

**PROCEEDINGS OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
ATLANTIC MENHADEN MANAGEMENT BOARD**

**Loews Annapolis Hotel
Annapolis, Maryland
October 30, 2007**

Approved August 20, 2008

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ATTENDANCE

Board Members

Terry Stockwell, ME, proxy for Lapointe (AA)	Bernard Pankowski, DE, proxy for Sen. Venables (LA)
Pat White, ME (GA)	Howard King, MD DNR (AA)
Rep. Dennis Abbott, NH (LA)	Bruno Vasta, MD (GA)
G. Ritchie White, NH (GA)	Sen. Richard Colburn, MD (LA)
David Pierce, MA, proxy for Diodati, (AA)	Steve Bowman, VA, (AA)
William Adler, MA (GA)	Catherine Davenport, VA (GA)
Vito Calomo, MA, proxy for Rep. Verga (LA)	Louis Daniel, NC (AA)
Mark Gibson, RI (AA)	Jimmy Johnson, NC, proxy for Rep. Wainwright (LA)
Everett Petronio, Jr., RI (GA)	John Frampton, SC (AA)
Gil Pope, RI, proxy for Rep. Naughton (LA)	Malcolm Rhodes, SC (GA)
Eric Smith, CT (AA)	Robert Boyles, Jr., SC (LA)
Dr. Lance Stewart, CT (GA)	Spud Woodward, GA, proxy for S. Shipman (AA)
James Gilmore, NY (AA)	John Duren, GA (GA)
Pat Augustine, NY (GA)	William Sharp, FL, proxy for G. McRae (AA)
Brian Culhane, NY, proxy for Sen. Johnson (LA)	April Price, FL (GA)
Peter Himchak, NJ, proxy for D. Chanda (AC)	Steve Meyers, NMFS
Erling Berg, NJ (GA)	Jaime Geiger, USFWS
Dick Herb, NJ, proxy for Asm. Fisher (LA)	A.C. Carpenter, PRFC
Jeff Tinsman, DE, proxy for P. Emory (AC)	

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

Ex-Officio Members

Alexei Sharov, MD DNR	William Windley, MSSA
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Staff

Vince O'Shea	Braddock Spear
Robert Beal	Toni Kerns

Guests

Derek Orner, NMFS	James Price, CBEF
Mary Griffin, MA DFW	Tom McCloy, NJ DFW
Ken Hinman, NCMC	Michael Luisi, MD DNR
Kyle Schick, PRFC/VMRC	George Lapointe, MADNR
William Rice, PRFC	Paul Diodati, MA DMR
Ron Howey, USFWS	Arnold Leo, Baymen's Assn.
David Wallace, Wallace & Assoc., Cambridge, MD	Jack Travelstead, VMRC
Candy Thomson, Baltimore Sun	Bill Goldsborough, CBF
Ron Kobell, Baltimore Sun	Sean McKeon, NCFA
Karl Blankenship, Bay Journal	Russell Dize
Dick Brame, CCA	Dr. Gene Kray
Patricia Riexinger, NYS DEC	
Joseph Smith, NMFS - NC	

The Atlantic Menhaden Management Board of the Atlantic States Marine Fisheries Commission convened in the Ballroom of the Loews Annapolis Hotel, Annapolis, Maryland, October 30, 2007, and was called to order at 1:45 o'clock p.m. by Chairman A.C. Carpenter.

CALL TO ORDER

CHAIRMAN A.C. CARPENTER: Good afternoon, ladies and gentlemen. I'm A.C. Carpenter. I'm the chairman of the Menhaden Board. I would like to call the board to order. For the record, we'll note that we have a quorum present.

The first item on the agenda is to recognize some folks that I'd like to take the opportunity as chairman to introduce. There have been a lot of questions of who the PRFC is from year to year. In addition to Steve Bowman and Howard King who serve as commissioners of PRFC, we have three other commissioners from the PRFC here with us during this meeting.

Bill Rice is the chairman of the commission. I would appreciate if you all would take the opportunity to introduce yourselves to Bill. Kyle Schick is also one of our commissioners. Kyle will be here for today and tomorrow. Mr. J.T. Holland is not here right at the present time, but you will see him probably this evening at dinner. If you would take an opportunity to meet these gentlemen and get to know them, they would appreciate getting to know you folks as well. That's on my own personal note that I wanted to recognize those folks.

APPROVAL OF AGENDA

Now I will continue with the agenda. The first item is the approval of the agenda. Is there any addition or modification to the agenda by any of the board members? Seeing none, we will consider it approved by consensus.

APPROVAL OF PROCEEDINGS

The proceedings from May 9th, 2007, meeting was in your packets that were distributed. Are there any additions or corrections to that?

Seeing none, we can consider them approved by consensus.

PUBLIC COMMENT

As always, we afford the public comment period at the beginning of our meetings. There are some guidelines that have been established that we will try to adhere to. I do want to take this opportunity to recognize Mr. Jim Price. Jim, I appreciate your being here. I had received a letter from Jim updating us on some of the efforts that he has ongoing. It was included in your packets, but, Jim, if you could take just a minute or two to go over that, we would appreciate it.

MR. JIM PRICE: Okay, thank you, Mr. Chairman. This is sort of an update from the research that we're doing out of Oregon Inlet and into the Chesapeake Bay, which we hope is going to help the board understand how depletion is occurring actually in a number of places, but mainly in the Chesapeake Bay.

I'll just read to you basically the information that I've put together and summarized. Our Predator/Prey Monitoring Program has collected over 3,000 striped bass. We've found the average weight of 18-inch striped bass caught in the Choptank River during the fall is less than 70 percent of their historic weight at a level symptomatic of starvation.

Weight at length of striped bass caught in the Choptank River increases and decreases with high and low recruitment levels of age zero menhaden. You can see in Figure 1 how that is occurring. The diet analysis confirmed that the number of age zero menhaden in the stomachs of striped bass caught in the Choptank River increased when the Maryland DNR Juvenile Menhaden Indices are high and decreased when they are low.

This shows that low recruitment or localized depletion of age zero menhaden can result in more than a 30 percent decrease in striped bass weight at length. Cumulative data compiled since 2003 from Maryland DNR and the Predator/Prey Monitoring Program Study show that menhaden are crucial to the diet of large striped bass in Maryland's portion of the Chesapeake Bay and in ocean waters from fall

through the spring when menhaden constitute over 80 percent of their diet by weight.

Chronically low recruitment of age zero menhaden limits prey supply to striped bass less than 18 inches in the Upper Bay. Low menhaden recruitment and the intensive reduction fishery limits prey supply to striped bass over 18 inches from late fall through spring. This is a feeding period that is crucial to the older striped bass to build their fat reserves that assimilated during the summer to maintain their weight and health.

That's why they get skinny and the fishermen see a problem during the summer. They didn't build up enough body fat reserves during the winter. Following the decline of adult menhaden, the migratory striped bass have suffered from poor nutrition as well, and they now compete with the Upper Bay striped bass for more numerous younger menhaden.

Our studies along the coast and in the bay show us that they are feeding on smaller prey. You can see on Figure 2 at the bottom they are almost feeding on the same sized prey as our resident males, which is not a good situation. We've found that along the coast last year the body fat index was much lower on the fish feeding in the ocean, and a large number of the migratory females came up the bay and competed with resident males, which exacerbates the problem of depletion in the bay. That's pretty much what I've got to say. Any questions?

CHAIRMAN CARPENTER: Thank you, Jim. We do appreciate all of your efforts in continuing to do this work. I know that it's an act of love as much as anything else, and we do appreciate it. I was also very encouraged to learn that you are nearing publication of your data in a manuscript, hopefully, later this year or early next year?

