PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

HORSESHOE CRAB MANAGEMENT BOARD

The Marriott Norfolk Waterside
Norfolk, Virginia
October 17, 2017

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ATTENDANCE

Board Members

Ray Kane, MA (GA)
Rep. Sarah Peake, MA (LA)
Dan McKiernan, MA, proxy for D. Pierce (AA)
Bob Ballou, RI, proxy for J. Coit (AA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
David Borden, RI (GA)
Colleen Giannini, CT, proxy for M. Alexander (AA)
Sen. Craig Miner, CT (LA)
Lance Stewart, CT (GA)
Sen. Phil Boyle, NY (LA)
Emerson Hasbrouck, NY (GA)
Russ Allen, NJ, proxy for L. Herrighty (AA)
Tom Fote, NJ (GA)
Adam Nowalsky, NJ, proxy for Asm. Andrzejczak (LA)
Stewart Michels, DE, proxy for D. Saveikis (AA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Roy Miller, DE (GA)
Michael Luisi, MD, proxy for D. Blazer (AA)
Rachel Dean, MD (GA)
Ed O'Brien, MD, proxy for Del. Stein (LA)
Rob O'Reilly, VA, proxy for J. Bull (AA)
Catherine Davenport, VA (GA)
Kyle Schick, VA, proxy for Sen. Stuart (LA)
Michelle Duval, NC, proxy for B. Davis (AA)
David Bush, NC, proxy for Rep. Steinburg (LA)
Robert Boyles, Jr., SC (AA)
Malcolm Rhodes, SC (GA)
Spud Woodward, GA (AA)
Pat Geer, GA, proxy for Rep. Nimmer (LA)
James Estes, FL, proxy for J. McCawley (AA)
Sherry White, USFWS
Chris Wright, NMFS
Martin Gary, PRFC

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

Ex-Officio Members

Steve Doctor, Technical Committee Chair
Doug Messeck, Law Enforcement Representative

Staff

Robert Beal
Toni Kerns
Tina Berger
Mike Schmidtke
Megan Ware
Kristen Anstead

Guests

Loren Lustig, PA, Gov. Appointee Commissioner
Mike Millard, USFWS
Andrew Shiels, PA, Administrative proxy

The Horseshoe Crab Management Board of the Atlantic States Marine Fisheries Commission

convened in the Hampton Roads Ballroom V of the Marriott Waterside Hotel, Norfolk, Virginia, October 17, 2017, and was called to order at 9:45 o'clock a.m. by Chairman Malcolm Rhodes.

CALL TO ORDER

CHAIRMAN MALCOLM RHODES: I wanted to welcome everyone to the Horseshoe Crab Management Board meeting. If you are on another flight, please get on the correct plane. My name is Malcolm Rhodes; I'm taking over for Jim Gilmore, and wanted to welcome you all here.

APPROVAL OF AGENDA

CHAIRMAN RHODES: We had sent out materials previously; we had an agenda, and I was wondering if there were any additions or corrections to it. Seeing none; we'll move for approval by consent.

APPROVAL OF PROCEEDINGS

CHAIRMAN RHODES: We also received the proceedings from last October's meeting. Were there any corrections or changes to those? Seeing none; we'll approve those by consent.

PUBLIC COMMENT

CHAIRMAN RHODES: This is a time for public comment for any issues not on the agenda. Is there anyone from the public who wishes to speak to the Board?

REVIEW RESULTS OF EEL AND WHELK BAIT PRACTICES SURVEY

CHAIRMAN RHODES: Great, seeing none; we will move down to Item Number 4. Rachel is going to review the results of the eel and whelk bait practices survey.

MS. RACHEL SYSAK: Good morning everyone. I'll be presenting the Horseshoe Crab Technical Committee's report on Bait Use Surveys of the American Eel and the Channeled Whelk Fisheries. We had two main goals with this survey. One was to discover how horseshoe crabs are used as bait in the trap pot gear, for both the American eel and the channeled whelk fisheries.

We wanted to look at things like preference, prevalence, and how the bait performed. The second goal was to provide information for the future viability of manufactured or artificial baits. We wanted to know things like the amount of horseshoe crab that was used, average cost per trap, and the industry's impression of manufactured baits.

For our methods, between January and February of 2017 surveys were mailed to all current permit holders in the eel and channeled whelk fisheries. The only exceptions to that were New York only mailed the survey to fishers that were active in the previous two years, and South Carolina does not currently permit the use of horseshoe crabs as bait.

However, they do have a small scale whelk fishery, and a description of that fishery and its bait practices was included in Appendix 3 of the bait survey report. For the survey responses, on this graph you can see the state on the left hand side and in blue are how many surveys were sent, and orange are the number of responses that were received.

Overall for the American eel surveys that were sent out; the return rate was 30 percent. Massachusetts and Connecticut do not currently have active American eel fisheries. For the responses for the channeled whelk fisheries, again in blue are the surveys sent and orange are the number of responses that were received back. The return rate for the voluntary surveys was 32 percent overall. For Massachusetts the survey was a requirement for permit renewal; so that's why they had such a high return rate. As you can see also from this chart, Georgia and Florida do not currently have channeled whelk fisheries.

One of the first things that we asked was how experienced the responders were. As you can see, the largest slice of this pie is over 20 years of experience, 33 percent had more than that and over 50 percent had at least 11 years of experience. Overall the respondents were experienced in their fishery.

The results for bait preference, the next couple of slides I'm going to try to use the same color scheme. You'll notice that the channeled whelk fishery responses on the circle chart are in purple and the American eel fishery are in green. Overall the channeled whelk fishery is using more horseshoe crabs as bait than the American eel fishery; 92 percent of channeled whelk fishers reported using horseshoe crabs as bait, versus only 23 percent of American eel fishers.

Now to expand on that in both fisheries most fishers were reporting using multiple primary baits in their pots. Only 8 percent of channeled whelk fishers reported only using horseshoe crabs, versus 1 percent of American eel fishers only using horseshoe crabs. For a brief summary of the other primary baits that they were using, these were the four main primary baits.

They included fish as racks or whole, shellfish, blue crabs and green crabs; and this was for both fisheries. To continue on how they were using horseshoe crabs. The American eel fishery uses more female crabs than male crabs; 66 percent of American eel fishers reported using female crabs versus 49 percent of channeled whelk fishers.

In addition to that most fishers are not using whole crabs, so both fisheries use a larger proportion of male crabs than female crabs; and this could be related to the fact that male crabs are smaller than female crabs. If you look at this circle chart; I know it's a little bit busy. But the darker green for the American eel fishery is less than a quarter female; and the lighter section is greater than a half of a male, and the same color scheme for the channeled whelk fishery.

We also asked them about bait saving devices, like bait bags. They were more common among channeled whelk fishers than American eel fishers; 92 percent of channeled whelk fishers reported some type of bait saver use, versus only 21 percent of American eel fishers. Most states, with the exception of Delaware, do not currently require the use of bait saving devices in these fisheries.

We also asked questions on the type of gear they were fishing. Coastwide the channeled whelk fishery has more fishing gear to bait on average. There was an average reported maximum of 212 pots in the water for channeled whelk fishers versus 165 pots for American eel fishers. Channeled whelk fishers were also fishing more pots per trip on average; they had 147 pots versus only 80 pots for the American eel fishers.

There were regional differences and gear composition for the channeled whelk fishery, Massachusetts through New York fish less pots on average than New Jersey through Virginia. For the American eel fishery, Maryland had several fishers that reported extremely high maximum pots in the water and pots used per trip; which kind of skewed some of those numbers. For how bait is needed seasonally, the coastwide channeled whelk fishery has two peaks, and a defined season that begins in April and ends after December. Peak fishing activity, as you can see from this chart, occurs between May through July, and September through December. This is just the number of responses.

For the American eel fishing activity, the coastwide fishery also has two peaks, but it occurs more continuously through the year. Peak fishing activity occurs between March through June and September through November. We asked about each fisheries manufactured bait usage. Both fisheries had low percentage of participants who had tried manufactured or artificial baits.

For the fishers that tried the baits, most of them reported poor results. As you can see on this pie chart, the orange are the people who have never used it, and that big chunk of blue are the people that said yes they used it, but had poor results. If you can see the tiny little sliver of red, those are the people that used it and thought it worked.

Based on Technical Committee discussions of the previous manufactured bait trials that we had, poor results might not have been solely based on bad performance. Fishers reported issues of cost, and issues of availability that also affected their view of manufactured bait. For information that is

important for any viability of a future manufactured bait. Both fisheries and all current bait practices, the bait typically lasts for two days. On average it's costing $1.50 or less per pot.

Overall the price per pot was generally more expensive in the whelk fishery than in the eel fishery. Based on these results that we received, manufactured bait, in order to be viable, would need to last at least two days; and it would need to cost $1.50 or less to have a chance of success. It would also need to use either less than an eighth of a female horseshoe crab, or less than a quarter of a male horseshoe crab; to use less crabs per trap than the current bait practices, questions?

CHAIRMAN RHODES: Well first of all, I want to thank the Technical Committee for making the survey and getting all the results together. This was something that the Board asked the Technical Committee to do at the annual meeting last year; so this is helpful to all of us to understand kind of where we are with the baits, what they're used for and where we're going. I saw hands up over here, Emerson and Tom.

