually phased in to flatten out that particular graph a little bit?

DR. SWEKA: I don't know if we've really discussed how the function might change. But moving forward with this new Population Dynamics Model, where that threshold is at 11.2 million, you know that could change. It is a possibility to have a different utility function. That is something that would have to be discussed amongst stakeholders and among the ARM Workgroup members.

Everything is on the table. I mean back after the 2009 stock assessment when the ARM Model was first peer reviewed that was a question even by the peer reviewers. Should it be a knife-edge function like this? Is 11.1 million too few females to have any harvest, but 11.2 million is okay.

MR. MILLER: Yes that is just kind of what I was thinking. I wondered if we ramped up harvest of females at something less than 11.2 coming up to the full utilization that's something beyond 11.2, if that might ease the pressure on New York, for instance, to supply female horseshoe crabs for the industry.

DR. SWEKA: I mean all I can say at this point is the utility function is something that we would look at, and possibly throw out a couple options for that utility function in the revised model.

CHAIR RHODES: Mike Millard.

DR. MIKE MILLARD: Thank you, John for that report. I wonder if we could jump back to that slide that has the three competing models about the relationship between horseshoe crabs and red knots. It's embedded within the ARM. We've been at this I guess since 2013 with the ARM Model. Is there some way that we're able to see, or is there some clarity emerging about which one of these models is doing the best job or best describes the system?

DR. SWEKA: Yes we could, you know through Bayesian model updating, we could look at where we started and where we end up currently. We've seen that female horseshoe crab abundance has increased, and the red knot abundance has kind of stayed steady. Given the empirical data, perhaps we would start to put a little more weight on the first model, and a little less weight on the others.

That might be one option. How these weights were originally developed was through expert opinion. We went around the table among the ARM Workgroup members, and everybody threw out which model they had the most faith in based on expert opinion, so we could also elicit expert opinion once again to update some of these model weights.

CHAIR RHODES: Are there any further questions? Tom Fote.

MR. THOMAS P. FOTE: I really don't have a question coming from me, but I have a question that I was asked about three years ago while I was sitting in a room, and I was at a conference and basically wound up in a room with former Governor Christine Todd Whitman of New Jersey. The first two questions she asked me in this room, now this is 20 years later after her being governor and going to EPA and everything.

She says, how are my horseshoe crabs going and red knots, and how is the glass eel situation? I had to give a 15 minute briefing. I always said, God you never think you get to the governor on issues like this, and here it is 22 years later and she's still worrying how the glass eels and the horseshoe crabs are. It's amazing how important things stick in their minds, so it reaffirmed the job I do representing the governor.

CHAIR RHODES: Chris Wright.

MR. CHRIS WRIGHT: In the review process of this next thing, is it just going to be the Delaware TC that is going to be presented? I would think that we should also do this to the regular Horseshoe Crab TC.

DR. MIKE SCHMIDTKE: With the structure that was put in place related to the TCs when the Delaware Bay TC was formed. That one is kind of on equal footing, so to speak, with the Horseshoe Crab TC. If the Board wants both TCs to review this then that is something that may be able to be done, but the structure that is currently in place is the ARM Subcommittee reports to the Delaware Bay TC, Delaware Bay TC reports directly to the Board. The Delaware Bay TC does not report to the Horseshoe Crab TC, so they kind of operate in two different realms there.

MR. WRIGHT: I would prefer that the TC would look at it. I mean it's hard to make judgments on things if we don't get a broad perspective.

CHAIR RHODES: Bill Hyatt.

MR. HYATT: Just going back to the comment you made a few minutes ago relative to not seeing an increase in the red knots relative to the concurrent increase in horseshoe crabs. This would speak back to the question that they asked earlier. The folks that I'm hearing from would argue that simply seeing the increase in the crabs does not mean you're seeing an increase in the eggs on the beaches, which would relate to the impact on the red knots. I think that is largely the thesis behind their desire to at some point in this process have some index of egg density on these important beaches as part of the process, so just a comment.

