Atlantic States Marine Fisheries Commission

Atlantic Striped Bass Management Board

February 4, 2014
10:15 a.m. – 12:15 p.m.
Alexandria, Virginia

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1.	Welcome/Call to Order (*T. O'Connell)*	10:15 a.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from October 2013	10:15 a.m.
3.	Public Comment	10:20 a.m.
4.	Consider Draft Addendum IV for Public Comment (*M. Waine)* **Action** • Technical Committee Report on Reference Points (*C. Godwin*) • Catch and release fishing in the Exclusive Economic Zone	10:30 a.m.
5.	Consider 2013 FMP Review and State Compliance (*M. Waine)* **Action**	12:00 p.m.
6.	Other Business/Adjourn	12:15 p.m.

The meeting will be held at the Crown Plaza, 901 North Fairfax Street, Alexandria, VA 22314; 703-683-6000

Atlantic States Marine Fisheries Commission

MEETING OVERVIEW

Atlantic Striped Bass Management Board Meeting
Tuesday, February 4, 2014
10:15a.m. – 12:15p.m.
Alexandria, Virginia

Chair: Tom O'Connell (MD) Assumed Chairmanship: 02/12	Technical Committee Chair: Charlton Godwin (NC)	Law Enforcement Committee Rep: Kurt Blanchard (RI)
Vice Chair: Doug Grout	Advisory Panel Chair: Kelly Place (VA)	Previous Board Meeting: October 28, 2013
Voting Members: ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, DC, PRFC, VA, NC, NMFS, USFWS (16 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from October 2013 Meeting

3. Public Comment – At the beginning of the meeting, public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance, the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Consider Draft Addendum IV for Public Comment (10:30a.m. – 12:00 p.m.)

Background

- The 2013 Striped Bass Stock Assessment recommended changes to the fishing mortality reference points that were consistent with the spawning stock biomass reference points.
- The Board initiated development of a draft addendum to consider changes to the fishing mortality reference points in October 2013 (**Supplemental Materials**).
- The Board tasked the Technical Committee with developing stock specific reference points for the Chesapeake Bay and Albemarle Sound/Roanoke River stocks (**Supplemental Materials**).
- Board members would like to discuss catch and release fishing in the EEZ and consider a potential recommendation to NOAA Fisheries for regulatory changes through the proposed draft addendum.
- As a reminder, Draft Addendum IV addresses the change in reference points and a second addendum (Draft Addendum V) will consider management options to achieve the new reference points. Draft Addendum V will be considered for public comment at the May Board meeting.

Presentations

- Overview of Draft Addendum IV for Public Comment by M. Waine
- Technical Committee Report by C. Godwin

Board Actions for Consideration

- Approve Draft Addendum IV for Public Comment.

5. Consider 2013 FMP Review and State Compliance (12:00– 12:15 p.m.) Action
Background • State Compliance Reports are due on June 15 (**Briefing CD)** • The Plan Review Team reviewed each state report and drafted the 2013 FMP Review (**Briefing CD**)
Presentations • Overview of the 2013 Fishery Management Plan Review by M. Waine
Board actions for consideration at this meeting • Accept the 2013 Fishery Management Plan Review

6. Other Business/Adjourn

Board letter Jan 2014

January 28, 2014
916 Rahway Drive
Newark DE 19711

Striped Bass Management Board
ASMFC

Dear Commissioners,

I would like to draw your attention to a point made in the recent peer-reviewed striped bass stock assessment. The restrospective analyisis in that document examined how stable and reliable the estimates of spawning stock biomass and fishing mortality from the Statistical Catch at Age model were as additional years of data were added. The estimates for 2005 were examined as an example. These estimates were based on data through 2005.

What this retrospective analysis showed was that, as additional years of data were added, the estimates of these management parameters were unstable and unreliable in the Statistical Catch at Age model. The estimate of biomass increased as each additional year of data was added, until by the time the 2012 data was added, the estimate of biomass had increased by 37%.

