

PROCEEDINGS
of the
ATLANTIC STATES MARINE FISHERIES COMMISSION
ATLANTIC MENHADEN MANAGEMENT BOARD

February 19, 2002
Swissotel Washington, The Watergate
Washington, D.C.

Approved August 27, 2002

Table of Contents

ATTENDANCE	iii
SUMMARY OF MOTIONS	iv
WELCOME/INTRODUCTIONS	1
APPROVAL OF AGENDA/MINUTES	1
PUBLIC COMMENT	1
TECHNICAL COMMITTEE REPORT	2
MULTISPECIES MODEL REVIEW	9
ADVISORY PANEL NOMINATIONS	13
ADVISORY PANEL REPORT	14
OTHER BUSINESS	18

ATLANTIC STATES MARINE FISHERIES COMMISSION

Swissotel Washington, The Watergate Washington, DC

ATLANTIC MENHADEN MANAGEMENT BOARD

February 19, 2002

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Attendance

Board Members:

Lew Flagg, ME DMR
Dennis Abbott, proxy for Rep. Blanchard, NH Leg. Appte.
Dr. David Pierce, MA DMF
Vito Calomo, MA, proxy for Rep. Verga, MA Leg. Appte.
Gil Pope, RI Gov. Appte.
Dr. Lance Stewart, CT Gov. Appte.
Bryon Young, NY DEC, proxy for Gordon Colvin
Brian Culhane, NY, proxy for Sen. Johnson, NY Leg. Appte.
John Connell, NJ Gov. Appte.
Jeff Tinsman, proxy for Lloyd Alexander, DE F&W
A.C. Carpenter, PRFC
Jack Travelstead, proxy for William Pruitt, VA MRC
Melvin Shepard, proxy for Rep. Redwine, NC Leg. Appte.
William Dukes, SC, proxy for Sen. Drummond, SC Leg. Appte.
Susan Shipman, GA Coastal Res.
Bill Cole, proxy for Dr. Geiger, USFWS
Steve Jones, Omega Protein, proxy for Sen. Chichester, VA Leg. Appte.

John Nelson, NH Fish & Game
Ritchie White, NH Gov. Appte.
Bill Adler, MA Gov. Appte.
David Borden, RI DEM
Ernest Beckwith, Connecticut DEP
Sen. George Gunther, CT Leg. Appte.
Pat Augustine, NY Gov. Appte.
Bruce Freeman, NJ DF&W
Bill Goldsborough, MD Gov. Appte.
Eric Schwaab, MD DNR
Catherine Davenport, VA Gov. Appte.
Preston Pate, Jr., NC DMF
Damon Tatem, NC Gov. Appte.
David Cupka, SC Gov. Appte.
Ken Haddad, FL FWCC
Paul Perra, NMFS

Ex-Officio Members:

Mike Bloxom, MD DNR, LEC Rep.
William Windley, MD, AP Chair

Ellen Cosby, VA MRC, TC Chair

Staff:

Dr. Joseph Desfosse
Vince O'Shea
Carrie Selberg

John H. Dunnigan
Geoff White
Robert Beal

Guests:

Sherman Baynard, CCA - MD
Michael Doebley, RFA
Charles Lynch, NOAA
Dick Brame, CCA
Jim Drummond, PRFC
Dr. John Merriner, NMFS/SEFSC
Niels Moore, NFMOA
Jerry Schill, NCFE
Jill Stevenson, MD DNR

James Price, CBEF
Peter Burns, NMFS/NERO
Steve Monkkmen, MD DNR
Tom Fote, JCAA
Dr. John Olney, VIMS
Anne Lange, NMFS HQ
Richard Daiger, PRFC
Jule Wheatly, Beaufort Fisheries
Charlie Lesser, DE DNREC

There may have been others in attendance who did not sign the attendance sheet.

Atlantic Menhaden Management Board

February 19, 2002

SUMMARY OF MOTIONS

1. *The minutes of July 17, 2001 were approved with no objection.*

2. *The Advisory Panel nominees (Mr. R. Weisberg, Mr. K. Hinman, and Mr. T. Ogle) were approved with no objections.*

ATLANTIC STATES MARINE FISHERIES COMMISSION

ATLANTIC MENHADEN MANAGEMENT BOARD

Swissotel Washington, The Watergate Washington, D.C.

February 19, 2002

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The Atlantic Menhaden Management Board of the Atlantic States Marine Fisheries Commission convened in the Monticello Room of the Swissotel Washington, The Watergate, Washington, D.C., on Tuesday, February 19, 2002, and was called to order at 1:00 o'clock p.m. by Chairman, David V.D. Borden.

WELCOME/INTRODUCTIONS

CHAIRMAN DAVID V.D. BORDEN: All right, everybody have a seat, please, we're going to start. We're going to pass around an attendance list but, Joe, I would note for the record that we have a quorum present. I'd ask everybody to sign in.

APPROVAL OF AGENDA/MINUTES

You have an agenda that has been distributed and circulated prior to the meeting, along with various background documents. I would ask are there any changes, additions or deletions to the agenda which we have circulated. No hands up. Anyone in the audience? No hands. The minutes of July 17 have been circulated. Any comments, additions or deletions to those? Any objection to approving the minutes as submitted? **No objections, the minutes stand approved.**

As we always do, we have a period of public comment in terms of the Menhaden Board and all the other Commission boards. Are there any members of the public that wish to address the Commission before we get into the formal agenda? Yes, sir, could you come to the microphone, please, and identify yourself for the record.

PUBLIC COMMENT

MR. SHERMAN BAYNARD: Thank you, Chairman. My name is Sherman Baynard and I represent the Coastal Conservation Association of Maryland. I had forwarded a letter from the Coastal Conservation Association of Maryland requesting the board consider asking the technical committee to investigate localized depletion in the Chesapeake Bay

and the surrounding waters, adjacent ocean waters.

It is CCA Maryland's concern that with the stock assessment process including the entire coastal stock as a whole, that the process would be better served if we were also able to look at an isolated region such as the Chesapeake Bay in which we think there is a depletion of menhaden.

I also think that if the board were able to push this forward, that a report of this nature from the technical committee would also serve to enhance your ability to manage other species. Thank you.

CHAIRMAN BORDEN: Thank you very much. Any questions? Anyone else care to address the group? Mr. Wheatly, did you want to address the group before we started? All right, Mr. Price.

MR. JAMES PRICE: Jim Price, Chesapeake Bay Ecological Foundation. I would like to support the request that was just made by the CCA and add to that that as far as information that might be available to help the technical committee really look at the problem in depth, there are two studies -- one has been completed; the other will be completed in about six weeks -- that have looked at the diet of striped bass in the Chesapeake Bay prior to 1970, some early data that was taken by the Maryland Department of Natural Resources that has now been put into a form of a study.

Also, the diet study that has just been completed over the past three years will be finished in about six weeks. I think that will give the technical committee a lot of information as to what's going on in the Chesapeake Bay with menhaden abundance prior to the 1970s, and the most recent study will show the conditions present today. I believe it points out that there is a problem, but I think the board should have access to this information so I'll make it available as soon as it is made available to me. Any questions?

CHAIRMAN BORDEN: Any questions for Mr. Price?

MR. PRICE: Oh, there is one more thing; some good news that Maryland's DNR Juvenile Seining Survey Index last year for the first time in nine years indicated that there was good survival and recruitment of menhaden in the Choptank River. And based on, I

think, previous discussions, everyone was in agreement that environmental conditions were the leading factor in poor recruitment.

I think this helps point us still in that direction, that since they did survive well the fourth highest index in 40 years, even though it was only one river and that was in Maryland's section -- I don't know what Virginia's results indicate, but it does indicate that environmental conditions haven't been suitable but were suitable at least in one location last year.

CHAIRMAN BORDEN: All right, thank you very much, Mr. Price. We've had a couple of suggestions from members of the audience that basically would involve referring these issues to the technical committee. Do we have any objection to referring these issues to the technical committee and just asking them to review the issue? No objection, then the technical committee is so charged. Mr. Wheatly did you want to address the board before we start?

MR. JULE WHEATLY: I think the technical committee report would probably say everything I have to say about the menhaden stock assessment.

CHAIRMAN BORDEN: All right, thank you very much. Anyone else in the audience? If not, we're going to move on with the agenda.

The next item is the technical committee report. As you'll recall, as a result of the last board meeting I had tasked the technical committee with a whole series of questions that related to issues that various board members had raised, so we're going to first start with the report of the technical committee, which is Ellen Cosby.

TECHNICAL COMMITTEE REPORT

MS. ELLEN COSBY: Thank you, Mr. Chairman. The technical committee met January 8th and 9th in Raleigh, North Carolina. We discussed each specific charge and developed recommendations for the board which are included in our report. Dr. Lance Garrison gave a presentation on the development of the multi-species assessment model and you'll be updated on that information shortly.

The first charge was to revisit the proposed change to the overfishing definition and provide a clear rationale for making this change. The technical committee recommended the revision of the biological reference points pursuant to changes to the 2000 Menhaden Assessment.

At the May (2001) stock assessment meeting, the technical committee reached scientific consensus that the bait landings should be included in the catch-at-age matrix used in the virtual population analysis. The board accepted this recommendation for the revision of

the catch-at-age matrix at their July (2001) meeting. The inclusion of the bait landings in the catch-at-age matrix significantly changed the output of the VPA. The reduction fishery primarily catches age one to four menhaden. In prior assessments, this catch was believed to be an unbiased sampling of fish. A lack of older fish results in the VPA model estimating high F for older ages. The newly added bait landings, however, contained a significantly greater proportion of older, larger fish than in the reduction fishery landings.