CHAIR RHODES: Are there any further comments or questions? Stew.

MR. STEWART MICHELS: John, if the Board chooses to move forward with recommending to the group that they follow through on this. Would it also make sense to also charge this group with giving consideration to alternate suite of, perhaps harvest packages at that same time, or do you think it should be get one out of the way first before we initiate looking into a suite of harvest packages?

DR. SWEKA: I guess from a technical standpoint it really doesn't make a lot of difference in the technical modeling. If the management board would like to choose a different suite of harvest packages, I guess that is up to the management board's discretion to make that recommendation to us, and we could obviously evaluate any number of harvest packages that are put forth.

CHAIR RHODES: Are there any further questions?

DR. SCHMIDTKE: Just one note related to Stew's question, if alternate harvest packages were to be actually approved for implementation that would have to happen through an addendum process. They could be explored through this process simply by Board direction, but any approval or use of alternate harvest packages would have to go through addendum process.

CHAIR RHODES: Mike Millard.

DR. MILLARD: I want to follow up on that a little bit. My understanding is regarding female harvest. If we were to change the packages, and maybe include more opportunities for female harvest that as it stands now, if the threshold for the utility function, females have no value. Until that is met, the model will never pick a package with females in the harvest. Do I have that correct?

DR. SWEKA: Yes that is correct.

DR. MILLARD: Well if I could follow up. Your recommendation Number 2 is going to possibly address that about changing the threshold when females have value.

DR. SWEKA: Yes. We change that threshold; perhaps a different harvest package would be selected.

CHAIR RHODES: That would be at the adoption in two years; hopefully two years from now when everything is prepared and we're looking at specs for the 2022 season would be the earliest we would be looking at that I would think. Yes, okay. But at this point what is the Board's desire? Do we want to charge or make a formal recommendation and charge to look at all six of these areas? Do we need to discuss any parts of it? I'm going to turn it over to the Board at this point. Stew.

MR. MICHELS: I would very much be interested in charging the Delaware Bay ARM Working Group and Delaware Bay Ecosystem Technical Committee, is that what it's called, with exploring these recommendations further. Do they have a motion prepared?

CHAIR RHODES: We don't need a motion. All right I'm seeing a lot of heads shaking. Is there any objection to moving forward with these six areas, recognizing that the first one would actually become implemented this year? We would start with that immediately.

DR. SCHMIDTKE: Just one clarification. What has been said, the ARM Subcommittee would be the group that is actually doing the work. It would be subject to review by the Delaware Bay TC, and as the Board has expressed interest in the Horseshoe Crab TC also reviewing this work. Both of those groups could be part of the review, but the ARM Subcommittee would be the group that's actually doing the work and charged with that task.

CONSIDER RE-INITIATION OF POSTPONED DRAFT ADDENDUM VIII

CHAIR RHODES: We'll move on to the next item in the agenda, and this actually ties in to quite a few things of what we talked about. Several meetings ago we started talking about a Draft Addendum VIII, we discussed it at the last meeting, and it's being brought up again. At this point I'm going to turn it over to Mike to do a quick synopsis through it, and I think it may be clear where we move forward from that point, considering what we just did.

DR. SCHMIDTKE: This is just going to give a brief timeline of what happened with Draft Addendum VIII, as far as its development, and then its eventual postponement, bringing us to this meeting today where it's being considered for either reinitiation or not. In August 2016, Draft Addendum VIII was initiated with two main goals of incorporating mortality associated with the biomedical industry into the ARM Model, and then exploring bait harvest packages that would allow female horseshoe crab harvest.

There is an appendix in the ARM Framework Review from 2016, but the basic gist of this is there were additional harvest packages that were proposed that would allow female harvest in a more limited fashion than the five that are currently used. In October 2016, there was a motion approved to postpone development of Draft Addendum VIII until after the benchmark stock assessment was completed.

