

**Striped Bass Advisory Panel
Wentworth by the Sea, New Castle, NH
Wednesday, November 10, 2004**

Advisory Panel Attendees:

Jim Gilford (*Chair*), C. Louis Bassano, Fred Frillici, Dave Gittens (*new AP member*), Dave Pecci, Richard Schmachtenberg (*new AP member*), Ed Cherry (*proxy for Al Ristori*), Bob Fjelstad, Ed O'Brien, Peter Whelan, John Pappalardo, Richard Colagiovanni, Kelly Place, Riley Williams (*new AP member*), Leland Heath, III (*new AP member*), Chuck Casella (*new AP member*), Michael Doebley, and Arnold Leo.

Absent Advisory Panel Members:

Fred Schwab, Al Ristori, Leonard Voss Jr., Nicholas Grez, and Joe Fletcher.

Other Attendees:

Megan Gamble (*Striped Bass FMP Coordinator*), Gary Nelson (*Striped Bass Technical Committee Chair, MA DMF*), Andy Kahnle (*Striped Bass Stock Assessment Subcommittee Chair, NY DEC*), Stuart Welsh (*Striped Bass Tagging Subcommittee, USGS/WVU*), Damon Tatem, Patrick Paquette, Bill Windley, Byron Young, Anne Lange, G. Ritchie White, Dennis Abbott, Pete Jensen, Steve Meyers, Don Swanson, Dick Brame, R. Luce, Duncan Barnes, Rip Cunningham, Alexei Sharov, Gib Brogan, Tom Meyer, Bill Hogarth, Bill Cole, George Watson, Dick Anderson, AC Carpenter, Bruno Vasta, and Bruce Buckson.

Meeting Summary:

The Atlantic Striped Bass Advisory Panel met on Wednesday November 10, 2004 from 8 am to 12 pm at the Wentworth by the Sea in New Castle, NH. The following report summarizes the issues discussed during the AP's meeting and summarizes the AP's consensus statements. This report is not meant to reflect the complete discussion of the advisory panel, rather it serves as a meeting summary. The Advisory Panel was invited to attend the Atlantic Striped Bass Management Board meeting held on the same day later in the afternoon.

Stock Assessment Report for 2003

Andy Kahnle presented the Striped Bass Stock Assessment Subcommittee's findings from the ADAPT VPA model using data through 2003. Following Andy's presentation, Stuart Welsh summarized the Tagging Subcommittee's report for 2003. Then, Gary Nelson, as the Striped Bass Technical Committee Chair, summarized the overall results for 2003 and discussed the uncertainty associated with the 2003 stock assessment. Appendix 1 of this summary is the Stock Assessment Advisory Report for 2003. To review the final Stock Assessment Report for the 2003 fishing year, readers are referred to the Commission's website (<http://www.asafc.org/strippedBass.htm> and see under Annual Reports, Stock Assessment Reports 2004).

Discussion:

The Advisory Panel discussed the 1998 assessment where the fishing mortality rate was reported to be high and in the subsequent assessment the 1998 F estimate declined. In the meantime, the Board took action to reduce the fishing mortality, implementing more restrictive management measures. Andy and Gary explained there would be more confidence in the 2003 F estimate in

the next assessment. Confidence in annual estimates increases with time because more information is gathered over time with more striped bass landed from a particular year class. One audience member explained that the problem with 1998 assessment was a computational error.

The AP discussed the Amendment 6 triggers and that Amendment 6 is suppose to hold management measures constant for several years to better evaluate their impact on the population. AP members expressed concern about having a management program that relies on one good year class entering the population after another. And if a good year class doesn't come along in any given year, then the status of the stock is in trouble. It was clarified that management triggers in Amendment 6 are designed to prevent us from relying on one good year class after another.

The AP discussed advice they would deliver to the management board. Some members wanted to ask the Board to apply the precautionary approach in light of the stock assessment report. Most members agreed to support the findings of the Technical Committee, but some did not support the advice to not allow the liberalization of state regulations, especially if it is within the means of Amendment 6. Advisory Panel members expressed concern for increasing the fishing mortality rate on the stock. States should be able to change regulations if it will not impact the coastwide fishing mortality rate.