This result is of serious concern. It indicates that the terminal year's estimate of spawning biomass, which is the one that managers such as yourself normally base decisions on, are biased low and are not reliable estimates of spawning biomass. These estimates for 2012, for example, will increase as additional years of data are added.

By the same token, the retrospective analysis in the assessment showed that the estimate of fishing mortality is overestimated, since the estimate of F for 2005 decreased as more years of data were added.

Consequently, the retrospective analysis indicates that the model estimates of spawning biomass and fishing mortality for the most recent years have become unreliable and unstable.

My final point is that a dominant year class was produced in the Chesapeake Bay in 2011, which has already caused some increase in total coastal recreational catch-per-unit effort, although these fish were only two years old in 2013. This year, they will begin to move out onto the coast and abundance experienced by the recreaional fishery will increase. To increase female spawning stock biomass, they will have to grow up and mature, however.

Yours Truly,

Desmond M. Kahn, Ph.D.

former member, ASMFC Striped Bass Stock Assessment Subcommittee
former Chair, ASMFC Striped Bass Tag Subcommittee
former Chair, ASMFC Striped Bass Technical Committee

MOTION

The members of the Cape Cod Flyrodders consider ourselves to be sportsmen and conservationists. We are passionate about our sport and support the "catch and release" philosophy.

Studies have proven that the recreational catch of striped bass has declined by more than 80% over the last several years.

According to the Atlantic States Marine Fisheries Commission (ASMFC), the 2013 stock assessment for striped bass indicates the stock is on the decline and that decline will continue over the next few of years due to low reproduction rates. The simple fact is that recreational and commercial fishermen are killing more fish than are being reproduced.

In 2011 the Massachusetts Marine Fisheries Director recommended that taking action to reduce fishing mortality by a small amount could prevent having to take more significant cuts a few years down the road. The situation has not improved since then and despite the Director's advice no action is being contemplated until 2015.

The Cape Cod Flyrodders unanimously support legislation or regulations that will reduce the recreational catch of striped bass from the current two fish per day to one fish per day and substantially reduce or eliminate the commercial fish quota until the stock is substantially replenished.

Politics and self interest must be put aside. The time to act is now. We ask that both the ASMFC and the Massachusetts Marine Fisheries Commission take immediate steps to protect this valuable resource before it is too late.

We ask that all responsible fishermen support these efforts.

Richard Hunt

Mr. Doug Jenkins, Sr.

Hi Mike;

We are loosing our Spot Tail Fishery Along with our Valuable Crab Industry.

Something MUST Be Done Now To Halt the over A Bundance of small Rock-Fish In the Chesapeak Bay Ecosystem.

It's Time For ASMFC Leaders, To Face up To The Facts. Hope To Talk on ph Soon Doug

FORUM

COMMENTARY • LETTERS • PERSPECTIVES

Citizen-scientist Jim Price has earned his stripes studying rockfish

By Tom Horton

"Fishing is great," is what you'll hear from the charter captains around the popular striped bass sportfishing port of Tilghman Island in the mid-Chesapeake.

But ask the fish and they'd tell a more complicated story. For years, Jim Price, a rare citizen-scientist in an era where Ph.Ds dominate Bay research, has been listening attentively.

Mostly on his own hook, he catches or buys around 1,500 stripers, or rockfish, annually. He analyzes every one to see what they're eating year-round, as well as whether they have adequate fat reserves or show signs of disease.

His surveys range from his native Choptank River, to the Virginia Chesapeake and the mid-Atlantic coastal ocean—more than 12,000 fish to date.

"He's meticulous and his data is incredibly valuable," said Jim Uphoff, a senior fisheries scientist with Maryland's Department of Natural Resources. "Most Ph.D. studies only last a few years and don't cover the whole Bay like Jim. He is the epitome of the citizen scientist," Uphoff said.

"I'm curious and I like to fish," said Price, a retired jeweler from a family of commercial fish netters in the Caroline County river town of Choptank.

