PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

HORSESHOE CRAB MANAGEMENT BOARD

Radisson Plaza-Warwick Hotel
Philadelphia, Pennsylvania
October 24, 2012

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Board Members

G. Ritchie White, NH (GA)
Dennis Abbott, NH, proxy for Rep. D. Watters (LA)
Dan McKiernan, MA, proxy for P. Diodati (AA)
Bill Adler, MA (GA)
Jocelyn Cary, MA, proxy for Rep. Peake (LA)
Mark Gibson, RI, proxy for R. Ballou (AA)
William McElroy, RI (GA)
Rick Bellavance, RI, proxy for Rep. Martin (LA)
Dave Simpson, CT (AA)
Rep. Craig Miner, CT (LA)
James Gilmore, NY (AA)
Pat Augustine, NY (GA)
Brian Culhane, NY, proxy for Sen. Johnson (LA)
Peter Himchak, NJ, proxy for D. Chanda (AA)
Adam Nowalsky, NJ, proxy for Asm. Albano (LA)
Tom Fote, NJ (GA)
Stewart Michels, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Bernie Pankowski,DE, proxy for Sen. Venables (LA)
Tom O'Connell, MD (AA)
Bill Goldsborough, MD (GA)
Russell Dize, MD, proxy for Sen. Colburn (LA)
Jack Travelstead, VA (AA)
Rob O'Reilly, VA, Administrative proxy
Catherine Davenport, VA (GA)
Kyle Schick, VA, proxy for Sen. Stuart (LA)
Louis Daniel, NC (AA)
Bill Cole, NC (GA)
Robert Boyles, SC (LA)
Patrick Geer, GA, proxy for S. Woodward (AA)
John Duren, GA (GA)
Jim Estes, FL, proxy for J. McCawley (AA)
Charles Lynch, NOAA
Wilson Laney, USFWS
Derek Orner, NMFS

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

Ex-Officio Members

Jeff Brust, Delaware Bay Ecosystem Technical Committee Chair
John Rutherford, Law Enforcement Committee Representative

ASMFC Staff

Robert Beal
Danielle Chesky
Mike Waine

Guests

Steve Meyers, NOAA
Wendy Walsh, USFWS
Mitchell Feigenbaum, Leg. Proxy, PA
Tom McCloy, NJ DFW
Chris Boelke, NOAA
Ellen Cosby, PRFC
Kelly Denit, NMFS
Benjie Swan, Limuli Laboratories-Dias Creek
Lisa Glan-Donohue, Delaware Valley Fish Co
Doug Huntley, Delaware Valley Fish Co
Allen Burgenson, Lonza Walkersville Inc
Tarin Rickett, Croton, NY
Glen Gauvry, Ecological Research and Development Group

The Horseshoe Crab Management Board of the Atlantic States Marine Fisheries Commission convened in the Radisson Plaza-Warwick Hotel, Philadelphia, Pennsylvania, October 24, 2012, and was called to order at 1:30 o'clock p.m. by Chairman David Simpson.

CALL TO ORDER

CHAIRMAN DAVID SIMPSON: Okay, we will get started with the Horseshoe Crab Management Board.

APPROVAL OF AGENDA

CHAIRMAN DAVID SIMPSON: The first item on the agenda is to approve the agenda. Are there any changes to the agenda? Is there anything on new business? Stew.

MR. STEWART MICHELS: Mr. Chairman, when we get to new business, I would just like to talk a little bit about an issue that has come up involving Asian horseshoe crabs and their importation into the U.S.

CHAIRMAN SIMPSON: Okay, that would be great, thanks. Is there anything else under other business to add?

APPROVAL OF PROCEEDINGS

CHAIRMAN DAVID SIMPSON: Okay, we need to approve the proceedings from the May 3, 2012, meeting. Is there a motion to that effect? Bill Adler, thanks. Any objection to that? Seeing none, we will consider the proceedings approved.

PUBLIC COMMENT

CHAIRMAN DAVID SIMPSON: Public comment; is there any public comment for the Horseshoe Board for items that are not on the agenda? Okay, seeing none, we will move on to the Delaware Bay Ecosystem Technical Committee Report that Jeff Brust will provide.

DELAWARE BAY ECOSYSTEM TECHNICAL COMMITTEE REPORT

ARM FRAMEWORK HARVEST OUTPUT RECOMMENDATIONS FOR 2013

MR. JEFF BRUST: I've got a quick presentation for you today. It is going to come in two parts. The first will be the 2013 harvest recommendation based on the ARM Model. I'll take a minute after that part for questions and see if there is any action by the board. Then the second part of the presentation will be a summary of the Horseshoe Crab and Shorebird Survey Indices that the technical committee has looked at during their last meeting.

Since this is the first official implementation of the ARM Model, I thought I would go back and give you an overview and a reminder of what the framework entails. The whole process is driven by the overall objective statement that we have developed for this process; basically what is the goal of the fishery management plan?

I don't have the specific language in front of me, but it is something to the effect of maximizing horseshoe crab harvest from the Delaware Bay Region with the condition that there is enough forage left for the shorebird populations to recover. The analytical portion of the framework is a multi-species model. We have got individual models for horseshoe crabs and red knots.