MR. EMERSON C. HASBROUCK: Hi Rachel, thank you for that presentation, it was very good; and thank you for doing that survey, it's very interesting. The one question I had was on one of your slides you showed that shellfish was a large component of alternative bait. What was included in that category of shellfish? Was it basically bivalve mollusks or was it something else? What was grouped in there?

MS. SYSAK: We included complete breakdowns in the supplemental materials we sent out; but it was a mix, and it was very dependent on which state you were in. It was largely bivalve mollusks, but there were, I believe some shrimp and other things included in that category as well. We break down the full list in the report.

CHAIRMAN RHODES: Tom.

MR. THOMAS P. FOTE: Rachel, we've done this kind of study before over the years. I think it's been three or four times we've done this study. Did you go back and look at the comparison of what the results on this were in compared to the other two studies, I think two or three. I'm not sure exactly the number, to see if we started getting more participation or less, as far as using artificial bait?

MS. SYSAK: I wasn't involved in any of the previous studies, and I wasn't aware that we looked at how bait was used. Are you talking specifically about the artificial bait studies that were previously done?

MR. FOTE: Yes.

MS. SYSAK: We didn't do a cross comparison. The Technical Committee felt that we should at least get a baseline of what current fishery practices were doing; and just and overall view of the manufactured bait that had been used. Certainly not everybody who participated in those previous bait trials might have responded on this report. Responses were anonymous. We weren't able to kind of go back and see if everyone who participated in the other trials participated in this. We only got a broad overview of just their impression of manufactured bait.

MR. FOTE: I want to follow up to that. When I was looking at the participation from surveys; and since part of my background was marketing advertising, I really realized that Massachusetts skewed the numbers on one of those, in comparison to New Jersey who basically had a lot of things going out, a lot questionnaires going on and very small response.

If you looked at individual states, New Jersey's response was probably less than 3 percent or 4 percent or 5 percent of what was going on, and how did you weight those. Because you're looking at it in one way, Massachusetts kind of skewed the numbers for all the other states because it was mandatory.

MS. SYSAK: Right, so for our analysis of the results we did break it down by state. We did a lot of side-by-side analysis of how each state's results came out. In this particular presentation that I did, we

took the overall results; because for the most part, even though yes there were a larger number of responses for Massachusetts, and a larger number of participants in Massachusetts.

But overall their results were very similar. The biggest differences that we saw was in the amount of gear that they used; so they had larger participation, but a smaller amount of gear that they reported on average and a smaller amount of gear per trip.

CHAIRMAN RHODES: Roy Miller.

MR. ROY W. MILLER: Thank you, Rachel for the survey report. What is discouraging for me, and perhaps other members of the Board are the poor results for artificial baits. Our state spent a fair amount of money a number of years ago, funding University of Delaware studies on artificial baits; and we all had high hopes for artificial baits.

To see there, I think it was less than 1 percent or something; it was a very low percentage reported use. Did you receive any feedback on what the principal complaints were, and how that situation could be rectified or is there a light at the end of the tunnel with regard to artificial baits?

MS. SYSAK: We had a lot of detailed discussions before we sent this survey out and we were discussing a lot of the complaints that we had received about artificial baits. That was why we tried to put this together in a way that we got at what the average cost was, how long it was used for, and how much horseshoe crab was in it; because the artificial bait trials, I believe that were used in the past, used based on these survey results about the same amount of horseshoe crab that the fishery was already using on its own.

In addition to that I know that there were reports of longevity issues, because I guess the type of manufactured bait that was sort of a puck dissolved fairly quickly; and didn't get to that two day soak time. Those were complaints, and also another complaint was that the cost was about the same or more than what was already available. That was once again why we sent this out; to just try to get a bigger picture of what would a manufactured bait need to actually be successful?

MR. MILLER: Could I follow up just a second.

MS. SYSAK: Sure.

MR. MILLER: The reason that's discouraging is I remember the trials, and there was much better bait integrity earlier on in the process; when it was still in the experimental research phase. Something happened between the experimental research phase and the production phase that decreased the integrity of that bait. I find that discouraging.

CHAIRMAN RHODES: I saw Rob O'Reilly.

MR. O'REILLY: Thank you for the report. I just wanted to make a correction about the states requirements. In Virginia, the timing might be off here, but I remember Bob Fischer from VIMS did a study. I want to say that by 2006 bait bags were required in Virginia, where only a half of a female horseshoe crab could be used, and whole male crab. I just wanted to make that correction. The other situation is in that graphic where you look at the bait, and fish, and shellfish, and everything is sort of included.

It probably isn't weighed or weighted by regional differences. For example, not only are there regional differences, but also there are magnitude of differences in terms of the harvest. It may be good in a further follow up to something like that to look at the regional specific uses of bait relative to the expected amounts of bait; because of the harvest amount. I just wanted to add that so thank you very much.

MS. SYSAK: Thank you, also that we did break down everything by region, by state in the actual baits that we report if you wanted to look at the differences.

CHAIRMAN RHODES: Are there any other questions? Bob.

MR. ROBERT BALLOU: I probably have the wrong name tag, sorry. Thank you, Rachel. Does the, I realize we call it artificial bait, or manufactured bait, same concept. Does the manufactured bait remain available; or did this survey hark back to the trial period, which I believe was a couple of years ago. I have a follow up, but I'm just wondering do you know whether the artificial bait remains available to the industry this year today, as an alternative to using actual horseshoe crabs?

MS. SYSAK: This is based mostly on the Technical Committee discussions, but to our knowledge it isn't in a wide available or large use at all in the past couple years. Past the trials it doesn't seem that any of them were successful.

MR. BALLOU: My follow, and thank you for that. I share much of what Roy Miller indicated, and that is I just feel that it's tough to do an analysis like this when you don't have a readily available alternative. Given Roy's comments about how there seemed to be a transition in integrity that strikes me that the industry is obviously going with what is most available, and then of course price and efficacy all fold in.

Where do we go from here? I mean I think that is going to be a key part of the discussion either about to happen or currently happening. It strikes me that we've either got to just rely on market forces, which may well be influenced by an assessment, which may well reduce the availability of horseshoe crabs.

Then low and behold the market responds, or we try to nudge that issue by trying to work again through a bait trial process; to try to see if we can address the very issues that you raise, and an excellent analysis in terms of cost. I mean clearly this is not going to work unless it is cost effective and the efficacy is there, and the convenience is there.

I remembered thinking about the difference between just having a cooler full of hockey pucks versus having the back of your boat full with the crabs. It seems to me like we still have a door to knock on here; but I'm just not sure how best to proceed. This survey is great, but it's not compelling in terms of what it tells us.

It seems to me that we've got to figure out best how to move forward, and either that's going to happen through the pressure of a stock assessment and potentially some limitations on the availability of crab; or we're going to have to work to try to figure out how to encourage the availability of a product that is appealing to the industry, which then allows for a natural transition.

CHAIRMAN RHODES: Colleen.

MS. COLLEEN GIANINI: I just wanted to speak to Roy's concerns too with some of the observations that I had during those initial artificial bait trials; specifically one of them being the economics of the cost per bait. In our experience that we had in Connecticut, it required two times the amount of bait that the manufacturers thought would be necessary to result in catches that would be worthwhile.

Consistency was a problem in warm weather, and in areas with high flow. The bait seemed to disappear almost overnight. One of the other big issues with it was because it requires refrigeration, and not freezing, the availability of shore side walk-in refrigerators was a problem in our area. I'm not sure if other states have that issue. But freezing the artificial bait, at least the bait that we had with the manufacturer that made it, it essentially just freeze dried the product and that affected its performance as well.

CHAIRMAN RHODES: All right one more, Pat.

MR. PAT GEER: There is a company in North Carolina; I think it's called Kepley BioSystems that has got North Carolina Sea Grant money to look at what they're calling OrganoBait. They also have a large National Science Foundation Grant to develop these baits in like a cube, so it doesn't need refrigeration.

They're starting to look at, they've been looking at lobsters and blue crabs, but they also want to look at these fisheries as well; trying to eliminate

horseshoe crabs. Has anybody heard of this company at all? I'm just seeing shaking heads. They've contacted us because of work they're doing, but there is a company that is out there trying to develop these, and they have a very large National Science Foundation Grant to do this.

The idea of this grant is to be able to create a business that can do this on a regular basis and have it be cost effective. They are just in the infancy of this project; so I don't know how successful they're going to be. But we should all be aware that there are other companies out there trying to do this.

CHAIRMAN RHODES: Thanks for the information. Stewart.

MR. STEWART MICHELS: Rachel that was an excellent and very thorough review of the fishery and their needs. Just to clarify, so currently the fishery is operating with the same amount of horseshoe crab. They are basically using the same amount of horseshoe crab now that was contained in that alternative bait.

MS. SYSAK: Yes. Some of that was because of the reasons that Colleen stated; which two times the amount that they thought would be necessary ended up being necessary, and consistency issues, so if it broke down they needed more. That was what ultimately made it the same amount that people are already using; and those are just for the baits that also included horseshoe crab in that mixture.

