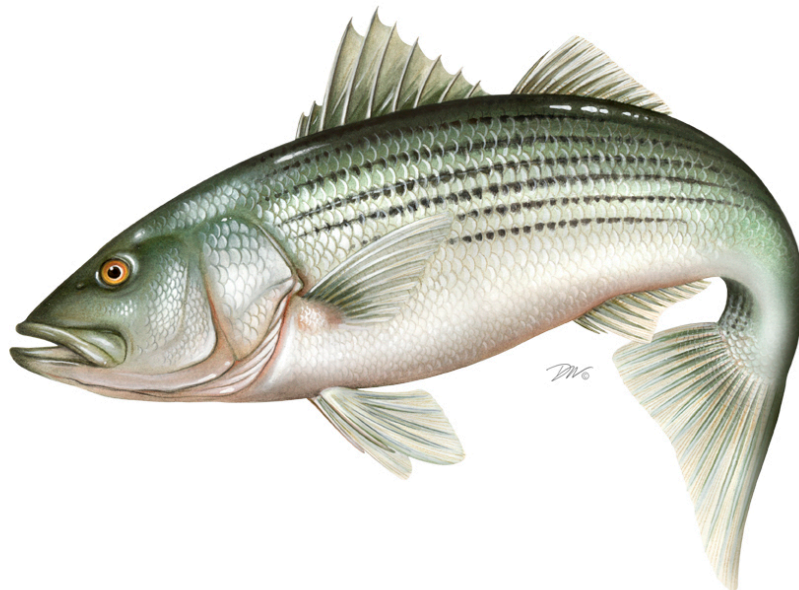


Atlantic States Marine Fisheries Commission

PUBLIC INFORMATION DOCUMENT

**For Amendment 7 to the
Interstate Fishery Management Plan For**

ATLANTIC STRIPED BASS



February 2021



Sustainable and Cooperative Management of Atlantic Coastal Fisheries

The Atlantic States Marine Fisheries Commission seeks your input on the initiation of Amendment 7 to the Atlantic Striped Bass Fishery Management Plan

The public is encouraged to submit comments regarding this document during the public comment period. Comments must be received by **5:00 PM (EST) on April 9, 2021**. Regardless of when they were sent, comments received after that time will not be included in the official record. The Atlantic Striped Bass Management Board will consider public comment on this document when developing the first draft of Amendment 7.

You may submit public comment in one or more of the following ways:

1. Attend public hearings pertinent to your state or jurisdiction; given COVID-19, its likely most hearings will occur via webinar.
2. Refer comments to your state's members on the [Atlantic Striped Bass Board](#) or [Atlantic Striped Bass Advisory Panel](#), if applicable.
3. Mail, fax, or email written comments to the following address:

Emilie Franke
Fishery Management Plan Coordinator
Atlantic States Marine Fisheries Commission
1050 North Highland Street, Suite 200A-N
Arlington, Virginia 22201
Fax: 703.842.0741
comments@asmfc.org (subject line: Striped Bass PID)

If you have any questions please call Emilie Franke at 703.842.0740.

**YOUR
COMMENTS ARE
INVITED**

The Atlantic States Marine Fisheries Commission (Commission) is developing an amendment to revise the Interstate Fishery Management Plan (FMP) for Atlantic Striped Bass. The Commission is responsible for developing FMPs which are based on the best available science and promote the conservation of the stock throughout its range. The states and jurisdictions of Maine through North Carolina, including Pennsylvania, the District of Columbia, and the Potomac River Fisheries Commission, participate in the management of this species as part of the Commission's Atlantic Striped Bass Management Board (Board).

This is your opportunity to inform the Commission about changes observed in the fishery, actions you feel should or should not be taken in terms of management, regulation, enforcement, and research, and any other concerns you have about the resource or the fishery, as well as the reasons for your concerns.

**WHY IS THE
ASMFC
PROPOSING THIS
ACTION?**

The last time a new plan amendment to the FMP was adopted was in 2003 (Amendment 6). Since then, the status and understanding of the striped bass stock and fishery has changed considerably which raises concern that the current management program no longer reflects current fishery needs and priorities. The results of the 2018 Benchmark Stock Assessment in particular led the Board to discuss a number of significant issues facing striped bass management. Consequently, in August 2020, the Board passed the following motion:

“Move to initiate an Amendment to the Atlantic Striped Bass Fishery Management Plan focused on the following management topics: (1) fishery goals and objectives; (2) stock rebuilding/timeframe; (3) management triggers; (4) biological reference points; (5) regional management (recreational measures, coastal and producer areas, regional reference points); (6) recreational discard mortality; (7) conservation equivalency; (8) recreational accountability; and (9) coastal commercial quota allocation.

Each of these topics will be presented in a Public Information Document in order to solicit stakeholder comment focused on prioritizing the importance of each topic for continued development and inclusion in the Amendment.”

**WHAT IS THE
PROCESS FOR
DEVELOPING AN
AMENDMENT?**

The publication of this document is the first step of the Commission's formal amendment process. Following this initial phase of information gathering and public comment, the Board will select the range of issues to be addressed through this Amendment, and identify potential management options. Other issues not addressed here can be addressed through a subsequent management document. The Commission will then develop Draft Amendment

7, incorporating the identified management options, for public review. Following that review and public comment, the Commission will specify the management measures to be included in Amendment 7, as well as a timeline for implementation. In addition to issues identified in this Public Information Document (PID), Draft Amendment 7 may include issues identified during the public comment period of the PID.