Advisory Panel Consensus Statement:

There should not be any changes to the management program that will increase the mortality to the coastwide stock unless it is allowed under Amendment 6.

Other concerns:

- Some advisory panel members had concerns about the phrase “no liberalization” as it affected the individual states prerogative to alter the state regulations, as allowed under conservation equivalency.
- Concern about the one year class making up a very large percentage of the stock and how that affects the assessment.

New York Proposal

New York submitted a proposal that consisted of previously approved regulatory changes. The Management Board approved the changes in December 2003 or earlier. The proposal was submitted to notify the Commission of the intended changes to New York's striped bass management program for the 2005 fishing year. There are three components to the proposal. First component modifies the Hudson River recreational measures. Currently, the measures are 1 fish and an 18-inch minimum size limit with an open season from March 15th to November 30th. There are two ways New York may modify the regulations: 1) stepwise minimum size increase (2005: 1 fish 24 inches; 2005: 1 fish 28 inches) or 2) the minimum size will be increased to 28 inches in 2005. The Board approved both 1 fish at 18 inches, 24 inches or 28 inches in June 2003.

The second component of the proposal addressed the striped bass regulations for the Marine District's Recreational Fishery. The current regulations are 1 fish at 28 inches between April 15th to December 15th. There is a special permit for party and charter boats, which are allowed 2

fish at 28 inches. The proposal is to increase the Marine District's recreational measures to 2 fish at a 28-inch minimum size or one fish with a minimum size of 28 inches and a second fish of a larger size (which is more conservative and yet to be determined). If the second option is selected, the party and charterboat measures may change.

The third and final component of the proposal pertained to the Marine District's Commercial Fishery. The current measures require a permit, have a slot size of 24 inches to 36 inches, a harvest cap of 828,293 pounds, as well as a season, mesh requirements for gillnets and bycatch provisions for other gears. The proposal modifies the slot size limit to 28 inches to 39 inches and correspondingly the quota to 877,180 pounds. The mesh size for gillnets may also change. Amendment 6 allows New York to increase the commercial quota up to 1,061,060 pounds if the bag limit was two fish at a minimum size limit of 28 inches. There is higher PCB contamination in the larger fish, so the alternative may not be viable for the west end of the open area toward New York City.

Advisory Panel Consensus Statement:

The Advisory Panel accepted all three components of the New York proposal.

Other Concerns:

- Some advisory panels had concerns about the Marine Recreational aspect of the proposal, which increasing the bag limit to 2 fish, because it may increase the mortality of the coastwide stock.
- Increasing the slot limit in the Marine District's commercial fishery may increase high grading.
- Also, concerned about the increased size limit in the Hudson River Recreational Fishery increasing the discard mortality on the stock.

Delaware Proposal

Delaware submitted a proposal that does not modify any of the mandatory requirements in Amendment 6, but does modify their current management program. The first aspect of proposal would require circle hooks for bait fishery while fishing the three identified spawning ground areas. There is already a seasonal closure in place from April 1 to May 31 when the take or retention of striped bass is prohibited. Due to an increased catch and release fishery, the circle hook requirement will likely reduce the mortality associated with the fishery. New Jersey already has a circle hook requirement in the New Jersey portion of the Delaware River and Pennsylvania is considering one in their jurisdiction.

The second aspect of Delaware's proposal addresses the commercial hook and line season. Delaware's commercial quota (193,447 pounds) is allocated between to gears with 90% allocated to the gill net fishery and remaining allocated to a hook and line fishery occurring from September 1 through the end of December. Because the hook and line fishery does not harvest all of the quota allocated to the fishery, the state proposed to extend the season to include the spring and summer months to allow the fishery to take advantage of higher market prices. The season would begin April 1 rather than September 1. The spawning grounds would remained closed and for those fishermen who also hold a gill net permit, no hook and line tags will be issued until after the spring gill net season.