That was completed earlier this year, but in the meantime October of 2017 the Board was presented with ARM sensitivity runs, or alternative runs that were conducted on two biomedical mortality inclusion options, and these two different options, both when they included showed minimal impact of biomedical mortality on the harvest package selection. The Board also received clarification in October of 2017 that of how the utility function works in the ARM Model for females in that unless horseshoe crab females or red knots exceed their respective threshold, no female harvest would be selected by the model regardless of any alternative or additional harvest packages that would be added to the Framework.

In May of 2019, the benchmark stock assessment was completed, leading to the Board needing to consider Draft Addendum VIII, and whether it would proceed further. In the benchmark stock assessment there were runs conducted with and without biomedical mortality in the Delaware Bay for females in that region.

The results showed no significant impact of this mortality on that population. Following this the Board tasked the ARM Subcommittee with incorporating the stock assessment model, which is what John just went through. That brings us to today, where the ARM Subcommittee and Delaware Bay TC have submitted recommendations that would incorporate biomedical mortality, and these recommendations would do so without the need for an addendum.

There are really two courses of action that the Board could take at this point. The Board could direct staff to resume development of Draft

Addendum VIII, or if the Board does not desire to resume development of this draft addendum, then there would need to be Board action indicating such.

CHAIR RHODES: Any members of the Board want to discuss this action? Yes, Mike.

MR. MICHAEL LUISI: In thinking back to the interest that I know we had in Maryland when this Addendum was initiated. It was to explore. You know the piece that I remember most vividly was the exploration of harvest packages that could include female harvest, given that we were making a shift in our bait industry from a male/female combined harvest to a male only harvest.

There were a lot of concerns by the industry that that shift to male only was going to impact their markets. Since then the issue has subsided, and I believe that our industry has found some balance with the male only harvested at this point, and they're focused very heavily on that biomedical industry as well.

Personally, I don't think we as in the state of Maryland have the same interest at this time. I think it's been generally accepted that knife-edge modeling approach to having both red knots and horseshoe crab biomass at a certain point before females can be harvested again. It's kind of a generally accepted term, I think at this point.

I look forward to the work that's going to be done over the next few years. If it were up to me I would say let's not focus any more attention to revisiting this addendum. It would be my opinion that we could probably put it to rest, and allow for staff to work on developing the work that was just presented by Dr. Sweka. That would be my opinion, thank you.

CHAIR RHODES: Mike, if I'm hearing what you are saying, you would like to make a motion to postpone indefinitely the development of Draft Amendment VIII.

MR. LUISI: I can do that, sure.

CHAIR RHODES: I appreciate it, do we have a second? We have a second by Chris Wright. Is there any objection to this motion? Seeing none it is accepted unanimously.

SET 2020 HARVEST SPECIFICATIONS

REVIEW OF THE HORSESHOE CRAB AND RED KNOT ABUNDANCE AND HARVEST PACKAGE

CHAIR RHODES: Dr. Sweka, we move back to you for the Review of the Horseshoe Crab and Red Knot Abundance and Harvest Package.

DR. SWEKA: Okay this is our annual update on the status of both red knots and horseshoe crabs, and to make a harvest recommendation for the next harvest season. Within the adaptive resources management framework, our underlying objective is to manage the harvest of horseshoe crabs in the Delaware Bay to maximize harvest, but also maintain ecosystem integrity, and provide adequate stopover habitat for migrating shore birds.

We have both red knot and horseshoe crab population thresholds, which describe when the harvest of female horseshoe crabs has value. We have red knot and horseshoe crab abundance estimates each year coming from the Virginia Tech Trawl Survey, which surveys in the fall, and then the red knot population estimate comes from a mark-resight population estimate conducted each spring.

As you know there are five possible harvest packages, and annually we make our harvest recommendations based on the status of red knot and horseshoe crabs. Just to recap and refresh everyone's memory on the five harvest policies or harvest packages that we have. They range from a full moratorium to a maximum harvest of 420,000 males and 210,000 females, including two male-only-harvest options.

Harvest Package 1 is the most conservative, which is a full moratorium on both sexes, and they ramp up to Harvest Package 5, which allows harvest on both males and females. For the past several years since the ARM Framework has been used for management, we've been implementing Harvest Package 3; things haven't changed significantly enough to alter that recommendation.