The timeline for completion of Amendment 7 is as follows. Please note that the timeline is subject to change per the direction of the Board:

February 2021	Board reviews Draft PID and considers approving for public comment
February - April 2021	Public comment on PID <i>Current Step</i>
May 2021	Board reviews public comment; directs Plan Development Team to develop Draft Amendment
May - September 2021	Preparation of Draft Amendment with input from Technical Committee and Advisory Panel
October 2021	Board reviews Draft Amendment and considers approving for public comment
November 2021- January 2022	Public comment on Draft Amendment
February 2022	Board reviews public comment and selects final measures for the Amendment; Policy Board and Commission approve the Amendment

WHAT IS THE PURPOSE OF THIS DOCUMENT?

The purpose of this document is to inform the public of the Commission’s intent to gather information concerning Atlantic striped bass and to provide an opportunity for the public to identify major issues and alternatives relative to the management of this species. Input received at the start of the amendment process can have a major influence in the final outcome of the amendment. This document is intended to solicit observations and suggestions from commercial and recreational anglers, the public, and other interested parties, as well as any supporting documentation and additional data sources.

To facilitate public input, this document provides a broad overview of the issues already identified for consideration in the amendment; background information on the Atlantic striped bass population, fisheries, and management; and a series of questions for the public to consider about the management of the species. In general, the primary question on which the Commission is seeking

public comment is: **“How would you like management of the Atlantic striped bass fishery to look in the future?”**

**WHAT
ISSUES WILL
BE
ADDRESSED?**

The primary issues considered in the PID are:

1. Fishery Goals and Objectives
2. Biological Reference Points
3. Management Triggers
4. Stock Rebuilding Targets and Schedule
5. Regional Management
6. Management Program Equivalency (Conservation Equivalency)
7. Recreational Release Mortality
8. Recreational Accountability
9. Coastal Commercial Allocation
10. Any other issues concerning the management of Atlantic striped bass

**ISSUE 1:
Fishery Goals
and Objectives**

Background: The current goal and objectives of the Atlantic Striped Bass FMP were established in 2003 in Amendment 6. They are:

GOAL

“To perpetuate, through cooperative interstate fishery management, migratory stocks of striped bass; to allow commercial and recreational fisheries consistent with the long-term maintenance of a broad age structure, a self-sustaining spawning stock; and also to provide for the restoration and maintenance of their essential habitat.”

OBJECTIVES

- Manage striped bass fisheries under a control rule designed to maintain stock size at or above the target female spawning stock biomass level and a level of fishing mortality at or below the target exploitation rate.
- Manage fishing mortality to maintain an age structure that provides adequate spawning potential to sustain long-term abundance of striped bass populations.
- Provide a management plan that strives, to the extent practical, to maintain coastwide consistency of implemented measures, while allowing the States defined flexibility to implement alternative strategies that accomplish the objectives of the FMP.
- Foster quality and economically viable recreational, for-hire, and commercial fisheries.
- Maximize cost effectiveness of current information gathering and prioritize state obligations in order to minimize costs of monitoring and management.

- Adopt a long-term management regime that minimizes or eliminates the need to make annual changes or modifications to management measures.
- Establish a fishing mortality target that will result in a net increase in the abundance (pounds) of age 15 and older striped bass in the population, relative to the 2000 estimate.

Statement of the Problem: The status and understanding of the striped bass stock and fishery has changed considerably since implementation of Amendment 6 in 2003. As a result, both managers and stakeholders have expressed concern that the existing goals and objectives of this management program may be outdated, and no longer fully reflect current fishery needs and priorities. Some of the objectives may need to be refined, while other priorities may be missing entirely. The Board identified management stability, flexibility, and regulatory consistency as guiding themes for future striped bass management, and discussed the desire to balance these principles to the extent practical.

Public Comment Questions: Are the existing goal and objectives of Amendment 6 still in line with current fishery needs and priorities? Which specific priorities (if any) are missing from the existing goal or objectives? Which of the existing objectives (if any) should be removed or refined? Do the existing objectives balance the need for management stability, flexibility, and regulatory consistency? Which of these three themes do you value most?

***ISSUE 2:
Biological
Reference
Points***

Background: Biological reference points (BRPs) are used in fisheries management to measure stock status and evaluate management plan effectiveness. The current BRPs for striped bass are coastwide in nature and based on historical stock performance, and given in terms of threshold and target levels of female spawning stock biomass (SSB) and fishing mortality. Specifically, the 1995 estimate of female SSB is used as the SSB threshold, with the SSB target set at 125% of the threshold. When female SSB is below the threshold level, the stock is declared overfished. The fishing mortality target and threshold are the values of fishing mortality estimated to achieve the respective SSB target and threshold over the long-term. When fishing mortality is above the threshold, the stock is experiencing overfishing. The current SSB and fishing mortality target and threshold values are based on results of the 2018 Benchmark Stock Assessment, which represents the best available science on the coastwide stock (NEFSC 2018a and 2018b; Table 1). The FMP manages towards the target levels, providing an additional buffer to help achieve the management plan's objectives.

Table 1. Current female spawning stock biomass (SSB) and fishing mortality (F) target and threshold reference points for Atlantic striped bass based on results of the 2018 benchmark assessment.

	Female SSB	F
Threshold	SSB ₁₉₉₅ = 91,436 mt (202 million lbs)	0.24
Target	SSB _{threshold} × 1.25 = 114,295 mt (252 million lbs)	0.20

The female SSB threshold and target were first implemented through Amendment 6 in 2003. Model-based reference points, such as the biomass needed to achieve maximum sustainable yield (MSY), were uncertain, resulting in reliance on empirical-based reference points. The SSB in 1995 was selected as the threshold because that was the year the Commission declared the stock recovered from its depleted status in the 1980s, and many desirable stock characteristics were achieved, such as an expanded age structure. The additional 25% buffer for the target was an ad hoc decision to account for uncertainty in the SSB estimates, and also produced a target value comparable to those observed prior to the stock's collapse in the 1970's. The current fishing mortality reference points were implemented in 2014 through Addendum IV to Amendment 6 and are linked to the SSB reference points. The previous fishing mortality reference points were calculated independently of the SSB reference points and were based on MSY. The 2013 Benchmark Stock Assessment moved away from that approach primarily due to uncertainty in the F_{MSY} estimates because of difficulty fitting a stock-recruit relationship and the inconsistency between the F_{MSY} reference point and the empirical SSB reference points.