It is now apparent that the reduction fishery does not representatively sample older menhaden likely because fishing effort is concentrated in the Chesapeake Bay rather than areas where larger fish are proportionally more abundant. Thus, the catch matrix prior to inclusion of the bait landings was biased towards younger menhaden. When the VPA was run with the revised data, F was significantly lower and abundance was significantly higher relative to a model run that did not include the bait data. F was 0.6 and the SSB was 90,100 metric tons with bait data. F equaled 1.1 and SSB equaled 33,200 without.

The lower F and higher SSB are the result of the model catch input having a greater number of older, mature fish. These results were due solely to changes in the input data and not to any changes in the VPA methodology. The consensus of the technical committee is that these estimates of F and SSB are the best available biological indicators of current stock status. Because the new catch data resulted in a model estimating a new partial recruitment vector, it was necessary to reestimate the biological reference points.

Again, this was not a change in methodology but simply an update of the input data used in the calculations to estimate F and SSB reference points. The new calculations lowered the F reference point slightly but raised the SSB reference point significantly. There is a table in this report that notes that.

In summary, the technical committee did not use new methodologies to conduct this assessment. Rather, the best available input data were used and this resulted in a significant change in stock status. Reference points were recalculated to be consistent with the more accurate characterization of the fisheries. We recommend strongly the adoption of these revised reference points. We think that the catch matrix and reference points are significant improvements to the stock assessment. Do you want to take questions on each?

CHAIRMAN BORDEN: I think we'll take the questions on this one at a time, basically. Any questions of Ellen on this segment? Bruce.

MR. BRUCE FREEMAN: Thank you, Mr.

Chairman. Relative to the bait fishery, I know in our area there is a conscious selection for larger fish because that's where the value of the bait fishery is. Does that conscious selection for larger fish influence the calculations in any way in that there may be other fish smaller but they simply won't be set on because the value is much less? Therefore, in most instances, they will select for the largest size fish they can find.

MS. COSBY: The bait sampling that is conducted by the National Marine Fisheries Service gets samples. They try to get representative samples of what is taken. Now you're asking about the fish that's not taken?

MR. FREEMAN: No, no. The fact that the bait fishery, at least in the area -- and my understanding is New Jersey and Virginia account for the majority of the bait landings, at least at the present time.

MS. COSBY: That's right.

MR. FREEMAN: I'm not familiar with what occurs in the Chesapeake, but I do know a little bit about the New Jersey fishery. And my question is, in that bait fishery they are selecting for larger fish.

Now the issue here is that the reduction fishery was assumed to be a non-biased sample of what's available, and that premise has been used to calculate the references. When the bait landings are added, we're finding more larger fish; therefore, it does effect the new reference points because now we know that those larger fish are, indeed, in the population.

My question is since the bait fishery at least in the northern section of the existing fishery is selecting for the larger fish, the fact that those larger fish are constantly being attributed to the bait fishery, does that have any impact on the calculations? Still not clear?

MS. COSBY: Well, my understanding is that they are taken into the calculations and this is part of what we're using.

MR. FREEMAN: No, no, I understand that, but let me just back up. In order to make the calculations, we have been assuming that the reduction landings or the landings from the fishery are a representation of the population. Now it appears that is not correct because a majority or -- yes, the majority of the reduction landings are taken from an area which have a preponderance of smaller fish. Bear in mind when this fishery existed up into Massachusetts and Maine, I think their fishery was predominantly four- and five- and six-year-old fish. The further north, the larger the fish.

I'm just curious from a biological standpoint if in fact the bait landings are such that only larger-sized fish are sought and caught, is the assumption made in our bait fishery that that is a representation of the population that occurs off New Jersey?

And I would submit it is not, and that may be fine.

I'm just curious if that was discussed by the technical committee. It's a biased sample. New Jersey bait harvest is a biased sample for larger fish. Now, if you accept that, my question is does that have any impact on the calculations for the reference points?

MS. COSBY: I'm not sure I can answer that. Mr. Perra might be able to help me on that.

CHAIRMAN BORDEN: Paul Perra.

MR. PAUL PERRA: We're going to have to refer that to the stock assessment committee to give you an answer, but it is my understanding that the bait fishery was added because it does take bigger fish. We knew that fishery, like a lot of fisheries, is biased towards certain size classes. It's now approaching 20 percent of the total catch.

The reduction fishery, basically, isn't catching the big fish so the technical committee felt even though these landings are biased, they are giving us some information on the big fish. Now, I'll confirm that in making the assessment better basically because 80 percent of our catch now is biased toward small fish.

CHAIRMAN BORDEN: All right, are there other questions for Ellen here? Yes, Bill.

MR. WILLIAM GOLDSBOROUGH: Thank you, Mr. Chairman. I was wondering about the new reference points, F target and F threshold being so close together and the advisability of that circumstance both as a practical matter given the very variability of our estimates of F, but more importantly the possibility, very distinct possibility, I think, that before we even realize that we're over the target, that we're also over the threshold.

CHAIRMAN BORDEN: Any reaction, Ellen? Did the technical committee consider that when you deliberated on this?

MS. COSBY: I don't recall them saying anything about the closeness of the points. That's something that maybe we can look at further.

CHAIRMAN BORDEN: All right, any objections if we have the technical committee re-examine that the next time they have a meeting, that issue? Other questions here? Any board questions? Anyone in the audience on this report? No hands up.

The process here that we would have to -- it seems to me that we've had a few questions that have been raised on this that are going to require additional work or at least closer examination by the technical committee. If in fact, after we get that input, the board would have to make a motion at a subsequent meeting to basically initiate the process of an addendum to modify the plan if they want to implement these. Now, you can do that today and then we can ask for the technical report at the next meeting or in fact you can

wait until the next board meeting.

We do not have -- and if Susan is in the room, she can correct this if I am incorrect -- there is no money budgeted for a menhaden addendum this year so we would be putting this on the plate for 2003 assuming that it is ranked as a priority in the fall. Everybody comfortable with that?

So, I guess my recommendation would be let's get the technical advice. We can do another meeting and then if it seems appropriate to not only adopt this but possibly modify the guidance, we can do it at that time. Any objection to that course of action? No, then we will proceed. Ellen, charge two.

MS. COSBY: Okay, the second charge was to review current fishing practices, including the harvest of age zero menhaden, and to discuss whether or not these practices are viewed as problematic. We talked about the current removal rate of age zero and discussed whether or not a higher rate would be a problem. We were asked to identify a rate of removal that would be of concern biologically if this is identified as being a potential problem and develop a list of prioritized management alternatives to address this potential problem.

The fact that the reduction fishery has always harvested some zero-age menhaden was discussed, and we noted that the industry has reduced their take on zero-age menhaden since 1993 voluntarily. We know that there is a preference for larger fish both in the reduction fishery and in the bait fisheries. When there is high recruitment, abundant age zero, or very good fall weather, there will be some increase in the age zero catch. The size of the age zero year class contributes to the size of the catch.

We did talk about recreational cast net fisheries that were identified in several states that do harvest age zero menhaden but we didn't believe that that was very significant. But, the extent of their harvest is unknown at this time. We did not view any of these fishing practices as problematic at this time. If you would like to look at page 3, the table that's on page 3, we can show you the magnitude of the harvest of age zero and show you the relative percentage of the age zero harvest and the estimated size of the age zero population by the year.

The values for the age zero population and the percent age zero population harvested are generated by the VPA and those are not available at this time for 2001. But you'll note that the age zero harvest, which is based on the bio-statistical sampling for 2001, was valued at 22.7 million fish. If you look at 2000, it was 77.8 million fish, and the actual population was 6 billion, so it's a fairly small percentage there, 1.3

percent. The total landings for 2000 were 657 million fish, and for 2001 it's 680 million fish.

The percent age zero in the total landings for 2001 was only 3 percent. The committee discussed these figures and then we were presented the multi-species model which demonstrated that the relative magnitude of the impact of fishing versus natural mortality was in fact a huge difference, two orders of magnitude difference.

So in light of this information, the technical committee was in agreement that the fishing practices related to the age zero menhaden are not a problem at this level. We would like to explore and identify higher rates of removal and evaluate potential problem areas with this new multi-species model. This is something we could do in the future.

CHAIRMAN BORDEN: Questions on this segment? Yes, Eric and then Bill.

MR. ERIC SCHWAAB: The one question I would have would be whether this data would be available pre-1990? I would assume the same data would be available back through previous decades. I'd be interested in seeing whether there was any trend over time.

I would just make the comment that it strikes me that while from a coastal management perspective this might not seem problematic based on these data, that it relates back to the comments that were made earlier. And in the context of a focused fishery in the Lower Bay and at the mouth of the Lower Bay, I think this issue ought to be looked at in relation to the charge that was offered to the technical committee earlier to look at those localized impacts.

MS. COSBY: The bait landings were only available from 1985.

MR. GOLDSBOROUGH: I was going to make that same point and also ask a question. It says that since 1993 the reduction industry has voluntarily reduced their take of age zeros. Just a question of clarification. How do they go about doing that? Is that identification from spotter planes allows them to do that? I just would like to understand how that works.

MS. COSBY: This is part of what's indicated by our tracking the reduction fishery. In our annual report there is a table that showed the reduced take of zero menhaden. The industry, well, they can speak, I guess, but they have told us that they have tried to reduce their take of zero menhaden. They don't want them. I mean, they really don't want to take them so they've gone out of their way, I guess, to try and avoid taking them.