The population thresholds, female horseshoe crabs have value to harvest, once 80 percent of the theoretical model-based carrying capacity is reached, and that is 11.2 million female crabs. The abundance threshold for red knots is 81,900 birds and that if their population reached that then female horseshoe crabs have value to harvest.

We also want to maintain a spawning beach sex ratio of at least two males to every female, and this is so that we don't harvest so many males that egg fertilization may be compromised by a female dominated sex ratio. If both populations are below the threshold there is no female harvest, and if the sex ratio falls below two to one, there is no horseshoe crab harvest.

For red knot abundance, this graph shows the time series that we have with the population estimates in blue and confidence intervals, and in green are the peak red knot counts from aerial surveys flown over the beach every spring. In 2019 estimates were similar to estimates from 2016 to 2018. In 2019 the estimated stopover duration for birds that arrive at the beach was 12.1 days, which was slightly more than in 2018, which was 9.7 days. In 2019, the estimate was 45,133 red knots stopping in the Delaware Bay, which is obviously below the threshold of 81,900 birds.

For horseshoe crab abundance, again it's based on the Virginia Tech Trawl Survey. The trawl survey wasn't funded every single year. There was a gap between 2013, well actually 2012 and 2015, where we came up with a composite index based on the Delaware 30 foot trawl, New Jersey/Delaware Bay Trawl, and the New Jersey Ocean Trawl, and we found the relationship between that and the Virginia Tech Trawl when there were overlapping years.

In 2018 there was an estimate of 7.9 million females, which that is also under the 11.2 million threshold. But as you can see from 2009, generally from 2009 through 2018 we have a general increasing trend in the abundance of female horseshoe crabs, and also the abundance of males, although the last couple of year's males have declined slightly.

In 2018 there were 7.9 million females, and 16.6 million males. We put these together, our crab abundance and our red knot abundance. You know we see the numbers I just discussed. Ultimately from the ARM Framework the recommended harvest package is once again Package Number 3, which calls for a male-only harvest of 500,000 males. Both red knots and female horseshoe crabs are below the threshold, which would give the harvest of female's value, so therefore no female harvest is recommended.

When we partition this out among the states, these are each states quotas according to the allocation scheme that was developed in the last addendum. For Delaware Bay origin crabs, and then also the total quota, which accounts for the proportion of Maryland and Virginia's crabs that are not of Delaware Bay origin, and also the two-to-one male-to-female offset that was adopted during the last addendum? I'll take any questions.

CHAIR RHODES: Any questions, Mike Luisi?

MR. LUISI: I may have missed it in the past, but you mentioned John that the spawning beach sex ratio is something that could have an effect to which crabs are able to be harvested, if that sex ratio were to drop below two-to-one. What is the current ratio as we understand it right now?

DR. SWEKA: It is definitely on the beach it is over two, Stew is indicating up around five. Was it 5.2 in our last assessment, you know most recent data? Yes, it's very skewed towards male, despite having a male-only harvest for a number of years now.

CHAIR RHODES: Are there any other questions? All right I'm looking for a motion to accept harvest package from the Board. Stew Michels.

MR. MICHELS: Motion to accept the recommended harvest package for management.

CHAIR RHODES: Second, Mike Millard, any discussion, any objection, all right seeing none that motion passes also.

CONSIDER FISHERY MANAGEMENT PLAN REVIEW AND STATE COMPLIANCE REPORTS

CHAIR RHODES: Mike we'll turn it over to you for the FMP and State Compliance Reports**.**

DR. SCHMIDTKE: The Horseshoe Crab Plan Review Team conducted the 2019 FMP Review. That report was provided in the supplemental materials for the meeting, and I'll give a brief summary of that right now. The FMP was approved in 1998; there are seven addenda, the most recent of which established the ARM Framework for managing in the Delaware Bay.