The third and final aspect of Delaware's proposal extends the commercial gill net season by opening it two weeks earlier and closing it one month later. The state would try to reduce the amount of bycatch resulting from the extended season by requiring drift gill nets with mesh sizes greater than 4 inches throughout most of May. Again, the extended season is proposed to allow the fishery to harvest the full quota and to take advantage of better market prices.

Advisory Panel Consensus Statement:

The Advisory Panel supports Delaware's proposal and emphasizes the importance of considering the Technical Committee's concerns for increased discard mortality.

Menhaden Workshop

Nancy Wallace, the Commission's Menhaden FMP Coordinator, presented a summary of the Menhaden Workshop including all of the presentations made and the workshop participants' consensus statements. The consensus statements from the workshop are attached at the end of this document. The Menhaden Management Board met prior to the Striped Bass Advisory Panel meeting, so Nancy summarized the next steps for menhaden management. Some which includes reviewing and summarizing the available multi-species/ecosystem management plans and approaches applied on the west coast. The Menhaden Technical Committee was directed to further explore various aspects of stock status in the Chesapeake Bay and evaluate alternative assessment methodologies. The Menhaden Management Board agreed to meet jointly with the Technical Committee to discuss the next steps in assessments and management. For more detailed information on the Menhaden Management Board's proceedings at the Commission's 2004 Annual Meeting, readers are referred to the Menhaden Board's proceedings (11/9/2004). The complete proceedings will be available in December 2004.

Advisory Panel Consensus Statement:

If a multispecies advisory panel is established then the striped bass advisors want to have an appointee on the panel.

NOAA Fisheries Update on Rulemaking for the Recommendation to Reopen the EEZ

Anne Lange from National Marine Fisheries Service's (NOAA Fisheries) State-Federal Program presented an update on the striped bass rulemaking progress for re-opening the exclusive economic zone. NOAA Fisheries has nearly completed the draft Environmental Impact Statement (DEIS), which identifies the alternatives for considering the re-opening of the EEZ and analyzes the impact of the alternatives (biological, environmental, economic, and social). There are four different alternatives under consideration:

Alternative 1: Open entire EEZ to Atlantic striped bass harvest following the recommendation from ASMFC (28" minimum size and allow states the ability to adopt more restrictive rules for fishermen and vessels licensed in their jurisdiction).

Alternative 2: Open entire EEZ to Atlantic striped bass harvest (28" minimum size; allow states the ability to adopt more restrictive rules for fishermen and vessels licensed in their jurisdiction; require circle hooks for all hook & line bait fishing; adopt a 2-fish bag limit for recreational fishing; and adopt one of the following sub-alternatives for commercial fishing: commercial trip limit of 100 fish per net trip, 40 for hook & line; or restrict commercial harvest

to bycatch-only by imposing a limit of no more than 20% of the total catch or 100 fish per net trip, whichever is less).

Alternative 3: Open entire EEZ to Atlantic striped bass harvest (hook & line gear, only; require circle hooks for all bait fishing; 28" minimum size; allow states the ability to adopt more restrictive rules for fishermen and vessels licensed in their jurisdiction; adopt a 2-fish bag limit for recreational fishing; adopt one of the following sub-alternatives for commercial fishing: commercial trip limit of 40 fish per trip; or restrict commercial harvest to bycatch-only by imposing a limit of no more than x% of the total catch or 40 fish per trip, whichever is less).

Alternative 4: No Action (status quo; maintain moratorium in EEZ).

The next steps for the rulemaking process are to complete the draft EIS, then announcement its availability. After which, a comment period will be open and public hearings on the DEIS will be held. After the comment period and public hearings, NOAA Fisheries will determine whether or not to move forward with the proposed rule.