There are three competing models and how those species interact. Eventually over time one of the models hopefully will mimic what is actually happening in the population better than the others, and those other models will fall away and we will have a better understanding of the interaction between these species. We have also included some judgments on the value or the utility of these species, horseshoe crab in particular, so basically at a given horseshoe crab population size and a given red knot population size would it be more important to leave the horseshoe crabs on the beach as forage for the red knots or could they provide a better use as bait to the conch and the eel fisheries.

We take this population model and we run it though the optimization routine. The fancy name for the optimization routine is adaptive stochastic dynamic programming. That is just the mathematical model. We run this model across a range of inputs to evaluate uncertainty in our population understanding.

What this gives us is a table. For every combination of the inputs, it provides the optimum harvest so there this table of optimum harvest. Then we take the most recent population information of horseshoe crab abundance from the Virginia Tech Trawl Survey and the shorebird abundance from the stopover counts in Delaware Bay.

We look those up in the table and it tells us what the optimum harvest is given our understanding of how the populations interact and our current understanding of what the population sizes are at the

time. You will remember that we provided the model five different harvest packages to select from.

We couldn't just let it pick randomly from all available options, so we narrowed it down to five. They range anywhere from a full moratorium all the way up to 420,000 males and 210,000 females. Based on the information that we have, our current population sizes in the model that we have, the optimization routine selected Harvest Package 3, 500,000 male-only harvest.

This is consistent with what we have been seeing from the unofficial runs in the last couple of years. You will remember, though, that this is just the harvest for the entire region as a whole. The model does not divvy it up among the states. Addendum VII did that. You will remember there were four criteria for splitting the region harvest among the states.

These include the proportion of each state's horseshoe crab population that comes from the Delaware Bay, the historical harvest allocation among the states. We also included a harvest cap for Maryland and Virginia to protect non Delaware Bay crabs that are also harvested by those states.

We also had the caveat that if there was a female moratorium – the harvest package that was selected had included a female moratorium, there was a two to one male-to-female offset; so every female that you can no longer harvest, you're allowed to harvest two males. The 500,000 crab harvest, the table on the left there, that is how it splits out among the states.

That is basically taking into account Criteria 1 and 2 from the previous list; but when you account for the harvest cap, the two to one male-to-female offset, and you include non Delaware Bay crab harvest, the table on the right is each state's quota for 2013 based on the ARM Model and the Addendum VII allocation strategy. New Jersey and Delaware would be looking at a quota of 162,000 crabs, male-only; Maryland gets about 256,000 crabs; and Virginia would get about 81,000 crabs east of the COLREGS Line; so this is all crabs, both Delaware Bay and non Delaware Bay harvest; and for Virginia it is only east of the COLREGS Line. That is the 2013 recommended quota from the ARM Model. Are there any questions on that? Pat.

MR. PATRICK AUGUSTINE: Great report, Jeff, thank you very much. Does this include the medical purposes harvest, also, or is that dealt with as a separate body? This infers in my humble opinion that it is a total of 500,000; is that true or not?

MR. BRUST: The 500,000 is Delaware Bay only. If you go up to this figure here; it is more than 500,000 because it includes not only the two-to-one offset, which would bring us actually above our 500,000, but it also includes non Delaware Bay harvest. The 256,000 from Maryland and the 81,000 from Virginia also includes everything else that they harvest. They're allowed 256,000 crabs total in Maryland and not just 256,000 from the Delaware Bay Region.

MR. AUGUSTINE: Jeff, do you recall what the approximate usage of horseshoe crabs is for bleeding purposes? I just want a clear picture so I know where we're going.

MR. BRUST: How many are bled?

MR. AUGUSTINE: Yes, that part of that number.

MR. BRUST: No, I'm sorry, I guess I misunderstood your question. This does not include the biomedical harvest. Some of the crabs that are collected through the bait industry go for bleeding and then come back to the bait industry, but the biomedical harvest is separate.

MR. AUGUSTINE: And they're allowed to bleed females or are they exempt from that?

MR. BRUST: They are allowed to bleed females, yes.

MR. AUGUSTINE: Okay, then a follow-on question; if they're allowed to bleed females and their discard mortality is 10 or 15 percent, how do we account for that in the reduction in females?

MR. BRUST: The biomedical harvest is managed separately from the commercial harvest. The mortality from the bleeding process is included in the stock assessment separately from the mortality due to the commercial harvest. Right now the only regulation for the biomedical harvest is that they should stay under the cap. It is not a hard and fast – it is not a quota; it is just a recommendation.

MR. JACK TRAVELSTEAD: I need you to refresh my memory on this a little bit. How does hat 81,000 for Virginia relate to the 152,000 crab quota that we've had for many years? Is that part of it or is the 81,000 in addition to?

MR. BRUST: I'm going to pass it off to Danielle. The 81,000 is just what is east of the COLREGS Line. In the past – I think in the last couple of years you have been harvesting about 60,000 east of the COLREGS Line.

MR. TRAVELSTEAD: Yes, we have 152,000 total of which 40 percent could be east of the COLREGS.
MR. BRUST: Right.