MR. PRICE: Yes, thank you very much.

CHAIRMAN CARPENTER: And we look forward to receiving that information. A comment from the audience here.

MR. ARNOLD LEO: Arnold Leo, Town of East Hampton. That sounds to me, the presentation that we've just heard, like a really good argument for increasing the striped bass quota. I mean, it looks like circular reasoning because,

you know, if we have too large a stock of striped bass, they're going to eat out their normal food supply. That normal food supply is not going to reproduce as well, and the cycle is going to get worse. The striped bass begin to starve and the menhaden don't reproduce right.

I think when we get to the point of ecosystem management we'll see that maybe the answer here is increase the quota on striped bass, and we'll have bigger striped bass and we will have more menhaden. Thanks.

CHAIRMAN CARPENTER: Thank you, Leo, and that certainly did fit in under public comment with things that were not on the agenda. We certainly appreciate your sticking with us there. Any other public comment? All right, we're moving along on the agenda here; an update on the 2007 landings. Brad Spear is going to give us a presentation on that.

UPDATE ON THE 2007 LANDINGS

MR. BRADDOCK SPEAR: Just real briefly, Mr. Chairman, just to take a quick look back at the 2006 fishery, the bait harvest was about 26,000 metric tons. That was the second lowest in the time series, which dated back to 1985. The reduction harvest came in at 154,000 metric tons. That was a little bit below the previous five-year average.

To put all that into context, the blue line is the reduction fishery landings dating back to 1940. You'll see the bait landings are the red line on the bottom. In general, we have decreasing trends since about the mid-eighties or so for the reduction landings. You will note that as the reduction landings go down, the bait landings kind of become a higher percentage of the landings and become increasingly more important.

The effort that went into the 2007 fishing season, in Virginia there were ten vessels fishing for reduction purposes. There were three that rigged up as bait vessels. In New Jersey there are about five to six bait vessels. In New England they had two fishing in New England waters, and those boats also came down into mid-Atlantic waters.

We don't have preliminary estimates for the bait landings. We do have some information on the

reduction landings. Joe Smith, I believe, is in the audience; and maybe between he and I, if you have any specific questions, we can talk more about the 2007 reduction fishery.

EXECUTIVE DIRECTOR JOHN V. O'SHEA: Thanks, Mr. Chairman. It's interesting about the – I don't know if that's a growth in the New Jersey bait vessels. I was just curious, is there any way to characterize those vessels in terms of size, and is there a trend associated with them? Is there more than there has been or is that fleet holding steady and how big are those boats?

CHAIRMAN CARPENTER: Perhaps Pete can give us a reply to that.

MR. PETER HIMCHAK: Well, first of all, I wanted to compliment the bait fishery industry for being most cooperative in providing us with samples. We had a target of something like 350 samples and got over 600 that are critical pieces of information for the stock assessment.

The number of vessels, actually, it decreased there for a while, Vince, when we pretty much peaked at around 35 million pounds. It's tough to tell the number of vessels because we have so many permits. Even a carry boat has to have a permit. So we kind of like to go by fishing operations. I think it's been pretty – well, it did decrease for a while and then it did – it's pretty stable. We do get vessels coming down from Massachusetts regularly that fish out of Point Pleasant.

I think our bait landings have gone up over the last couple of years, but they dropped 10 million pounds, and they may have come up by four. I don't think anything is developing that's new there. I think if the market is asking for more fish, then we're able to get them.

MR. ERLING BERG: Thank you, Mr. Chairman. Just to extend what Peter Himchak said, in our particular area, in the Cape May area, at one time we had probably six boats pursuing this. Right now there are only two. We had two boats at one time; we have none now. We're not into that fishery. I think Lunds has one; and Cold Spring, which is the lobster house, they have one. That's it for our area. I think the other boats would be in Point Pleasant. Thank you.

MR. JACK TRAVELSTEAD: Thank you, Mr. Chairman, just a brief update on where we are relative to the harvest cap in the Chesapeake Bay. I would like to take this opportunity to thank Joe Smith for the work that he is doing for us in monitoring that quota. We get very complete reports from Joe on a monthly basis.

He is looking not only at the reduction harvest from the ten vessels, but occasionally some of the snapper-rigged vessels will sell their catch to Omega for reduction purposes. He not only is looking at the harvest, but he is also making projections for us relative to the harvest over the last five or six years.

While a lot of that information is confidential, I think I can tell you that the projections suggests that we will not hit the cap this year. You will recall we did hit it last year. We're ahead of last year's harvest, but not such that we'll hit that cap. The industry appears to be concentrating a lot of its effort on the larger, older fish on the coast that obviously have more oil content and are more in line with what they're after. I'll be glad to answer any questions if anybody has any.

CHAIRMAN CARPENTER: Thank you very much. Vito.

MR. VITO CALOMO: Thank you, Mr. Chairman. I just want to report from the New England area that for the fourth year in a row there is an abundance of a zero age class of fish never seen before. I can only report from Rhode Island to Maine or to the Canadian border, we are seeing larger fish once again. I think there is going to be an explosion in the northeast shortly.

I think you'll see the age three-year class into the fishery in 2008, probably the spring of 2008. I think that your reduction boats are not entering the Chesapeake Bay for the same reasons that Jack Travelstead said that the bigger fish are on the outside, on the ocean side. The larger schools that have been spotted by aircraft are on the ocean side.

As I've said for the last three years, the fish are migrating further and further to the north. I think they're about to enter the New England area stronger and stronger, but they are outside. Things look, from my point of view as a past fisherman, very rosy when you have year classes like we're having, with the peanuts showing tremendous. I can't tell you what is happening

in the Chesapeake Bay because I don't know. Thank you.

CHAIRMAN CARPENTER: Thank you very much. Jack, do you want to reply?

MR. TRAVELSTEAD: Just one other point that I failed to mention. Joe was showing me some data earlier that strongly suggests that the '05 year class looks fairly strong based on the presence of a lot of two year olds in the population. I don't know if that means a significant recruitment event occurred in '05, but it seems to suggest that, which is something we haven't seen in quite some time.

CHAIRMAN CARPENTER: Thank you very much. Terry.

MR. TERRY STOCKWELL: Thank you, Mr. Chairman. As Vito indicated, there has been a northern migration of large fish for the first time in a number of years. We've had a measurable amount of commercial effort in mid-coast Maine. They're big fish; they're good fish; and the bunk are everywhere.

CHAIRMAN CARPENTER: Thank you very much. I think that concludes our discussion of the update of the 2007 landings. The next item on the agenda is the Menhaden Collaborative Research Program. Derek Orner is here to give us a presentation. This is the research program that was laid out a few years ago. It's a continuing program, and I call upon Derek to give us his update.

MENHADEN COLLABORATIVE RESEARCH PROGRAM

MR. DEREK ORNER: Thank you, Mr. Chairman. Being passed around now is an Excel spreadsheet. I went ahead and made a spreadsheet as opposed to trying to do any kind of presentation with the table and small numbers and small text. This is something you can actually take with you; and if you have questions or comments, you can always shoot me an e-mail or a phone call.

Basically, this spreadsheet has the previous four years' worth of funding that's come specifically out of the NOAA Chesapeake Office. There are other pots of money that are coming in, whether it's through VMRC, Maryland DNR, ASMFC.

But, for this spreadsheet alone, I kind of focused on what our office has kind of pushed out.