CHAIRMAN RHODES: Thank you, great presentation, wonderful talk from the Board, lots of points brought up, historic and kind of looking towards for going in the future. Is there any more discussion on this topic?

2018 BENCHMARK STOCK ASSESSMENT

CHAIRMAN RHODES: All right seeing none; we'll move to the fifth topic, which is preparing for the 2018 Benchmark Stock Assessment. I'm turning it over to Kristen.

MS. KRISTEN ANSTEAD: Good morning. This morning I want to go over our plans for a benchmark stock assessment for next year, and then present the terms of reference for your consideration. This is just a reminder of the previous stock assessments that have been done for horseshoe crab.

In 2009 was our last benchmark, and at that time there was no formal set of reference points. I've included a table from the stock assessment overview of kind of the status of the horseshoe crab population in each of the regions. New England and New York both showed declining population; and Delaware Bay and the southeast were having increasing populations at that time. There was an update done in 2013, and the results were consistent with the benchmark for the most part. During both of these times it was stated that biomedical should be considered to be included in the models for horseshoe crab. It was not included in that benchmark or that update. The reason that biomedical increasingly should be included as part of the coastwide and regional trends, is because proportionately it's making up more of the overall harvest.

You have your bait harvest in green, and then the lighter blue is the biomedical harvest. It's thought that 15 percent we attribute the 15 percent mortality to their harvest, so 85 percent we believe survive, and that's the light blue, the combined – all of the biomedical harvest. Then the small, dark blue is the mortality that we're attributing to them.

But as bait harvest has come down proportionately speaking, biomedical is making up more of this kind of coastwide numbers. This is where we are with biomedical facilities. I believe the 2009 benchmark, there were four facilities at that time. We now have six along the coast. We still have some data confidentiality issues; because while there are four in the Delaware Bay, which exceeds the Rule of Three, regionally we would still be getting into some confidentiality issues.

For example, if we did publish Delaware Bay numbers, Massachusetts could subtract what they harvest and then identify what South Carolina

harvests. We will still have some data confidentiality issues, even though we have more facilities at this time. This is the table that's included in the FMP review every year of the number of horseshoe crabs harvested, bled and the 15 percent mortality applied to those.

That is in the bottom in the, I guess it's orange. The FMP establishes a mortality threshold of 57,500 horseshoe crabs; which has been exceeded from 2007 to 2015. You can see for the first time that in 2016 it was not exceeded, and this was due to temporary changes in productivity. We're moving into the 2018 assessment with these concerns over New England and New York continuing to show declining trends and the continued need to include biomedical in a regional assessment. That is what we've been tasked with moving forward.

How we will present this still sort of remains to be seen. We're doing our data workshop January/February of next year; and once the SAS kind of looks at the data, looks at the potential models, sees the biomedical, we hope to have a better idea of how we'll move forward with this black box assessment.

REVIEW TERMS OF REFERENCE

MS. KRISTEN ANSTEAD: What I would like to do now is go through the terms of reference. I've abbreviated them.

If you want to see the full terms of reference they are on Page 58 of your meeting materials. But I've sort of summarized them. I'll just kind of talk about what's different from our standard TORs that are in our TC Guidance Document. These have been amended to kind of address this regional task; as well as the biomedical inclusion. Since we're tasked with doing a regional assessment, the first TOR will be to define and justify the use of population structure.

We're likely to also look at this population on a coastwide level; but if we are going to do it regionally we need to thoroughly examine how that should look. The TOR 2 is pretty standard characterized precision and accuracy of fishery independent and fishery dependent data; including biomedical data. TOR 3 will be to develop the models; and there are some sub-points under that. But I've put up the H bullet, because it is specific to horseshoe crab; which will be incorporate biomedical into the models used, and reassess the associated mortality of bled crabs on a coastwide and a regional level. As you know right now we do the 15 percent mortality; and this is a benchmark, so this is an opportunity to go back to the literature, to look at different datasets, and really consider is 15 percent the best for the coastwide?

Should we be doing this regionally? Is what's happening in one region different from what's happening in other, and should they have different mortality associated with it? We'll go back to the drawing board for that. That's an explicit task for our TORs. Four and 5 are to characterize the uncertainty in the model and to perform retrospective analysis. TOR 6 is to recommend a stock status and reference points.

Then 7 are other potential scientific issues, and one that has been added as a sub-bullet here is to compare any model output for the Delaware Bay Region with the output from the ARM model. We currently use the ARM model to set the harvest specifications in the Delaware Bay. If the stock assessment is showing a different picture than the ARM model is, or the same, we need to discuss that in the stock assessment.

Then TORs 8-10 is the minority report if there is one, to make research recommendations, and also recommend a timing of the next assessment going forward. Then we have kind of the mirror of them in the peer review; and those are also pretty standard TORs. Now, I think we'll do the AP report.

REVIEW DATA CONFIDENTIALITY PRACTICES WITHIN THE ASSESSMENT

MR. MIKE SCHMIDTKE: The Advisory Panel met in September via conference call; and they have some recommendations that they would like to make in reference to the stock assessment process.

One thing that I just wanted to hit on before we move to that is related to the confidentiality practices within this assessment.

We've discussed with the SAS, the Stock Assessment Subcommittee has applied and is in the process of gaining confidential access to data; so they will have legal permission to view those data. When we get into the actual data workshop we're going to be having closed door sessions; where basically members that does not have confidential access, TC members, data providers that do not have that access will be asked to leave the room.

The only people in the room will be those that have confidential access. There will be a similar type of closed door process for the review as well. There are going to be some intricacies; but we're making our efforts to make sure that we're within the bounds that we're legally bound to for confidentiality purposes.

MR. SCHMIDTKE: Now I'm going to turn it over to Jim Cooper to present the APs recommendations for the stock assessment process.

DR. JIM COOPER: By the way, the Advisory Panel appreciates your work, and that of the staff in helping us put this together. There is one correction for you. There was a slide earlier about the number of biomedical companies; and there is an error on that slide. There is no biomedical company called HepTest in Virginia; that is an inaccuracy.

You can reference the FDA. The FDA decides who is a biomedical producer. They may be using horseshoe crabs for some type of scientific process; but they are certainly not part of the biomedical. We've alerted the staff to this, and we hope that this can be corrected in the future. Going on to the slide, our group of course is eager to see the 15 percent mortality reevaluated; and hopefully they will look at all types of information to try to arrive at a good opinion on that matter. You know the 15 percent mortality has been sort of held in great reverence since it was initially suggested from a study in Charleston; associated with a graduate student there, who observed that after a week that 3 of 15 crabs or 3 of 20 crabs did not survive for the full week. That's where the original 15 percent came from.

We would suspect that this is most likely the highest possible or the highest mortality that one would expect from this kind. Our industry has found that it's probably close to 10 percent; that is a 90 percent survival. I understand that someone will be commenting on this a little bit later in the day, in this session.

But nevertheless, we can go on to that. The AP certainly recommended that not only would they look at horseshoe crab peer reviewed papers, with regard to mortality assessment and that type of thing, but look at other information as well. A couple of the peer reviewed papers that are out there we think suffer from the methodology issues. But I think the SAS can look into that appropriately.

We would also hope that marine resource studies that have been done by some of the states and some of them are really elegant studies, this is difficult work to do and we would hope that that would be looked at as well; and look at the historical data that the biomedical facilities have come up with over the years.

No one is more dedicated and striving more to guarantee the sustainability of the horseshoe crab than our industry. We have an enormous responsibility of protecting the world's injectable medication supply. We are indeed interested in good management decisions from this; and we work hard to make sure that we guarantee their sustainability.

Now we would hope that you would include a biomedical scientist in this SAS process. Their role would not be in looking at the modeling, but making sure that the methodology of some of these studies is evaluated properly; so that the numbers they get help them understand whether or not this represents what's going on in the biomedical community.

We would also recommend that the findings of the SAS would be reviewed in some way, or form or fashion, with appropriate confidentiality, be reviewed before any final submission. I want to assure you that what we want here is meaningful dialogue to be taking place with the biomedical community; as well as others, because we want good outcomes.

I've heard the rumor that an SAS stock assessment study on the Atlantic sturgeon was made based on one peer reviewed paper; and bad management decisions came out of that effort. We want to see that that is avoided here. We're anxious to have good dialogue here, and give the SAS as much information as they need; meaningful and truthful information, so that you can make good decisions. Thank you very much.

CHAIRMAN RHODES: Thank you, Kristen and Dr. Cooper. Are there any Board questions? Tom Fote.

MR. FOTE: I don't have a question, but I have a comment. We've complained about AP reports that didn't seem to be AP reports; and more part of what one person felt about the industry. This seemed to me to be a little bit that way; and I would like to make sure that doesn't happen again.

CHAIRMAN RHODES: Mike Millard.

MR. MIKE MILLARD: A question for Kristen on that Table 2 that had the biomedical numbers involved in it. Row C talks about the number of biomedical only crabs collected. Then Row E is labeled number of biomedical only crabs bled. The difference between collected and bled ranges from, I don't know something like 30,000 to 60,000. What is the disposition of those crabs that were collected but not bled?