MS. DANIELLE CHESKY: Yes, your total quota was about 152,000; 60,000, which was the 40 percent, was allowed to be harvested east of the COLREGS, and so now your total quota east of the COLREGS instead of being 60,000 is about that 81,000; and so the total quota, if you added west and east of the COLREGS, would be about 172,000 now, give or take. Does that make sense?

MR. TRAVELSTEAD: No, not exactly. Maybe I'll get with you later and figure it out. I don't want to take up the board's time.

MS. CHESKY: The amount that was allowed to be taken east of the COLREGS previously was 60,000 and that was at a two-to-one ratio; so at most 20,000 of those could be females in the past and in this current year. Going forward, there is not going to be any female harvest allowed east of the COLREGS, and so that is where you get that two-to-one offset. Because Virginia can no longer harvest those 20,000 females east of the COLREGS, your quota is allowed to be an additional 40,000; so 60 plus 20.

MR. TRAVELSTEAD: So what is our total quota for east and west of COLREGS?

MS. CHESKY: About 172,000.

MR. TRAVELSTEAD: Okay, thank you, I understand it perfectly now.

CHAIRMAN SIMPSON: Are there any other questions for Jeff? Okay, seeing none, can we get a motion to approve the ARM harvest output for management in 2013? Pat.

MR. AUGUSTINE: Mr. Chairman, **I move that the board accept the Harvest Package Number 3; the optimal selected harvest package for management of the 2013 horseshoe crab harvesting season.** Do you want me to spell out the actual on that?

CHAIRMAN SIMPSON: I don't think you need to.

MR. AUGUSTINE: Thank you; that is my motion.

CHAIRMAN SIMPSON: Is there a second to Pat's motion: Bill Cole. Is there any discussion on the motion? Is there any objection to the motion**? It is therefore approved**. The next item on the agenda is a review of the horseshoe crab and shorebird survey report. Jeff.

HORSESHOE CRAB AND SHOREBIRD SURVEY REPORTS SUMMARY

MR. BRUST: Okay, that was the exciting part of the presentation. The Delaware Bay Ecosystem Technical Committee met a couple of weeks ago to review all of the surveys that we had available to us. This sort of came about as in the past individuals were trying to interpret the different survey trends and how they relate to some of their own surveys, so what we wanted to do was get together as a group to look at them all together and hopefully make some inferences about where the populations are going.

The data that we had available; there were six horseshoe crab trawl surveys, there were two horseshoe crab spawning surveys, the Delaware Bay Egg Survey. We have counts of red knots in their wintering grounds in Tierra del Fuego and we also had stopover counts in Delaware Bay and Virginia and also the stopover weight gain data.

The trawl surveys, generally speaking we saw declines during the 1990s. This isn't really news to anyone. They stabilized in the early 2000s, and since about 2004 or 2005 they have been variable. There isn't any real clear trend amongst the surveys in what the horseshoe crab population is done.

I do have a figure that I'm going to show you that shows the trends. I did not include the confidence intervals on the figure mainly to minimize clutter. They are included in the technical committee report in the briefing CD. One thing I just wanted to point out, though, is that the confidence intervals are large.

Here are the six trawl surveys that we looked at. The top left; that is the Virginia Tech Trawl Survey. I put that one first because the ARM Model actually depends on that trawl survey. The rest of them, they are not included in the ARM Model. But you can see certainly from the longer ones that the population during the nineties was declining.

Most of them show that in the early 2000s it stabilized, and then since about 2004 or 2005 we're not seeing any real clear trend in the abundance. Some of them are increasing; some of them are stable. This one actually here looks like it may be

still declining a little bit. There is a whole range. There is no clear trend here in what is happening.

The overall conclusion that we came to was that there is no clear trend apparent in the recent data from the trawl surveys, but we're confident that the population has at least stabilized. We don't seem to be declining any further; at least not consistently. We did talk quite a bit about how we all sort of expected to see increases in the adult population, certainly the juveniles and hopefully the adults by now.

We talked a bit about why we thought that might not have happened. We have got a list here. It is certainly not a comprehensive list, but I also need to point out that it is not a consensus list. Everyone on the committee had their favorite reason. This is not in order of priorities. Some people think that some of these up here might be total bunk while theirs is the best one.

Not everyone agrees which ones are right, but the ones that we did talk about is perhaps there has been insufficient time since the major management actions went into place. We sort of assume our understanding of the population is that they reach maturity around age ten. It has been about ten years since we saw the major harvest cuts and we think we'd start seeing increases in the adult population by now.

Maybe our understanding of the population is flawed and maybe it takes twelve or maybe even fifteen years for these critters to reach maturity and so we just haven't had enough time since the major management cuts. That is one idea. We also talked about maybe a recruitment bottleneck; something similar to weakfish where we're getting good sets of age zeros but something is preventing them from getting to older ages.

A couple of folks mentioned excessive mortality such as undocumented harvest of females. There is no information on that, but it could be one thing that is holding back the population. There was concern that maybe some of the surveys that we're using to identify the trends aren't really able to capture the trends very well. I will go a bit into that in a little bit. We also talked about maybe an ecological shift; not enough forage out there, increasing temperatures, decreasing spawning habitat, and maybe we have reached a new equilibrium, something like that.