We started funding in Fiscal Year 2004, our federal fiscal year, which means the projects started in late 2004 if it was funded that year. It kind of follows out for the next four years' worth of funding. The projects that were the last on the table are Fiscal Year 2007. They pretty much are now just getting underway.

If it's a continuation of a project, then it's starting the second year or possibly starting a third year's worth of funding. Altogether we've had roughly about 17 projects that we've supported over the past couple of years. The total over that time has been just over \$5 million. This past year, Fiscal Year 2007, we did take a little bit of a budget cut, so we didn't have quite as much funding going to menhaden research this past year.

The column that I think I'd want to probably call your attention to is the last column on the second page. It's the duration of study. That column lets you know when the project was initiated and also when the project is scheduled to be completed. As we all know, in Addendum II we set out the research plan or research program that was a five-year plan, starting in 2005. We're roughly about three years or so into that.

A lot of the projects, if you go down the list, are ending either late 2007 or within the next year in 2008. Rather than bring a bunch of results from projects that have been vetted through the technical committee or through any type of peer-review process, just let me call your attention that a lot of the projects that we've been supporting are starting to come to closure. We're starting to get some final reports in now.

Those final reports will be presented to the technical committee for them to review, and I would assume either Alexei or myself can bring back the results from the projects themselves at that point. They're going to go through that technical review process first rather than me trying to present kind of unpeer-reviewed work here.

Another item that I'm going to talk about briefly was brought up I think in the last management board meeting about cooperative research. We did put out a call for proposals this past year, in Fiscal Year 2007, seeking cooperative research

proposals. We did receive one in our office under that solicitation.

I've talked to the PIs so that I can – I can't expand a little bit on it as they are traditionally confidential proposals. The proposal itself was requesting vessel monitoring systems to be installed on the ten vessels that were working for Omega Protein. The cost of the proposal was roughly \$200,000. About \$150,000 was the federal request into my office, and then their match was another \$50,000.

Unfortunately, due to budget constraints, we at one point tried to reduce the budget and kind of a pilot stage of just doing like maybe two-vessel monitoring systems as the pilot. Then we had a few data issues, kind of the data stream and where the data were to go, that we never really worked out. So, a few minor issues like that kind of snowballed into the point where, you know, that proposal was not selected for funding.

I do have a few copies that I gave to Brad. If anyone is interested, either see me or see Brad. We can share copies of that. Like I said, it more or less came down to a lack of budget out of our office to be able to fund a cooperative research proposal, as well as the other research projects that we were continuing. I guess I can take any questions if anyone has any.

CHAIRMAN CARPENTER: Are there any questions for Derek? Derek, I have one question. I'm involved with some other work that is in connection with NOAA-funded research. The issue in that particular work has been these automatic extensions of the grant, such that the final reports of a number of projects that we were counting on having been delivered and available for us to use in other work that we're doing, we have not received.

I understand that there is some kind of general rule in NOAA that automatic grant extensions are available, and I'd hate to see us get into a situation, when we had a five-year time horizon here, that nearing the end of that, a lot of critical research has been granted this extension and it drags out the process. Are you able to comment on the policy of NOAA or on the probability that we're going to run into that situation with this work?

MR. ORNER: What you're referring to is a lot of research programs that NOAA funds has what

is called expanded authorities, so they have like a one-time no-cost extension granted to them. Yes, a lot of projects at the end of the one year into the two-year project will submit a no-cost extension for a year, and NOAA doesn't have a lot of leeway of whether or not they can grant or not grant it. It's basically provided for them.

Depending on the project, depending on who the PI is, and depending on how we set the projects up, we can't necessarily say no to the request for the extension, but we can work with the PI to get either an annual progress report or a draft final report while they're still closing out the award or still working on it.

A lot times those extensions are for actually funding or actually expending the funds. One in particular, the Stock Assessment Training Program, I'm working with the University of British Columbia and the Virginia Institute of Marine Science to get graduate students working on stock assessments, and menhaden was kind of a case study. They came in with a request for the extension. Just in talking to the PI, we were able to work it out and did not grant the extension, and the final report is pending within the next month or so.

CHAIRMAN CARPENTER: Thank you. I just would hate to be at the end of this process, and our technical committee won't be able to use the information that we have all looked forward to. If you can keep that in the forefront of your planning process and working with these PIs, it would greatly be appreciated by the chairman at least.

Are there anymore questions on the collaborative research? Do you have anything to add Derek's report on the status of these research projects as chairman of the technical committee? All right, I'll ask Alexei to give us his report on the LIDAR update, and I think he has some information from the technical committee as well.

LIDAR UPDATE

MR. ALEXEI SHAROV: Good afternoon, ladies and gentlemen. I would like to thank you for the opportunity to present here the report on the study that is funded by the ASMFC. As most of you know, we are in the second year of this multi-institutional study that involves the

Maryland Department of Natural Resources, NOAA Environmental Technology Lab, Fish and Wildlife Service, and the Virginia Institute of Marine Science.

I'll go very briefly over the slides since I have quite a few slides for you. As you would recall, the study was initiated to attempt to address the issue of the potential localized depletion in the Chesapeake Bay, and hence there was a need a methodology to estimate the population size of menhaden in the Chesapeake Bay.

The proposed study is based on the LIDAR technology, which essentially utilizes the laser in the same way as the hydroacoustic is being utilized in other fisheries research. Here you simply send the beam of light from the laser down into the water; and as the beam hits the water and goes through the water column, the light is being reflected from any object in the water, including menhaden.

As it comes back, that light is being captured by the system converted into an electronic signal and then being measured as the measure of the size of the object in the water. We planned it initially as a two-year study, and there were several objectives in that study. One was to calibrate the system to be able to detect menhaden; then to test LIDAR's ability to detect menhaden schools in real life on the Chesapeake Bay.

Then we wanted also to do the so-called groundtruthing; that is, to calibrate LIDAR in the field by measuring menhaden schools using LIDAR and compare it with a measurement of the same school using some other information. These were the tasks for the first year. For the second year we planned to design the bay-wide survey that would allow us to estimate the population size and its changes throughout the season.

We initiated the study a year ago, in the early fall of 2006. The first step was measuring the tagging strength of menhaden. The way it's been done, we just put the fish in the tank, and we shot the laser beam down into the tank and measured the amount of light that was coming back from those fish. This is just a photograph of the system that was used.

That's the same fishing tank, and as you see there is a window in there and the menhaden

swimming by. The green color is the color of the laser light that we're using in this experiment. The idea is that when the fish are swimming by near these three circles – as you see, the circles have a known replicativity, so we know that one of them reflects back only 2 percent of light, the other one 5 percent, the other one 10 percent.

By comparing how much light comes back from these known targets, and we're comparing this with how much light comes from a single menhaden fish, then you can convert it into how much light can come back from five fish, ten fish or thousands of fish. Once we have done this, we mounted the LIDAR system on the airplane, which has a window down in the bottom, so the system is looking down into the water.

That is a brief look at how the system looks inside the airplane. This picture was taken in a much larger airplane. We used a very small airplane, as you saw. Then we fly over the bay or any other area and hopefully you find some menhaden schools and then get the measurements of those schools. Here is an example of what you see when you're flying over.

This is actually what we get back once the data are obtained and loaded, and it's all being recorded in the gray scales. It is something different from what you would normally expect to see. If you would look into this red square, you would see in the center of that square there is a somewhat darker spot in that black line. That is actually a school of menhaden.

What is important to note here is as they would look at that, under that school there is a much lighter area compared to the areas next to the left or to the right. That much lighter area indicates that the amount of light, there is much less light penetrating through the school than the amount of light that comes through the water column nearby where there is no school.