While the definitions for the SSB threshold and target have remained unchanged since 2003, the estimated female SSB time series (values and trajectories) has changed with each new stock assessment. Those changes are often more pronounced in a benchmark assessment as new or improved data and advancements in population modeling are incorporated. As a result, the female SSB reference point values, and the Commission's understanding of stock performance has changed over time.

Figure 1 shows results of the last four benchmark stock assessments for striped bass (2002, 2007, 2013, and 2018 benchmarks) which demonstrate how the Commission's understanding of stock condition in 1995 has changed over time. Note that in 2003, when the SSB reference points were established, the most recent assessment information indicated the stock was above the SSB target. Also, while the general pattern of SSB is consistent across the assessments, the magnitude of the estimates and trajectories have changed. For example, the 2007 and 2013 benchmark assessments indicated female SSB was above the

SSB target for a period of time during the early 2000s. This fits our understanding of striped bass population dynamics, as the population was considered to be at a historically high level during that time period, but the 2018 benchmark shows the SSB target has not been reached at any point during the 1982-2017 time series. It is worth noting, however, the 2018 benchmark also indicates fishing mortality has consistently exceeded the fishing mortality associated with achieving the SSB target since 1996 (Figure 2). Given the 2018 benchmark assessment found overfishing was occurring and the SSB was below the target even during those years that the striped bass population was at a historically high level, the current reference points may be unattainable given current objectives for fishery performance.

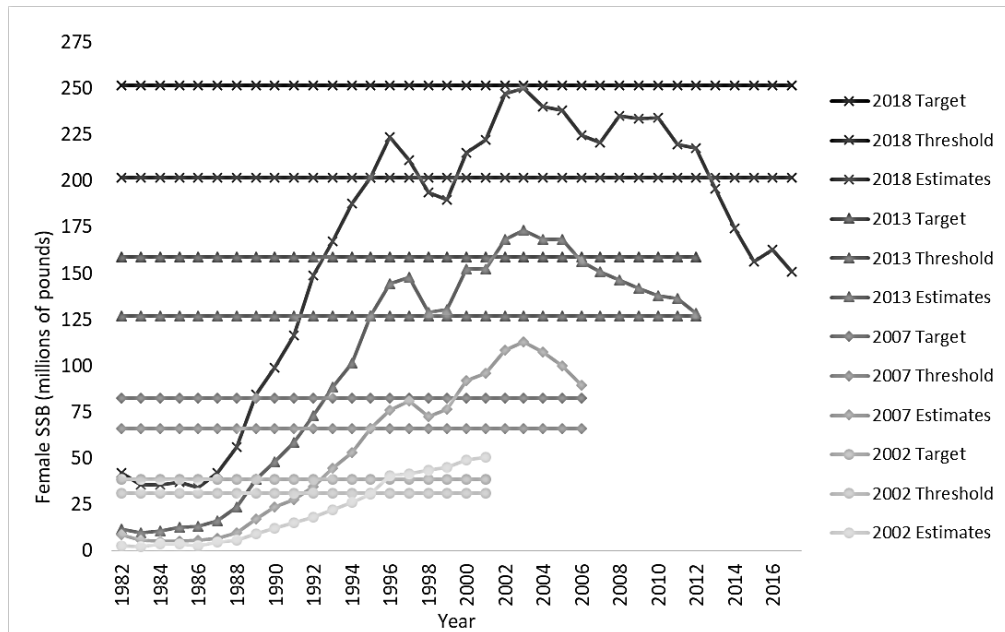


Figure 1. Historical perspective of Atlantic striped bass female spawning stock biomass (SSB) estimates and resulting SSB target and threshold since implementation of Amendment 6 in 2003. The SSB threshold and target are based on the estimate of female SSB in 1995 which has changed over time with improved data and modeling techniques. Source: ASMFC.

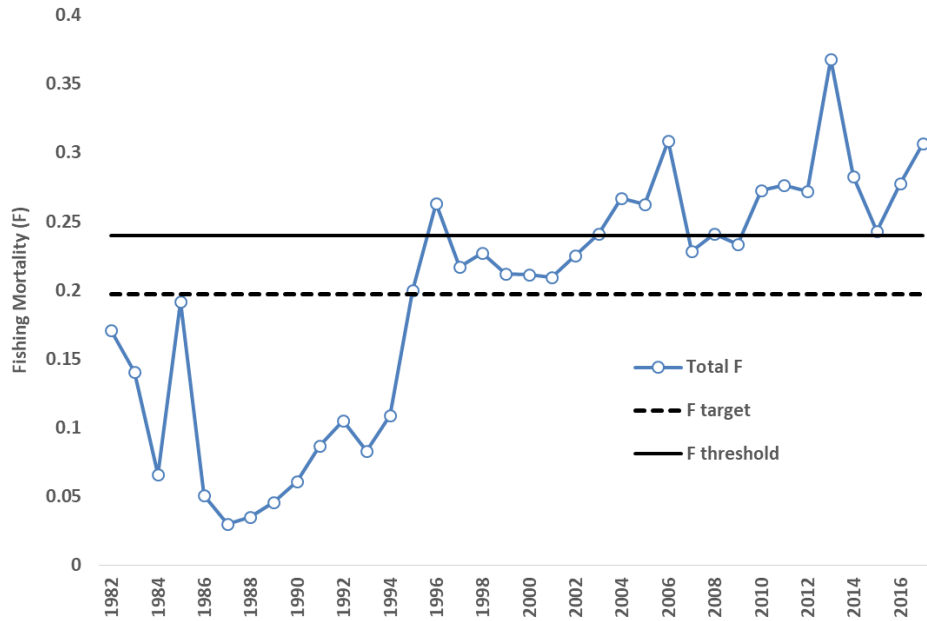


Figure 2. Current estimates of fishing mortality (F) relative to the F target and threshold, 1982-2017. Source: NEFSC 2018a.