MR. GOLDSBOROUGH: Yes, that would be my question, how is it they do that? I just want to understand how the fishery works. Perhaps Steve can

comment on that.

MR. STEVEN JONES: Yes, we specifically are not targeting them now. Back in the mid-80s we did target those small fish in the fall of the year, so we do not go after them. If we see them, we avoid them. We do not use small mesh nets as we did in the past to go after them, so we've gotten away from targeting those species, those small fish.

CHAIRMAN BORDEN: Ernie Beckwith.

MR. ERNEST E. BECKWITH JR.: Yes, it's just a follow-up question. Perhaps Steve can answer this also. What happened in 1999? There was a large jump in the percentage of the population harvested and the percentage landed of zeros.

MR. JONES: Back in '99 we saw a tremendous amount of small fish in the Bay and they were mixed in with the other fish. And if you look on the age zero population for '99, we are only showing 1.2 billion. Well, the year before that I think it showed 19 billion. So the reason that went down so seriously, we didn't catch many age ones. But this past year we caught a lot of age twos so I think we'll see that number go back up.

But, as far as we're concerned, it was a big age class and we didn't intentionally catch them, but they were so mixed in with the other fishes when we were down at the mouth of the Bay, that's what made it spike up that year.

CHAIRMAN BORDEN: Other questions on this segment? Bruce and then Vito.

MR. FREEMAN: Thank you, Mr. Chairman. On charge two there was a statement here asking the technical committee to identify a rate of removal that would be of concern biologically. I don't see anything pertaining to that. Was that an issue that the technical committee will consider further?

MS. COSBY: That was an issue that we thought we could use the multi-species model with, to look at.

CHAIRMAN BORDEN: It's a work in progress, in other words, Bruce.

MR. FREEMAN: Okay. Well, was there discussion relative to not looking at multi-species but just looking at the menhaden resource as it exists, whether in fact it would be a percent that could be taken?

I'm looking at the last column with percent age zeros and total landing. Is there any concern -- for example, look at '91 where almost 30 percent of the harvest was zeros. Is that of biological concern, or was there any discussion? I mean is that a high number or a low number or something else?

MS. COSBY: We didn't discuss any percent levels or any values that would hit a concern level at this point. I think they wanted to explore with the model

and they thought that the fishing level that is being taken right now was not significant enough to worry about it.

MR. FREEMAN: Well, the thing that strikes me -- and, again, it may not be even at 30 percent because this is a forage species and most of the species we've been working on -- all the species we've been working on to date are much different. And we look at some of these fishing mortality rates and then we look at menhaden, and it's a very different species and we have to look at it very differently. And sometimes you have to be conscious of which species you're dealing with.

But, in all these cases, it seems to me the capture of young of year fish occur, the decision or, as Steve indicated, their mix or whatever the case may be; and then after that occurs, we come up with a VPA to determine what percent that was of zeros or what percent of the total catch harvested were zeros, that's all done after the fact.

The harvest is made and perhaps a year later you'll know where you are. And so there's obviously a lot that's not known when the catch occurs, so I'm just curious if there's a way of having some guideline to control beforehand that harvest. Is there a concern and if that concern is a certain number, can we have some sort of target? Is that possible?

CHAIRMAN BORDEN: Bruce, Mr. Jones would like to respond to that.

MR. JONES: I realize that the multi-species model is preliminary, and it definitely is preliminary, but the results we were looking at, the industry, what they catch age zeros is insignificant. I believe it's like 99.8 percent of the age zeros are eaten by predators and the industry is looking at about 2 percent now -- not 2 percent but 0.2 percent. Like I said, this is preliminary but the early results is showing that no matter what we catch we're still insignificant.

MR. FREEMAN: Okay, I haven't come across that in a technical report. It may well be; I just have not seen that statement.

CHAIRMAN BORDEN: All right, Vito.

MR. VITO CALOMO: Thank you, Mr. Chairman. I have probably a question. On your report on page 3, on the top, on the second line from the top it says, "The technical committee did not view any of these fishing practices as problematic at this time"; referring to age zero?

MS. COSBY: Correct.

MR. CALOMO: That's all you need to say to me is correct and I understand. And then under this fine chart you laid out here, there's another paragraph and it says, after about the second sentence that begins, it says: "The results indicate that the percentage of age zero fish

taken in the reduction fishery appears to be minimal compared to other affects of predation. The level of predation on page zero menhaden was, in fact, one or two orders of magnitude higher than taken by fishing." Then it says in light of this information, the consensus of the technical committee -- that's you people -- was that the fishing practices related to age zero menhaden are not a problem at this level? Is that correct?

MS. COSBY: Yes, sir.

MR. CALOMO: My question to Mr. Jones, if he may answer, Mr. Chairman, is that in your fishing practices is a better fish for reduction where you secrete the oils and meal from a larger fish? Is that not a better fish to fish for, an older fish?

MR. JONES: Yes, sir.

MR. CALOMO: I thought so, because it hasn't changed since 1958, I believe. So we have the reduction people really looking for a larger fish. We have now discovered that the bait people that take 20 percent are looking for a larger fish. We have the technical committee on record here from this report saying minimal problematic or minimizing the capture of these small fish and yet we seem to pound the living hell out of this. I'm just trying to feel a reason for going down this road. And I've also heard the chairman making reference back to the technical committee to keep looking for any problems that may exist. So, I think that's the point I'm making. Thank you, Mr. Chairman.

CHAIRMAN BORDEN: Dennis Abbott.

MR. DENNIS ABBOTT: Thank you, Mr. Chairman. Looking at the chart, between the years 1999 and 2000 we had a quadrupling of the population of age zeros. The total landings at the same time from '99 to 2000 went down 33 percent. How can that be explained if the population has increased to such magnitude? Why did the landings drop off that year by a third?

CHAIRMAN BORDEN: Ellen.

DR. JOSEPH DESFOSSE: Just briefly, what you're looking at in total landings here is numbers of fish. The actual pounds landed did increase back up to the five-year running average. So what you're looking at is a decrease in numbers of fish. The average size of those fish has increased, so they are actually catching larger fish.

CHAIRMAN BORDEN: Steve, did you want to respond? Anyone else on the board that wants to ask a question? I've got a couple of hands up in the audience. Bill.

MR. WILLIAM A. ADLER: Thank you, Mr. Chairman. Some of what I was going to say Dennis covered. The vast increase in the number of fish here

between '99 and 2000, is that due to the environmental conditions were right for menhaden or -- it's an and/or perhaps -- better data gathering; which one or was it both that contributed to this big increase here?

MS. COSBY: I don't think the data gathering changed.

MR. ADLER: Okay.

MS. COSBY: It had to be --

MR. ADLER: So it was just a massive increase in the stock of small fish because perhaps of environmental conditions, which I've heard many times has been the main reason here. Is that correct?

MS. COSBY: That's my understanding.

CHAIRMAN BORDEN: Anyone else on the board? If not, Julie, did you want to offer a comment?

MR. WHEATLY: I could clear up Bruce's question on why in 1991 so many little fish. There was a company that used to fish out of Beaufort that would bring in 10 or 12 boats, large vessels, and they more or less targeted little fish. There wasn't any big fish. And, finally, they've gone out of business and closed the plant down. So that's the reason for those figures being so high up into the mid-90s. That won't happen any more because the company is gone, and those 10 or 12 boats are out of the fishing population.

CHAIRMAN BORDEN: Anyone else in the audience? Yes, Tom Fote. Tom, could you come to the microphone, please.

MR. TOM FOTE: Tom Fote, Jersey Coast Angler's Association. We still have concerns about the harvest of small fish. And Steve is right. Steve has looked at the Virginia boats. The Virginia boats put a larger mesh into place. They basically only caught like 4 percent. That's the year of zeros and ones was caught like 27 percent. They came mostly out of North Carolina, out of two boats. It's always interesting that if they're not targeted, how come two boats make up such a large percentage of the catch when the other nine boats do not.

Also, when we deal with facts and figures and models, I mean, for years I've been told there's plenty of mackerel out there by the models that the National Marine Fisheries Service basically puts forth. We've never seen the fish. We argued those models for years. We still haven't seen the fish inshore. The party and charter boats don't see that stock.

But we know when you kill 79 million pounds of juvenile fish, that's 79 million pounds of fish that has been killed before they spawn. We know they will grow up and they could possibly spawn. The rest are all guesstimates. It's not an exact science. We've learned that. And, as a matter of fact, I would like to know, you know, what's the confidence level in some of these

models?

Basically when you put in the bait industry, it kind of skews the whole model. The bait industry is a small part of the catch. It is not compared to the reduction industry and yet you're interpreting that data to fully reflect what has happened in the menhaden industry.

I always look at the fact that we have no menhaden in states that historically had it. If we don't have it there, there's something wrong with the stocks, and why are we fishing on pre-spawn fish? Thank you very much for the chance to make a statement.

CHAIRMAN BORDEN: Thanks, Tom. Anyone else in the audience before we move on? So just let me conclude by saying that the technical committee has answered some portions of the charge here and still owes us a response on other facets of the task. Third charge, Ellen.

MS. COSBY: Okay, number three was to look at the list of management options for future conditions as considerations. In Amendment 1, they are listed and we prioritized them according to what you wanted us to look at. The preferred management option that was listed in Amendment 1, that the board had talked about before, is to control the catch through imposition of a total allowable catch by area. The technical committee agreed with that, and thought that was fine.

We ranked them as most likely to be effective, possibly effective and not likely to be effective. Along with the TAC we went with closed seasons and area closures as being likely to be effective. Possibly effective would be gear limits and not likely to be effective would be trip limits or days-at-sea restrictions. We did note that socio-economic impacts of all these options should be taken into consideration before implementing.