What you see is what is called the shadowing effect. The menhaden school is so tight that the amount of light that comes through is diminishes very quickly. That is one of the potential problems, because if the school is too dense, then no light comes down through the entire school depth, and therefore you're losing an ability to measure how deep that school goes down in the water.

Well, once this black-and-white image is enhanced and the different intensities or densities are different colors, you get a much more understandable or at least visually representative image of the same school that shows like here. This is an example of a menhaden school seen from the LIDAR in different colors.

The warmer the colors are, the higher is the density or intensity of the LIDAR for a density of fish. As you can see, we could measure the distance or diameter of the school as well as depth in terms of how far deep the school extends to the extent of the ability of the method. This is another example of another school that well beyond the surface. The upper edge of the school is at about two meters or six feet below the surface. You would not be able to see that school from the airplane with the naked eye.

Once we have done this, we tried to fly over certain areas of the bay and see if we could detect a measurable number of schools in the area, and we did. This graph shows you that in the case of two different days we have seen a number of schools on both occasions. The red circles represent schools seen by the LIDAR in one day, and then the green circles represent the other day's findings.

One of the most critical aspects of this equipment is the penetration depth; that is, how far can we see down in the water in the conditions of the Chesapeake Bay. As you all know, it's far different from the Caribbean waters. As you can see, the depth of penetration varied in the bay, and generally it was worse in the upper bay.

The LIDAR could see down to five or seven meters in the upper bay, the red and orange colors. The depth of penetration has generally increased down to the mouth of the bay up to thirteen or fifteen meters, which would be about 40 or 45 feet.

The next step was what I called the groundtruthing where we attempted to conduct a measurement of the schools in cooperation with the menhaden industry where the commercial vessels would be catching schools of menhaden, and we would fly over those schools that they were targeting and measure those schools before they captured.

Then once they captured and transported on board, the captain would make an estimate of what was the school size in terms of the number of a thousand fish, and we would compare that estimate with the LIDAR-based estimate. Unfortunately, when we attempted to do this experiment in September and October of '06, there were very few schools of menhaden seen in the bay where the fishery traditionally catches them.

Eventually the entire fleet moved out into the ocean off the coast of Delaware and New Jersey, and that's where we were forced out to do these experiments. This particular experiment was conducted in the course of several days in the Atlantic Ocean rather than in the Chesapeake Bay. But, nonetheless, we flew over about 15 to 20 different schools of fish that were captured by the reduction fleet as you can see on this photograph.

As I said, we plotted this data by plotting the estimated size of these schools as it was estimated by both captains when they loaded those fishing boats with the estimates from LIDAR return. We obtained relatively good correlation in this case. Then once you do this, then you essentially can attempt to utilize information on the schools that were observed and their size, and you can move into different spatial statistical techniques that would allow you to plot and calculate the average densities in the areas of the bay and estimate absolute population size or the number of fish present in there. That concluded our first year of study.

For this year we have conducted two surveys. We have developed a survey methodology and designed a survey that is supposed to cover the entire bay area. We conducted it in August and then next in September with the general idea of attempting to try two different intensities of coverage. In one case we would fly in the course of one day over half of the bay, for example, the upper bay, and do a certain number of transects across the bay. You can see where this horizontal line is across the bay. Then on the next day we would fly over the second half of the bay.

That would give us an instant estimate of the number of schools present in each of the areas. And, of course, you could try to fly over the entire bay area within one day, but then the total number of transects they would be able to make

would be less. Here is an example of what we have seen in our first survey in late July or early August. These are the schools that were detected visually but not necessarily with the naked eye.

I failed to mention that this year we actually are testing two methodologies. We're using LIDAR, but at the same time we have a hydro-imaging video camera installed which records everything throughout all the flights that we're doing. Then it's being processed in the laboratory manually.

So every time that we see on the screen an image of what seems to be a school of menhaden obviously near the surface, we would take measurements of that school and record the coordinates. So this is a summary of how many schools were seen visually in the course of approximately one week in early August.

What is surprising is that visually we couldn't detect any schools in the upper bay accidentally or not, but that's what we had. It's interesting that this information was sort of supported by what the reduction fishery had seen in their experience in that time of the year as per our communication with the Beaufort Lab.

This is an example of what we actually saw with all the tracks that we have made over the bay in the July '07 survey. The red circles are the schools that were detected and recorded by LIDAR. As an example, this is what we've seen in the September of '07 in our second month of study, using the LIDAR information as well.

So, as of now, here are the conclusions that we can make based on our analysis that the LIDAR is capable of detecting menhaden schools in the Chesapeake Bay and Atlantic Ocean, but its ability depends on the water turbidity and the school depth. The LIDAR penetration depth in the Chesapeake Bay conditions varies from 5 to 15 meters generally in the oceanic direction.

The large menhaden schools demonstrate a shadowing effect that leads mainly to the underestimation of the individual school size. LIDAR can also underestimate the number of schools in absolute abundance in certain conditions due to limited depth penetration. These are the conclusions that we have so far. We continue to work on the final estimates of the number of schools that we've detected during our surveys in August and September.

We will compare different designs, different intensities of the coverage, and we'll see how close those estimates will come with each other and later, hopefully, we'll report to the technical committee the summaries of these analyses. Thank you. If you have any questions, I'll be happy to answer.

CHAIRMAN CARPENTER: Thank you, Alexei, I appreciate the presentation very much. Question for Alexei? Jack Travelstead.

MR. TRAVELSTEAD: Thanks for the report, Alexei, a couple of questions. One, do you have any plans to extend your transects into the tributaries in the future? Some of the tributaries are quite large and obviously contain menhaden. The second question is you've concluded that the LIDAR likely produces an underestimate of the amount of menhaden, but how close are you to concluding whether or not LIDAR can produce a relative index of abundance? How much more work needs to be done before you're able to conclude that?

MR. SHAROV: Well, I'd probably say that we are close to be able to say whether the LIDAR-based estimates with – you know, whether we could use them as an index of abundance. Personally I think I'm confident that we could use this information as a index of abundance, but the initial plan or hope was that we potentially could come up with the absolute abundance estimates.

Although I tried to deliver to you the fact that while there is a potential for bias or underestimation, we hope that we will be able to work on additional ideas as to how to estimate this potential bias and try to get up with the true absolute abundance estimates in the future. But in terms of using this as an index of abundance, I have no doubt that could be done, but we still have to do a little bit more work in terms of the seasonal dynamics.

The estimates that we are producing or will be producing and reporting are what we see them as like the instant they estimate of what is present at certain times at a certain moment. We know that the abundance changes throughout the summer season; that is, you know, from May through October there is a lot of dynamics.

There are a lot of schools entering the bay, moving out of the bay, lots of schools being

harvested into bait fisheries and reduction fisheries. The only way we could deal with this is to have at least like monthly estimates which would require us to move on a much more intensive schedule, which, of course, depends on funding. That's the answer on the second question.

The first one also is really that, yes, certainly, we would – if we have more time and more resources, we would be able to move into the tributaries as well, or at least some of the most important such as the Potomac. Yes, we certainly would be able to do this if given the resources.

CHAIRMAN CARPENTER: I've got several people on the list, but rank does have its privileges, and in this case, Pat, since you are vice-chairman, you get to move to the top of the list.

MR. PATTEN D. WHITE: Thank you, Mr. Chairman. Just as a continuation of where Alexei was going with this, if you're concentrating on the bay with study, do you anticipate using this as the baseline for the beginning of a trend analysis? And then if you do that, how do you fit in – as you said this year a lot of the big commercial harvest was happening outside, which I would think have a vast influence on what you're seeing in the bay.