Potential alternatives to the current reference points are restricted by data and modeling limitations. Unfortunately, the statistical-catch-at-age (SCAA) model currently used in striped bass stock assessment is unable to produce reasonable estimates for model-based reference points, such as MSY or SPR (spawning potential ratio). The Technical Committee (TC) has made considerable progress on a two-stock SCAA model which may be able to produce reasonable SPR-based reference points in the future, but the model needs more work and is not available for management use at this time. However, other empirical-based reference points could be considered, such as the estimate of SSB in a year other than 1995 as the SSB threshold, or a percentage other than 125% for the SSB target. For example, the TC discussed 1993 as a possible alternative proxy year because SSB was lower than in 1995 but still produced a strong year-class (Figure 3).



Figure 3. Current estimates of female spawning stock biomass (SSB) relative to the SSB target and threshold, and recruitment (age-1 fish), 1982-2017. The 1994 recruitment estimate, which represents the 1993 year-class, was the first large recruitment event in the time series. Source: NEFSC 2018a.

The Atlantic Striped Bass FMP has also managed specific areas of the fishery with different F rates (i.e., the Chesapeake Bay, and the Albemarle Sound/Roanoke River (A/R) management area in North Carolina), although these F rates were not used to determine overall stock status and are not considered BRPs in the context of this section. The Board has expressed interest in establishing separate reference points for the primary stocks that contribute to the coastwide migratory population, but the current SCAA model does not allow for this. The two-stock SCAA model that is under development has the potential to produce a set of reference points for the Chesapeake Bay stock and for the ocean region (which includes the Delaware Bay/Hudson River stock complex), but this remains a long-term objective. However, the current SCAA model does separate fishery removals into two fleets or regions, and these fleet components could be used to explore regional management programs which is discussed in Issue 5: Regional Management (page 13).

Statement of the Problem: It's approaching two decades since the 1995 estimate of female SSB was selected as the basis for BRPs for striped bass. However, improved data and advancements in assessment modeling have changed our understanding of historical stock performance since the stock was declared restored. This is an appropriate time to revisit the BRPs to ensure they are reliable indicators of stock performance and are properly aligned with the FMP's goal and objectives.

Public Comment Questions: Is the 1995 estimate of female SSB still an appropriate benchmark for determining stock status? Is there a better empirical reference year or other empirical approach that should be considered? Is a 25% buffer appropriate for the SSB target? Should the Board prioritize development of model-based reference points and/or stock-specific reference points for the Chesapeake Bay and other stock components? What stock characteristics (abundance of large fish available to anglers, diverse age structure, etc.) should the BRPs attempt to achieve to balance the needs of diverse striped bass fisheries and the state of the resource?

**ISSUE 3:
Management
Triggers**

&

**ISSUE 4:
Stock Rebuilding
Target and
Schedule**

Background: Amendment 6 includes a series of management triggers to prevent overfishing the striped bass resource. The triggers are based on the BRPs and juvenile recruitment indices, and are paraphrased below. Management measures implemented by the Board are to be held in place for at least three years, unless a trigger or threshold is violated (although CE has allowed for exceptions to this 3-year timeframe; see Issue 6 on page 15). Upon reaching any (or all) of these triggers, the Board is required to modify the management program to ensure the goal and objectives of Amendment 6 are achieved.

Management triggers established in Amendment 6 are:

- 1) If the fishing mortality threshold is exceeded in any year, the striped bass management program must be adjusted to reduce the fishing mortality to a level that is at or below the target within one year.
- 2) If female SSB falls below the threshold, the striped bass management program must be adjusted to rebuild the biomass to the target level within an established timeframe [not to exceed 10-years].
- 3) If the fishing mortality target is exceeded in two consecutive years and the female SSB falls below the target within either of those years, the striped bass management program must be adjusted to reduce the F to a level that is at or below the target within one year.
- 4) If female SSB falls below the target for two consecutive years and the fishing mortality rate exceeds the target in either of those years, the striped bass management program must be adjusted to rebuild the biomass to a level that is at or above the target within an established timeframe [not to exceed 10-years].
- 5) If any Juvenile Abundance Index shows recruitment failure (i.e., an index value lower than 75% of all other values in the dataset) for three consecutive years, then the Board will review the cause of recruitment failure (e.g., fishing mortality, environmental conditions, and disease) and determine the appropriate management action.

The BRP-based management triggers require action on different timelines. When the fishing mortality-based triggers are met, corrective action is required quickly, as management action can reduce fishing mortality immediately by reducing total removals. When the SSB-based triggers are met, changes to the management program can occur gradually over a long period of time (up to 10-years); this is in recognition of the fact that striped bass are slow to mature, with 100% of females reaching maturity by age 9, and as a result, the impact of management action on SSB will not be fully realized until the protected age classes are mature. This also provides stability for the fishery while rebuilding the stock. The latest science also indicates that the SSB target has never been reached which raises questions that it may be an unreasonably high management target given current objects for fishery performance and changing or altered ecosystem conditions (e.g., climate change, and changes in other predator and prey population abundance). Meanwhile, the recruitment-based trigger is evaluated on a 3-year cycle and has not been triggered since it was established, even though the stock experienced a period of variable, but below average recruitment from about 2005-2014 which contributed to stock declines in recent years.