In the stomachs of the fish coming to the dock at Tilghman, Price sees little of the menhaden, bay anchovies, and blue crabs associated with rockfish diets. Instead the fish are full of cut-up chunks of spot, used by charter boats to lay a trail of "chum" or "chunks" to attract fish to their clients' lures trailing behind the boat.

"Essentially, they are doing the same thing I'm doing in my aquarium, running a feeding operation, but on a larger scale," Price said. Uphoff said there's no evidence that this is hurting the overall rockfish population, but it shows "great fishing" can be partly the result of artificially concentrating fish.

Similarly, Price said, rockfish can look fat and healthy on casual inspection, but they frequently turn out on analysis to have absorbed water as fat reserves shrank.

His work has convinced Price that rockfish nowadays are getting inadequate nutrition. Body fat's down, disease is up and bigger fish appear in decline. Only in 2010, when they were able to exploit an unusually large number of small spot—not a big part of their normal diets—did the bulk of the fish he sampled seem well-nourished.

"Of all the threats to stripers I used to worry about, not having enough food was one I never imagined," he said.

Indeed, Price founded his Chesapeake Bay Ecological Foundation in the early 1980s to stop the massive overfishing of the bass coastwide by sport and commercial fishermen.

He was a player in Maryland's leading a virtual coastwide moratorium on rockfishing that lasted from 1985 until 1990. It worked; and the explosion of rockfish by the mid-90s is considered a success story of Bay restoration.

But again, if you ask the rockfish, they tell a more complicated story. It is one thing to bring back a species; quite another to ensure the ecosystem can sustain it.

For rockfish, that ecosystem centers on menhaden, a fish so nutritious and historically numerous that W.K. Brooks, an early Bay scientist, would write in 1893: "All our best and most valued food fishes are only menhaden in another shape."

Menhaden numbers have plummeted since the 1970s. This has brought pressure on Omega Protein in Reedville, VA, whose fleets of spotter aircraft and factory ships catch them by the hundreds of millions for fish oils and meal. A "cap" enacted on Omega's catches is fairly meaningless, Price said, as it is higher than current fishing levels.

Jim Price holds a rockfish that he has just caught in the Choptank River. He catches or buys around 1,500 rockfish annually to analyze what they are eating. Photo / Dave Ha

Uphoff agreed that we aren't leaving enough menhaden for the rockfish; but their downturn is more complicated than just Omega's fishing. Food webs in the Bay at the fundamental level of the plankton on which menhaden feed may have shifted toward less nutritious types. Research on this critical issue is "bogged down" he said.

Meanwhile, Price is tracking other shifts: big female striped bass spawners are arriving earlier from the ocean to gorge on eels in December at the Bay's mouth; bay anchovies, another important rockfish food, are at a low ebb, perhaps from the bass trying to make up for a lack of menhaden; and rockfish are eating more small blue crabs, a relatively pc source of calories.

Have we brought the rockfish bacl to an ecosystem that can no longer support so many? Should powerful Omega Protein get so large a share of what was recognized by Brooks more than a century ago as the "most important fish in the sea?"

Fisheries managers are struggling to sort it out. When they do, Jim Pric citizen-scientist, will deserve a lot of the credit.

Tom Horton covered the Bay for 33 years for The Baltimore Sun and is author of six books about the Chesapeake.

Note Omega Protein Don't Harvest small Menhaden that small Rock Feed on. Small menhaden Doesn't Have the oil & meal like larger ones!

Atlantic States Marine Fisheries Commission

DRAFT ADDENDUM IV TO AMENDMENT 6 TO THE ATLANTIC STRIPED BASS INTERSTATE FISHERY MANAGEMENT PLAN FOR PUBLIC COMMENT

This draft document was developed for Management Board review and discussion. This document is not intended to solicit public comment as part of the Commission/State formal public input process. Comments on this draft document may be given at the appropriate time on the agenda during the scheduled meeting. If approved, a public comment period will be established to solicit input on the issues contained in the document.

ASMFC Vision Statement:
Healthy, self-sustaining populations for all Atlantic coast fish species or successful restoration well in progress by the year 2015.