Unfortunately, we don't have any information to – well, we haven't done the work to narrow down this list. Hopefully, we have enough information now that we can start investigating some of these things and maybe narrow the list down. Again, I wanted to point out that obviously this isn't comprehensive and it is not a consensus list.

I also wanted to spend a few minutes talking about the Virginia Tech Trawl Survey. When we met in early September we did not have funding to do the full trawl survey for the 2012 season. Eric Holloman from Virginia Tech provided the technical committee with sort of a menu of options given the available funding as sort of a tradeoff and how much time he would keep on his staff, how many months and trade off between staff time and how many stations that we could do in the survey.

All of these options that were presented had fewer samples than we have done in the past. None of them were able to keep Dave Hata on for a full year, so we were really short on funding this year. Based on the menu that he gave us, the technical committee selected what we thought was the most appropriate option. It covered most of the core area of the survey but didn't even fulfill the entire core area.

We did get a last-minute donation from one of the biomedical companies that allowed us to sample the entire core area, which we're very grateful for that donation. It certainly will help our ability for next year to implement the ARM Model, but it is still less than what we have done in the past, and we're not sure what the effect will be in terms of how well we will be able to implement the ARM Model.

If we aren't able to get a representative sample of the entire population, the information going into the ARM Model is going to be flawed, and it is not a good situation. I think I have said this every time I have sat up here in front of this board. We're recommending that we need to find some long-term funding for this survey. As I said, this survey is used in the ARM Model.

If we can't do the survey, the ARM process could go away. At the same time the technical committee is going to look into the survey design and the analytical method and see if there are ways that we can change how the survey is done to increase the cost efficiency and to make it a little bit easier to find funding every year.

Okay, moving on to the spawning survey, we looked at two. There is the Delaware Bay Spawning Survey that was standardized back in 1999. Since that time there has been a significant increase in male spawning density but no trend in female spawning

density. Because we have got an increase in males and no trend in females, there has also been an increase in the male-to-female ratio.

We also looked at the Maryland Coastal Bays Spawning Survey, which has been ongoing for I think eight to ten years, but survey changes in about 2008 have made it so that the consistent portion of the survey is too sort. We don't have the time series that we need to really evaluate the trends, but we're hopeful that in a few years we will have a sufficient time series that we will be able to see what is happening with spawning in the coastal bays of Maryland.

Figures of the Delaware Bay Spawning Survey results, you can see on the top the males; there has been a general increase. On the bottom are the females and it has been relatively flat. The noticeably lower number in 2008, I think most of you will remember at least from the Mid-Atlantic there was a storm in early May in 2008, which dropped water temperatures right about the time the crabs should be coming up on the beach.

It dropped the temperatures; they delayed spawning until the survey was pretty over for the year, so we didn't get a good index that year. The egg survey that is done by Delaware and New Jersey; this is something that was done as a one-time deal in the eighties. Then New Jersey picked it up in the late nineties or early 2000s. We tried to standardize how it was done in 2005; trying to standardize the methods on both sides of the Bay.

It has worked as well as we hoped in getting the two contractors to standardize their methods; but so be it, the trends that we have seen are there has been a significant positive increase in egg densities on the New Jersey side. On the Delaware side there is no significant trend. If you include all of the beaches; and when you include all the beaches, there is no trend across the Bay either.

We do know – and I think I have mentioned to this board a few times in the past – there are one or two beaches that can significantly influence the results of the Delaware side and also of the bay-wide index. Whether you include that station or not, it changes your results. One thing that we need to do is – it has been going on long enough now – we need to standardize how this data is evaluate.

Because I have shown you similar graphs in the past, I chose this method to show you what is happening recently. Up here on the top left are all of New Jersey stations in the light gray. In the dark gray is all of Delaware minus that one station that really influences the results. In New Jersey you can see this trend slightly increasing over time, since about 2007 or so.

Delaware, it is flat. I guess if you don't include Mispillion, it is significantly declining. You can see down here the Mispillion Harbor on the Delaware Bay side, you can notice that the scale is like one to two orders of magnitude higher than everywhere else in the Bay. We're talking 15 to 20,000 for most of the Bay and talking close to 200,000 just in Mispillion Harbor.

One thing that we need to do is standardize how these data are analyzed and then we can present them in a consistent manner in the future. But even before we get there, there is some disagreement concerning the utility of this survey as a whole. There are a lot of people that just want to get rid of it.

One discussion was that we take money that is being used to fund this survey and pass it off to the Virginia Tech Trawl Survey; but before anyone goes that far, we need to investigate it a little bit more. Some of the reasons that folks were against continuing the survey is that, like I said, the methods are not standardized across the Bay, and even the methods that they used aren't even documented.

If our contractors were to leave tomorrow, we're not sure we could even continue the survey as it is being done now. The results are highly variable and there is no consensus that even density is a measure of availability, which is what the survey is trying to measure, the availability of eggs for the shorebirds.