MR. SHAROV: At the moment this study is being seen as the pilot study or the explorative study. It's not a monitoring program at work yet. Like I said, we intend to provide with our initial estimates of the number of schools detected, but in order for us to move towards the development of the true bay or coast-wide survey, we had some discussion of the possibility of a coast-wide survey.

I believe that technically it is possible, but it certainly would not be cheap project to have using the LIDAR. That's why we tried to kill two birds with one stone, and we initiated this video survey as well to see if in the future we would like to move into this direction; that maybe this aerial video survey which is less expensive could be useful.

EXECUTIVE DIRECTOR O'SHEA: Thanks, Mr. Chairman. I'm intrigued by the relative abundance question because we know what we're taking out of the bay. We have that in

landings. The issue is what is the impact of those landings on the abundance in the bay. I think embedded in the LIDAR approach was an assumption that the LIDAR might be better than other ways of measuring the schools.

For Alexei, your experience so far, has any thought been given to maybe the human eye might be a better tool here than LIDAR or are you still optimistic that we could get a standardized measure developed from LIDAR? I look at the transects you're flying back and forth, and it starts to look like what I suspect the industry is doing every single morning before they make dispatches of where they're going to send the boats. They're measuring relative abundance right now. Of course, there is objectivity and standardization. So, comparing to human spotters, have you got any results from your experiments on how LIDAR is competing with that?

MR. SHAROV: I'm not ready to say yes or no. Hopefully, we'll be able to say something more definite within the two or three months once we compare the visual survey results with the LIDAR results.

If the near the surface number of schools is always approximately proportional to the total number of schools present in the bay, you could say, well, yes, then we could use just the visual observations and use it as a relative index, and maybe even do only one or two years of very intensive LIDAR-based surveys and develop some sort of scaler, and say, all right, we'll just multiply visual estimates by a factor of five, this is our approximate estimate of the total number of schools.

That has to be seen yet. We need to look at it and I promise that we'll deliver everything that we have. The possibility of the aerial visual survey to be used in the future, the TC had discussed this actually; and as you will hear later in the technical committee report, we even planned to have the meeting with the industry representative to discuss the possibility of developing something like that in the future.

But I have to also caution that even though maybe it seemed to you that what we were doing was about the same what industry's spotter pilots are doing, it's not the case. What they are doing, they are searching for the concentrations of the schools and they have this huge experience.

They know when to expect – normally to expect these fish at a certain time period, while what we were doing, we were going over the transects, which were randomly, but at an even space distributed all over the bay, so it had a special design in it. The industry is trying to maximize its time and search where most of the fish are so it's somewhat different.

EXECUTIVE DIRECTOR O'SHEA: That's good, Mr. Chairman, thank you very much.

REPRESENTATIVE ABBOTT: Thank you, Mr. Chair, I won't take up any of your time.

MR. CALOMO: Thank you, Mr. Chairman. I was wondering did you use the LIDAR system at night at all?

MR. SHAROV: We did try LIDAR at night during our first year of study, but I have to admit the number of tries was limited. There were some technical problems. From what we had, we did not find any improvement in the night measurements compared to the day measurements. Plus, there is this psychological factor where – well, during the day, when we're flying and taking measurements, the laser beam is expanded to the diameter of about five meters.

So you cannot see, and even if you would look up, you won't feel in your eye that you're looking into a laser beam. While if you do it at night, you'd certainly see the column of light going down and not everyone appreciates it.

MR. CALOMO: I can understand that today. About 25 years ago, I flew in an airplane with the system at night and we found plenty of fish. But, do you realize – and a lot of people don't realize this – that the menhaden themselves are similar to a chameleon as far as changing their color and adapting to their environmental conditions as far as light or dark; and if they don't want to be seen at times, maybe you'd gone over it with an airplane and looked down and see nothing, you know, and an hour later you could come back and the bay could be alive at times. I'm not so sure if anybody ever told you that.

CHAIRMAN CARPENTER: We're going to add that to our repertoire of things we know now. Thank you, Vito. Mark.

MR. MARK GIBSON: Thank you, Mr. Chairman. I just want to report to the board that Rhode Island started doing exactly what I think Vince was talking about. This year we actually collaborated with the purse seine industry. I put staff in the spotter pilot plane, on board the commercial vessels, and they agreed to adjust their search routes – Narragansett Bay is much smaller – so that they would cover the entire bay in more of a survey mode in addition to identifying the schools they wanted to fish on.

We collected a dataset of essentially how many schools, their estimates of how many fish were in the school. We had observers on the fishing vessel so that when they targeted a particular one, we had an estimate of the size of that school from the captain and actually the weigh-out.

The other thing we did was monitor the fixed gear in the bay which can serve as a sentinel and give you some information on directionality because the depletion model that we're using has to account for immigration and migration out of the bay. We used the floating traps as sentinels to do that. I am going to be reporting on this work at a workshop we're holding and hosting concurrently with URIC Sea Grant later in November.

I think it's November 30th. I think there is some real promise in combining all sources of data, whether it be observer, you know, what the eye sees versus LIDAR, with fixed gear data as well as monitoring. The food industry generates a depletion effect. You know, if they think there were 2 million pounds in the bay and the fishery took a million pounds in a week, and the observer's information declined by half, you know, observationally that's probably how much you had.

I am pretty sure this can be done. Clearly, in Narragansett Bay it can; I don't know how easy it's going to be to do it in the Chesapeake Bay particularly with all the fingers and the large flight pattern necessary and the possibility of extensive out-migration, but I think there is some promise in it. We have been looking into it; and if our funding holds, we're going to continue to do.

MR. TRAVELSTEAD: Alexei, one of your first drafts of your proposal that you put together a couple of years ago suggested that you were going to look at hydro-acoustic methodologies as

well as LIDAR, and I'm just curious as to whether you all have given up on that notion, or is it just a question of funding. What are your thoughts on that?

MR. SHAROV: Yes, that is very true. When we submitted the proposal, we were very optimistic. We had this wonderful plan in our minds, but life always makes corrections on all your dreams. We rolled back on the hydro-acoustics for a couple of reasons. Reason number one is that we underestimated the cost of the LIDAR study itself. That's number one.

Number two is that we have a relatively small team, and unfortunately we lost the person who was supposed to take the lead on the hydro-acoustics part. He has taken another job and left our team. Since the focus and the interest, it seemed obvious that most of the interest of the technical committee and this board and then everyone else was primarily concentrated on LIDAR, we decided that given the limited resources we'll concentrate our efforts on the LIDAR.

But, a comparison with the hydro-acoustics to some degree would be useful. However, thinking of the development of the baywide and even more so coast-wide survey, nothing could compete with the airplane in terms of the speed and the coverage. So, using hydro-acoustics in the survey mode was probably not practical because we will never have 20 or 30 boats, each of them equipped with the sonars and such. These are the logistics.

TECHNICAL COMMITTEE REPORT

CHAIRMAN CARPENTER: Thank you very much, Alexei. Seeing on other questions, we'll continue with the Alexei show, and this time he's the chairman of the technical committee, giving the technical committee's report.

MR. SHAROV: Well, I guess you're tired of me already so I'll try to be really short, although that's a problem for me. We had a couple of charges from the management board for the technical committee. The first one was pretty important but very focused, which was to provide you with a definition of what localized depletion is as you had two or three years of sometimes very intensive and emotional

discussions, and yet everyone had probably a different idea of what this constitutes.