February 2014

Public Comment Process and Proposed Timeline

In October 2013, the Atlantic Striped Bass Management Board initiated an addendum to the Interstate Fishery Management Plan (FMP) for Atlantic Striped Bass to consider changes to the biological reference points. This draft addendum presents background on the Atlantic States Marine Fisheries Commission's (ASMFC) management of striped bass, the addendum process and timeline. Also provided are a statement of the problem and options of striped bass reference points for public consideration and comment.

The public is encouraged to submit comments regarding this document at any time during the addendum process. The final date comments will be accepted is XXXXX. Comments may be submitted by mail, email, or fax. If you have any questions or would like to submit comment, please use the contact information below.

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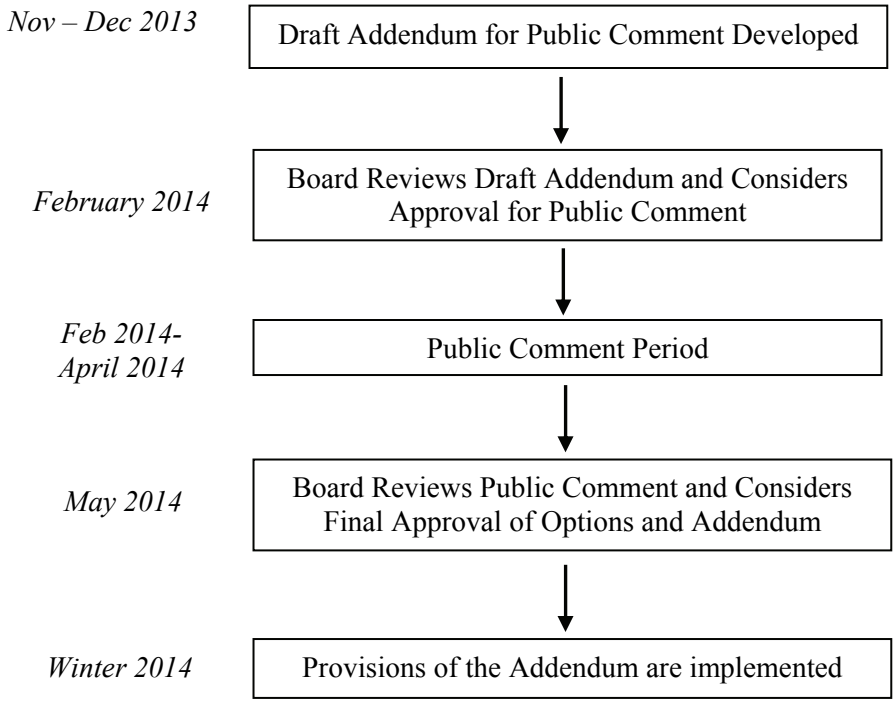

1.0 Introduction

The Atlantic States Marine Fisheries Commission (ASMFC) has coordinated interstate management of Atlantic striped bass (*Morone saxatilis*) from 0-3 miles offshore since 1981. The management unit includes all coastal migratory stocks between Maine and North Carolina. Atlantic striped bass is currently managed under Amendment 6 to the Fishery Management Plan (FMP) approved February 2003 and Addenda I–III. Management authority from 3-200 miles from shore rests with NOAA Fisheries.

2.0 Management Program

2.1 Statement of the Problem

There are two biological reference points for striped bass currently used for management. The first is based on fishing mortality (F) and is set to achieve maximum sustainable yield (F_{msy}). The second is based on spawning stock biomass (SSB) and is equal to the SSB value in 1995, which was the year that the striped bass stock was declared recovered. However, maintaining F_{msy} does not result in achieving the SSB reference points because these reference points are derived by different methods. To address this issue, the 2013 benchmark stock assessment recommended new fishing mortality reference points that were derived from projections set to stabilize SSB at the 1995 level. This procedure provides consistent biological reference points and was accepted by the Striped Bass Management Board (Board) for management use in October 2013. An addendum to the FMP is required to implement new biological reference points. The proposed addendum also needs to consider changes to stock specific F reference points for the Chesapeake Bay and Albemarle Sound/Roanoke River stocks because these stocks are being managed with reduced F targets to account for their harvest of smaller fish than the coastwide fishery.