So even in the Mispillion Harbor if you have got 200,000 eggs per square meter, if you have got a peregrine falcon sitting in the tree just off the beach, you're not going to get any red knots there. There is concern that density is not really a measure of availability. On the flip side, some reasons for continuing the survey; New Jersey has set benchmarks based on the egg density before they will consider reopening their fishery.

Also, there is some information that shows that red knot weight gain is significantly correlated with the survey-based densities, which sort of goes counter to the statement that density is not a measure of availability; if there is this correlation, that maybe it is a good measure of availability. The bottom line is that the technical committee has formed a subcommittee to look at it.

The first thing we need to do is decide if we want to continue the survey; and after that we will talk about standardizing the methods for analysis and what we're presenting to the board. Okay, moving to the red knot counts, the stopover counts in Delaware Bay have approximately doubled over the last five or six years; moving from about 12,000 to 25,000.

One factor behind this is we had strong recruitment during 2009 and 2010, but there is also some concern that the survey that we're doing – it is a flow-through population and we're not measuring the entire population at a time. We have got birds coming and some of them are staying and some of them are leaving. Every time we sample, we're sampling a different subset of the population.

Sometimes we just happen to catch them when a whole bunch came in and before the next group leaves, so we get these large staging events. This peak count is not really indicative of the total population, so there is a concern that maybe what we have seen lately is we're catching some of these staging events. Also, in 2009 and 2012 we had problems with the aerial count so we were using ground counts, which might slightly alter the information.

Regardless, we have seen this increase but we're still low relative to the long-term trend of about 50,000. Looking at the mass gain information, we have seen an increase in the proportion of knots that are making weight to fly to the Arctic in the last few years. This is likely due to good environmental conditions; one of those being that the eggs are on the beach when the birds are on the beach. If the eggs are there, they can feed and gain the weight and off they go.

As I mentioned, the peak count for the aerial survey is not great. We are investigating a new method based on tag recapture data that will give us an estimate of the total population and not just what is on the Bay on the day of the survey. We have done it for 2012; we should have data from 2013 next year; and also we have the data to analyze 2011. Hopefully, by this time next year we will have the numbers for you and possibly a new method for estimating the red knot population in Delaware Bay.

The figures from the Delaware Bay counts, the long-term trend is about 50,000. We declined in the early 2000s. You can see these darker lines are when we had to use the ground counts. We do have slight increase here, but it is certainly the ground count data that are the highest in the last five to ten years. We need to look into that. The bottom left figure is the proportion of red knots making the 180 gram minimum weight or the optimum weight to fly to the Arctic.

You can see the uptick there in the last five to ten years. On the right-hand side, on the bottom is the correlation between the egg density from the egg survey and the proportion of knots making weight. You can see that there is that significant correlation. We also had red knot counts from Virginia. The survey goes back longer than 2007, but this is the data that I had.'

The counts have about tripled since 2007; increasing from about 4,000 knots to 12,000 knots. One possibility is that there are higher prey numbers. The red line up there is the red knot counts. In Virginia they don't eat horseshoe crab eggs so much, but they eat small bivalves, blue mussel fat and donax.

You can see that the density of both these prey species have gone up in the recent years, which might be driving the increase in red knot numbers on Virginia beaches. Even though we have tripled in size in the last couple of years, the abundance is not significantly higher than the long-term average from these beaches of about 10,000.

The wintering counts in Tierra del Fuego, that first line there is 1982 and you see there is a break. The next survey wasn't done until the 1999/2000 winter. You can see those two points were about the same, though, so the inference is that the population was relatively stable during that interim period.

After that 1999/2000 time period, though, we see the decline in numbers; but since about 2004 or so we have been relatively stable around 15,000 birds. Because these are resident birds – in the winter they're resident in that area, so it is not a flow-through population, so these counts will be a little bit more stable. We think it is a better estimate of the total population than we get in the Delaware Bay Region. You can see we have been relatively stable around 15,000 birds.

One major theme that we talked about during this meeting was uncertainty in the surveys that we have, how appropriate are they for capturing trends that we're trying to see. We talked about ways that we could change the survey design or whether we need to investigate changing survey design of each of these surveys to better capture the trends that we're looking for. Are there modifications to improve the method or to improve the cost efficiency of the survey? Are there alternate ways to analyze the data?

We have been doing this long enough now and none of these concerns are new. Hopefully now we have enough time series in each of these series that we can actually look into it and see if there are ways that we can improve it, so you might see some changes in the near future on how we present these data or how the surveys are done.

Of course, the initial focus will be on the two surveys that are used in the ARM Framework, the Virginia Tech Trawl Survey and the Delaware Bay counts, whether it is the aerial counts or the tag recapture data. One last slide just to summarize everything I have presented; the horseshoe crab abundance had pretty much stabilized about 2005. Since then there has been no real clear trend across all of the surveys. Horseshoe crab spawning females and the egg densities show no significant trends at the bay-wide level.

Red knots show some improvement. We had that good recruitment in 2009 and 2010. We have had better mass gains in the last couple of years. This is probably largely due to favorable environmental conditions for the red knots. One thing that the technical committee needs to do is to evaluate the survey methodology and the analysis. That is my presentation, Mr. Chairman.