MR. COOPER: Would you like me to answer that please?

MS. ANSTEAD: Well let me ask a clarifying question. Is this in reference to the biomedical crabs that aren't counted that are double use in some states, I think Massachusetts that the biomedical bleeds it and then they turn it over to bait?

MR. MILLARD: Well, the label on C says that this is not the double use crabs, this is biomedical only crabs; not those counted against state bait quotas.

MR. SCHMIDTKE: I can answer that just from viewing data annually for the FMP review. The disposition of crabs is reported; and generally crabs can be rejected for a variety of reasons such as size or such as injury. Injury can sometimes be specified. From our perspective, from the reporting perspective, what level of injury there is that occurs. It could be minor injury; it could be more than that.

Sometimes it is included, sometimes it isn't. It kind of varies from report to report. But generally those are crabs as we interpret with the reports that we received that those crabs are alive, as far as we can tell, and they're rejected for other reasons than mortality; because those that are rejected because they're dead are specifically reported to us. Those would be included within the observed mortality of biomedical only crabs from collection to release. That would be the fourth row down.

CHAIRMAN RHODES: Follow up.

MR. MILLARD: Thank you, Mr. Chair for a follow up. I guess that's what I'm getting at Mike is there is observed dead, and then there are crabs that are culled due to injury. Do we know the ultimate end to those injured crabs? Are they anywhere accounted for in here?

MR. SCHMIDTKE: That's something that has been discussed by the TC, as well as the Plan Review Team. With our current knowledge that we have, we don't know. That would be something that we would have to ask; and that may require a specific study to actually investigate what would happen for rejected, non-bled crabs. I don't know that we have that information available to us currently.

MS. ANSTEADT: I'll just add that that last column is the amount observed in the observed mortality

plus the 15 percent, so those are the only mortalities that are included in that final column.
CHAIRMAN RHODES: Rob O'Reilly.

MR. ROB O'REILLY: The gentleman giving the Advisory report may have been talking about this; but I couldn't pick it up exactly. But there was a slide that listed Wako harvesting from the EEZ and landing in Virginia. My understanding is that hasn't happened in about five years, and there is no intent to do that in 2018 either. I'm not sure if that coincides with what the Advisory report was talking about; sounded like a different company name up there perhaps. But anyway, Wako has not made its presence in Virginia for about five years.

CHAIRMAN RHODES: Dr. Cooper.

DR. COOPER: I'm trying to remember the slide. I think if I'm correct it listed two companies in Virginia, and Wako is an FDA licensed facility for making LAL reagent. There may be a representative here from there, but that's what I can tell you and I know this to be the case. The other company that is listed there, some of the principals sold their business to Wako more than a decade ago, so maybe that is the source of the inaccuracy. Does that answer your question?

MR. O'REILLY: Sure, thank you.

CHAIRMAN RHODES: Bob.

MR. BALLOU: A question for Kristen and then another question for Dr. Cooper if I may. First, Kristen on Term of Reference 6, it says recommend stock status as related to reference points if available. Why that caveat, if available?

MS. ANSTEADT: Well there was no formal stock status that came out of the last one. We are hopeful that we will have more data this time to be able to evaluate a larger suite of models; and we hope to get a formal reference point and stock status out of that. It's keeping it loose. But that is the goal as it is with every stock assessment; we hope to make that more than it was last time.

MR. BALLOU: If I could, Mr. Chair, could I ask Dr. Cooper a question regarding the AP report. First of all I thought the AP report was very well done and very helpful. I did note, and I'm pulling up the page right now. There is a fairly strongly worded comment from you, Dr. Cooper in the report, noting that the preference for peer reviewed literature (and this has to do with the biomedical evaluation of mortality, I believe) that a preference for peer reviewed literature could be a concern.

If I understand the comment correctly, in that it would miss the point of actually looking at the actual practices and the actual mortality occurring at the biomedical facilities. If I understand that correctly, and I would like you to comment on that, is the follow to that that what might really be needed is an independent, third party, scientific review of practices actually occurring at the biomedical facilities? If so, then I would like to ask through the Chair whether that's something that this Board could pursue.

DR. COOPER: Well, with respect to that comment. It's my personal opinion, and I believe the opinion of other AP members certainly from the biomedical community, and also from, and I've talked with this with Rick Robins as well who is from the other industry. We feel that there have been academic groups have done very difficult experiments and worked hard, to try to look at the mortality issue. But we have great question with their methodology used. We're stressing the animals far greater than what would have occurred at the biomedical facility. Now I know of some of the state marine resource groups that are doing a lot of work, elegant studies, trying to address the mortality issue.

I would be amendable to the Board looking at an independent group, and looking carefully at the methodology of such studies that might be done. You know unfortunately the horseshoe crab is not amendable to study in a laboratory environment. It is a difficult creature to work with, and then after the bleeding introduce them into an environment that represents normal foraging and so forth, very difficult. It's a challenging study.

CHAIRMAN RHODES: Bob, to your question. I think as we go into this stock assessment, they're going to be looking at that literature and perhaps next year is going to be the appropriate time when they've reviewed what literature is out there, see if they're good studies or if something more needs to looked at. I think that would probably be the best time for the Board to task a subcommittee to look at that; if the rest of the Board agrees. Emerson.

MR. HASBROUCK: I had a similar concern as to what Bob just voiced. I would support any effort along those lines; whether it's soon or further down the road, but not too far down the road. My other question was Dr. Cooper in his presentation had mentioned that the industry is protecting the world's biomedical supply; which I think is a very admirable goal.

But I'm wondering, in terms of protecting the world's biomedical supply, what percent of the lysate that is collected along the east coast of the United States is used in the United States, and how much is exported to the rest of the world?

DR. COOPER: I'm not a marketing person, but I would estimate that the LAL consumed by, and LAL meaning the Atlantic Ocean product, consumed by the U.S. is probably about 40 percent; because our FDA really urges and requires the companies to use a lot of redundant testing. They in my opinion, perhaps consume more reagent than is actually necessary to get the job done.

But in terms of answering your question, I would think that 40 percent of the LAL is U.S. and the rest is Europe, and to a great extent Japan. I think perhaps the amount of the reagent that is produced by the *Tachypleus* might take care of maybe 10 to 20 percent of the world's supply. Is that enough information?

MR. HASBROUCK: That answered my question, thank you.

CHAIRMAN RHODES: Any other Board members; any public comment, sorry, Stewart.

MR. MICHELS: Just a point of clarification on that 15 percent mortality estimate that is attributed to the biomedical harvest. I believe that value is not based on a single study; but actually on a range of studies that the Technical Committee reviewed, and they basically used an average of the observed mortality in those studies.

Then to the point of on the terms of reference, I was wondering, Kristen, do you think it would be possible to also include some kind of evaluation of the sublethal effects of bleeding on the horseshoe crab population? I know there has been some indication in the past that these animals may not spawn in the year that they're bled and such.

MS. ANSTEAD: Yes, I think some of that would be evaluated as part of kind of digging into this literature. We're going to do a call for data, maybe next week. We hope that any datasets out there that have to do with biomedical will be part of things that we get to consider going forward. But if you want to make that an explicit TOR to evaluate sublethal affects that is at the will of the Board.

MR. MICHELS: I would.

CHAIRMAN RHODES: We'll get to it. Are there any other Board members, any public that wants to? Okay. Please state your name and association.

MS. BENJIE SWAN: Hello everyone, Benjie Swan from Limuli Laboratories. I put some comments together that I will read. My comments, some of them will directly answer some of the questions that were raised today; and also kind of give a different way of thinking about biomedical mortality.

All right here goes. My comments are as follows: Regarding biomedical mortality. Dead horseshoe crabs are counted at the biomedical facility prior to bleeding and at release; accounting for mortality from collection to release. From this point on their mortality rate is not known, and difficult to ascertain because of their release into the wild.

At the onset of the industry, Anne Rudloe's study, 1983, established a 10 percent greater mortality rate for bled animals than un-bled. Her study had a large sample size of 10,000 horseshoe crabs, and the crabs were released into a small, enclosed bay, mimicking the biomedical return-to-sea policy.

More recently studies have attempted to improve on Rudloe's study, and to arrive at mortality rates. However, the resultant mortality rates are most likely higher than the actual value; since the bled animals were kept in recirculating tanks for two weeks or longer; rather than being released into their natural environment.

One study, intending to mimic the time horseshoe crabs are on deck, placed horseshoe crabs that were already captured and studied for two weeks into a barrel. The barrel was then placed on top of a roof for four hours in the sun; then covered for another four hours in the shade. They were eventually bled, and driven around in a hot van, and stored again.

Still, under these extreme conditions 16 of the 21 crabs lived, 76 percent survival. What should be gleaned from these studies are not the resultant rates, but other relevant facts. The most important fact is that horseshoe crabs are hardy animals; able to withstand hours out of the water in wide ranges of temperatures.

The studies also collectively show that the mortality rate is variable; depending on a variety of stressors, such as the amount of blood collected, time out of the water, and temperatures endured. Using best management practices, the survival of the collected horseshoe crabs is guaranteed to be high. Nevertheless, the number of crabs that die from bleeding is estimated to be 15 percent based on these studies; despite biomedical companies protest that horseshoe crabs do not die from bleeding. Other alarmist concerns want to push the mortality rate higher; suggesting there is a large, unaccounted numbers of dead animals due to culling at sea and the possible demise of the rejected horseshoe crabs.