2.2 Background

2.2.1 Biological Reference Points for Striped Bass

In the early 1990s, the status of Atlantic striped bass stocks was determined using annual tag-based estimates of survival and the associated fishing mortality. Fishing mortalities that produced a sustainable population were estimated in simulation models developed by Rago and Dorazio, as well as Crecco, and described in the Amendment 4 source document (ASMFC 1990). Subsequent to Amendment 4, a relative index of spawning stock biomass was developed using a forward projecting model of age-0 recruits as determined by the time series of Maryland juvenile indices (ASMFC 1998). The SSB index served as the basis for developing a biomass threshold for evaluation of the stock rebuilding status. The SSB index increased to a level comparable to historic abundance in the 1960s and consequently, in 1995, the striped bass stock was declared restored. The modeling approach used for the SSB index also served as the basis for the Crecco model for biological reference points, specifically F_{MSY} (ASMFC 1998). The model applied a combination of minimum sizes (20" in producer areas and 28" on the coast) to define full recruitment to the fisheries. The biological reference point of $F_{MSY} = 0.40$ was adopted in Amendment 5 and a target F of 0.31 was established with a subsequent addendum to the FMP. A lower target F of 0.28 for the producer areas was derived based on equivalent SSB/R when the jurisdictions requested a reduction in their minimum size limit from 20 to 18 inches. These values were compared against annual tag based estimates of F for determination of stock status.

In 2003, the ASMFC adopted Amendment 6 to the Striped Bass FMP (ASMFC, 2003). As part of the amendment, new biological reference points were established. F_{MSY}, estimated using a Shepherd/Sissenwine model, was adopted as $F_{threshold}$ for the coastal stock. An exploitation rate of 24%, or F=0.30 was chosen as F_{target}. Target F for the Chesapeake Bay, was reduced proportionately to 0.27. $SSB_{threshold}$ for the coastal stock was chosen to be slightly greater than the female spawning stock biomass in 1995 when the population was declared recovered. SSB_{target} was set to 25% greater than $SSB_{threshold}$. No biomass targets were chosen specifically for Chesapeake Bay.

These biological reference point definitions were maintained for the 2007 assessment. Point estimates of SSB_{target} and $SSB_{threshold}$ were calculated from the SCA model and updated in 2008. The estimate for F_{MSY} was derived using the results of the 2007 assessment, updated in 2008, in which four stock-recruitment models were considered: a Ricker, a log-normal Ricker model, a Shepherd and a log-normal Shepherd model. The Striped Bass Technical Committee (TC) used a model averaging approach among the four results, producing an estimate of F_{MSY} = 0.34 (range of 0.28-0.40). The F_{target} remained the 24% exploitation rate, F=0.30 (these are currently the reference points used for management).

In October 2013 the Board approved new biological reference points for the Atlantic coast striped bass following the SAW/SARC 57 review of the benchmark assessment of striped bass stock status. New values for $F_{threshold}$=0.219 and F_{target} = 0.180 were recommended so that both F and SSB reference points were internally consistent (ASMFC 2013). The new fishing mortality reference points were suggested from modeling which showed that these F values would result in SSB equaling the SSB threshold and target, respectively, longterm. Since no reference points for Chesapeake Bay and other producer areas were considered by SAW/SARC57, the Management Board charged the TC with the adjustment of the reference points for the Chesapeake Bay and Albemarle Sound/Roanoke River stocks.

2.2.2 Chesapeake Bay Stock Reference Points

From 1993 through 2004 estimation of striped bass fishing mortality in Chesapeake Bay relied on a summer-fall tagging study. Tags were applied to fish in Maryland and Virginia in several rounds beginning in June and ending in November of each year. A logistic regression model was applied to the data to produce an annual estimate of F (Goshorn et al., 1998).