Of note, the BRP-based management triggers are based on the most recent estimate of fishing mortality and/or SSB. While significant changes in SSB tend to occur slowly over time due to the biology of the species (i.e., long lived and late to mature), fishing mortality is a measure of fishing pressure which is variable from year-to-year. As a result, the Board is sometimes criticized for having 'knee-jerk' reactions when responding to a single point estimate of fishing mortality. Additionally, development of both short- and long-term rebuilding programs are informed by simulations of stock performance in the future based on assumptions of fishing mortality, recruitment, and other variables. As a result, these stock projections are inherently uncertain, particularly the further out they project.

Statement of the Problem: The management triggers are intended to keep the Board accountable and were developed at a time when the stock was thought to be at historic high abundance and well above the SSB target. However, as perceptions of stock status and fishery performance have changed, shortfalls with how the management triggers are designed have emerged. When SSB is below the target level, the variable nature of fishing mortality can result in a continued need to for management action. Additionally, the shorter timetables for corrective action are in conflict with the desire for management stability, and the use of point estimates introduces an inherent level of uncertainty in decision making. Furthermore, the Board is sometimes criticized for considering changes to the management program before the stock has a chance to respond to the most recent set of management changes. Lastly, the observed long period of below average recruitment which contributed to recent declines in

biomass has raised questions about the recruitment-based trigger and whether it is designed appropriately.

Public Comment Questions: Which management triggers (if any) should be revisited? What is an appropriate timeframe to respond to overfishing or overfished determinations? Should the fishing mortality-based triggers account for annual variability in fishing mortality? What is more important, rebuilding the stock quickly, or mitigating impacts to fisheries? In other words, do you prefer significant changes to rebuild the stock quickly, or smaller incremental changes over time to gradually rebuild the stock?

**ISSUE 5:
Regional
Management**

Background: The Atlantic striped bass population is assessed and managed on a coastwide basis. However, the population is actually comprised of several stocks each with unique contributions to the coastwide population. Striped bass fisheries are conducted very differently throughout the species range due to the size and availability of fish in those areas (and other cultural differences), although there are some regional similarities.

To address this, previous striped bass management programs have managed specific regions of the fishery differently. Under Amendment 5 (1995), fisheries in the Chesapeake Bay and A/R were managed under a lower F rate than the rest of the coast which allowed these regions to implement different harvest strategies including size limits, bag limits, and catch quotas. Fisheries included in the ocean region, like in the Delaware Bay and River, and the Hudson River, were also able to implement lower size limits during certain seasons, although this was accomplished through management program equivalency (see Issue 6 on page 15). This regional management approach for the Chesapeake Bay and the A/R was maintained in Amendment 6. However, with implementation of Addendum IV to Amendment 6 in 2015, the entire striped bass population is once again managed under the same F rate (i.e., the coastwide fishing mortality reference points). Addendum IV also formally defers management of the A/R stock to the state of North Carolina (under the auspices of the Commission) based on evidence that the stock contributes minimally to the coastwide population.

Although the coastwide fishing mortality reference points include the effects of harvesting smaller striped bass in the Chesapeake Bay (and in other areas like the Delaware Bay and Hudson River), they do not reflect the heavily male-skewed sex ratio in the Chesapeake Bay catch. During the 2018 benchmark assessment, the current single-stock SCAA model was modified into a competing two-stock SCAA model; a Chesapeake Bay stock and a mixed ocean stock which included all other stock components of the population. The intent of the two-stock model approach was to develop separate reference points for the Chesapeake Bay stock and the ocean region (which includes the Delaware

Bay/Hudson River stock complex), however, this model requires further testing and is not ready for management at this time.

There are stock assessment tools available now that the Board could use to pursue a different management program for the Chesapeake Bay region. The current single-stock SCAA model separates fishery removals into an ocean fleet and a Chesapeake Bay fleet, and these fleet components can be used to explore different management programs for the two regions. This approach would be unique in the Commission framework and would raise a number of questions about implementation. In this scenario, the fishing mortality target and threshold would be set for the entire coastwide stock complex, and the Chesapeake Bay region and the ocean region would be allocated a proportion of the overall F to manage towards. With further model development, additional regions could be added. The Board would decide how to allocate total F to each region, which could be based on historical performance of each fishery or other management objectives. The Board would also have to decide how to implement accountability for each region. Currently, if total removals have to be reduced to bring the overall coastwide fishing mortality down to the fishing mortality target, both regions take an equal percent cut. With a regional fishing mortality management program, the reduction could be based on whether a region has exceeded its allocation of fishing mortality and by how much. The Board would also have to consider whether a region would have to reduce harvest if it exceeds its regional F allocation, but the overall fishing mortality for the stock was not exceeded.

Statement of the Problem: An ongoing objective of the Atlantic Striped Bass FMP is to provide regional flexibility while maintaining coastwide regulatory consistency to the extent practical. Previous striped bass management regimes have allowed specific regions to manage their fisheries independently (under a different F rate than the rest of the coast) to balance these competing priorities. While the development of stock-specific reference points has been identified as a research priority, there are tools available now that the Board could use to pursue different management programs for the Chesapeake Bay and ocean regions. However, the appropriate allocation of fishing mortality between these two regions is ultimately a policy decision, and must be considered carefully along with other management implications.