Looking at a figure of annual total harvest, we see the coastwide bait harvest decline shortly after the FMP was established, and has remained fairly consistent since about 2004. Coastwide biomedical only collections and the estimated biomedical mortality have also been fairly consistent, going back to about 2010. There was some period of increase in earlier years, but most recently both uses of horseshoe crab have remained fairly consistent.

In 2018 bait harvest was 658,589 crabs, the majority of which came from Massachusetts, Virginia, and New York. This was a 35 percent decrease from bait harvest in 2017, and it accounted for about 41 percent of the coastwide quota. There was one overage that was noted. Delaware had an overage of a reduced quota.

They had an overage in 2017, therefore they adjusted their quota in 2018, and they exceeded their adjusted quota by about 3,000 crabs, so they have reduced their quota again for 2019 as well. Looking at the biomedical use, there were about 464,000 biomedical only crabs collected in 2018. This was a slight decrease from 2017, leading to a mortality estimate of about 71,000 crabs.

The biomedical only mortality estimate, as a reminder it includes the reported number of crabs that were observed dead during the bleeding process, with an addition of 15 percent multiplied by the number of crabs that were bled. The biomedical mortality accounted for 10 percent of the directed removals, directed removals being defined as the biomedical use as well as the bait harvest.

The FMP allows for states to request *de minimis* status if they have a combined average for bait landings in numbers of crabs for the last two years. That is less than 1 percent of the coastwide landings for the same period. *De minimis* states are exempt from a required harvest cap. There are four jurisdictions that requested de minimis, PRFC, South Carolina, Georgia, and Florida. All of these qualify for *de minimis* status in 2019.

New Jersey did qualify, as they are in a moratorium for horseshoe crab bait harvest, but they did not request this status. The Plan Review Team developed the following recommendations. As the first one that the Board would continue seeking long term funding for the Virginia Tech Trawl Survey.

This is the basis for a lot of work that goes on for horseshoe crabs in the Delaware Bay, as well as for the stock assessment model use in that

region. It has been funded through 2020, but the PRT recommends the Board continue seeking that long term funding for this survey. There have been some issues, as far as turning in compliance reports on time. The current due date for those reports are March 1, and for several years now there have been states that have had difficulty meeting this deadline. Most of the time compliance for this species hasn't been reviewed until the summer of the fall meeting anyway, so in a way to try to accommodate the needs of states and their scheduling, as far as when their data is available.

The PRT recommends that the Board would change the due date to July 1. This would allow kind of a similar timeframe for review in either the summer of the fall. The PRT also recommends that the Board encourage and continue to monitor the actions that are being taken to reverse the negative population trends in the New York region.

The Board gave direction during the last meeting for this population to be monitored, since it has a poor status from the last assessment. There are data included in the FMP review for this region. The most recent data for all of the state surveys that are conducted in that region have shown an increase from the previous year, but the PRT will continue to monitor the progress of this region going forward.

The FMP requires the Board to consider action if the biomedical use and the mortality associated with the biomedical use rather, exceeds the threshold spelled out in the original FMP. The mortality did exceed this threshold. The threshold I believe is 57,500. The use did exceed that threshold, but the PRT would note to the Board that the assessment results do not indicate significant mortality from the current levels of biomedical use.

Additionally, biomedical use has been consistent over the last ten years, and so it doesn't seem to be showing trends of increase associated with that. The PRT also would recommend that the Board continue to have a focus in directing staff and committees to look at the characterization of discard removals. That was a very significant component of mortality indicated from the last stock assessment, and the PRT just wants to kind of keep that as a focal point moving forward for directed efforts.

Discard removals are one thing that can be looked at through the recommended work from the ARM Subcommittee, so that is something that can be looked at moving forward. Finally, the PRT would recommend that the Board approve the 2019 FMP Review, State Compliance Reports, and *de minimis* status for the Potomac River Fisheries Commission, South Carolina, Georgia, and Florida.

CHAIR RHODES: Great thank you, any questions from the Board? Yes, Joe.