We also discussed the evaluation of predation levels and management regimes of various predator species such as striped bass, weakfish and bluefish. Our preliminary examination of the multi-species model results indicate increased levels of predation on age zero menhaden as a result of increases in the population size of these predators.

CHAIRMAN BORDEN: Questions for Ellen? Gil Pope.

MR. GIL POPE: Thank you. First is on areas, by area of catch. Do you have those defined somewhere or are they to be defined by areas of catch here; total allowable catch by area of catch?

MS. COSBY: We simply ranked what was in the amendment. We didn't go into a lot of detail on this.

MR. POPE: The other one is down here it says the technical committee noted that the socio-economic impacts should be taken into consideration. Are you

asking the board to charge like, say, the CESS Committee next door with looking at this? Was that why you included that?

MS. COSBY: We thought it should be done. One of our members brought that up and it was noted that it should be taken into consideration. Now I don't know who would do that.

CHAIRMAN BORDEN: Go ahead, Gil, do you want to pursue that?

MR. POPE: Well, no, I just was saying is that something that we should do? Maybe we'll take that up in a minute here, if anybody else sees the reason for that and make a motion to that?

CHAIRMAN BORDEN: Well, I'm not sure you need a motion to do it, unless there's objection. Is there any objection to doing this? Bill.

MR. GOLDSBOROUGH: Not an objection but I'd like to add to it, if I could, broaden it a little bit. I'm assuming the way it's written here that it means socio-economic impacts on the industry, of the restrictions of the industry. I think it ought to be broadened, if you're going to look at these kinds of impacts, to include the socio-economic impacts on other fisheries of problems with the menhaden stock that we might be attempting to address by restrictions on the fishery.

CHAIRMAN BORDEN: All right, any other comments? Yes.

MR. PATRICK AUGUSTINE: Thank you, Mr. Chairman. I'm just concerned that we end up broadening the charge, if we give it to the CESS Committee, to be so large that they're not going to be able to address it in a relatively reasonable time.

I agree with Gil's initial comment that I do think that something must be done along those lines, and as quickly as possible so that when we move forward with this, it won't be a convoluted thing. It will be focused right on the effect on the fishermen. I think that was the point Gil was making, and if he'll make the motion, I'd second it.

CHAIRMAN BORDEN: Gil.

MR. POPE: Well, I wouldn't mind doing that. That wasn't part of the charge but if we want to do that, that's fine with me. I don't see any problem with it at all.

CHAIRMAN BORDEN: All right, so Bill's suggestion just broadens the charge slightly; and if they have inadequate time to deal with the broader charge, they can deal with the narrower charge. I mean, all of this, at least my intent was to start to have the committees start to deliberate on these things in advance of suddenly coming to a meeting like this and saying, "We have a crisis; we have to do something."

So they will just put this on the plate. As the funding and time allows, they'll continue to work on it. Any objection? No objection. Anything else on this item? Anyone in the audience? If not, we're going to move on to the fourth charge.

MS. COSBY: Okay, the fourth was to evaluate the current age structure of the population and identify, if possible, some future desired age structure as a goal. We should also evaluate why this condition exists and what could be done to restore or rectify the situation, develop management alternatives that could address attaining a future goal regarding a desired coastwide age structure.

The committee discussed what an optimum age structure should look like and concluded that basically this wasn't practical. We noted that any population age structure is a result of the management regime imposed on a particular population. The current assessment estimated that F was below the target; therefore, the resulting age structure should, under equilibrium conditions, approach an optimal age structure needed to sustain the spawning stock. As recent as three years ago, the spawning stock biomass was at a high of about 120,000 metric tons and has since declined to about 90,000 metric tons. A number of successful series of year classes are needed to reverse the declining trend in SSB and to expand the species range once again.

Environmental factors appear to be more a determining factor as to where adult menhaden migrate north of Long Island. These boom-and-bust cycles for New England have been noted for at least the last 100 years based on reports and noted in the following sections as provided by Joe Smith down in North Carolina. After five decades of fishery-dependent data collected by the National Marine Fisheries Service supports the trends of scarcity in abundance of menhaden in New England waters during more contemporary times.

Menhaden were abundant in New England during the mid-50s into early 60s with reduction plants active in Maine and Massachusetts. Fish were scarce north of the Mid-Atlantic after the early 60s and most plants in New England went out of business due to scarcity of menhaden. The stock rebuilt during the '70s and '80s. Menhaden again became abundant in New England waters, so much so that an internal water processing venture with the Russians evolved in Southern Maine beginning in 1988. The IWP last operated in 1993 as adult menhaden once again disappeared from the coast of New England. Commercial quantities of menhaden have not been seen north of Cape Cod since 1993.

CHAIRMAN BORDEN: Questions on this charge? Ritchie.

MR. G. RITCHIE WHITE: Thank you, Mr. Chairman. What are the environmental factors and could the technical committee look at the boom-and-bust cycle to see if the environmental factors were in place during those boom-and-bust times?

MS. COSBY: Environmental factors relating to storms and temperature, currents, salinity, predation.

CHAIRMAN BORDEN: Go ahead, Ritchie.

MR. WHITE: Yes, the question is, there is some composition of those that the technical committee must feel keeps these fish from going north. I guess my question is if they can be more specific than that and is there any way of relating it to those boom-and-bust times to prove that theory out?

CHAIRMAN BORDEN: Let me just kind of add on that since I was one of the ones that initiated this. The question that I get asked all the time is whether or not there are specific changes in the management program that we could implement that in fact over time would somehow moderate the influences of some of the environmental changes. I think the clear message you get out of the technical report is environmental change has the biggest impact on the population, but that assumes the age structure that existed at the time that that situation presented itself.

So are there things that we could change in terms of population structure that in fact would somehow smooth out some of those types of effects, and I'm not sure I've gotten an answer to that. But, other points on this? Any other questions? Anyone in the audience? Yes, sir.

MR. MICHAEL DOUBLEY: Thank you, Mr. Chairman. Michael Doubley from Recreational Fishing Alliance. We perhaps would like to see if the report that's cited here could be made available to the public?

What we've seen in the past often is these boom-and-bust cycles that are brought up, and certainly there is a natural cycle which some species are faced with. These are often compounded by overfishing. And if we're going to take quotes from a report I would like to see if we could perhaps, to the best extent possible, reconstruct catch data from these times, considering this is an old fishery and maybe there's some older records available.

Because when we talk about -- as I mentioned, as we talk about boom-and-bust cycles, too often it was brought about by overfishing and we want to be sure that we're not attributing environmental factors for something that could be taken care of through the technical committee. Thank you.

CHAIRMAN BORDEN: Ritchie.

MR. WHITE: Yes, that's more in line of what I'm thinking is it seems like we're saying they're boom-and-bust cycles and we don't really have the

answers so we say it's environmental. I mean, shouldn't we be taking these boom-and-bust cycles and looking at the population, looking at water temperatures, looking at all of this to see if there is a cause or there is not that we can attribute.

CHAIRMAN BORDEN: Comments on that point? Yes, Joe.

DR. DESFOSSE: Two years ago Doug Vaughan, as part of one of the supplemental analysis, did look at environmental factors and he's continuing to do so. But what he did was he looked at it over the entire coastwide population, what affect it had on the whole population. We can go back to him and ask him if there's any way to look at the effects of certain portions of the population range.

CHAIRMAN BORDEN: Bill.

MR. ADLER: Thank you, Mr. Chairman. It was said earlier that the majority of the take of these fish was by the predators. And I think if we looked at some of the fish that we've brought back -- the weakfish, the striped bass -- they're increasing. And right here it says predators eat most of them, I guess, so that right there could be one of the environmental factors, I guess, that they could take a look at is the fact of what is the effect of the predator fish that we know or say are returning. What are they doing to this population?

CHAIRMAN BORDEN: Any other comments on this? Gil.

MR. POPE: Just real quick. It takes me back to a book, I guess, that was written in the 1600s on bluefish and they would disappear for 50 years at a time. I don't think there was much activity going on that was taking these bluefish but they would just disappear, going away. And nobody knew where they went and all of a sudden they came back in great numbers. So, this is what this reminds me of.

CHAIRMAN BORDEN: All right, anything else under this segment? Mr. Price.

MR. PRICE: Yes, I would like to mention to the board that after talking to Mr. Garrison, who is working on the model, he's got such preliminary data, limited data, on the stomach analysis of only three predators that any percentages or any figures, that I think that have been discussed today should be taken with the understanding that there are dozens of predators feeding on menhaden and that to make any assumptions based on what little data he has looked at, I think, would be wrong.

In fact he agreed with me that it would be years, at least two or three years, before he would even be able to get any kind of an idea of what's going on. So we have to remember, we're not going to have any answers for several years on predation of zeros. Of course, the

higher predation, the less that leaves as a percentage of the industry that harvest them would even be larger but it's too early to have any idea of what percentages we're talking about.

CHAIRMAN BORDEN: Thank you. Anyone else in the audience? If not, we'll move on. The next item is the review of the multi-species model which is Geoff White. And there is a handout that has been circulated that he's going to work from.

MULTISPECIES MODEL REVIEW

MR. GEOFF WHITE: Thank you, Mr. Chairman. Yes, the handout went out at the same time with the technical committee update from the same meeting, January 8th, with the technical committee, and you should all have that in front of you.