Public Comment Questions: Should separate regional management programs be pursued for the Chesapeake Bay and the ocean region, which includes the Delaware Bay/Hudson River stock complex? If so, how should the Board determine the appropriate allocation of fishing mortality between the two regions? Should the Board consider any other areas (e.g. Delaware River or Hudson River) for separate regional management programs? If so, what level of data should support additional regional separation? Should development of

similar assessment tools be prioritized to support regional management programs for other areas of the coast?

ISSUE 6
Management
Program
Equivalency
(Conservation
Equivalency)

Background: Management program equivalency (hereafter referred to as 'conservation equivalency' or CE) has been an explicit component of the striped bass management program since the stock was declared rebuilt in 1995. The Atlantic Striped Bass FMP (and Commission's ISFMP Charter) employs CE to provide states and jurisdictions (hereafter states) flexibility to develop alternative regulations that achieve the same quantified level of conservation for the resource as the FMP standards. Allowing states to tailor their management programs in this way avoids the unequal impacts that result from implementing one set of management measures for all states.

The striped bass population is managed on a coastwide basis, although the fisheries are executed very differently due to size and availability of fish and a wide range of fishing cultures and priorities. This makes it difficult to develop a 'one-size-fits-all' regulation for the entire fishery. Early striped bass CE programs addressed areas where only a portion of the stock was available, e.g. areas were approved to have smaller size limits because large fish were not available during the summer. The primary motivation for more recent CE programs has been for states to propose alternative measures to ameliorate social and economic impacts of actions to reduce harvest. States typically pursue CE to adjust commercial size limits and quotas, or to implement different recreational bag limits, size limits, and seasons.

The process and application of CE is detailed in the Commission's [Conservation Equivalency Policy and Technical Guidance Document](#). To implement CE, states must develop a CE proposal demonstrating, through quantitative analysis, how the proposed regulations are equivalent to the FMP standards. Guidance regarding data use and methods that states should follow when developing CE proposals are typically provided by the TC, while the Board determines what constitutes equivalency on an ad hoc basis (e.g., the level of harvest (or reduction) that proposed measures must achieve). All CE proposals are subject to technical review and Board approval before the state can implement a CE program, as well as a post-implementation review of effectiveness. However, it is challenging to evaluate the effectiveness or success of CE programs once implemented because of the difficulty in separating the effects of the CE program from other factors like angler behavior and availability of fish that determine the amount of catch and release (see Issue 7 and Issue 8 on page 16 and 19, respectively) that occurs. As a result, CE programs, once implemented, typically become the new baseline for future regulatory changes for that state and fishery. Furthermore, CE proposals for the recreational fishery generally rely on state-level catch and effort data estimated by the Marine Recreational

Information Program (MRIP) which are less precise than regional or coast-wide estimates.

The fundamental conflict between allowing flexibility through CE and achieving regulatory consistency among states escalated recently with the implementation of Addendum VI. For the recreational fishery, the Addendum implemented a 1-fish bag limit and a 28 inch to less than 35 inch slot limit for the ocean region and a 1-fish bag limit and an 18 inch minimum size limit for the Chesapeake Bay in order to reduce recreational removals by 18% coastwide. However, at the state-level, some states were predicted to reduce removals by more than 18% (and some by less) due to varying contributions of each state's fishery to the total, and states needed to only demonstrate an 18% reduction at the state-level in CE proposals, which could result in falling short of overall target reductions. Also, majority of states pursued CE and submitted a very large number of options for TC review, which raised questions for additional guidelines regarding the submission of CE proposals.

Statement of the Problem: There is an essential tension between managing the striped bass fishery on a coastwide basis while allowing states to deviate from the coastwide standard, and thus creating regulatory inconsistency among states and within shared waterbodies. However, there is perceived value in allowing states to implement alternative regulations tailored to the needs of their fisheries, even though it is difficult to evaluate the effectiveness of CE programs once implemented. Both CE programs and coastwide measures have variable levels of effectiveness. A CE program may provide a higher level of conservation than the coastwide measure in a state. However, it is difficult to determine if a coastwide measure or a CE program has performed better or worse due to the challenge of separating the performance of the measure and outside variables, particularly on a state level when more than one state implements a CE program. There is limited guidance on how and when CE should be pursued, particularly when the stock is overfished and rebuilding is required, and how 'equivalency' is defined.

Public Comment Questions: Should CE be part of the Striped Bass FMP? Should the Board restrict the use of CE based on stock status, data restrictions, differences from neighboring state, and/or any other potential issues? Should the Board provide a strict definition for 'equivalency' (e.g., equal to the level of harvest the fishery would have achieved under the standard measure)? Should more quantitatively rigorous and clearly defined data requirements be required as a pre-requisite for CE proposals to be considered? Should there be limitations to how many CE proposals a state can submit? Should CE be limited to time and areas with unique ecological characteristics (e.g., presence of smaller striped bass)? Given state-level MRIP estimates are often less precise than regional or coastwide estimates, are these data used appropriately to

develop CE proposals? Given the variability in recreational catch and harvest from year-to-year, how do you evaluate effectiveness of CE programs following implementation?

ISSUE 7
Recreational
Release
Mortality

Background: Recreational releases are fish caught and released alive during recreational fishing trips. A proportion of releases die as a result of that fishing interaction, which is referred to as release mortality (or dead releases).

The number of striped bass harvested recreationally, as well as those caught and released alive, are estimated by MRIP. The number of striped bass that die after being caught and released is estimated by multiplying the total number of live releases by an estimated rate of hooking mortality. The stock assessment currently applies a 9% hooking mortality rate to all recreationally released striped bass. This does not mean that every time a fish is released alive it has a 9% chance of dying. Under some conditions, the released fish has a higher or lower probability of dying, but overall, coastwide, it is assumed that 9% of all striped bass released alive die.