Historically, an additional value of 0.1 was added to the estimated F value to account for non-harvest related losses, e.g., catch and release mortality, and poaching. The summer-fall tagging study was terminated in 2004 due to resource constraints and difficulties in obtaining fish for tagging.

Starting in 2005, estimates of fishing mortality were based on annual recaptures of fish tagged in spring on the spawning grounds. These were analyzed using the MARK model, catch equation, and Instantaneous Rates Catch and Release model (IRCR, Jiang et al, 2007). Tag based estimates are produced for three groups of fish sizes: greater than 18 inches, greater than 28 inches and males between18-28 inches. The latter is considered to represent the resident population of striped bass in Chesapeake Bay.

These tag-based F estimates were compared to F_{target} (F=0.28 prior to 2003 and F=0.27 since 2003). Observed fishing mortalities were generally below the target for the entire period of

observation. Tag-based estimates are produced on an annual basis, reviewed by the ASMFC Striped Bass Tagging Subcommittee, and reported in annual stock assessment updates and benchmark assessment documents.

Chesapeake Bay jurisdictions (Maryland, Virginia, and the Potomac River Fisheries Commission) employ a Harvest Control Model (HCM) developed by Rugolo and Jones (1989) to set the catch limits that will ensure that annual fishing mortality does not exceed the target F. An exploitable stock size (ESB) is an integral element of the HCM. ESB is a relative measure of striped bass biomass in Chesapeake Bay which is calculated based on the forward projection model developed by Crecco and Rugolo (1998). The model projects a striped bass juvenile index of abundance forward by applying constant natural mortality, year-specific fishing mortality, age- and size-specific selectivity and emigration rates. The model has been reviewed by the TC in the past, including the software programming code.

According to the HCM approach, catch in year *t+1* is calculated as catch in previous year (*t*) multiplied by the relative change in fishing mortality F from year *t* to year *t+1* and by the relative change in exploitable stock size (ESB) from year *t* to year *t+1*.

$$C_{t+1} = C_t * \partial F * \partial ESB = C_t \frac{F_t}{F_t} \frac{ESB_{2t+1}}{ESB_t}$$

Estimated catch in numbers is then multiplied by the mean weight of fish in the Bay-wide catch to obtain harvest in weight. The maximum allowable catch for year t, is calculated by assuming fishing mortality in the projected year is equal to the maximum allowable (target) F. This number can be further adjusted based on the consideration of trends in the stock and uncertainty in the estimate of F.

3.0 Management Options

The section below will replace section 2.5.1 "Fishing Mortality Target and Threshold of Amendment 6 of the FMP.

3.1 Coastal Migratory Stock

Threshold reference points are the basis for determining stock status (i.e., whether overfishing is occurring. When the fishing mortality rate (*F*) exceeds the *F*-threshold, then overfishing is occurring; the rate of removal of fish by the fishery exceeds the ability of the stock to replenish itself.

Option 1 – Status quo, the fishing mortality reference points are based on maximum sustainable yield:

Fmsy target = 0.34
Fmsy threshold = 0.30

Option 2 – the fishing mortality reference points are internally consistent with the 1995 SSB target and threshold:

Ftarget = 0.180
Fthreshold = 0.219

3.2 Stock Specific Reference Points for Producer Areas

See stock specific reference point memo by the Striped Bass Technical Committee

The Board will evaluate the current estimates of F with respect to its reference points (*Section 3.1 and 3.2*) before proposing any additional management measures. If the current F exceeds the threshold level, the Board will take steps to reduce F to a level that is at or below the target; if current F exceeds the target, but is below the threshold, the Board should consider steps to reduce F to a level that is at or below the target. If current F is below the target F, then no action would be necessary to reduce F.

Section 4.1 in Amendment 6 contains management triggers to prevent overfishing the striped bass resource and ensure the objectives of Amendment 6 are achieved. Management triggers are evaluated upon receipt of an updated or benchmark stock assessment.