However, these numbers are accounted and reported, and add very little to the overall mortality. Fishing vessels trawl in a manner that minimizes injury and death, and the small percentage of horseshoe crabs rejected at the biomedical facility, is for minor injuries that would almost be invisible to the untrained eye.

Regarding threshold numbers, establishing a threshold number for biomedical mortal crabs under the horseshoe crab fishery management plan in 1998 was misguided. First of all, the word threshold implies a limit. However, it was not the intention to limit the collection of horseshoe crabs for the manufacture of Limulus Amoeboctye Lysate.

Secondly, how the specific number of 57,500 was calculated remains a mystery. As reporting of biomedical numbers was not required prior to Addendum III in 2003. For 13 years, from 2004 to 2016, the average of the reported number of dead horseshoe crabs was 5,086 horseshoe crabs, and the estimated mortal number calculated after release is 58,721; still close to the 57,500.

Over the years the number of biomedical only harvest crabs and in turn mortal crabs increase slightly. The increase can be attributed to management measures that resulted in fewer bait crabs utilized, and more males used to compensate for taking fewer females. My last point is a suggestion to incorporate synthetic lysate into the Atlantic States Marine Fisheries Commission discussions and documents.

I find this to be completely out of the realm of the Atlantic States Marine Fisheries Commission's jurisdiction. Managing the horseshoe crab research for bait harvest, and finding alternative sources of bait is part of the fisheries biologists/manager's expertise. To think about discussing the needs of human health in the testing of pharmaceutical products is beyond the scope of fisheries.

To promote a product that is not accepted as an alternative for LAL is irresponsible. To summarize; to continually suggest that mortality due to

biomedical use is unaccounted for and substantial is contrary to the facts. The facts are that the mortality of horseshoe crabs associated with manufacturing lysate, is a very small number; compared to the number of horseshoe crabs used for bait and the total population.

Fact 2, that biomedical best management practices, especially our return-to-sea policy, ensure the utmost survival of the horseshoe crabs, and Number 3 that exceeding the threshold number is of no relevance and should be eliminated. That would be it. If anybody has any questions, I would be happy to answer them. Mike Schmidtke has a copy of my letter if anyone would like a copy.

CHAIRMAN RHODES: Thank you for your comments, any other comments? At this point we do need to accept the terms of reference. If there are any additions to it or any other task, this would be the time to add them. Stewart.

MR. MICHELS: If I may, I would like to make a motion to accept the terms of reference, and add to the terms of reference an evaluation of the sub-lethal effects of bleeding on horseshoe crab.

CHAIRMAN RHODES: Do we have a second? Colleen. Is there any discussion, any objection? **Seeing none; we will approve the Terms of Reference by consent**, and move on to Item 6, which is setting the 2018 Harvest Specs. Kristen. I guess I'll add that to read that into the record.

All right the motion was: **Move to accept the Terms of Reference for the 2018 Horseshoe Crab Benchmark Stock Assessment, and add a Term of Reference evaluating the sub-lethal effects of biomedical bleeding. Motion by Mr. Michels, second by Ms. Giannini, and it was approved by consent; now onto the next.** While we're bringing up the slide, you guys in the back, it's great to sit up here where you can actually read the little bars and see what they mean.

SET 2018 HARVEST SPECIFICATIONS FOR THE DELAWARE BAY

MS. ANSTEAD: Now I'm going to walk us through the 2018 harvest specifications for the Delaware Bay. We set the harvest specifications using the ARM model. We go through this each year; and I've just put up the goals of the ARM model, which is to manage the harvest of horseshoe crabs in the Delaware Bay to maximize that harvest, but also maintain ecosystem integrity for the stopovers for the birds, mainly the red knots.

REVIEW HORSESHOE CRAB AND RED KNOW INDICES OF ABUNDANCE

MS. ANSTEAD: I'll go through briefly in this presentation where we are with the red knots and the horseshoe crab populations; as well as review the harvest packages, and then tell you what the specifications are. First as a reminder of some of the thresholds that are in the ARM model, we have two population thresholds.

One is for a female horseshoe crab and one is for red knots. The way the model functions is that there must be 80 percent carrying capacity of female horseshoe crabs available in the Delaware Bay to get female harvest of horseshoe crabs; so that's 11.2 million female crabs, or there is a red knot population threshold, which is 81,900 birds.

There is an additional threshold that there must be a two-to-one spawning-beach-sex ratio. We've never come close to not having that. But that is an additional threshold in the model that if that was not seen on the beaches that would also limit harvest. This is just to remind you that if both population estimates are below threshold, we don't have female harvest of horseshoe crabs in the Bay.

This is where we are with the red knots right now. The estimates come from mark-resight investigations. The red line is the population threshold. You can see that for 2017 the estimates were similar to 2016. There were 49,000 approximately birds, which is below the bird threshold of 81,900.

You can also see that even with the confidence intervals we haven't come close to the threshold in the last few years. It's worth noting that the

stopover duration was shorter this year. It was 9.5 days, and last year it was 12.3. The estimates of horseshoe crab abundance come from the Virginia Tec Trawl Survey; but as you may recall that doesn't run every year.

In lieu of the survey for the years that we don't have it, the Committee developed a composite index, which is made up of a few surveys in that region. You can see how well they're tracking each other there. The Virginia Tec Trawl Survey is in the black lines; so it did run this year, so our population estimate is from that. Additionally that supplied an extra data point for kind of comparing the performance of the composite index. The 2016 estimate of female horseshoe crabs is 7.7 million females; which is also under the threshold of 11.2 female horseshoe crabs.

These are the five harvest packages from the ARM, and they range from a full moratorium at Harvest Package 1, to a midrange male only harvest at 2; 500,000 male only harvest in Package 3, 4 is kind of the midrange female/male harvest, and then 5 would be the highest male and female harvest that we have.

The model looks through all possible states of the population; the juvenile abundance of horseshoe crabs, birds, males, females, and it builds a giant matrix of all possible combinations, and then applies the harvest packages to that and that is how we get our harvest. This is just a summary of where we are. The horseshoe crabs, that is 7.7 million females estimated in the Bay. The red knot abundance was 49,000; and therefore the harvest package is again Harvest Package 3, which it has been for the last several years. With that I will take questions.

CHAIRMAN RHODES: Are there any questions from the Board? At this point we will need a motion to approve these specifications. Stewart Michels.

MR. MICHELS: So moved.

CHAIRMAN RHODES: Thank you, and a second. Second by Mike Millard, is there any discussion? Do we have any opposition? All right well this motion is approved by consent also, so this is a **motion to select Harvest Package 3 for 2018 horseshoe crab harvest in Delaware Bay; motion by Mr. Michels, second by Mr. Millard and approval by consent.**

REVIEW RESULTS OF THE ARM MODEL RUN INTEGRATION BIOMEDICAL DATA AND RECOMMENDATIONS FROM THE ARM SUBCOMMITTEE, TECHNICAL COMMITTEE, AND ADVISORY PANEL

CHAIRMAN RHODES: Guys, I'm not going to say anything, but we'll move on to the next area of business right now; and this is Review the Results of the ARM Model Run and Incorporating the Biomedical Data. Is that you first Kristen?

MS. ANSTEAD: While she gets that up, I will just remind you that last year that we went, I think it might have been 2016; we went under short term review of the ARM model, where we were tasked with evaluating some different parts of it. It was not the full long term review; which would have been more thorough.

But one of the tasks we had last year was to look at incorporating biomedical data into the ARM model; particularly since we're talking about doing that for the benchmark. We felt it was appropriate to see if we could also put in the ARM model; so that all of the output is similar. We put forth a preferred option for including biomedical; as well as a minority opinion.

I will briefly review both of those and the Board had tasked us with seeing how that would affect the harvest package selection in the model performance. That is what I'm going to go through today. The preferred option for including biomedical is here. What we have on the left side are the current harvest packages that we just reviewed.

Then to the right would be how we would deal with biomedical going forward; if we included the biomedical data in the arm model under the preferred option. These are not real numbers, so biomedical data the confidentiality has not been

breached by doing this. It was kind of taken from a fraction of what we're attributing to the coastwide, and applying a sex ratio to it. If these were real numbers what we would do would be taking a running average; so a three to five year average of what's harvested in the Delaware Bay, and we would update that number every few years. You couldn't really do the math to put an exact number on what that harvest is.

Biomedical is fairly stable for their harvest, so having an average that is only updated every so often is not so much a concern. We would still capture any major changes, but it would not have to be done every year. That harvest would be subtracted from the current harvest packages. Biomedical, this is not a quota; this is just explicitly showing that harvest is happening in the Delaware Bay from the biomedical industry, and by working that into the harvest packages.

You can see that for example, Harvest Package 3, which is the 500,000 male-only crabs for the bait fishery, would then be adjusted to subtract the biomedical from it. That is how that would operate. Again, our current harvest packages 1 through 5, I wanted to talk briefly about how often each is selected under the current ARM model.