To get on the mailing list to receive DEIS once it is available, your information can be sent one of three different ways. An email can be sent to stripedbass.eez@noaa.gov; a fax to 301-427-2590; or postal mail to:

Anne Lange
Chief, State Federal Fisheries Division
Office of Sustainable Fisheries – F/SF8
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910

Please note that this is not the time to comment on the specific alternatives, rather the above information is provided to receive a copy of the DEIS. To do so, your information should include name, state, email and/or postal mail address, and finally, indicate if you would prefer an email with the web address of the DEIS, a CD with the DEIS, or a hard copy of the DEIS mailed to you.

Bycatch Data Collection Program

Per the request of Fred Schwab, Megan Gamble updated the Advisory Panel the progress towards developing an addendum to address striped bass bycatch. There are two phases to the Bycatch Reduction Program, mandated under Amendment 6. The first phase requires the adoption of an addendum within the first two years of implementing Amendment 6 to establish a mandatory bycatch data collection program. The Technical Committee will meet in early January to begin the development of this program/addendum. The Board will adopt the addendum before the end of 2005.

The second phase implements management measures geared to reduce the bycatch of striped bass via penalties for excessive bycatch problems and/or incentives to jurisdictions that implement measures to minimize the impact of discards. This addendum is to be implemented four years after the implementation of Amendment 6 (2007). The development of this second phase will not occur until after the initiation of the bycatch data collection program, as the information collected in the program is to be used to design phase two.

Advisory Panel Consensus Statement:

High priority should be given to the two bycatch addenda to ensure the deadlines set in Amendment 6 are met.

Election of Vice Chair

Louis Bassano, recreational fisherman from New Jersey, and Michael Doebley, recreational fisherman from Pennsylvania, were nominated for the position of vice chair to the Striped Bass Advisory Panel. The Advisory Panel members elected Michael Doebley as vice chair by way of secret ballot (9 in favor of Michael Doebley, 8 in favor of Louis Bassano).

Meeting adjourned at noon.

Appendix 1. 2004 Atlantic Striped Bass Advisory Report

State of the Stock

Stock Size: The estimate of total abundance for January 1, 2004 is 56.7 million age-1 and older fish due to the strong 2003 year-class. This estimate is about 11 million fish higher than the average stock size for the previous five years and 23.8% higher than the 2003 abundance.

Spawning Stock Biomass (SSB): The female spawning stock biomass for 2003 is estimated at 30 million pounds which is above the recommended biomass threshold of 28 million pounds (12,726 mt). However, most TC members expressed concern over the current estimates spawning stock biomass and, hence, the conclusions derived from these estimates.

Recruitment: Recruitment of the 2003 cohort for all stocks combined is 21.6 million age-1 fish and is the highest observed in the time series. Preliminary survey indices for young-of-the-year striped bass for 2004 in Chesapeake Bay indicate that the 2004 year-class is of average strength.

Fishing Mortality Rates: Based on VPA results, average age 8-11 fishing mortality in 2003 is estimated at $F=0.62$ (a 77% increase compared to 2002) and exceeds the Amendment 6 target of 0.30, and above the threshold of 0.41. However, all technical committee members expressed concern over the terminal year estimate of F from the VPA and, hence, the conclusions derived from this estimate.

Based on spawning area tagging programs, stock-specific, model-based estimates of fishing mortality in 2003, for fish greater than twenty-eight inches total length, were 0.40 for the Maryland portion of the Chesapeake Bay; 0.28 for the Rappahannock River; 0.28 for the Delaware River, and 0.09 for the Hudson River. Based on coastal tagging programs, fishing mortality estimates ranged from 0.09 for MA to 0.24 for the New York Ocean Haul Seine. The tag-based F estimates were not similar to the F (N-weighted) estimates (F in 2003 = 0.53) produced in the VPA and did not show an increase in F for 2004 (except for Maryland).

Chesapeake Bay fishing mortality in 2003 is estimated at $F=0.20$ by the direct enumeration study. This F represents mortality during the June 2002 – June 2003 period, so it is not directly comparable to the average, weighted (by N) VPA calendar-year F on age 3-8 striped bass equal to 0.18.