As Ellen pointed out, Lance Garrison was there and was able to present the whole suite of data, calculations and preliminary results that he has at this point. There's a lot of information overall. The technical committee was very pleased with the model formulation, the calculations that were taking place inside of it and how it handled data and presented the outputs. So in that sense, they were very pleased. Lance was excited about just some of the preliminary numbers. I didn't present you with a lot of graphs and things because the data is preliminary. His main point is that the specific numbers are probably not right but the orders of magnitude are correct in what he has at this point.

The model takes natural mortality and parcels it into two parts. One is still kind of that all-else natural mortality section and the rest is accounted for by the predation of these three species. The good news is when you run the model without any of the predators, it still gives you the same results as Doug Vaughan's approved VPA. So it puts you on the right scale as an error check.

The other is when you add in the predation mortality factor, which is specifically accounted for by these three predators, and add it to the -- kind of round it off -- to the natural mortality section that's still there, you come out with abundance estimates that are right on par with what we expect when we include natural mortality into one large lump sum. One of the questions that came up about predator abundance, a generalized output from the model is that as bluefish were high maybe ten years ago, and striped bass are high now because of the population has kind of shifted, the menhaden consumption at age, I think it was zero or one, has remained relatively, not exactly, but relatively constant.

But a subcommittee was formed to delve deeper

into the model to try and understand the calculations a little bit better, what data went into it, if there were improvements that could be made on the formulation as well as the data that went in. A few of those comments that required some substantial work by Lance -- and he has gone back to do -- was adding the bait landings to the historical VPA analysis, as Doug Vaughan has done, to allow age-variant natural mortality in the historical model, to allow users to specify the digestion rates for the predators as those vary by temperature as well as by region.

And the recruitment levels were kind of fixed in the original formulation so he has added a routine to allow that to be randomly selected. And, also, in the forecast projection models, it was set to project a fishing mortality level for menhaden or the predators, and he has allowed the users to then select for a catch level which may be a little bit more helpful.

Those are all comments that came up from the subcommittee that have been reviewing the model, and they're all things that have gone back to Dr. Garrison. He's been trying to incorporate them and will probably have a new model program back to them by the middle of March that will allow them to have something that they can rest on a little bit more firmly to work forward. So that's the good news in getting some review and some feedback and working with Dr. Garrison to improve the model as it is right now.

For 2002 the subcommittee came up with three main tasks to continue to review the model equations and formulations and assumptions so that once Dr. Garrison isn't there to explain it to them, that they'll be able to justify the answers and results to come out of the model to the board. Getting up to that level of understanding with the amount of complexity and detail that's in the model is going to take a little bit of time, and so they weren't ready to jump in and provide you with specific results today.

Secondly, they wanted to finalize some of the input data including just double checking. Lance has done a really good job of throughout the last year working with technical committee members from menhaden, striped bass, weakfish, bluefish, as well as getting other information into the model but double checking with them, getting the subcommittee to approve the data that's going in there and make any adjustments that they need to was one of the tasks that they wanted to do this year.

And, finally, with the new model becoming available, as they get the data in there and they understand the calculations a little bit better, they wanted to explore possible results and management scenarios and then later on this year provide the board

with a more complete report of how this tool may be used to improve assessments and your understanding of what's going on with the population right now. It is going to be a step-wise task, but they were very excited about being able to understand and quantify some of the things that the board and the technical committee have been talking about for years. So that's kind of their current activities.

There were actually three points that they brought up looking to the future that they would like to add to their ability to do analysis. This is under the ongoing activities section at the bottom. The first was kind of expanding the model to include prey switching, because right now it only includes menhaden as a prey species, and the feedback of prey availability to the predatory population size and some diet-dependent growth functions. These are items that we had already kind of identified with Lance as this is a developmental project that we wanted to do for the second year. So, by the contributions of several states and the commission, we've been able to come up with a contract for Lance to continue this work in 2002. So those items are being addressed and that began, actually, last month.

Another request, which has also been noted around the table today, is the need for a spatially explicit model, something which can look at localized effects, give you that true regional picture, as well as look at some more environmental factors, water temperature being one of the main ones but water currents, as well. That's a much heavier exercise and is not -- in the choice of what Dr. Garrison has begun with it, it's a Murphy VPA, it's not easy to incorporate those things explicitly. Therefore, the commission has gotten together with Jerry Ault and Jiangan Luo to write a proposal and we've actually submitted that proposal for funding that work in 2003. We're not going to hear back from that until April but there is a commission recognition that this may be the way to go, but it takes more data, more modeling and work, stepping our way to get there.

Finally, some of the subcommittee members brought up the idea of it's great to have the multi-species assessment tool; however, we could use a little bit more guidance on how to incorporate that into our management practices and maybe some guidelines on how it could fit into management options. And that's a very good point. It's another one of the things that we had recognized, and later this summer the research and statistics department is going to be having a more public workshop, kind of focused on the policy and questions of options, what are options for the commission to include multi-species assessments in their management practices, how to include these wider analyses in what we currently have as a single-species decision-making

process.

So those are things that we're going to be looking toward improving so the technical committee can give the board better advice.

CHAIRMAN BORDEN: All right, questions for Geoff? Any questions, comments, suggestions that you want him to consider? As I understand it, Geoff, you anticipate that be some of these changes will be incorporated into the model in March?

MR. WHITE: Yes. In the summary that I handed out, the bullets at the top half of the page are changes that I spoke with Lance this morning, and he said that by March he will have incorporated -- a lot of them are already done. He's working on one more, actually. And then he will be sending the model back out to the subcommittee.

CHAIRMAN BORDEN: All right, so my assumption here is the next time we have a board meeting, we can have another full-blown presentation on the model, then?

MR. WHITE: We could probably do it either way in terms of some results from the technical committee, their evaluation, and some results.

CHAIRMAN BORDEN: Okay, are there any other strategies or approaches that the board wants the committee to consider incorporating, variables that they want them to look at? Yes, A.C.

MR. A.C. CARPENTER: I don't necessarily want to add anything to the plate, but without appearing to be too over-simplificational on this model, the difference between this and Doug Vaughan's model is that you break out natural mortality into two subparts, everything else and these three species?

MR. WHITE: Correct.

MR. CARPENTER: Where is that going to get us down the road? Are we going to be able to say that striped bass are X percent of the mortality and weakfish are X percent and bluefish are X or Y percent and then we're going to adjust those management plans, or is it the other way around?

MR. WHITE: That's part of why we need to have the workshop this summer in how to implement these things. Right now the model only says what effect those predators have on the menhaden population. And so as a tool to give a board more information, it's really useful this year to the management board for menhaden. It does not tell what the amount of menhaden does to the population size of, say, striped bass, weakfish or bluefish. So, it's not really a tool built for those boards to use yet. We hope that next year or two years from now we will have that.

But balancing out the needs between species is something that the Commission doesn't have worked out

right now and that's why we're beginning to look at it this summer.

CHAIRMAN BORDEN: Eric.

MR. SCHWAAB: Just to follow up on that, of course, the last amendment to the menhaden plan was seriously lacking in the quantification of some of those roles that menhaden play in support of some of those other populations.

So, is it then the expectation that the current work would lead to ultimately our ability to quantify explicitly the role that the menhaden that are left in the water might play in supporting various predator species or predator species at varying population levels? I mean, is that an outcome we're on track to get?

MR. WHITE: We should be able to get an idea of that. I'm not sure how specific that can get but using the diet information that we've collected for all the species as well as the Commission-approved VPAs for the predators, it has given us a pretty good idea of its relative usage for the fishery as well as for a prey source for other animals.

CHAIRMAN BORDEN: Eric.

MR. SCHWAAB: I think that's important information for us to work toward being able to input into future additions or future amendments to the menhaden plan. I mean, again, that was a place that I think we were lacking.

But I guess my question, Mr. Chairman, is more broadly, as we move down this road, I mean, the focus of this work within the umbrella of not just of this board and the Menhaden Technical Committee explicitly might be a little narrow. And I just wonder if this board would want to raise through the policy committee some other framework to support in a broader sense this work to inform the work of other boards as well. And, you know, I'm not sure in what form to put that suggestion but it certainly seems like something that we as a Commission ought to be moving towards.

CHAIRMAN BORDEN: Any comments to that point by the board? Any suggestions? Bill.

MR. GOLDSBOROUGH: I would just add to that a note I saw in the AP written report, not to preempt you, Bill, but to the effect that one of the members had asked about why there had been no analysis of the filter-feeding role of menhaden and the statement was made that that was something that was intended to be looked at in the long term, and that would fit into a broader concept of this work, as well.

CHAIRMAN BORDEN: Any other comments on this? Vito.

MR. CALOMO: Thank you, Mr. Chairman. I've just listened to the comments here, Mr. Chairman, and wondering are we overloading the committee here now

and the technical committee by kind of spreading out too far? This is a menhaden board. It should be directed towards menhaden and all of a sudden we're going out -- it looks like we're expanding the parameters about striped bass, bluefish, other predator fish.

If we go to the northern where there's no menhaden, and we have probably some of the best stripers and the biggest striped bass in the eastern seaboard, they're eating mackerel. They're eating herring. They're eating butterfish. They're eating scup. They're eating crabs. They're eating lobsters. They're eating everything. I mean, I don't know what to tell you. Every time I cut one open, they've got a variety of things. In fact, I was a little nervous about putting my grandchild in the water except I'm kind of big, so I didn't worry.

But, also, I just wanted to pass a comment, Mr. Chairman, that just recently, with the expansion of the pelagic fisheries into the northern here, up and down the coast, that we're seeing tremendous amounts of mackerel migrating to the northern that we haven't seen in years -- coming from the oldest fish import in the country and the biggest fishing port in pelagics at one time, mackerel seiners reaching over 200 mackerel seiners at one time going from Maine to the Virginias, all of a sudden the mackerel disappeared. They just disappeared from our coast. They went further south and they took a different route. Now coming back about, I don't know, 60 years or so now, we're starting to see mackerel coming to our coast, and very large mackerel, I should say. And herring from Maine from the Virginias is showing up again.