So, when we got together and we started discussing it, we were not surprised to find out that we also had different ideas of what this could be. Fortunately, we had several guests there, who were representatives of different constituencies or user groups. Actually some of them initiated in the past these discussions so we were able to question them on what they think of it. Then after all that discussion, we came up with a relatively concise but at the same time a rather general definition of what in our minds localized depletion is.

Although we define it for the Chesapeake Bay, that's because the way the question was posed to us, but, of course, you could apply it to other areas. You can see we were able to say that we think that localized depletion is defined as a reduction in the menhaden population size or its density below the level of abundance that is sufficient to maintain its basic ecological, economic and social cultural function. It can occur as the result of fishing pressure, environmental conditions and predation pressures on a limited spatial and temporal scale. That is our formal definition. Do you want to ask questions about it now or later, whatever is better?

CHAIRMAN CARPENTER: I think it might be appropriate to see if there are any questions or comments about this definition before we go too much further. Gil Pope.

MR. GIL POPE: Thank you, Mr. Chairman. I am just wondering, there is no reference to a size in your definition as to when you say the local as in localized. Normally I think of local as maybe a square acre or maybe local as being ten square acres or maybe half a mile. In this definition, which is a great definition, and I appreciate your doing it, because I've asked this question many, many times myself, in there, though, it seems like there is one thing that is left out. There has to be some reference to scale unless that's what you mean by temporal scale. Thank you.

MR. SHAROV: Well, when you think size, you're talking about the size of the area. The very last sentence it says on a limited spatial and temporal scale. When we say spatial, that is what we mean, the spatial area, which would be either a certain area of the bay or a certain area

of the coast. That was as much as we could come up with.

CHAIRMAN CARPENTER: I think the definition is broad enough that I think you can substitute Chesapeake Bay for Narragansett Bay or Delaware Bay or any other defined area. I think you have defined your area in that first line of this as opposed to being able to plug in some other name or area there I think is how it appears to me anyhow. I have Eric Smith.

MR. ERIC SMITH: Thank you, Mr. Chairman. At first blush at seeing a definition like this, when I think about depletion, I think in terms of abundance or density. As I read down through the definition and I got to the word "economic", I got curious; and then when I got to "social cultural functions", I more than curious.

It seems to inject a level of subjectivity into the definition. I wonder whether that's useful. Knowing that it's such hot button issue to begin with, the definition seems to provide opportunity for it to be all things to all people. So I wondered then whether it's actually useful or not. I just offer that as a first initial reactions to it.

MR. SHAROV: If I could, the technical committee is primarily comprised from the fisheries biologists. I think we have one economist and one sociologist now. At the meeting we had only biologists and one sociologist. He was pretty adamant about the economical and social cultural functions, and we had to agree with him.

As we tried to present this as the general definition, of course, you could never focus it to the biological depletion, and certainly you're just thinking strictly of the ecosystem. That would be easier. But, I can certainly see a utility in using this definition in an economical sense. To give you an example, we could reduce the density in absolute abundance and density of menhaden or blue crabs or whatever to the point where it becomes economically not feasible to continue fishing.

That would be a perfect localized depletion or economical depletion where the population may not be overfished to the level that it collapses and would continue to reproduce, but the economical output would be so low that it's not worth the investment. We thought that works.

MR. SMITH: I mean, the point on economic value I think is well taken, and that's why I said I was only curious about that one. The pitfall that I see is social, cultural functions, which is really – frankly, it's a minefield and it lays a whole issue that has got people so worked up into play; and just for that reason, I wonder whether it's useful in a working definition to try and capture that whole part of the equation. I don't know if it's useful but maybe it is. That was my only point. Thank you.

CHAIRMAN CARPENTER: Well, when I first read this definition, I had some of the same questions and concerns that you're expressing, and I'm sure others have as well. I have come to the conclusion that the social and cultural aspects is being portrayed – there is a commercial on television now with the 800-pound gorilla standing next to the fellow getting ready to retire.

Here is the 800-pound gorilla in this particular area, so we'd just as well recognize that he is in fact in the room with us. Without him, the rest of this truly doesn't make as much sense as we would like to in our infinite wisdom say we're fisheries people, we're not people people. So, unless I can be convinced differently, I am of the personal opinion that is probably part and parcel of this definition of localized depletion that needs to be recognized. I'll get off of my soapbox here for a moment and get back to my list. I have Bill Adler.

MR. WILLIAM A. ADLER: Thank you, Mr. Chairman. I read over the past years all about the history of the menhaden population and what affects them, and I'm wondering if that is still holding true in the technical world, that they still believe in what they had said back there, basically that the populations of menhaden are affected mostly, actually, by ecological and environmental factors.

You mentioned right here that one of the factors seems to be environmental or ecological factors here. You also mentioned predation as well as fishing pressure. Now, we seem to have controlled fishing pressure to some degree. The predation factor is out of control, because there are so many predators in there that they're doing a wonderful job in there. We still have ecological or environmental factors to deal with.

It's interesting that you've put this into a definition like that, because some of the things that you brought up or the technical committee had brought up in past years had to do with the factors of the rise and fall of this species seems to come from environmental and ecological factors and the predation factors. Yes, fishing is in there somewhere. Does the technical committee still stick to that general reading of the menhaden population, not just here but everywhere?

MR. SHAROV: I am not sure exactly what the question is. Do we stick to the perception that the population dynamics is defined primarily by the environmental conditions; is that the question?

MR. ADLER: Not primarily. Actually I think you've probably hit this pretty well with environmental and ecological factors which I read before was one of the main factors. Predation is a factor; you mentioned that there. Fishing pressure is a factor; you mentioned that there. Of course, we've controlled fishing pressure, but we haven't controlled or can't control the other two.

I think this is very good, but I am still going back to that original story or rendition from the science community. For years and years it's been there. I don't know what my question is. I was just trying to say that I think that's good, but I'm wondering if the technical committee still believes in what I've read in the beginning, and I guess they do if they put this in. Thank you, I'll shut up.

CHAIRMAN CARPENTER: Bill, let me see if I can help you out. I think I understand your question or your comments. For years and years and years we were told that the menhaden fishery and the stock on a coast-wide basis were in very good shape. It was only in recent years that this idea of localized depletion was begun to be discussed and brought forward.

I think, unless I'm speaking out of term, the last time that we got a report from the technical committee on the status of the coast-wide stock as a unit, it's still in fairly good shape. I think this is an evolution of thinking and trying to narrow our focus to a more discrete area and define localized depletion. I commend the technical committee for the work that they've

done in this regard. If that helps at all, that's how I see this thing. I have Everett/

MR. EVERETT A. PETRONIO, JR.: Thank you, Mr. Chairman. As someone who plays with words on a daily basis, I would have to say to you that there is no question in my mind that localized depletion is a factor that we should be considering in managing menhaden stocks. However, I would say to the board that if we're going to try and do a better job than the technical committee has already done, we will be here into February.

So better or for worse, like any language, it's not the definition; it's how that definition is interpreted. When we talk about statutes, we talk about them being seasoned; how does someone go on to interpret what has been written down. I would suggest to the board right now that this obviously was the result of quite a bit of work, and I would encourage us to try it, to go forward with it and to recognize that it's not necessarily this definition that we're going to have to live with. It's what may come down the road, and we can adjust as we go. Thank you.

CHAIRMAN CARPENTER: Thank you, and I think you're right. I think this is an excellent attempt, and we do need to try to move on. I have two more people and then we're going to move on with the balance of the report and come back to questions later. I have Lance Stewart and Dr. Pierce and then we will move on.

DR. LANCE STEWART: Just in looking at what seemed to be patterns in your LIDAR school detection with concentrations on the western part of the bay, have you done any spatial density segmentation, weighting in portions of the bay and whether that's consistent. Is there any type of pattern information that could be correlated with the schools?