CHAIRMAN SIMPSON: Are there questions for Jeff? Pat.

MR. AUGUSTINE: Mr. Chairman, I'm wondering if there was a report somewhere that shows the increase or decline of blackback and herring seagulls and if that might be some indication as to why we're having some improvement. The second question is your report on eggs doesn't show what eggs – basically the number left after the red knots and shorebirds have flown through. The part of the question there would be is there an abundant amount of horseshoe crab eggs there to satisfy the needs of the shorebirds; or again are they being beat off by the – again, you said the hawk and possibly the seagulls. Is there a correlation between those?

MR. BRUST: To answer the first part of your question, I don't have the data in front of me. I know we have seen it. The trends in the gulls as competitors, I believe the full coastal technical committee has looked at this. My recollection is that there has been no trend in populations of gulls. I could be wrong about that.

But, yes, it is out there and we'll have to find it and we will get that information to you at some point. As far as the number of eggs left on the beach after the red knots leave, that is a good question. I don't know if anyone has really looked at it. My answer is not going to be a technical committee consensus statement, obviously, but my feeling would be that the number of eggs that are eaten by the red knots and other shorebirds – you know, early life history mortality is in the range of 0.999999.

I'm not convinced whether we had shorebirds or not would significantly alter that proportion that was surviving. It is a good question and maybe what we need to do is extend the survey after the birds have left to see what is left on the beach. It's an interesting question.

MR. AUGUSTINE: Follow-on, Mr. Chairman; there is a greater question than this. I made the motion that we go ahead with this Option 3, which now restricts the harvest to male crabs. As we have said in previous meeting, the body of horseshoe crabs we have in New York continues o decline. We know that they're being harvested to be sent to other places where they don't have an abundance of for trap purposes for eels and for conch and so on.

By doing this, the real question – and we don't have to answer it now, but I think we should think about it – is there going to be a continuing or expanded negative impact on the horseshoe crab populations of the nearby states where animals are being taken from our states to satisfy the needs of those other states?

Again, the concern here is we have watched the trend. We have limited harvest but at the same time our populations are not having that opportunity to rebound. That is really the question and I don't know if you can help me with that or not, but it is a concern of ours.

MS. CHESKY: Pat, if I can respond real quick; I know the Horseshoe Crab Technical Committee, which represents all the states along the coast, had a concern of what would potentially be the impacts of the ARM implementation, and so the board approved the technical committee's recommendation back at the May meeting; that for this coming spring in 2013 the Horseshoe Crab Technical Committee will work on doing an update of all the indices that were used in the last stock assessment.

It is not really an updated stock assessment, it is not a benchmark or anything on those, but it will put I guess a marker for pre-ARM implementation because it will be all those surveys through 2012. It is not a real answer to your question, but it is certainly

something that the technical committee has been aware of, and the board approved the technical committee's recommendation to do that.

MR. AUGUSTINE: Thank you, Danielle; that helps a great deal.

MR. PETER HIMCHAK: Jeff, I do not have a question for you, but would you put up the graph for the New Jersey Surf Clam Dredge? It is an observation. It follows on Mr. Augustine's comments about shifting effort. I'll try not to get myself in trouble here, but if you look at the graph you can see a significant – well, I don't know if it is statistically significant.

You can see a noticeable uptick in horseshoe crabs taken during the Surf Clam Dredge Survey, and the surf clam dredge is a more efficient mechanism of collecting horseshoe crabs. What we are grappling with at the Mid-Atlantic Council is that the surf clam beds off New Jersey, the landings per unit effort are in a precipitous freefall over the last ten years.

I know a lot of this is due to climate and maybe some fishing practices. But, when you consider that in 1996 New Jersey was harvesting over 600,000 adult horseshoe crabs – that is our reference period landings – and then you track that to the moratoriums in 2006, boy, there is sure a relationship there.

We keep looking for good juvenile sets in surf clams; and when they're encountered through the surveys, everybody gets excited, but, boy, they can be vacuumed up rather quickly by horseshoe crabs. So, I bring this up as an observation that the Mid-Atlantic Council is looking at because, I mean, this is a multi-species plan, horseshoe crabs and red knots.

As you may be impacting other horseshoe crab spawning populations, I'm very concerned about juvenile sets on the surf clams that may never happen. If you line up the harvest, it is almost like an inverse relationship; the harvest went down and the horseshoe crabs went up and surf clams are going down. It is just an observation and I hope I don't get myself in trouble on this.

DR. WILSON LANEY: Well, a follow-up question for Pete so I make sure I understood that; so the horseshoe crabs are eating the juvenile surf clams?

MR. HIMCHAK: Voraciously.

DR. LANEY: And then I had a couple of questions for Jeff. Jeff, I noticed on the horseshoe crab graphs we have confidence intervals and error bars on there, but I don't see any on the bird graphs. Would you comment on the suitability of those peak counts and maybe compare the rigor of the horseshoe crab estimates that we're getting with the red knot estimates that we're getting.