4.0 Compliance

Management programs addressing the biological reference points for striped bass will be effective immediately upon approval of the addendum document.

5.0 Literature Cited

ASMFC. 1990. Source document for the supplement to the Striped Bass FMP - Amendment #4. Washington (DC): ASMFC. Fisheries Management Report No. 16. 244 p.

ASMFC. 1998. Amendment 5 to the Interstate Fishery Management Plan for Atlantic Striped Bass. Washington (DC): ASMFC. Fisheries Management Report No. 24. 31 p.

ASMFC. 2003. Amendment 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass. Washington (DC): ASMFC. Fisheries Management Report No. 41. 63 p.

ASMFC. 2013. Update of the Striped Bass Stock Assessment using Final 2012 Data. A report prepared by the Atlantic Striped Bass Technical Committee. 74 p.

Crecco V and Rugolo L. 1998 Use of the spawning stock biomass model (SSB) to project quotas for Atlantic coast striped bass. Appendix I to the Amendment 5 source document.

Jiang H, Pollock KH, Brownie C, Hoenig JM, Latour RJ, Wells BK, Hightower JE. 2007. Tag return models allowing for harvest and catch and release: evidence of environmental and management impacts on striped bass fishing and natural mortality rates. North American Journal of Fisheries Management 27:387-396.

Goshorn C, Smith D, Rodgers B, Warner L. 1998. Estimates of the 1996 striped bass rate of fishing mortality in Chesapeake Bay. Annapolis (MD) and Kearneysville (WV): Maryland Department of Natural Resources, USGS Leetown Science Center. A report to the ASMFC Striped Bass Technical Committee. 31p.

Rugolo L.J. and P.W. Jones. 1989. A recruitment based inter-season harvest control model for Chesapeake Bay striped bass. Maryland Department of Natural Resources, Annapolis, Maryland, 51 p.

Atlantic States Marine Fisheries Commission

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MEMORANDUM

January 29, 2014

TO: **Atlantic Striped Bass Management Board**

FROM: **Atlantic Striped Bass Technical Committee**

RE: **Request for Board Guidance on Chesapeake Bay Reference Points**

Since no reference points for Chesapeake Bay and other producer areas were considered by the 2013 benchmark stock assessment, the Management Board charged the ASMFC Striped Bass Technical Committee with the adjustment of the reference point for the Chesapeake Bay and Albemarle Sound/Roanoke River stocks.

Biologically, the Chesapeake Bay population is recognized as one of several stocks that make up the coastwide meta-population, but the current assessment cannot model the Chesapeake Bay stock separately. Estimates of fishing mortality and total abundance are for the entire coastwide population. Thus, there are constraints on the meaning and utility of the reference points the TC can provide. The TC is requesting additional guidance from the Board on the purpose of these reference points within the management framework for striped bass.

Reference points in fisheries management serve two purposes: they determine stock status and they are used to set a sustainable quota. Because of the limits of the current modeling framework and the available data, the TC cannot develop a single set of reference points to accomplish both goals.

Option 1: The TC can develop reference points to assess the impact of the Chesapeake Bay fleet on the total coastwide stock and determine whether the Chesapeake Bay fleet is overfishing the coastwide stock.

To determine stock status, an estimate of current fishing mortality is compared to the $F_{threshold}$; if the current F is above the threshold, overfishing is occurring. In order for the $F_{threshold}$ to be meaningful, we must have an estimate of current F that is derived from a model with similar assumptions. Historically, the current F in the Chesapeake Bay was derived from a tagging model and compared to model-based reference point ($F_{threshold}$). However, in recent years, estimates of F from the tagging model have been consistently lower than estimates of F from the statistical-catch-at-age (SCA) model that is used to assess the coastwide population, despite the fact that estimates of total mortality (natural + fishing mortality) are similar. This may be due to increases in natural mortality that are not included in the SCA model, or changes in the tag reporting rate that are not included in the tagging model (or a combination of both). This indicates that estimates of F from the tagging model are not directly comparable to estimates of F from the SCA model and from the YPR and SPR models used to develop the current Chesapeake Bay reference points. If the estimates of current F for the Chesapeake Bay stock are biased low compared to the reference F, the Board runs the risk of not recognizing when overfishing is occurring on the coastal stock?.