This 9% hooking mortality rate estimate is from a study by Diodati and Richards (1996) which took place in a saltwater environment and encompassed a range of variables including hook types, hooking locations, and angler experience levels. The TC conducted a meta-analysis of other striped bass release mortality studies which confirmed that an overall 9% discard mortality rate accounts for the variation in conditions and factors that attribute to release mortality coastwide. Applying this hooking mortality rate to the estimated number of striped bass caught and released from 2015 to 2019 results in an annual average of 2.8 million dead releases per year.

Since 1990, roughly 90% of all striped bass caught recreationally were released alive (Figure 4) either due to cultural preferences (i.e., fishing with the intent to catch and release striped bass) or regulation (e.g., the fish is not of legal size, was caught out of season, or the angler already caught the bag limit).

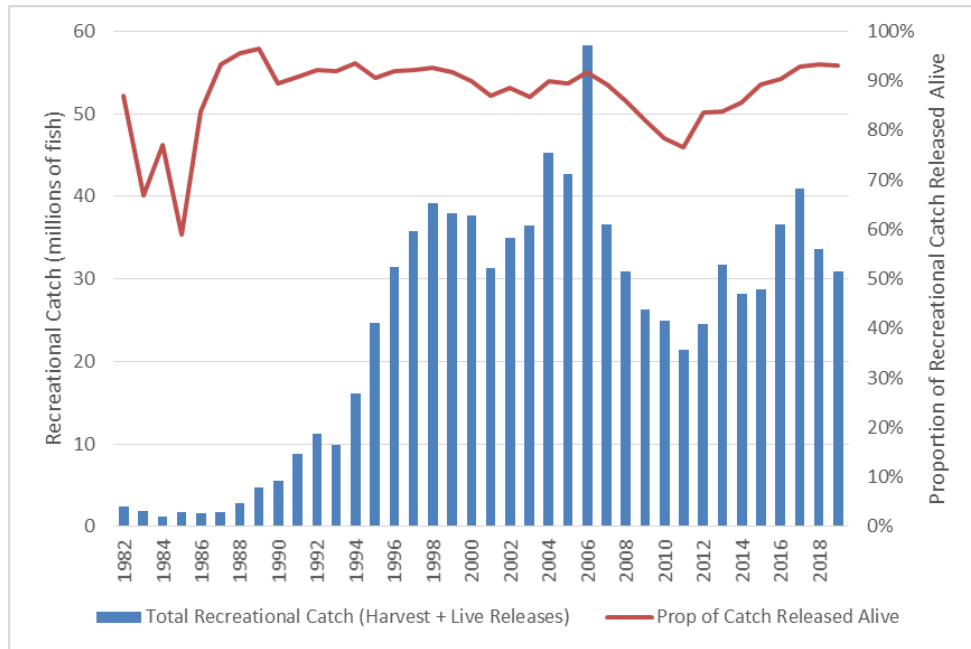


Figure 4. Total recreational catch (harvest + live releases) and the proportion of catch released alive, 1982-2019. Source: MRIP; excludes inshore estimates from A/R in North Carolina.

In 2019, more fish were estimated to have died from catch and release fishing than were harvested by the recreational fishery (2.59 million fish and 2.15 million fish, respectively; Figure 5). Because release mortality accounts for a significant proportion of total fishing mortality, Addendum VI sought to lower the rate at which fish die after being released by requiring the use of non-offset circle hooks when fishing for striped bass with bait (circle hooks have been proven to help reduce rates of gut-hooking when fished correctly). In addition to hook type, studies have shown other factors influence release mortality including environmental conditions (e.g., salinity, air and water temperatures), angler experience, and angler behavior (e.g., how fish are handled). Addendum VI also encourages states to develop education campaigns to increase compliance with circle hook regulations and to encourage responsible angler behavior. If management action is taken to influence where mortality (harvest vs discard) is coming from, managers will have to consider the impacts those actions will have on the fishery. For example, management measures focusing on reducing discards could discourage participation from anglers that value food fish and negatively impacts the industry which caters to those anglers.