Exploitation Rates: Based on the tagging programs, R/M estimates produced by 3 (New York Ocean Haul Seine, Delaware River, Maryland/Chesapeake Bay) out of 8 programs were generally similar in magnitude to the exploitation rates derived using F estimates from the current ADAPT assessment for years 1990-1999. However since 2000, the R/M estimates have declined, indicating exploitation has decreased.

Catch: Total catch in numbers including landings and discards increased from 3.7 million fish in 2002 to 4.7 million fish in 2003, a 26.3 % rise losses. The 2003 catch was above the 1996-2003 average of 4.0 million. Ages 3 to 7 represented 64%, and ages 8+ represented 30% of the total catch in 2003. The 1998 and 1996 year-classes dominated the catch, accounting for 29% of total catch. Total catch of age 8+ fish increased from 926 thousand fish in 2002 to 1.4 million

fish in 2003 (the highest level recorded in the time series) and the proportion of 8+ fish in the catch increased to 30% in 2003 from 25% in 2002.

Recreational harvest (2.4 million fish) and discards (1.2 million fish) accounted for 76% of the total 2003 catch. Maryland recreational fisheries harvested 21.8% of total recreational landings, followed by MA (16.9%), VA (16.7%), NJ (16.3%), and NY (13%). The remaining states each landed 5% or less of the total recreational landings.

Commercial harvest (0.86 million fish) and discards (0.27 million fish) accounted for 24% of the total 2003 catch. Maryland commercial fisheries harvested 50.8% of the total commercial landings, followed by VA (18.7%), PRFC (9.6%), NY (7.9%), and MA (6.4%). The remaining states each landed 4% or less of the total commercial landings.

Data and Uncertainty: No new data sources are included in this year's assessment. Tuning indices are similar to those used in past years, with some minor adjustments to the age-specific indices (Maryland SSN, Massachusetts, and NEFSC).

The Technical Committee expressed great concern over the divergent patterns in F observed among the VPA and tag-based programs and believes that both methods need to be further scrutinized to reconcile the differences. Violation of the model assumptions is the primary reason believed to have created the model differences, and these are discussed below.

Some members of the Technical Committee were concerned that the VPA is not adequately robust when dealing with a mixed stock such as coastal striped bass. In addition, the survey indices used in the tuning process of the VPA may not be providing accurate trend estimates for older fish due to the surveys' abilities to track the striped bass abundance as the population abundance has potentially plateaued in recent years. Some members of the Technical Committee were concerned that the distribution of larger striped bass may have shifted to offshore waters as the population has increased in abundance. Since the EEZ is closed to harvest and there is limited fishery independent survey data for older striped bass beyond state waters, these fish may not be fully represented in the assessment. However, other TC members suggest this may not be an issue since MD and VA spawning ground surveys provide relative abundance data on these larger fish when they have migrated from the EEZ to the spawning grounds in the spring. Other methods that are capable of directly accounting for mixed stock management units should be explored in the future and self-evaluation of surveys by each state should be performed, following recommendation made by the VPA indices workshop.

Other members expressed concern that there is considerable error in the catch produced by the MRFSS survey in 2003. Some states did not believe that the increased harvest in some waves was real because the trend contradicted independent observations on fishing effort (hurricanes interrupted angling in 2003) and angler opinions. However, some states could account for the increases in harvest. Other members expressed concern that the estimates of harvest are underestimates because the winter fisheries in North Carolina and Virginia are not being taken into account. It is recommended by the TC that, at least, MRFSS survey in NC should be expanded into wave 1 to account for winter fisheries' harvest. Due to error in MRFSS catch estimates, the TC also recommends that some statistical catch-at-age models that be explored that could incorporate error and tagging information.

Some members were also concerned that the tag based estimates of survival among coastal programs were so variable and that the estimates changed considerably depending on the year reported. It is possible that the assumption of mixing and dispersal is not being adequately met to provide a comprehensive estimate of mortality. If such assumptions are violated, the estimates could change in trend and magnitude. Others questioned whether the reporting rate derived by DE and used by all states is accurate. Since reporting rate is an important variable used in tagging model and R/M estimates, the TC recommends that a high-reward, coast-wide tagging study be conducted in the future. In addition, more analyses to examine the violation of assumption in the tagging models should be conducted.