I'm just trying to listen to this report, Mr. Chairman. I'm going off a little at the mouth here, but I guess we're getting towards the end, is that I've enjoyed this report. And it's to the point -- whether you like the contents or not, it's to the point. And there's so much that we do not know about pelagics, Mr. Chairman. I was born and raised in the pelagic business and did it for about 40-odd years myself. And I still wonder what I know, if I know anything. But, we do know that the larger fish were predominantly to the northern and smaller fish were always predominantly to the south.

In the last three years, Mr. Chairman, we've seen an abundance of zero fish to the northern end. In all my years of being on the waterfront with my family here, I've never seen these zeros appear with my eyes along our coast. So things are changing, you know. Whitings seem to be migrating to the northern. I don't know what pattern this is. I think it is beyond some of the people here to understand that temperature change and blooms of algae or whatever they're feeding on, but things are changing and we need some time to really see what the reasoning is behind it and go cautiously. Thank you,

Mr. Chairman.

CHAIRMAN BORDEN: All right, anything further on this item? Eric.

MR. SCHWAAB: Just that I think that illustrates the point that I was trying to make, maybe not as effective as possible. Even before we got into this discussion of the multi-species modeling effort, we were heaping many things on the plate of the technical committee and I was developing the same kind of concerns already. Then toss into that sort of the responsibility placed on this Menhaden Technical Committee, placing there the responsibility for dealing with these multi-species models is, I think, not necessarily the most productive approach for the Commission and perhaps a somewhat narrow approach.

And I wonder if, again -- and would be willing to offer it in the form of a motion if appropriate -- that this management board might want to recommend to the Commission some placement of these multi-species modeling responsibilities and the multi-species management responsibilities in a place that would be more broadly able to address the needs of multiple management boards, whether it would be in the form -- looking down the road -- of some additional committee on an ad hoc basis or not.

CHAIRMAN BORDEN: Yes, I was going to suggest something along the same line but slightly different, that with the indulgence of the board, I'll take it upon myself to consult with staff and the Commission Chair to evaluate exactly that issue, and then we'll basically report at the policy board as to what we think is the appropriate way to get at that.

I agree that if we've got really targeted expertise that has specialized in menhaden as we move into some of these broader issues, maybe we should broaden the scope of that committee. All right, not necessarily that committee. We may want to create a whole new committee to look at these things.

So is that agreeable to the board? Okay, so I have so tasked myself. Anything further on this issue before we move on to the next agenda item? Yes, Geoff.

MR. WHITE: I may not be the best person to speak to this but the multi-species modeling originated with the Management and Science Committee and it has oversight through them, and it has been developed by funds outside of any management board. It has been outside funds that have developed the model. It was built in response to a request to find out more about menhaden and its predators.

The reason the initial model development has been presented to the Menhaden Technical Committee and the board was to explore some questions there as they were focused on menhaden, which kind of got us into

this. I am the research and statistics staff lead on the multi-species model development. Obviously, Lisa Kline has departmental lead. But it was never really the goal of ours to put multi-species management on the Menhaden Technical Committee. And so I wanted to at least clarify where that came from and I hope that helps you.

Another thing, the question was raised about menhaden feeding on other species. We're not really the only ones doing this ecosystem multi-species work. There are some other efforts through CBSAC working on suspension feeding. There are some things going through the Chesapeake Bay Laboratories, more environmental models that include all species. And they're telling us -- and Bob Wood and Ed Hood are the two lead people on that -- and Bob and Dr. Garrison got to talk a couple of weeks ago and they found it a really neat thing, and that was that the predation accounts for a large focus on what happens to age, kind of 0.5 through 1.5 or 2, but that environmental effects, which are in Ed Hood's and Bob Wood's model, are really driving the recruitment mechanism from age 0 to 0.5.

And so there are two different modeling approaches. They're using some different data sources, some exactly the same, but they match up to provide a larger picture, and there is more work going on in this realm. Thank you.

CHAIRMAN BORDEN: All right, Ernie Beckwith.

MR. BECKWITH: Thank you, Mr. Chairman. I'm going to step back a bit, listening to all this and trying to really understand what it means and trying to make sure that we're focusing on the proper points here. And I've listened to all this and it really doesn't surprise me that a very high portion of the mortality on young fish comes through predators. I think we would see that with most prey species, and there is really not much we can do about that.

What we can manage is the fishing mortality on those species. One thing that is of concern to me -- and I don't think we've really talked about it today -- we've explored the mortality of the younger fish. We've seen that a major portion of it is through natural mortality; that fishing mortality on the younger fish is a very small portion of that. Well, that's all fine and good. What the real issue is, after everyone takes their bite out of that, are there enough fish left to recruit to the population so we can maintain the population of numbers and also age structure? I guess that's the question I would have for the technical committee.

As I said, we can only manage effectively the fishing mortality. Do we have an assurance that the escapement from natural mortality and escapement from

the current level of fishing mortality on the young fish provides us with enough recruitment to sustain this population? And I think that's the critical issue.

CHAIRMAN BORDEN: A.C.

MR. CARPENTER: That, I guess, leads me back to the earlier task that we asked the technical committee to evaluate, the target and threshold Fs being so close together. And as part of that answer, I'd like for them to come back with some estimates of how precise those numbers are. Are these two numbers statistically the same or can they actually be measured and are significantly different that we can tell one from the other? And I think Ernie is right, we control the fishing mortality and that's what we're pegging here.

CHAIRMAN BORDEN: All right, anything else? Yes.

MR. JONES: I'd like to just have one question answer so I would understand it. I always hear that we can control the mortality by controlling the fisheries. Why can't we control predators? We put limits on what we catch and through this multi-species, why can't we look and control the level of predators if we want to have a food source for all the major predators? Maybe you can address that, Mr. Beckwith.

MR. BECKWITH: No, I'm afraid I can't address that.

ADVISORY PANEL NOMINATIONS

CHAIRMAN BORDEN: All right, anything further on this? If not, I'm going to move on to the AP nominations. We have two nominations, one from Susan Shipman and the other one from Ernie Beckwith. And what I would ask is, Susan, if you would start off and simply introduce your nominee. David.

MR. DAVID CUPKA: If I may, Mr. Chairman, I don't know if everyone received the update but we also have a nomination from South Carolina so we actually have three to deal with.

CHAIRMAN BORDEN: I stand corrected.

MS. SUSAN SHIPMAN: Thank you, Mr. Chairman. We have a nomination; it's in the back. It's the very first part of the back part of the package. Our nomination is for Ken Hinman to be appointed to the AP.

And insomuch as I think there would be an interest in having someone on the advisory panel that has ecosystem interest and all -- and the state of Georgia, we do not have a fishery. We have conferred with our recreational fishermen. They're quite content to defer our slot, if you will, on the AP to someone that we feel would be broadly representative of all the coast's interests with regard to ecosystem management. So, our

nominee is Ken Hinman, who I think many of you know. Ken is with the National Coalition for Marine Conservation.

CHAIRMAN BORDEN: Any questions for Susan? I would prefer to take all these in one action. Ernie, would you like to introduce your nominee, please.

MR. BECKWITH: Okay, Mr. Chairman. I didn't know I was going to have to do this but Richard Weisberg is an attorney and he has been very active in fisheries' issues for a number of years. He is currently associated with the CCA. He is a person that does his homework and he will pull his workload on the committee. I can assure you he will be an active part of any discussions. He's a very outspoken person but he does his homework and I think he would serve the committee quite well.

CHAIRMAN BORDEN: David, would you like to introduce your nominee.

MR. CUPKA: Our nominee is Mr. Tom Ogle. Tom is a recreational fisherman. He is very active in the formation of CCA in South Carolina and then moved to Augusta on the North Carolina side of the river.

MS. SHIPMAN: North Carolina?

MR. CUPKA: I mean Georgia, I'm sorry. You didn't know we got that part of the river, too, did you? I'm sorry, Ms. Shipman is distracting me.

Anyway, Tom was very active in the formation of CCA in South Carolina. He has served on the advisory panel for coastal pelagics for the South Atlantic Council, a seat that he gave up when he moved back to South Carolina, and Tom was a very active member of that advisory panel for the council. He's a very avid recreational fisherman and does harvest menhaden for bait in his recreational pursuit. So, I think Tom would make a very good addition to our AP and would recommend him to the board.

CHAIRMAN BORDEN: Thank you, David. Susan.

MS. SHIPMAN: I would just add when Tom was on the Coastal Pelagics AP, he served as a member from Georgia. He has a strong science background. He's a professor of physiology at the Medical College of Georgia. I think he would be an asset to the AP.

CHAIRMAN BORDEN: Gil Pope.

MR. POPE: Thank you, I have a question. Susan, since Ken lives in Leesburg, Virginia, that's a long drive down to --

MS. SHIPMAN: Gil, I was saying we were giving up our seat, our AP seat to put someone on who we believe is broadly representative of the entire coast.

MR. POPE: Good.

MS. SHIPMAN: But now South Carolina may

have taken all the property all the way to Virginia. You've got to watch them; you never know.

CHAIRMAN BORDEN: Bill.

MR. GOLDSBOROUGH: I think Susan is forgetting to mention that Ken actually lived in Savannah for many years.

MS. SHIPMAN: Thank you, he did. You know, once a favorite son, always a favorite son, Gil.