You can see that Harvest Package 1, 3, and 5 are selected much more often than 2 and 4. This is under all scenarios. Yes, we always get Harvest Package 3, but that is because of the population thresholds. But if we were over those thresholds, you can see that the model actually chooses Harvest Package 5 more than the rest of them; and it rarely chooses Package 2 and 4.

That will be relevant here in a moment. Under this preferred option, when the ARM model was rerun, Harvest Package 1 was selected 99 percent of the time under the preferred option that it was under our current ARM model. Rarely did putting the biomedical data in, actually the model chose a different harvest package, so that was fairly consistent.

When it did, instead of a moratorium less than 1 percent, it went to that male-only harvest and less than 1 percent it went to the highest female-male harvest. That is how this table works. You can see that Harvest Package 2 and 3 didn't change at all by putting the biomedical data in. If the model under the current ARM model selected Harvest Package 3, it still selected Harvest Package 3 by including biomedical data in those harvest packages.

Harvest Package 4 changed the most, 85 percent of the time it still had Harvest Package 4; but the other 15 it did go to the full moratorium. But again that is where these frequencies come into. Harvest Package 4 is chosen about 1 percent of the time; given all possible states of the populations. While that is the biggest change, it also is the package that gets selected very rarely.

We also put forth a minority opinion for dealing with biomedical data in the ARM model. This put the 15 percent mortality attributed to biomedical in the population dynamics model. Briefly, this is a simple version of how the population dynamics model works in the ARM model, where juvenile horseshoe crabs can stay as juvenile horseshoe crabs from year to year.

They can also go on to be pre-breeders, or they can skip that stage and go right to being adults. Then additionally some die. The same with pre-breeders, and then we get to the adult stage. Some stay in the adult stage, some get harvested as bait, and some die as well. The way the minority option would work is by including the 15 percent in that kind of red state as I have in the graph; so putting it right into the population dynamics model. This is the table you just saw. The green all the way to the right is how it would change under the minority opinions. You can see it's a little different from the preferred option. In general, still pretty similar results. Harvest Package 1, 3, and 5 were very similar. By including biomedical in the population dynamics model, those three packages very rarely changed to a different package by including biomedical. Harvest Package 2 now was never selected.

When it was selected it most likely went to 1, but it also sometimes went to 3. Then Harvest Package

4 also was 88 percent of the time was still selected as Harvest Package 4; but 12 percent of the time it went to that full male and female harvest. There was some change, but in general that's fairly similar results to what we have already by including biomedical either way.

Just in summary, there was little change to the harvest packages by including biomedical under both the preferred and the minority opinion. The preferred option was the preferred option, because the ARM Committee felt that there was more transparency to it. You see what the biomedical harvest is with those harvest packages.

There were some concerns that this puts biomedical and bait harvest against each other; that the bait fishermen now see that the biomedical is taking away from their quota for the year. But it's also worth noting that they don't often reach that quota, and New Jersey doesn't harvest their portion of it.

There is a bit of a buffer there that it might not affect it as much, but it's still potentially baiting those two against each other. The minority opinion, oh I should also mention that if we go with the preferred option of including biomedical that would require an addendum; because the harvest packages are in the addendum. It would require an addendum to change them to have the biomedical harvest there.

The minority opinion was favored by some, because it doesn't require an addendum and it still maintains the same harvest packages, it's just putting that biomedical in the population dynamics model; but it is less transparent, because it's kind of hidden in the inner workings of the ARM model, rather than explicitly out there in the harvest packages.

These were presented to the various TCs that fall under the horseshoe crab; and they did maintain that the preferred option is recommended. Because of the benefits I just went through, neither one of them is more accurate. There are just two different ways of dealing with it; so both the Subcommittee and the TCs recommended that going forward.

CHAIRMAN RHODES: Dr. Cooper, do you want to do the AP response? Mike.

MR. SCHMIDTKE: The Advisory Panel reviewed these results as well. The Advisory Panel looked at them and they agreed with the TCs and Subcommittee on the fact that there is very little change in the harvest packages, due to incorporation of biomedical mortality. The Advisory Panel would recommend that this mortality not be included in the annual runs of the ARM model.

If the Board does have a preference for incorporating biomedical mortality into the ARM, the Advisory Panel has recommended the minority option be the preferred option; sighting the benefits of protecting the confidentiality, since the mortality would be worked within the population dynamics model itself it would not be exposed to the public. We wouldn't be able to see that overt subtraction from the harvest packages; and in addition it would not lower the quotas. It would not impact the harvest packages themselves.

CHAIRMAN RHODES: Any questions from the Board? Mike.

MR. MICHAEL LUISI: I guess this is a question for Kristen. Is there a table or someplace I can look to see what the effects of the different packages on the bait fishery are; related to the minority report or the minority opinion? You know you showed the one table that had the preferred option alternative with what is being taken out of the bait fishery; for the purposes of being accounted for by the biomedical industry.

However, under the minority opinion, does the package change the same way? The reason I ask is because I think it's very difficult when you look at what's being referred to as a non-quota for the biomedical industry; but then you're taking it away from established quota in the bait fishery. I certainly have concerns about putting the two forces together. I would just like to know what

those packages look like under the minority opinion.

MS. ANSTEAD: That was also a recognized concern among our talks; and that's why we went ahead and put forth the minority opinion. Those harvest packages are unchanged in the minority opinion. The crabs that die through biomedical are just put into the population dynamics model. Instead of subtracting what's harvested each year, when we do the ARM model we put in what was harvest.

Those were crabs that died, as well as their survival rate goes in there as well, just in general outside of bait harvest. This would just add that 15 percent mortality, so when we subtract what died that year, whether through bait harvest or natural mortality, it would just add an additional amount for the biomedical harvest from the running average of their actual numbers. The harvest packages would be unchanged. They would be as they are, and that is why it doesn't require an addendum.

CHAIRMAN RHODES: Follow up.

MR. LUISI: Under Package 3 there would still be a 500,000 crab allowance for the bait industry under the minority opinion.

MS. ANSTEAD: Correct.

CHAIRMAN RHODES: Mike.

MR. MILLARD: Two comments. The first I would like to get out that I do support adding biomedical mortality into the ARM. I don't know if you're ready to take a motion on that a little later in this discussion; but I would be willing to do that. More importantly, back to the sensitivity analysis of the preferred option.

I appreciate that. That was helpful. It seems to me though that another sensitivity we could look at, because my understanding is that used 15 percent. For many meetings now we've discussed and argued about the 15 percent. I'm wondering if we could task the TC to do a sensitivity analysis on that 15 percent figure; run a range through there from 5 percent to 10 percent, and see if that makes a difference. Maybe we can put this whole argument about what that exact percentage is to bed; if it doesn't really matter in our management scheme.

MS. ANSTEAD: The ARM model, the 15 percent that's used follows the benchmark. Part of this process of us reevaluating that number is if we come up with a different number for the Delaware Bay that will translate over to the ARM model. If it turns out that the Delaware Bay mortality is 8 percent in the new benchmark; that will then be the mortality used in the ARM model.

I do understand your point. If we decreased it to 5 percent, even for these sensitivity runs. I suspect that the harvest packages still wouldn't change that much. Because by using the 15 percent they barely changed anyway. But that can certainly still be ARM model Subcommittee task.

CHAIRMAN RHODES: Follow up.

MR. MILLARD: Do I interpret that to say that we really don't need to be arguing about what the exact percentage is in our management scheme?

MS. ANSTEAD: I think we're looking forward to reevaluating it; because it is a number that comes up and it is contentious. I think we should be concerned about it, and it's an important number. We look forward to relooking at the data to see maybe if there is a more appropriate number for that.

CHAIRMAN RHODES: Chris.

MR. CHRIS WRIGHT: I had the same question as Mike; whether or not they did a hypothetical run at 5 percent or 30 percent; because if it does go up, we might as well get that out in the open right now.

CHAIRMAN RHODES: Emerson.

MR. HASBROUCK: I've got a concern similar to Mike Luisi's concern. I'm not sure that I've got it straightened out in my mind yet. If I understand it properly, if the biomedical harvest is included in

the ARM model run, there really isn't any difference in which harvest package gets selected. Is that right?

MS. ANSTEAD: Correct.

MR. HASBROUCK: That's the first part. But the other part is that if the preferred option is chosen, then we'll be in a situation where a quota managed bait fishery, their quota will be reduced by a non-quota-restricted harvest. Is that correct?

MS. ANSTEAD: That is also correct. I think it's worth mentioning that the quota for say Harvest Package 3, which is always selected, the 500,000 would then be reduced to 464, so yes it is reduced but the biomedical is still a very small portion of the mortality that's being attributed to the Delaware Bay crabs. But, we've done these two options in case that that changes in the future; that we now have a method of dealing with that.

CHAIRMAN RHODES: Did you have a follow up?

MR. HASBROUCK: John just asked something, so I'll ask that as my follow up; and I believe the answer is no, but let's just verify that. Has the quota been reached in the past several years, and if not how close has the bait catch come to that quota? Then thirdly, do we anticipate that bait catch may go up or down in the future?