Some Technical Committee members believed it is time to notify the Board that there appears to be a problem with increasing natural mortality in Chesapeake Bay. Des Kahn, Vic Crecco, and John Hoenig presented analyses that showed an increase in natural mortality on younger individuals, which is concurrent with the incidence of mycobacterial disease. Several members agreed that the TC should tell the Board that there is some statistical evidence for an increase, but that not all empirical data (e.g., landings in Chesapeake Bay have increased despite supposed rise in M) supports the results of the model estimates. The TC could not resolve any plan of attack to address this issue, but recommends that it be further addressed over the next few months via email discussions.

Management Advice

Most striped bass technical committee members expressed concern over the current terminal estimates of F and spawning stock biomass from the VPA and, hence, the conclusions derived from these estimates. Most members agreed that the landings increased in 2003 compared to 2002 (some states liberalized regulations), and fishing mortality has probably increased compared to 2002, but they are skeptical that the F estimate from the VPA doubled. Since the 2003 F is a terminal year estimate and it has the highest error, most members believe that the F estimate produced by the ADAPT model will likely decrease when the stock assessment is updated in 2005, given the current retrospective pattern. Based on the ADAPT VPA estimates, the technical committee cannot say with certainty that overfishing is not occurring and that the population is not overfished. However, since since harvest increased compared to 2002, and the F estimates have been over the target since 1997, there is certainty that the target is still being exceeded. Until the uncertainties and divergences between the VPA and tag-based models are more fully investigated, the technical committee recommends that no liberalization of regulations occur at this time.

Appendix 2. Atlantic Menhaden Workshop Consensus Statements

Atlantic Menhaden Workshop October 12-14, 2004 Alexandria, VA

Consensus Statements

The following is a list of consensus statements from the state, federal and university scientists who participated in the Atlantic Menhaden Workshop.

Session 1: Status of menhaden's ecological role

- Atlantic menhaden play a unique role transforming primary productivity directly into fish biomass.
- Menhaden productivity depends on, and impacts water quality in the ways it supports primary production.
- Menhaden are important prey for large predators, historically at least in Chesapeake Bay and North Carolina they were the dominant prey species. This dominance has diminished. We can quantify the role as a filter feeder, we can quantify them as prey coastwide, however, abundance in Chesapeake Bay is needed to quantify this role regionally.
- We have the tools (Striped bass and menhaden bio-energetic models), but have not conducted a holistic quantitative analysis of the ecological role of menhaden.
- The abundance of Atlantic menhaden in Chesapeake Bay remains unknown.
- Menhaden may be the last major abundant inshore clupeid.
- There is a possibility of a link between striped bass disease and abundance of menhaden, however more research is needed.
- There may be a relative imbalance between the prey needs of an increased striped bass population and a decreased abundance of menhaden juveniles (age zeros and ones) in Chesapeake Bay
- While there was not consensus by the committee as causes for low recruitment to age zero in Chesapeake Bay, the following are possible causes:
 - A) Insufficient Spawning Stock Biomass
 - B) Eggs and larvae not being brought into Chesapeake Bay (transport)
 - C) Poor survival to at least several months old (unfavorable conditions of salinity, or temperature, mismatch of food, disease, and predation)
 - D) There is emerging evidence that climate forcing may play an important role
- There is an ongoing concern of the decadal decline in recruitment in Chesapeake Bay.

- Menhaden have diminished compared to their historical abundance in the Chesapeake Bay.
- As a prey species menhaden serve a much stronger role then 10 to 15 years ago.
- Menhaden continue to serve an important ecological role although their relative contribution in terms of forage and filtering has diminished because of their reduced abundance.