CHAIRMAN BORDEN: All right, any comments on any of the nominees? Any objections to any of the nominees? If not, **the nominees are approved as submitted.** Thank you.

Our next item is the advisory panel report and that's Bill Windley.

ADVISORY PANEL REPORT

MR. BILL WINDLEY: Thank you, Mr. Chairman. Briefly, in preparation, I'd like to warn that attempts to follow the written report that you have wouldn't be of great use because we met both with the advisory panel and the technical committee in the morning, and we received the same presentation from the technical committee that you did today. So in order to try to avoid redundancy, I've edited the document that you have in front of you to just the minimum that you need to have again to make the report clear.

That said, the Atlantic Menhaden Advisory Panel convened for the first time January 9, 2002, in Raleigh, North Carolina. We were joined by the Atlantic Menhaden Technical Committee for the morning session to review the progress on the multi-species assessment project and to hear the technical committee's responses to the charges from the management board.

Ellen Cosby, chair of the technical committee, opened the meeting and welcomed everyone. Joe Desfosse, ASMFC staff, provided the advisors with an overview of the Commission and AP process. We appreciate the effort on the part of the technical committee to bring us up to speed at that point.

Dr. Lance Garrison provided an overview of the multi-species assessment project, including initial results based on preliminary runs of the model using actual data. He cautioned that these results should be used only as examples of types of outputs available through the use of the model, though the trends seen in the outputs may be representative of the real picture. More work needs to be done with the technical committee in order to establish some initial findings. Dr. Garrison was questioned as to why the filtering aspect of menhaden was not addressed through this approach and funding was cited as the reason.

Ellen Cosby provided a brief summary of the

committee's meeting, including an overview of Amendment 1 to the FMP, goals and objectives and the new overfishing definition, the charges forwarded by the management board, and recent changes in stock status due to the inclusion of the bait fishery data. The panel questioned the accuracy of the bait data and were told that the majority of the data came from Virginia and New Jersey and was thought to be very accurate. The panel pointed out the obvious lack of historical data in the bait fishery.

Dr. Armstrong provided an explanation of the changes made to the assessment after including the new data and resulting changes to the overfishing definition as proposed by the committee. Changes in the input data had necessitated a reestimation of the biological reference points. A discussion of implications followed. The panel agreed with the recommendations of the technical committee but expressed general concern about making decisions based on multi-species modeling until further work was done.

Ms. Cosby then explained that the second charge for the management board was to examine current fishing practices and the impact on age zero menhaden. She said the reduction industry had reduced their harvest of age zero menhaden over the last ten years. The preliminary runs of the multi-species model indicated that predation was much more a factor in mortality of age zero menhaden than the impacts of the reduction fishery. The consensus of the technical committee was that fishing mortality of age zero menhaden was not a problem at this time and further exploratory work would be conducted with the multi-species model. The panel again cautioned that this conclusion was based on preliminary analysis that had not been tested.

When questioned further about the need to protect juvenile menhaden, Dr. Vaughan stated that age zero fishing mortality was approximately 0.0001 while the predation mortality was 1.0. Dr. Garrison added that the age zero mortality had been relatively stable over time despite an increased population.

The panel expressed concern that the technical committee had not identified a rate of removal that would be problematic. Dr. Vaughan offered that this would be examined through the use of the multi-species model. Dr. Mahmoudi said that the model would be used to identify potential rates of removal that might be problematic. The panel expressed concern that this could mean a span of three to four years before any measures would be initiated. Dr. Mahmoudi said that the VPA could also be tuned by using coastwide juvenile indices and observed recruitment. A few members of the panel felt that the reduction industry

had almost zero effect on the age zero population based on reports and presentations given by the technical committee.

It was pointed out that the majority of the current catch was age two and age three menhaden and catches were now more reasonable than they were 10 to 15 years ago when there were 25 boats fishing. Furthermore, if the entire menhaden catch was taken as age zero fish, it would still pale compared to the losses due to predation. The relative comparison was noted between 15 billion age zero menhaden consumed by predators versus 77 million taken in the reduction fishery. Therefore, ASMFC should increase the removal rate of striped bass. Others reminded that these figures were only estimates of population size, landings data or real numbers. Concern was expressed over the catch of the young fish and their survival to older ages. The technical committee was asked if we were fishing on or above the target and Dr. Vaughan replied that we were below the target.

Ms. Cosby stated that the next charge was to review potential management options and provide advice to the board. The board's preferred option identified in Amendment 1 was to implement total allowable catches by area in the event that new measures were needed. The technical committee suggested that most effective measures would be TACs by area and seasonal and/or area closures. Measures that might be effective included gear modifications, and those that would be the least effective were days at sea and trip limits. The technical committee suggested that manipulation of predator levels should be valued further before it could be categorized.

Ms. Cosby explained that the final charge of the technical committee was to examine the current population age structure and identify if possible some future desired age structure. A number of questions were raised concerning the distribution of adult population and where the age zero menhaden were being produced. Dr. Mahmoudi stated that the oceanographic or biological factors may be influencing the distribution of the older fish. One member of the panel pointed out that three years ago there were record numbers of age zero menhaden and asked where they were now. A discussion ensued about reports of large schools of menhaden sighted 18 to 20 miles offshore where we would not normally expect to find them. Industry representatives confirmed these reports.

At this time the management [ed. advisory] panel was convened. A motion was offered for the AP to accept the recommendations and responses of the technical committee as provided. After some discussion it was agreed that the panel would address each

recommendation individually.

All members of the panel agree that the AP needed to meet at least twice each year to provide advice to the board. It was pointed out that these were new tools, including the multi-species model, and the AP needs another meeting to follow up on the implications.

It was generally accepted that the AP doesn't seem to agree with all the recommendations of the technical committee and the board expects us to add input. Some members were unhappy with the technical committee's response to the second charge and felt they needed more input from them.

Charge one, reference points. It was pointed out that all the reference points need to be revised due to the addition of the bait fishery data. Others agreed by saying the bait fishery has increased in relative importance. It should be made clear that the changes are also reflected in past year's stock status. Some concern was expressed that we need to know more about what is going on with the adult population. The technical committee should provide more input on whether there is a problem or not.

Charge two, current fishing practices. It was generally felt that the board seemed to believe that there was a recruitment problem and the technical committee failed to address the issue. It was requested that the board specify -- the board, meaning this board, -- specify why they think there is a recruitment problem.

It was stated by the technical committee that they did not ignore the question. They stated that they would examine this issue through the multi-species model. The AP urged them to continue this work. The board will have new information when they get this report; i.e. the relative percentage of the age zero menhaden taken by the fishery and lost to predation, but they are unproven and should be tested. A cap on age zero harvest at 20 to 25 percent of the total catch was suggested. Others questioned the need to consider a cap on the fishery when the technical committee said there was no effect.

It was pointed out that this was the only fishery where we allow harvest prior to age at maturity. Well, it was pointed out. It was pointed out, once again, that preliminary evidence suggested that there was no effect of fishing mortality on age zero menhaden. It was stated that New Hampshire historically had some fishery for menhaden and there wasn't any today. The only way we'll see menhaden in the Gulf of Maine is if the population expands. Many felt that the technical committee's response was premature. There were outstanding issues in question. It now appears that the spawning stock biomass was larger than previously thought. Expanding the concern to age zero and one

fish was recommended.

One member asked what the spawning age was and if mesh size regulations would help. An industry representative said that during certain weather conditions fish will get all mixed up and the boats will yield more fish. Another added that during rough weather there was danger in clearing the nets of gilled fish. Yet another stated there was no correlation between age zero fishing mortality and recruitment. The technical committee should have continued to evaluate using the multi-species model.

It was noted that there have been additional state closures and the industry can't spread the effort out in order to catch more older fish. Many felt the technical committee's answers were just cursory and the AP needs more information on what was troubling the board. This issue needs to be further addressed and that age zero and age one should be the priority. Looking at issues doesn't mean putting people out of business and it was thought premature to look at new regulations at this time. It was stated that the question was developed to address the board's concern. Based on initial information from the multi-species model, it doesn't look like the current harvest of age zero menhaden is problematic.

The other question under the second charge can't be answered by the AP and the technical committee didn't try to answer it. It was left that this was an ongoing issue for the board. Some felt that the technical committee did address the issue by saying they will continue to look into this. They also added that the AP should be allowed to sit in on other technical committee meetings. Several members agree that they couldn't support the statement that the current harvest of age zero menhaden did not appear to be problematic. This is a work in progress and should continue.

The board should broaden their focus beyond age zero menhaden. It was generally agreed that the AP couldn't justify action on this issue yet and that we would need more information. Dr. Mahmoudi said that the multi-species model was a demonstration. It was the first time the technical committee had seen it. The next step is to verify the data, mathematics and results. After that was complete, there would be two choices to make; either everything was acceptable, have some further review and then implement or more model work. One member expressed his desire to have the assumptions behind the model documented and published.

Charge three, management issues. In regards to the third charge, some felt there was no basis to reject or accept the technical committee's response. It was generally agreed that it might be more apparent if the two committees met jointly in the future. Another

member stated that the preferred management option has been identified in Amendment 1. The technical committee identified other measures that might be effective and ranked them. It might be possible for the states to choose what is suitable for their fisheries. The AP consensus was to agree with the technical committee's response at this time.

Charge four, age structure. To address the final charge, Dr. Cieri reiterated the technical committee's response that the distribution of adult menhaden was probably due to ocean temperatures. It was also asked if the AP could recommend that this is a concern and that the board should look for funds to study. The desire was also expressed that the technical committee further investigate this issue. It was added that the AP shouldn't endorse one funding source over another, and the occurrence of menhaden in the Gulf of Maine was cyclic in nature. We agreed on the need for further study, that we need to know where the juveniles are coming from. Others concurred adding we need to know where the fish went and what could be done about this.