MR. BRUST: The shorebird figures don't have confidence intervals because certainly the overflights, the red knot counts are intended to be a census; so if you're getting everything, then you've got no confidence interval. It is everything. There is going to be some error, depending on who is doing the – you know, we had consistent counter for about 25 years worth of this survey. She retired a few years ago. We've switched observers a couple of times since then, but the idea is that it is supposed to be a census. If you have counted a hundred percent of them, then there is no confidence interval.

DR. LANEY: And then a followup; the graph that shows the rather dramatic increase in Virginia there and also shows the density of blue mussels and donax – if you said it, I didn't hear it, but is there some correlation there we think between the increase in the food supply and numbers of red knots; is that why that trend is so greatly upward there?

MR. BRUST: That was one possibility that we discussed, yes. As these prey species are increasing, it is either – we don't know if there are more knots there, like if the population has increased, or there are more knots that would normally go to Delaware Bay now coming to Virginia because of the prey availability. There are two possible reasons why the numbers of red knots are up, but, yes, the main theory is that because of the prey availability we have more knots there.

MR. MICHELS: Jeff, first a comment. I would like to point out that NEAMAP Survey has been going on for some time now, and they're intercepting and recording horseshoe crab, so that is another component that you might want to look at. Then my question regards the egg graphic where Morris Beach was excluded from the abundance estimates of eggs, and I was just wondering why Morris Beach is being excluded. Did it come on board late?

MR. BRUST: My understanding is that there is three years of recent data from Morris Beach. In two of them they were sampling the beachfront, and this most recent year they sampled the creek mouth. The numbers in the creek mouth were substantially higher than the beachfront. Because of the inconsistency there, we wanted to take it out. My understanding is

that it has only been sampled for the last – I think it was sampled early on and then it stopped and then we picked it back up a couple of years ago. But because we're not sampling in a consistent location, the decision was made to drop it.

MR. MICHELS: One more followup; there is a tie-in between the egg survey and apparently the New Jersey legislation for allowing harvest.

MR. BRUST: Yes.

MR. MICHELS: Is that threshold based just on the New Jersey egg survey results or is it baywide; do you recall?

MR. BRUST: I believe it is 50,000 eggs per square meter on 80 percent of the beaches or 80 percent of these available beach habitats across the bay, I believe. Pete, do you happen to remember if it is all of the bay or just New Jersey?

MR. HIMCHAK: I can document the 50,000 per square meter, but the area I can't confirm.

MR. BRUST: I will confirm with you, Stew, later, but I'm pretty sure it is 80 percent of available habitat across the bay.

CHAIRMAN SIMPSON: Are there any other questions for Jeff on this? I had one and that concerned the egg density that the technical committee seemed to be skeptical of the value of that and yet you've got a pretty good correlation with the bird weight. That is very logical correspondence, so I'm wondering what the concern is about the egg density. Does it not map up with the adult abundance or what are the concerns?

MR. BRUST: There are a couple of things. As I mentioned, one of the concerns was that I think in one year – it might have been the year that Mispillion had really huge numbers, like on the order of 700,000 eggs per square meter, but there were no birds there. There is the concern that just because there are eggs there, it doesn't mean there will be birds there.

I think it was because there were a couple of nesting peregrine falcon pairs right on the beach, and so it is going to keep the shorebirds away. We're trying to measure availability of crab eggs for the birds; and if you've got something like that keeping the birds away, then it is not really availability.

At the same time there is also the egg density – the survey continues throughout all of May, so these numbers are across the entire survey, okay, so for entire month or month and a half that the survey is conducted. You look at these figures and if you look at the Y-axis, you will see that it is just the egg density during three days, which is the critical period.

It is the last three days, generally speaking, that the birds are on the beach. It is their last-chance effort to gain weight so that they can make it to the Arctic. We've got the survey that last six weeks, but really only three days are critical or Weeks 3 and 4. There is some disconnect between what is being measured or what is being shown in these two graphics.

CHAIRMAN SIMPSON: Okay, if there are no other questions for Jeff, I think we move on to other business, which I'll let Stew explain.

OTHER BUSINESS

MR. MICHELS: Mr. Chairman, I'll explain as best I can. There has been some rumbling recently in Delaware, I guess, due to a lack of particularly female horseshoe crab availability for our eelers. I guess there has been some interest in importing Asian horseshoe crabs, which as I understand it I think the board heard last year that some Asian horseshoe crabs were brought into New York, which Jim may be able to speak on.

We're seeing the demand for bait – yesterday I was informed that they were paying five dollars a female horseshoe crab in Delaware Bay, which puts a lot of incentive into the possibility of importing more of these Asian horseshoe crabs. Now, that brings up concerns about introduced pathogens and parasites.

It also is my understanding that the Asian populations of horseshoe crabs are not in the greatest condition. There are at least two reasons for concern, and I was just wondering if any of the other board members were aware of any plans on trying to import these Asian horseshoe crabs or if there was any interest in supporting some legislation that I understand has been introduced in the House of Representatives dealing with the importation of not just Asian horseshoe crabs but a little bit more far-reaching than that. Perhaps someone from the U.S. Fish and Wildlife Service is aware of this legislation and can speak on it a little more. Thank you.

CHAIRMAN SIMPSON: Jim, could you tell us what you know about New York?