Session 2: Reference points implications for menhaden's ecological role

- The current reference points are related to the coastwide stock. They use Fishing mortality and reproductive capacity. They are based on a single species model. These are biological reference points, they do not take into account socio-economic factors. The reference points are designed for stock replacement.
- There is a need for an additional reference point (threshold) for juvenile abundance (age zeros and ones), which may require management action within a separate fishery within its ecosystem if exceeded.
- The Management Board should task the Technical Committee with exploring the possibility of including the effects of predation mortality on menhaden reference points (Collie and Gislason, 2001, Patterson 1992, Washington State Forage Management Plans, for example). Explore the possibility of including the MSVPA results.
- The Management Board has to provide advice to the Technical Committee on what the goals and priorities are, and frame a spectrum of possibilities to develop ecologically based reference points.

Session 3: Effects of concentrated harvest in the Chesapeake Bay

- Localized Depletion occurs when migratory immigration of menhaden is insufficient to replace removals.
- Localized Depletion of Atlantic menhaden effects two factors:
 - 1) Availability for predation
 - 2) Filtering capacity
- To determine if localized depletion is occurring, there must be a reference point.
- The localized depletion in the Bay can be characterized both as a forage shortage of recruits and as a shortage of filtering capacity of all ages in the stock.

- The reduction fishery does not directly focus on zeros and ones, but the harvest of the ages 2+ could result in feedback through regional spawning and recruitment processes that impact the Chesapeake Bay.
- We don't know the absolute abundance in the bay and we don't know what proportion of age zeros and ones is assigned to the bay.
- Data available to define localized depletion: Catch Per Unit Effort (CPUE), RI trap survey, DE trawl survey, pound net survey,
- If abundance declines however, purse seine CPUE will not decline at the same rate. A decline in CPUE can be used as a conservative (under estimates) indicator of abundance
- We don't know enough to accurately estimate the probability that localized depletion is occurring. We won't know the probability until we conduct the research that the Technical Committee has outlined
- The following are risks associated with localized depletion:
 - 1) Reduced forage for predators
 - 2) Reduced filtering capacity
 - 3) The disruption of the food web
 - 4) Within species genetic diversity

Session 4: Recommendations for a revised or new direction in fisheries management

- Examples of how other forage fisheries are managed:
 - 1) Atlantic Herring- Precautionary approach: OY is 20% less than MSY. Target is the threshold, which is OY.
 - 2) Closed a three mile corridor off of Tampa Bay for the Sardine/Anchovy fishery
 - 3) Some forage fisheries are managed by shutting down the harvest and leaving them for other purposes.
- Given the information presented during this workshop, the following is scientific advice to the Board on a revised or new direction in fisheries management.
 - 1) Time and space closures/openings have potential as a management tool.
 - 2) Develop reference points specific to Chesapeake Bay
 - 3) Need to quantify predation mortality and produce estimates of abundance of menhaden to develop ecologically based reference points
 - 4) Technical Committee/ Staff should examine the forage Fishery Management Plans of Alaska, Washington, and determine if they can be applied to the menhaden fishery.
 - 5) The Management Board should task the Technical Committee with exploring the possibility of including the effects of predation mortality on menhaden reference points

(Collie and Gislason, 2001, Patterson 1992, Washington State Forage Management Plans, for example). Explore the possibility of including the MSVPA results.

- 6) A Multispecies Technical Committee should be formed.
- 7) Confront the need and potential mechanisms for management that cross single species management boundaries.
- 8) Establish values and goals for population utilization that acknowledge ecosystem service and fisheries support provided by the menhaden population.
- 9) Have joint meetings between the Management Board and Technical Committee to accomplish above task.
- 10) The Technical Committee should evaluate additional reference points to address menhaden's ecological role
- 11) Explore the concept of an escapement based approach, (for example, closed seasons, area closures)
- 12) Investigate the issue of low recruitment in the Chesapeake Bay and what is causing it. One hypothesis is striped bass predation is reducing young of the year abundance prior to YOY surveys. Stomach content field studies and bioenergetic studies can be used to evaluate this hypothesis. Spatial temporal overlap must be taken into account.
- 13) The Management Board should charge the Technical Committee to meet with the ecopath/ecosim modelers to exchange information as soon as possible.