MR. JOE CIMINIO: I'm curious on that last point. If either the TC is going to explore other possible places where they might find information on discards, or if maybe the PRT is suggesting to states to maybe try and find new ways to get out there and estimate discards.

DR. SCHMIDTKE: I think what was discussed within the PRT was one for states to focus on ways to improve the discard estimation, kind of the primary way that we rely on right now for getting that information is through Northeast Fisheries Observer Program. But if there is any way to improve the mortality estimates associated with some of the gears or for states to improve on their end, the estimation of those discards, then that would be encouraged. The other aspect of it that those would be kind of looked at on a more frequent basis. That is something that would be done, at least for the Delaware Bay through the recommended ARM work.

CHAIR RHODES: Yes, Dan.

MR. DANIEL McKIERNAN: Is there a thorough description of where this bycatch is occurring seasonally, temporally, and what the target species is for those trips that are creating bycatch and discards?

DR. KRISTEN ANSTEAD: I can answer that. That was a big comment from our peer review. We just took a stab at the bycatch, and we did it on an annual basis for all of Delaware Bay. That resolution might not be there for seasonal, plus by state, plus by gear, plus by target, but it's certainly something that with this approved, passed forward for the ARM that we would consider looking at. We'll have that resolution in the data, but we're certainly going to give it another try.

CHAIR RHODES: Any other questions? All right I'm looking for a motion, all right Steward Michels.

MR. MICHELS: Okay, motion to accept the PRT Report and Requests for *de minimis* status. There you go, how about this.

CHAIR RHODES: Would you like to read that report?

MR. MICHELS: Move to approve that 2019 Fishery Management Plan Review, State Compliance Reports and *de minimis* status for Potomac River Fisheries Commission, South Carolina, Georgia, and Florida.

CHAIR RHODES: Thank you, second by Mr. Bell. Is there any discussion, any objection? Seeing none, that passes unanimously also.

OTHER BUSINESS

CHAIR RHODES: Is there any other business? Yes, Mr. Miller?

MR. MILLER: It's a very minor thing, Mr. Chairman, but I noticed in one of our handouts the Horseshoe Crab Harvest Recommendation based on Adaptive Resource Management ARM Framework, and most recent monitoring data. I spotted a small typo at the bottom of the page. It probably should be corrected. The last under monitoring data it shows red knot abundance time 1,000. I think there is a decimal point mistake in that so it should come to 45,000 as opposed to 4,500. Thank you.

CHAIR RHODES: Thank you for pointing that out and that will be altered. Any other business, yes Mr. Michels.

MR. MICHELS: Just one more thing. There was a recommendation in that Plan Review Team Report for July 1 report due date. Does this motion adequately address that?

CHAIR RHODES: If you would make that motion that would give specific direction that would be great.

MR. MICHELS: Okay, therefore I move to adopt a July 1 due date for annual compliance reports for the horseshoe crab fishery management plan.

CHAIR RHODES: Thank you, and a second by Mr. Bell. Is there any discussion, any objection? Seeing none, okay the motion is move to adopt a July 1 due date for the State Compliance Reports for Horseshoe Crab, motion by Mr. Michels, second by Mr. Bell. Again, are there any objections? Seeing none, it passes unanimously. Mr. Luisi.

MR. LUISI: No objection, I just wanted to bring up another one of the recommendations that I thought I heard regarding the stock condition in New York. Mike, was there anything? I listened to you, but if you could just go back to what the Plan Review Team was suggesting, or do we need to take any action to start any work down that path?

DR. SCHMIDTKE: From the previous Horseshoe Crab Board meeting, New York has already started taking some actions on the state level, and I believe Connecticut may be moving down

that path as well, so the Board kind of accepted that the states would take responsibility for actions in their state, and that the Plan Review Team would just monitor the progress to this point. If anything were to happen further, then the Board could consider that at a later time.

ADJOURNMENT

CHAIR RHODES: Thank you for the clarification. If there is no other business then this meeting is adjourned.

(Whereupon the meeting adjourned at 10:50 o'clock a.m. on October 29, 2019)