MR. SCHMIDTKE: Within the Delaware Bay the quota has not been reached in recent years; and I looked in the hypothetical of the preferred option with those reduced harvest packages, if that level has even been exceeded. Even with the lowering that resulted from these alternative runs that level has not been exceeded since the ARM has been instituted.

CHAIRMAN RHODES: Stewart.

MR. MICHELS: Correct me if I'm wrong. Is that because New Jersey simply chooses not to harvest their portion of the Delaware Bay?

MR. SCHMIDTKE: Yes, that is certainly a contributing factor.

MR. LUISI: Mr. Chairman, I would also like to that point raised by Emerson. A few years ago when female crab harvest was prohibited; and we went to male only. It took the industry a little time to rebuild that market that they had. Over the last few years, specifically to Maryland, we have been being able to access more and more of our male-only allocation. The market is there; so we foresee the issue of reducing our bait-crab allowance based on the biomedical industry subtraction as problematic to our continued efforts to keep that bait industry thriving at the point where it is.

CHAIRMAN RHODES: Any other discussion? Mike, did you have a motion you wanted to make or not at this point?

MR. MILLARD: Yes, I'll throw it out. I move that the ARM model incorporate biomedical mortality in the preferred option methodology.

CHAIRMAN RHODES: Do we have a second? All right, Chris Wright, discussion? Emerson.

MR. HASBROUCK: For clarification. If the Board approves that the ARM model incorporate, and I'll wait until the motion is up there, incorporate the biomedical harvest. Does that necessarily mean then that part of that process will be that the bait fishery quota will be reduced by the biomedical harvest, or is that going to be a separate motion?

MR. SCHMIDTKE: With the wording of this current motion using the preferred option, then yes that would mean that the bait quota would be reduced by the level that the biomedical mortality is evaluated at. Additionally, I believe we would need to make this move for an addendum. Is that correct, Toni?

MS. TONI KERNS: Mike, that is correct. In order to change the parameters or the impacts of the ARM model, we would need to initiate an addendum to do so. I know Mike is talking to Sherry; so I'm not sure. We would need to initiate an addendum to change the parameters, so it would be an option in the addendum if we were to move forward with this.

CHAIRMAN RHODES: John.

MR. JOHN MANISCALCO: To be clear, we can't account for the biomedical harvest in the ARM model, but set harvest specifications only for the bait fishery. Is that correct?

MR. SCHMIDTKE: Using the preferred option that would require an addendum and that would have the reduction in the harvest package. That's the reason why it would require the addendum; is because we're changing the actual harvest packages. If we went with the minority option then there would be no change to the harvest package; and that's why that would not require the addendum.

CHAIRMAN RHODES: Mike Luisi.

MR. LUISI: Just for clarification purposes. We've already established the 2018 specifications, right. This would be an addendum that would be worked on for 2019 and beyond.

CHAIRMAN RHODES: That's correct, and also I believe we discussed this last year and the will of the Board was to wait until after the 2018 stock assessment was completed to look at this. But we can revisit, you know initiation of an addendum or initiating an addendum if that is the Board's will. Emerson.

MR. HASBROUCK: While I have no problem supporting the utilization of the biomedical harvest in running the ARM model. I can't support this motion, in that it will end up reducing the quota of a quota managed fishery by the amount that is harvested by a non-quota managed fishery or harvest. I can't support this motion as it is.

MS. KERNS: Just to make sure we have the right words up there. Is the maker of the motion and the seconder of the motion okay if we say move to initiate an addendum that?

MR. MILLARD: Yes.

CHAIRMAN RHODES: Any further discussion on this? Russ.

MR. RUSS ALLEN: I'm really struggling to figure out why we need to do an addendum right now; when we have a stock assessment coming up, and I know how this Board works with other species. We're going to say as this addendum moves on we're going to say, well why didn't we wait for the results of the stock assessment? For that reason I would be opposed to this motion at this time. But if it got tabled from we were actually going to maybe do an addendum or an amendment. I think that makes more sense.

CHAIRMAN RHODES: Well are you making a motion to table this to time specific?

MR. ALLEN: No, I just put that out there for discussion; and if someone thinks that's the right thing to do we could do it, or we just vote it down now. That's fine with me, thanks.

CHAIRMAN RHODES: Eric.

MR. ERIC REID: I'm not struggling at all. This is not the time to pass this motion, at all.

CHAIRMAN RHODES: All right, any further discussion on this? Does anyone need to caucus? Take two minutes to caucus. Are we ready to vote on the motion? Emerson.

MR. HASBROUCK: I have a question that might help us here; in terms of our discussion amongst the New York caucus, as well as speaking to our neighbors in New Jersey. If we initiate an addendum, is the harvest quota linked to including the biomedical catch in the ARM model, or can the addendum process separate that out; so that we can incorporate the biomedical harvest in the ARM model without having the bait fishery quota reduced by the biomedical harvest?

MR. SCHMIDTKE: Not using the preferred motion. That would not accomplish that. I think what you're getting at, Emerson, are you suggesting the potential of incorporating the biomedical harvest in addition to the current bait quotas? Is that what you're asking about, whether that's a possibility?

MR. HASBROUCK: I'm not sure of your question. But what I'm suggesting is that we incorporate the biomedical harvest when we run the ARM model, but that we do not reduce the resulting bait quota by the amount of the anticipated biomedical harvest.

MR. SCHMIDTKE: That would be the minority option. That would be the minority option where the biomedical mortality is incorporated into the population dynamics model itself; but the harvest packages, the quotas themselves do not change.

MR. HASBROUCK: Right, I understand that. Voting in favor of the motion then essentially moves forward the preferred alternative; and will not consider the minority opinion.

MR. SCHMIDTKE: Correct.

CHAIRMAN RHODES: Mike.

MR. LUISI: One further clarification that came up in our caucus. Would we need to take action on the minority opinion, if this motion were to be opposed, if it didn't carry does the minority opinion then move forward or do we have to take up some form of an action by the Board today on either the preferred or the minority opinion?

CHAIRMAN RHODES: At this point we do not need to make any action going forward. This was brought out as a follow up that they were tasked to look at the biomedical harvest with the ARM model. They came up with the two options. At this point it was for information, if the Board wanted to look at either option, or beginning an amendment.

That was at this point or we could take this as information, we'll get the stock assessment and next year we may revisit this same issue and look at the minority, the preferred or possibly a different option as we get more information. There is no further requirement if this does not pass. **That being said, all in favor of the motion could they raise their hands please; opposed same sign, abstentions, null votes? All right the motion fails 2 to 13.** Is there any other Board action on this? Bob.

MR. BALLOU: I'll give this a shot. I would like to move to incorporate the biomedical harvest using the minority option.

CHAIRMAN RHODES: Okay, so you would move to initiate an addendum?

MR. BALLOU: No. That is not my intent.

CHAIRMAN RHODES: Oh, I'm sorry. All right, do we have a second? Emerson. All right, discussion Bob?

MR. BALLOU: It's all been said. I feel that the first part makes sense to me. The second part that would be the preferred option, the addendum approach does not make sense to me. I would rather wait the outcome of the assessment. To me it makes sense to incorporate; but going with the minority approach.

CHAIRMAN RHODES: Michelle.

DR. MICHELLE DUVAL: Procedurally we've set the specifications for 2018. I think our opposition to the previous motion was in line with New Jersey's concerns. While I support incorporation of biomedical mortality into the ARM model, and this type of approach, I kind of feel like this would still be getting the cart before the horse a little bit; in that we've set the 2018 specifications.

The stock assessment process is beginning in January. According to the timeline that I've read in the briefing materials, we're going to be presented with the stock assessment at the annual meeting next year; which is also the same time at which we would be setting specifications for the following year.

Bob, I guess the way I see it is that we've already set the specs for 2018, so if we were to use a minority option to incorporate biomedical mortality in the ARM model, we would be doing that for the 2019 specs. Yet presumably we would be setting those specs once we had received the information or the output from the stock

assessment at this time next year. Does that make sense or am I confusing people?

CHAIRMAN RHODES: It makes sense. Tom.

MR. FOTE: I agree with everything you said, so it makes sense to me.

CHAIRMAN RHODES: Rob.

MR. O'REILLY: I think you were asked this question and you answered about taking no action. What Michelle is indicating does make sense; and I think at least a number of us, the way we voted on the last motion, probably understand the implications, so thank you.

CHAIRMAN RHODES: Bob.

MR. BALLOU: I've been swayed by the discussion. I plan to vote against my own motion.

CHAIRMAN RHODES: Would you like to withdraw it?

MR. BALLOU: Whatever you prefer, Mr. Chair. I would be happy to withdraw or just call the question; whichever you prefer.

CHAIRMAN RHODES: Emerson, would you be all right with withdrawing?

MR. HASBROUCK: I will be fine with that.

CHAIRMAN RHODES: Okay, Mike.

MR. MILLARD: Even in light of the withdrawn motion, I have a question I think that will help me. Maybe it's for you, Kristen. We often say let's wait for the upcoming stock assessment before we take any action; and I get that when we have the normal, biological reference points. I should probably know the answer to this, but it's not occurring to me right now. What is it that will come out of this stock assessment that will change the ARM model routine?