MR. JAMES GILMORE: Yes, that is correct, particularly this year we have been getting reports of

quite a number of Asian horseshoe crabs into New York. In addition, we have increased our enforcement actions on our horseshoe crabs, but we still have a significant poaching problem, which I have been on record many times about the pitfalls of having moratoriums or extreme restrictions on a healthy population that you end up getting these things.

That concerns me probably greater than even the poaching in New York of our horseshoe crabs because now you're bringing in a whole new issue in addition to we don't know very well how it will survive; but considering the invasive species we have had to deal with, it is of grave concern.

I think everyone has to start recognizing that if we're getting non-native species coming into this country of large numbers because of our management actions, we need to take a second look at it. Yes, we're looking into it to see the magnitude of it in New York, but again we're just getting more recent reports that they're of significant numbers. Thanks.

CHAIRMAN SIMPSON: Does anyone else have information on the importation of these critters?

MR. RUSSELL DIZE: Mr. Chairman, I know some of our conch fishermen were using the Asian horseshoe crabs for bait. They didn't like them; they're too small; and they don't catch as well as our local horseshoe crab.

DR. LANEY: Well, I can't speak specifically to the legislation being considering, but I certainly can speak a little bit about the concerns associated with bringing in non-native organisms. I know in North Carolina we've done a little research on, in our case, bullfrogs that are being grown in Asia and then shipped back to the U.S. for live food markets, and we're finding that at least to some extent those are carrying the Kitrick Fungus that is so deadly for lots of different species of amphibian.

I think there are all kinds of issues associated with the live animal trade, and that is something that the commission may want to consider weighing in on at some point. Especially when these species escape from captivity or when they're intentionally released, as we all know they have the potential to get established and create all kinds of problems; not just the disease issue.

Even today we were talking in the Habitat Committee meeting about the fact that we have this introduced Nematode Air Bladder Parasite of American eels that has been here since about 1995, I think, and we're still having to deal with that.

One big unanswered question is given the commission's desire to try and increase the population of American eels by restoring access to habitats from which they have been blocked for many, many years; what impact are we having when we pass those native American eels who are now carrying a non-native parasite back into inland freshwaters? There hasn't been a whole lot of research on that. Right now we mostly have to say, well, we don't know.

We do know that the intermediate stages of that parasite do infest other native North American aquatic species, but we don't know a whole lot about whether or not that is having an ecological impact or not. There are all sorts of unanswered questions and I think it is an area that definitely is ripe for some sort of more control.

MR. DAN McKIERNAN: I am actually hearing two different issues. One is the live trade issues and the second one is the use of exotic baits. In Massachusetts I get this question fairly commonly from folks who are aware that Maine has some standards on what is allowed bait. I'm wondering if that wouldn't be something the commission as a whole should be actually thinking about tackling so we could have some consistency from state to state about the use of exotic baits, fish or other material that is coming from outside of the range of that species being introduced. I think it is a bigger issue.

CHAIRMAN SIMPSON: In the audience; can you help us?

MR. GLENN GAUVRY: Glenn Gauvry with the Ecological Research and Development Group. Just to comment in terms of the horseshoe crab exotic bait, if we want call it that, the Asian species that are coming into the United States; just as we have seen over the last several years a ripple effect of moratoriums that have been imposed in one state affecting other states in terms of harvest; the ripple effect actually goes much beyond that, which we are now starting to address right now, which is how it affects the Asian horseshoe crab species.

Stew alluded to the fact that the species in Asia are doing poorly, which is almost an understatement. It is crashing all around from various reasons, mainly having to do with human intervention, overharvesting, consumption, TAL, a lot of factors. The one thing that we're trying to do as an

organization, we've been able to form a specialist group as part of the IUCN, and we have a subgroup in the IUCN on trade and industry, which this has all come about within about the last six months.

We're starting to look at this issue from the Asian side of the problem. What we've found over there is that the regulations to restrict any harvest of the harvest crabs into the United States is almost non-existent, and it will probably take many years before there is anything that is effective.

The nature of the business over there, these things could shift from country to country that had lesser regulations in terms of restricting harvest and exporting. What we're really hoping to see is some leadership from the United States on this issue. Right now, from my understanding from the Fish and Wildlife point of view and from the ASMFC and all the way the line, there really isn't anything on the books to stop this.

I support any effort that any of the states can do individually or collectively to try to stop the importation of horseshoe crabs from the Asian species. It will not only benefit us over here but it will have a large impact on the conservation of the declining three species in Asia. Thank you.

CHAIRMAN SIMPSON: Okay, thanks. I think it may be good for us to ask staff if they could look into the issue a little deeper, the legislation and how the commission may want to respond or contribute to that process and maybe also consider whether we need to look a little broader than the current issue, which is Asian horseshoe crabs, to a little more expansively cover the commission interest broadly, as Dan suggested, if that is okay with Danielle and Bob.

ADJOURNMENT

Okay, is there anything else for the Horseshoe Crab Board? A motion to adjourn; Pat, thank you.

(Whereupon, the meeting was adjourned at 2:25 o'clock p.m., October 24, 2012.)