The current SCA model estimates the fishing mortality that the Chesapeake Bay fleet exerts on the total coastwide population of striped bass. Because of data limitations, the model is not stock-specific, and

thus cannot measure the impact of fishing on the Chesapeake Bay stock. The TC can develop reference points for the Chesapeake Bay fleet, and compare the SCA model estimates of F in a given year for the Chesapeake Bay fleet to that reference point to evaluate the overfishing status of the Chesapeake Bay fishery, to ensure that the impact of the Chesapeake Bay fleet on the total coastwide population is sustainable.

However, SCA-based reference points for the Chesapeake Bay fleet cannot be used to set an annual quota, because the SCA estimates of F are for the entire coastwide population, not the Chesapeake Bay stock specifically.

Option 2: The TC can develop reference points to set a sustainable annual quota for the Chesapeake Bay fleet.

The current method of quota-setting for the Chesapeake Bay jurisdictions (MD, VA and PRFC) requires a target F value. These jurisdictions employ a Harvest Control Model (HCM) developed by Rugolo and Jones (1989) to set the catch limits that will ensure that annual fishing mortality does not exceed the target F. An exploitable stock size (ESB) is an integral element of the HCM. ESB is a relative measure of striped bass biomass in Chesapeake Bay which is calculated based on the forward projection model developed by Crecco and Rugolo. The model projects a striped bass juvenile index of abundance forward by applying constant natural mortality, year-specific fishing mortality, age- and size-specific selectivity and emigration rates. The model has been reviewed by the TC in the past, including the software programming code.

According to Harvest Control Model approach, catch in year ***t+1*** is calculated as catch in previous year (***t***) multiplied by the relative change in fishing mortality F from year ***t*** to year ***t+1*** and by the relative change in exploitable stock size (ESB) from year ***t*** to year ***t+1***.

$$C_{t+1} = C_t * \partial F * \partial ESB = C_t \frac{F_{t+1}}{F_t} \frac{ESB_{2t+1}}{ESB_t}$$

Estimated catch in numbers is then multiplied by the mean weight of fish in the Bay-wide catch to obtain harvest in weight.

The maximum allowable catch for year **t**, is calculated by assuming fishing mortality in the projected year is equal to the maximum allowable (target) F. In practice, this number is further adjusted based on the consideration of trends in the stock and uncertainty in the estimate of F, so that the quota that is set is based on an F that is lower than the current F_{target}.

This method relies on estimates of relative change in F and ESB and has been employed to maintain a fairly constant level of exploitation on the Chesapeake Bay stock. An alternative to this method that would not require F reference points would be to use the catch history of the Chesapeake Bay to set a quota that is consistent with the historical performance of the fleet.

The TC can develop model-based or historical proxy reference points to ensure that the quota set for the Chesapeake Bay is sustainable for both the Chesapeake Bay stock and the total coastwide stock complex. However, because there is currently no way of producing point estimates of the F on the Chesapeake Bay stock that are consistent with these reference points, these reference points cannot be used to assess the overfishing status of the Chesapeake Bay fishery.

The TC needs guidance on what purpose Chesapeake Bay reference points will serve in the striped bass management framework in order to provide values that are biologically meaningful. If the Board wants reference points to establish overfishing status and to set quotas, the TC can provide two sets of reference points, but it's important that the FMP explicitly spell out how each reference point should be interpreted and how they will be used in management.

The TC discussed reference points for the Albemarle Sound/Roanoke River stock, but final results from North Carolina's stock assessment will not be ready until completion of the peer review which is expected at the end of February 2014. Considering North Carolina has the ability to model their stock's population dynamics, the TC expects reference points for the Albemarle Sound/Roanoke River stock to come directly from the results of the assessment.