MR. SHAROV: Well, the short answer is yes we're working on those and hopefully whenever we'll get another chance to report to you, we'll certainly on spatial distribution as well.

DR. STEWART: But you're sensing that there is some sort of a recurrent pattern like in pixel density?

MR. SHAROV: Well, definitely, and it's been reported in the past. There are publications. Joe Smith, who is present here, he published a

wonderful NOAA technical report a while ago that demonstrated that menhaden schools are distributed in the Chesapeake Bay not just randomly. There are certain areas where they consistently are found, and there are certain areas where you have a very low chance to find them at any time of the year.

DR. DAVID PIERCE: Thank you, Alexei, and the technical committee. Obviously, this is a tough one, a tough nut to crack. You've taken it another step along, another step further. This definition will have to grow on me. I'm still not comfortable with it. I consider it to be some good guidance, the framework that we can use since there are a lot of unknowns within this definition, making it therefore not a definition.

For example, "below a level of abundance that is sufficient to maintain its basic ecological, economic and social cultural function as well" – okay, how do you define that level for each of these particular functions, ecological, economic and social cultural functions? And then at the very end where you talk about "a limited spatial and temporal scale", I'm still not sure what "limited" means in terms of space and time.

So I'm still left floating, but, again, it's another step forward regarding this tricky issue. I've dealt with this issue of local depletion with sea herring up in New England, and, of course, with menhaden. I find it interesting that the technical committee actually has felt comfortable considering depletion to be caused by environmental conditions specifically because I'm still biased.

Like I said, it will grow on me, but I'm still biased by the fact that all the discussions I've had about local depletion in the New England area for sea herring has been depletion means removal by human beings; therefore, fishing. So, environmental conditions to me doesn't seem to fit the definition of local depletion since environmental conditions can cause a school of fish move an area.

Does that mean the area has just become depleted? No, I don't see the area as being depleted. The fish just left the area because the environmental conditions were not appropriate. Those are my comments for what they're worth. Like I said, I suppose it will grow on me, and your technical committee will continue to fine tune it as time goes along.

MR. SHAROV: If I could afford one minute to answer, definitely, we certainly had started with the narrow, focused definition of the localized depletion, specifically thinking of removals as a result of fishing activity. But, imagine if we had come to this board and presented a definition that covers only these aspects; do you think there will be fewer questions then to us?

We really tried to cover different aspects. I could think of the situation where you have a localized depletion that, indeed, is caused by the environmental conditions; for example, fish kills as a result of the low oxygen level, which, you know, unfortunately we observe them in the bay area quite frequently. It would be localized depletion and it would disrupt the normal functions which used to be normal before the onset of these environmental conditions.

They were not normal, you know, 20 or 30 years ago and now they are regular. And, certainly, there is no pretense – we're not saying that this is carved in stone, give us the Nobel Prize for it. You pick it from here and you carry on. We'll just be happy to help you whenever you ask us.

CHAIRMAN CARPENTER: I think that Everett said it a few moments ago best. This is a valiant attempt at defining this thing. It's going to be a work of art over the time period ahead of us. I think that we've heard an awful lot about it, and we do have other items on the agenda. Unless there is something really burning, I'm going to ask Alexei to move on with his report. All right, Vito.

MR. CALOMO: A small burn. Did you take into consideration that the upper part of that Chesapeake Bay is polluted to the highest? Would that cause the fish not to be in that upper part of the bay where you used the LIDAR system?

MR. SHAROV: I'm not sure if I truly caught the nature of your question. Well, correct me if I'm wrong. My understanding is, yes, well, the bay is traditionally or has been considered the area of the highest concentration of menhaden. The issue has been raised on the possible localized depletion as the result of primarily fishing activity. That's why we initiated the LIDAR study to address that question, and, yes, many around this table thought or think that the localized depletion is occurring. Is that what you were asking?

MR. CALOMO: Maybe sometimes because I'm an Italian I talk too fast, and I want to slow down and ask you the question again, because I'm not so sure you answered my question. My question to you, sir, is the upper of the bay where you showed the LIDAR system not showing any fish; is that maybe a direct reflection of pollution in that area, because it is heavily polluted in that area.

MR. SHAROV: That's not exactly correct. The LIDAR data do show the menhaden in the upper bay. The picture with the schools of menhaden that were visually seen in the August survey, that's when we did not see any schools near the surface. Well, why did this happen I cannot explain to you, but I would have to show them the next time next to each other to show you, well, here is what you see visually and here is what you see with the LIDAR. But, to be short, the LIDAR did see menhaden schools in the upper bay as well, but it certainly remains to be quite polluted. I would agree with that.

CHAIRMAN CARPENTER: Alexei, do you want to continue with the rest of the technical committee report, please.

MR. SHAROV: Remember, I promised this to be really short.

CHAIRMAN CARPENTER: We didn't promise to be short on questions, though.

MR. SHAROV: The second part of the charge was to review the research activity that is related to the localized depletion and tell you what is happening and are we getting closer to the answering that question. We discussed one more time the projects that were currently funded or recently funded.

All the TC members attended the Chesapeake Bay Research Symposium in April where the whole day was devoted to the presentation of the projects related to menhaden studies. We discussed all of those projects on the day next to the symposium and then one more time this September. The committee agreed that only a few studies that are concurrently funded by the Chesapeake Bay Office of NOAA or the Atlantic States Marine Fisheries Commission directly related to this issue.

We agreed that a few projects like the project on estimating removals of key forage species by predators in the Chesapeake Bay will help in answering those questions as it is directly related to the issue of the localized depletion. The other study on the recruitment variability on menhaden, the larval ingress into the Chesapeake Bay, is to some degree related to this issue. As you understand, of course, if there is no sufficient supply of menhaden at the larval stage and if recruitment is low – and we know that it is low – then obviously you're not going to have sufficient numbers of menhaden to fulfill its ecological function.

Then the other project, the so-called Chesapeake Bay Sub-Stock Assessment Project, which essentially had promised us the spatial model that will explore the menhaden movements and exchanges between the Chesapeake Bay and the coast, the expectations were high, but we haven't seen any results yet. We've seen only the presented concept as to how this analysis will be conducted, so we're just guessing, but we hope that there will be some positive results brought in by this research.

Finally, the LIDAR study, the committee felt that it's one of the most directly related because it attempts to actually estimate the absolute population size, the number of fish and schools present in the bay at any moment of the time. Obviously, if you have enough measurements and compare them to the removals, you can make some conclusions. That's as much as we could say on the research.

Primarily, the second charge to the technical committee was to review and report on the economic research on menhaden. I want to say that it was pretty challenging because, as I mentioned before, most of us are just fisheries biologists, and we have only one economist and one sociologist. We had to rely on these two experts and essentially just use their expertise and just agree with their evaluation.

So, generally, what they told us is that in general the research on the economic value of Atlantic menhaden is lacking in a large sense, but there are some studies like Kirkley et al. They found that the menhaden fishery contributed approximately \$52 million in sales and income and supported 281 jobs in '04 in Virginia.

Well, that work did not include an economic assessment of the reduction fishery so that covers only the menhaden bait fishery and the industries related to the bait fishery. They concluded that no economic information is available currently regarding the contribution of menhaden to the health of the ecosystem, but they inhabit like filtering and water quality. Nobody had put a price tag on that yet and so there are no economic values available.

None of the available research provides any understanding of the magnitude or distribution of economic values that depended on stock abundance, distribution of age composition and how these economic values might change following changes in the stock structure or changes in the harvest.