MS. ANSTEAD: The percentage that we're attributing to biomedical for their mortality could potentially change. Other than that the ARM model is not part of the stock assessment. The only thing we're tasked with, with the two of them as they relate to each other, is comparing any model output from the Delaware Bay Region with what comes out of the ARM model. The only number that will transfer over is a percent. If that changes from 15 percent, if it's reduced or increased that would then be changed also in the ARM model. Does that answer your question?

MR. MILLARD: Yes, I think so. The ARM model is insensitive, for the most part; the packages that it's going to pick are insensitive to any stock assessment results.

MS. ANSTEAD: They're not really related. I mean they are related to each other in that they're using data. But nothing from the benchmark gets fed into the ARM model except for that percent mortality; if we even incorporate biomedical into the ARM model.

2017 FMP AND STATE COMPLIANCE REPORTS

CHAIRMAN RHODES: All right, is the Board comfortable where we are with this? Good. Seeing lots of nodding heads; we'll move on to the 2017 FMP and State Compliance Reports.

MR. SCHMIDTKE: We received state compliance reports to perform the 2017 fishery management plan review. The Plan Review Team conducted that review. Just as a brief reminder of the management history, the FMP was approved in 1998. There have been seven addenda; the most recent one being the institution of the ARM framework. You've already seen this graph, so I don't want to spend a whole lot of time on it.

But as you can see just going from 2015 to 2016 there was an increase in the bait harvest; and a decline in the biomedical collection, as well as a decline in the estimated biomedical mortality. In 2016 the total coastwide harvest was 787,223 crabs; with the majority of this coming from New York, Delaware, and Maryland. This was a 35 percent increase from 2015; and there were state specific increases in landings in Rhode Island, New York, Delaware through North Carolina, and

Florida. Approximately 65 percent of the coastwide quota of 1.59 million pounds was landed. Biomedical facilities collected 426,195 crabs. This was a 21 percent decrease from the previous five-year average. There were temporary changes in production in 2016 that resulted in a lower number than has been seen over the past few years. The biomedical only mortality estimates, so these again the estimated mortality of crabs that were not then incorporated into the bait industry.

That estimate was 48,780 crabs; using the 15 percent number with the uncertainty of multiple studies that are used in formulating that number. We present a range from 5 percent to 30 percent mortality. You can see the associated numbers there. There is a text edit that I noticed as I was making the presentation; but it's not in the actual text of the FMP review.

We did a little bit of consideration of what that 15 percent was actually incorporating; and the last two sentences of Page 6, and this is in the graph but not in the text. But those where it says up to the point of release, should be up to the point of bleeding. The 15 percent is meant to incorporate mortality associated from the process of bleeding on forward to release. That is a point of clarification there.

De minimis, states may apply for de minimis if their combined average bait landings for the last two years are less than 1 percent of the coastwide bait landings for the same two-year period. Measures in these states, they are not required to implement any harvest restriction measures; but they are required to implement the monitoring requirements from A, B, E, and F of the FMP.

The Potomac River Fisheries Commission, South Carolina, Georgia and Florida all requested and qualified for de minimis for 2017. New Jersey qualified, since they do not have a bait harvest; but they did not request de minimis status. The Plan Review Team has a few recommendations and statements regarding this year's review of the FMP and compliance.

There was a concern with the number of crabs that are unidentified by sex within the biomedical reports. There was a reporting format that was worked on collectively among the horseshoe crab Technical Committee, since many of those members are the ones that provide the data. We worked to develop that so that it's a bit clearer when those reports are submitted to the Plan Review Team; so that we can be able to identify what is in those reports a bit more clearly.

This new format will be included in the compliance report template for 2018. This is not asking for any new information; it's just a clarification of format. The Plan Review Team recommends continued funding for the Virginia Tech Trawl Survey. This survey was funded in 2017, and we are in the process of attaining funding for 2018. But that has not been finalized, so we hope to hear good news on that sometime soon.

Other than that the Plan Review Team found all states to be consistent with the FMP; with the exception of the District of Colombia, who did not submit a report and has not done so for the last 15 or more years. The PRT would recommend to the Board that all states be found in compliance with the requirements of the FMP with the exception of the District of Colombia; and that the Board approve de minimis status for the Potomac River Fisheries Commission, South Carolina, Georgia, and Florida. With that I will take any questions.

CHAIRMAN RHODES: Mr. Boyles.

MR. ROBERT H. BOYLES, JR.: Mike, I seem to remember discussions about D.C. in years past. Is this something we could make a recommendation to the Policy Board to excuse the District of Colombia from its obligations and its membership on the Horseshoe Crab Board?

MR. MILLARD: As far as I understand that is something that has been talked about at previous meetings; and the hurdle that is in the way is that District of Colombia is not present at these meetings. As far as I know, we cannot excuse them without their presence, or the Board could not, excuse me.

CHAIRMAN RHODES: Great question. Toni.

MS. KERNS: We'll just follow up with Brian and see if you want to be removed from the Board, if he wants to be removed from the Board then we can take him off the declared interest the next time we approve that the Policy Board can, then they'll be removed.

CHAIRMAN RHODES: Mr. Boyles.

MR. BOYLES: A question, maybe for our New Jersey delegation. I know they did not request de minimis. I would ask, is there interest in that and if so I would make the motion; if you're ready, Mr. Chairman.

CHAIRMAN RHODES: Mr. Boyles.

MR. BOYLES: Mr. Chairman, I would make, oh my cheat sheet is gone. I would make the motion that we accept the 2017 FMP review and approve the de minimis request of South Carolina, Georgia, Florida and PRFC.

CHAIRMAN RHODES: Do we have a second? Mr. O'Reilly. Is there any discussion; any objection. **All right, the motion was to accept the Horseshoe Crab 2017 FMP Review and State Compliance Reports and approve de minimis requests for Potomac River Fisheries Commission, South Carolina, Georgia, and Florida; motion by Mr. Boyles, second by Mr. O'Reilly, and the motion passed by consent**.

POPULATE ADVISORY PANEL WITH NONTRADITIONAL STAKEHOLDERS

CHAIRMAN RHODES: All right on to the next, I believe Tina is going to speak to us about getting some nontraditional stakeholders on the AP.

MS. TINA BERGER: Hi there. Recently we sent out a notice of a call for nominations for nontraditional stakeholders to the Horseshoe Crab AP; based on the Board's fairly recent discussion about adding some shorebird interest to that AP. We received a number of nominations; and it would be our request to the Board that we get a couple of volunteers from the Board to sit in with staff and review those nominations, and make recommendations to the Board at its next meeting for the addition of candidates to the AP.

CHAIRMAN RHODES: Basically, if I'm getting this correct, it's going to be creating a subcommittee from this Board looking at adding two nontraditional, probably at least one from the shorebird group, if not both. If it's the will of the Board we'll get together a handful of Commissioners to populate that group; and go over the nominees. Is there any objection to that plan? All right seeing none; is that okay with you?

MS. BERGER: Yes, but I would be selfish and ask for a couple of people, two or three people to step up, maybe in addition to you, Malcolm, just to meet via conference call, so we can do that sooner than later.

CHAIRMAN RHODES: All right. Anyone who would be interested in reviewing those members, all right, Stewart, Pat, Bob. Thank you all very much.

ELECT VICE-CHAIR

CHAIRMAN RHODES: We are at the pin ultimate part of this. We need to elect a Vice-Chairman for the Board. Do we have any nominations? Yes.

MR. DAN McKIERNAN: I would like to nominate John Maniscalco as the Vice-Chair.

CHAIRMAN RHODES: Second. **Second by Dr. Duval, any discussion, any objections, all right congratulations!**

OTHER BUSINESS

CHAIRMAN RHODES: With that is there any other business to be brought before the Board? Dr. Duval.

DR. DUVAL: Just really quickly. Just prior to the Board meeting, this is something I let staff know about. But I just wanted to make note of it here is that during some dealer checks that we had it was brought forward that one of our dealers found a couple of tickets from 2014 that resulted in 3,371

unreported horseshoe crabs from 2014. I passed this along to staff to let them know.

The statute of limitations in North Carolina is two years for a misdemeanor, so we are unable to take any action on this. But after talking to Mike and talking to Toni, it seems like that amount did not put us over any, while it exceeded North Carolina's horseshoe crab quota, it did not put us over any quota limits from a coastwide perspective. But perhaps Toni or Mike wants to speak to that. I'm just bringing this up in the interest of full disclosure.

MR. SCHMIDTKE: What we discussed related to that was the possibility of a retrospective quota transfer. There have been quota transfers in the past, specifically from Georgia to North Carolina. We looked into that option, but with the timing of it being in 2014, as well as the fact that within that year the additional unreported crabs would not have exceeded the regional quota, so for that South Atlantic population. We do not need to have that quota transfer; that retrospective quota transfer, and we can just move forward from here and update the numbers that are within the landings history.

ADJOURNMENT

CHAIRMAN RHODES: All right, any other business? Seeing none; I want to thank everyone for being efficient for the discussions at this meeting; for our Chairs who condensed a lot of information and have us all waiting for the stock assessment next year.

(Whereupon the meeting adjourned at 11:46 o'clock a.m. on October 17, 2017)