Briefly, bait fishery. The advisors agreed that the bait fishery numbers represented the best information available at this time but that they should be monitored on a continued basis.

Elections, Mr. Jones nominated Mr. Windley as chair and the motion carried with no objection. Mr. Windley nominated Mr. Jones as vice-chair and the motion carried.

It was requested that the AP be kept up to date with any new information prior to their next meeting in May or June. Dr. Desfosse said this would be a staff function. Any new materials would be forwarded to the advisors.

Mr. Doubley of the Recreational Fishing Alliance raised concerns over localized depletions, predatory-prey issues and water quality. Mr. Weisberg said the filtering aspect of the study was not being addressed and should be done as soon as possible. He also stated the need for an economic study to encompass all aspects of the fishery. Mr. Hinman stated that this should not detract from the current multi-species efforts. The technical committee should examine what is already being done and evaluate the utility of the information.

Mr. Tarbox stated that when the menhaden return to the Gulf of Maine, bycatch issues need to be addressed should this need to be studied further.

The AP wishes to point out that all states are not represented on the technical committee. They should appoint someone since the committee was formed on a coastwide basis. All the AP members need to attend the

meetings.

In closing, it was added by the chairman that the AP needs to work as a team for a common goal. We should try to stay productive since the public scrutiny will be great. Thank you.

CHAIRMAN BORDEN: Questions for Bill? Gil, did you have your hand up?

MR. POPE: Yes, I'm sorry for my outburst in the middle of your presentation.

CHAIRMAN BORDEN: Anyone else? Yes, John.

MR. JOHN W. CONNELL: Thank you, Mr. Chairman. In at least two places in the report, I interpreted what I read as saying that fishing mortality or that mortality, yes, fishing mortality on age zero menhaden had nothing to do with recruitment. Can you explain that to me, why that was indicated?

MR. WINDLEY: Is that addressed to Ellen or to me?

MR. CONNELL: I think the technical committee chair could probably better address it.

MS. COSBY: Okay, this is the advisory panel's report.

MR. CONNELL: Right.

MS. COSBY: We didn't say that they didn't have anything to do with it. At the technical committee level we said it was insignificant compared to the predation.

MR. CONNELL: Well, there's a statement in here from Dr. Vaughan and another one from Mr. Tarbox.

MS. COSBY: I didn't write this report, sir.

MR. CONNELL: Okay. But is that correct, that the fishing mortality on age zero would have nothing to do with recruitment? I mean, would you agree with that?

MS. COSBY: No, that's not -- no, sir. It doesn't have anything to do -- I mean, it contributes but it's insignificant.

MR. CONNELL: No matter what the mortality would be?

MS. COSBY: At the rate that it is right now.

MR. CONNELL: At the rate it is right now. Okay, thank you.

CHAIRMAN BORDEN: John, just to follow up on that, that gets to one of the charges to the technical committee which was to not only examine that issue but to examine the issue of at what level, under what circumstances it would be a cause for concern, and they have not finished that task. Bill.

MR. WINDLEY: Well, the one thing that I'd like to point out is that this assumption is good based on the results of the first run of the multi-species model. And in looking at that data, it would seem that even in orders of two or three magnitude or in either direction, that the data has some viability.

But the AP, again, cautions that this is not hard data yet to make hard decisions on yet. It may in fact be valid, but at this point scientifically even Dr. Garrison would be the first one to say that it's not time to use it for hard decisions.

CHAIRMAN BORDEN: Other questions for Bill? Anyone in the audience? If not, back to the board. Gil Pope.

MR. POPE: Thank you very much. To Bill Goldsborough's earlier point, should one of the charges be to have some kind of estimate on a time certain to try and avert exceeding F at MSY type of thing? In other words, in striped bass sometimes we don't know for two or three years exactly what has happened. How accurate can we be on trying to estimate what would happen in the future as far as what we would need to do for F at MSY? I mean, would we need to know, how far in advance?

I guess that was my idea as to what he was trying to get at, first of all, which would go back to the 0.9 as the target and the 0.1 or the 1.1 as an MSY threshold.

Number two, in that report that you gave and the one earlier by the technical committee, they kept talking about area. They were going to do things by area. I looked up in the menhaden plan here and I didn't see anything as to areas. I don't know if there are established areas here that they do their studies by; and if there aren't, are they going to establish areas?

And, number three, they talked earlier about the natural age structure and I know that has been talked about in other fisheries. Is that impossible to identify what that would be, a natural age structure? And would it be useful for us to attempt to try and achieve what it is?

CHAIRMAN BORDEN: Joe, do you want to take at least the first two?

DR. DESFOSSE: I could take the area question. I know that the landings over the last 30 or 40 years have been broken down into geographic and areas along the coast and that would be a starting point for the technical committee to evaluate. Further, in terms of identifying TACs by management areas, that charge has not been given to any group so no analysis of that nature has been done.

MR. POPE: No, I mean what are the areas? Are they listed somewhere so I could look at an area from Maine to Rhode Island. Do you know what I'm saying? Are they identified anywhere?

DR. DESFOSSE: They are in various historical reports. I can get some information to you, if that would help.

MR. POPE: Yes.

CHAIRMAN BORDEN: All right, other questions

here? If not, we'll move on to other business. Any other business to come before the board? There are a series of charges that will go back to the technical committee and obviously those will be dealt with at the next meeting. Bruce.

OTHER BUSINESS

MR. FREEMAN: David, I may have missed it, but we talked about the new reference points after we added the bait landings and they differed from the original. And you may have mentioned and I may have missed it, but did we accept those or do we need to take action to accept them?

CHAIRMAN BORDEN: No, there are still some questions. And I think, as you will recall, Bill or Eric had raised the issue of the narrowness between the threshold and the target and they wanted some additional work by the technical committee on that, which they would do and then report back to us.

At that point, given the fact that there's no budget in this fiscal cycle to initiate an addendum, for the sake of argument or example, two or three months from now or four months from now we get that report, then at that point I think we have to make a fundamental decision as to whether or not we want to start an addendum, which wouldn't start until 2003.

MR. FREEMAN: Well, that's fine. It just seemed there was an argument made for those changes and the report indicated that indeed there was a significant change in the spawning stock biomass target. It went from 37 to 50,000 metric tons. And then there was a substantial change in the F target which went from -- no, I'm sorry -- in the F threshold. It went from 1.3 to 1.1. It may simply be a technical explanation as to why the threshold and target are so close together, but in reality it would be probably very difficult to measure in either case, either the old reference points or the new when you get up to those high levels.

CHAIRMAN BORDEN: Well, that was a facet of the point that was made before, I think, Bruce, that given the narrow range there, the question was are you going to be able to discern when you hit one versus the other one, and so that will be the issue that the technical committee will have to deal with.

The other issue that I pointed out to Joe is when you get back to the office, if you look at the draft of the menhaden plan, when they get into the definitions of overfishing, there's a whole strategy that's laid out there in terms of overfishing targets and thresholds and what the population size and SSB levels were at different mortality rates.

And that's going to have to be re-calculated. In

other words, I think so that everything is on the table and the board understands all the implications of a particular strategy, the staff is going to have to go back and redo some of those charts and graphs and tables.

MR. FREEMAN: Okay, all right, fine. I just had one other comment to Gil's question. The original plan, Gil, had broken the coast down into geographical areas, and you may just want to refer to that. It was done relative to the way the fishery was prosecuted and the catch.

CHAIRMAN BORDEN: Paul.

MR. PERRA: Yes, I'm just concerned, like Bruce, that we're not moving our changes to the plan along in a timely manner. I think we can be more efficient, and I would hope at the next meeting a technical addendum will be put on the table that we could just approve. I see this as a normal upgrading of the assessment and what it means. I think a lot of fisheries management plans that are done, this is done automatically, I think, if you look at some of the council plans.

CHAIRMAN BORDEN: As I understand it, we can't do a technical addendum to change the reference points. It has to be done through a -- and Jack or somebody else can correct that if that is wrong. I think it has to be done through a formal addendum.

MR. PERRA: Well, my point is, then, we need to start the process as soon as possible because I believe we have the best scientific information, and it says we should change the reference points and we haven't changed the plan yet.

CHAIRMAN BORDEN: Well, this goes back to what I said before. If you start the process at our next meeting, if we get these reports back and we consider whatever the facts are at that point and then you start the process at that point, then the actual work is going to take place in 2003.

Unless we're willing, at the Policy Board, to go back and put some items on the table and say we're not going to do such and such a task, then the work won't get done until we schedule it as a work priority in 2003. And our esteemed Madam Chair can correct me if I'm wrong on that.

MS. SHIPMAN: You are absolutely correct. We are level funded and if something goes up above the line, something comes down.

CHAIRMAN BORDEN: It's always nice to have the current and past chairman saying the same thing.

MR. PERRA: Then my point would be that we start the staff work at least now in that we get something --

CHAIRMAN BORDEN: And that, I think, is a good point, Paul. That gets to the point that I made, that last point, that they have to go back and look at this

whole section on overfishing standards and so forth. I would hope that that will be on the table the next time we have a committee meeting. I don't think that's a lot of work. They have to re-analyze some of the assumptions that went into it and some of the results. Any further business to come before the Menhaden Board? If not, the meeting stands adjourned.

(Whereupon, the meeting adjourned at 2:55 o'clock p.m., February 19, 2002.)