As you know, the Atlantic Menhaden Study proposed and I understand funded currently and to be conducted by researchers at the Virginia Institute of Marine Science proposed a comprehensive evaluation of the menhaden fishery in the Chesapeake Bay. According to them, it does plan to use the state-of-art economic evaluation techniques. We're taking their word for that.

So, we wholeheartedly endorsed this study and they said all those missing elements that I have mentioned on the economics of the menhaden fishery are supposed to be covered by this study. They also commented that in the past they have proposed to conduct inexpensive economic studies of a similar nature in the areas outside of the Chesapeake Bay, and they continue to think that it would be a good idea as well, and they wanted you to know about this. That concludes the report on the economic research on menhaden.

Finally, the technical committee discussed the cooperative research meeting. At our previous meeting in April, the technical committee had discussed and agreed that it would be a very good idea to have a meeting with the industry representatives. Primarily, we thought of the reduction fishery or Omega Protein, although it wouldn't be closed to other participants.

It is to explore the possibility of implementing a coast-wide aerial survey for menhaden and/or discuss other possible joint activities. Essentially, it was a goodwill gesture on both sides that both sides were interested in sitting

down and sharing the experience and sort of looking at what can be done jointly in the future to help in terms of our understanding of the stock dynamics, industry dynamics and improvement of management. As far as I understand, though, we still plan to have that meeting. That concludes the technical committee report.

CHAIRMAN CARPENTER: Thank you, Alexei. Are there questions with regard to the items which weren't covered under the definition? I am going to start with Gil.

MR. POPE: Thank you, Mr. Chairman. How far away is LIDAR from being used with satellite technology; do you know?

MR. SHAROV: I don't know. I know that LIDAR is actually, indeed, used – I mean, it is installed on some satellites, and it is used for certain research activities. At this moment I'm not technically equipped to answer whether this is going to be proven or possible to use in terms of the menhaden studies. I plan to learn about it to see if anything could be done. You know, using the publicly available information from satellites could reduce significantly the total cost.

MR. HIMCHAK: Thank you, Alexei. I am looking at the charges that the technical committee needs to address by 2010. I am glad that I got off that committee after about 18 years. I'm getting the sense that in some of your final comments, where you talked about the dilemma of the health of the coastal stock, which seems to be constant, and the issue of localized depletion in the Chesapeake Bay – and I know one of the focal points was always the question of can you measure the advection of eggs and larvae into the Chesapeake Bay, and if that is sufficient as a reflection of the health of the coastal stock, and then there are problems within the bay itself, either in terms of survival and recruitment and growth.

I'm getting the sense that you're not going to be able to answer that question by 2010, so we're still going to be left with the dilemma of we have a robust coastal stock, and then this issue of localized depletion in the Chesapeake Bay, which is not a separate stock. It's just a component of the coastal stock. That's the sense that I'm getting.

MR. SHAROV: Most likely you're more right than wrong, but I'm a bit more optimistic in terms of what we're going to learn, for example,

from the larval study that you have mentioned. Of course, there is no way – we could not replay the history. We cannot extend this survey back into the eighties and seventies when the population was abundant, and so what we're going to have by 2010 – if we continue funding, for example, this particular study, we'll have, say, five years of the most recent data, and we could compare only, you know, the estimates of the densities of larvae, and then there is seasonal distributions.

We will learn when mostly they enter the bay, whether it's early winter or mid-winter or late winter, how variable it is. But, it certainly would be representative over a period of low recruitment unless we'll see all of a sudden a significant increase in the recruitment. So, yes, we'll have only a very short historical perspective in terms of this particular data available.

But, still, it is the beginning of the new stage where we are going to have this data, which then could be compared in the future with the similar data that hopefully will be collected at the times when the stock will be – well, at least in the Chesapeake Bay area we'll be doing better. You may not have all the answers, but you certainly will have some answers to what you would want to know.

CHAIRMAN CARPENTER: Thank you, Alexei, and that makes me think that, no, we can't go back and do that research in prior years, but we do have about 50 years' worth of young-of-the-year indexes for menhaden in the upper bay that may be able to be correlated with more recent efforts at the mouth of the bay to give us a clue of what may have happened in prior years. I am hopeful that this work is going to be fruitful, and I am confident enough that you're all going to be able to figure out a way to go back in time. Any other comments or questions regarding the technical committee report? Thank you, Alexei, for a very fine report.

OTHER BUSINESS

This brings us to other business. I have jotted down a few things that I think I need to cover under this situation. First, I want to thank Bill Windley for being with us. Although you don't have a formal advisory committee report to present, I do want to recognize his dedication in

showing up today and his willingness to sit here, and ask if he has any comments for the benefit of the board at this point.

MR. WILLIAM WINDLEY: I'm just like the board, I am waiting with baited breath for the results of the research.

CHAIRMAN CARPENTER: Thank you, Bill. I think just about everybody is aware that there have been a few bills introduced in congress of recent vintage here that menhaden was mentioned in. I'm going to ask Vince if he wants to say a few words about that at this point or put this as an agenda item for some future meeting. I'm going to give him that option.

EXECUTIVE DIRECTOR O'SHEA: Thanks, Mr. Chairman. I think a future meeting probably would be appropriate. What I do know, speaking to some of the congressional staff, is certainly in the case of Mr. Gilchrest the intention was to get the issue out on the table and encourage discussion on issues related to menhaden.

I understand that they intend to go forward and consult with the commission as they have that discussion, and we will be participating with Mr. Gilchrest in helping him and try to make the issues, from the commission's perspective, available to him. We also, with Tina Berger's help, have framed some talking points of established commission policy that this board and the commission itself have adopted relative to menhaden.

We would offer that as a resource to commissioners that might be called upon to comment on these bills. They're very broad; they're a commitment to science, commitment to sustainable management, status of the stocks, those types of things, without getting into specific criticisms for and against the specific bill. I hope that is helpful.

MR. P. WHITE: Are they available now?

CHAIRMAN CARPENTER: Is that available now or will it be in the near future?

EXECUTIVE DIRECTOR O'SHEA: I think our intent was to announce it at the Policy Board on Wednesday or Thursday and make it available.

CHAIRMAN CARPENTER: Thank you very much. While the rest of you were paying very close attention to all the important things that were going on up front here, I noticed that we

had a couple of visitors that slipped in the back door there. I would like to recognize Pres Pate and Gordon Colvin, two former commissioners who just couldn't leave without coming back. Thank you, and we look forward to being here with you this evening as well.

The last thing that I have under other business is the need to have a call for a nomination for a vice-chair because in just a very few seconds here I'm going to turn the gavel over to our current vice-chair, who is becoming the chair, and you are going to need a vice-chair immediately after that.

Not to put any pressure on anybody right at the moment, but I'm suggesting that one of the items on the agenda for our next meeting would be the election of a vice-chair. With that, I relinquish my chair. I am going to pass the mike over to Pat White. Pat, it's your meeting to continue.

MR. P. WHITE: Thank you for all that. I just got blessings from Mr. Windley. I'm not sure if that's good or bad, but I would look for any motions to be made at this time.

MR. PATRICK AUGUSTINE: Thank you, Mr. Chairman. I think we need to recognize the effort that A.C. has put in, the detail he has brought to the table to keep the process moving. You've done an outstanding job, A.C., and you've been helpful to me in some of my presentations as chairman. Again, congratulations on a great job. (Applause)

ADJOURN

MR. P. WHITE: Unless there are any further things to be brought before the board, we're adjourned.

(Whereupon, the meeting was adjourned at 3:35 o'clock p.m., October 30, 2007.)