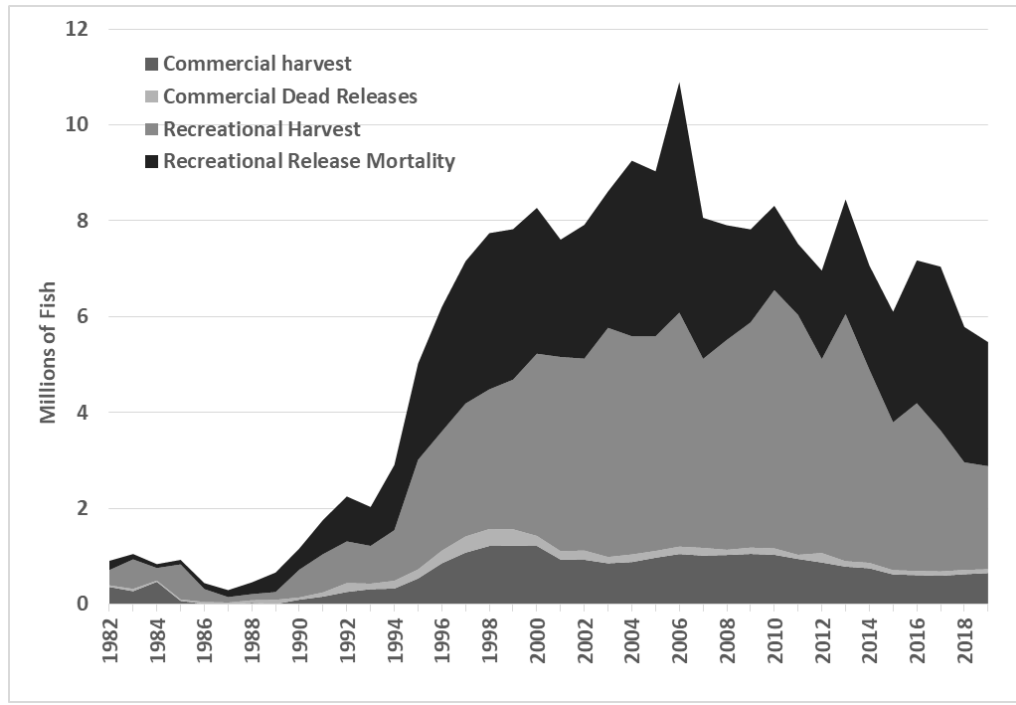


Figure 5. Total striped bass removals by sector in numbers of fish, 1982-2019. Note: Harvest is from ACCSP/MRIP, commercial discards and recreational release mortality is from ASMFC. Estimates exclude inshore harvest from A/R in North Carolina.

Statement of the Problem: Recreational release mortality constitutes such a large component of annual fishing mortality because the striped bass fishery is predominantly recreational and an overwhelming majority of the catch is released alive. The source of mortality does not matter to the health of the stock, as long as the overall fishing mortality is below the threshold. The current management program, which primarily uses bag limits and size limits to control harvest, is not designed to control the catch and release fishery which makes it difficult to control overall fishing mortality. Some stakeholders value the ability to harvest striped bass, either commercially or recreationally, while others value the experience of fishing for striped bass regardless of whether they are able to retain fish. The acceptable proportion of release mortality in total removals should reflect the management objectives for the fishery. Nonetheless, in order to better control all sources of fishing mortality, managers could consider additional gear restrictions to help increase the chance of survival after being released, or additional effort controls (i.e., time and area closures) to reduce the number of trips interacting with striped bass and thus the overall number of striped bass released alive.

Public Comment Questions: Should management focus on reducing the rate at which fish die after being released alive through additional gear restrictions similar to recent actions regarding the use of circle hooks (e.g., banning gaffing or the use

of treble hooks)? Should management focus on reducing effort in the fishery in order to reduce the total number of striped bass caught and released? Should management consider seasonal closures when environmental conditions are unfavorable to striped bass survival when released? What are some ways to improve awareness and stewardship of the resource?

ISSUE 8: **Recreational Accountability** Background: The striped bass resource currently supports commercial fisheries in eight jurisdictions and recreational fisheries in 14 jurisdictions along the Atlantic coast. The commercial fishery is regulated through Addendum VI with state-by-state commercial quota allocations and size limits (see Issue 9 on page 20 for more information about the striped bass commercial quota). Many jurisdictions have imposed additional management measures, including time and area closures, and gear restrictions, which are designed to control effort and the size of fish in the catch. Quotas are allocated to the states on an annual basis. If a state exceeds its quota in a given year, the state's quota is reduced by the amount of the overage the following year on a pound-for-pound basis. States are able to monitor the commercial quota closely throughout the year via landings and dealer reports which are typically required on a daily or weekly basis depending on the state. The state closes the fishery when its quota (or a percentage of the quota) is projected to be landed.

Unlike the commercial sector, the recreational striped bass fishery is not managed by a quota system; instead, the fishery is managed with size limits and bag limits (and with seasons in some states). As a result, recreational removals (combined harvest and release mortality) fluctuate from year-to-year with changes in angler effort and changes in the size, age structure, and distribution of the population throughout its range. Additionally, recreational catch and effort data are estimated in two-month intervals, called 'waves', via angler intercept and mail-based surveys administered by MRIP. These estimates are generally available six weeks after the end of a wave, which limits manager's ability to monitor the fishery during the season.

Some recreational fisheries, such as summer flounder and black sea bass, are managed by an annual recreational harvest limit (RHL) due to federal mandates. In the federal process, stock projections, estimates of release mortality, and management uncertainty are considered when setting the RHL for a species. Management measures (e.g., bag limits, size limits, and seasons) are implemented at the state, regional, or coastwide level, to collectively achieve the RHL. If the RHL is projected to be exceeded in a given year, the states may be required to adjust measures prior to that season to address potential for overharvest. Conversely, if recreational removals are projected to be less than the RHL, the states may be allowed to liberalize measures to fully utilize the RHL. While this approach allows for recreational accountability, it can also lead to frequent annual regulatory changes.

Statement of the Problem: The Atlantic Striped Bass FMP does not use an RHL or quota to manage the recreational fishery, which makes it difficult to evaluate whether removals from the sector are too high and to implement accountability measures. The use of RHLs is an effective way to implement accountability, however, recreational removals are inherently variable from year-to-year and MRIP data can have high levels of uncertainty (particularly at the state-level). Furthermore, a quota-based management approach conflicts with the stated objective of management stability for the fishery.

Public Comment Questions: Should the Board consider implementing an RHL for recreational striped bass management? How should an RHL overage or underage be addressed? Should stock status be considered when handling an RHL overage or underage? Are there additional accountability measures the Board should consider for managing the recreational striped bass fishery?

**ISSUE 9:
Coastal
Commercial
Quota
Allocation**

Background: Some species management boards (e.g. the Summer Flounder, Scup, and Black Sea Bass Board) are emphasizing the need to update commercial allocations to reflect recent catch and population distribution data. The Atlantic Striped Bass FMP uses a quota system to manage the commercial fishery. Each state from Maine to North Carolina is allocated a commercial quota in pounds of fish for harvest in the ocean region. A separate Chesapeake Bay commercial quota is allocated to Maryland, Virginia, and the Potomac River Fisheries Commission per the state/jurisdiction's mutual agreement. Quota overages are paid back the following season on a pound-for-pound basis, while the transfer of quota between states and rollover of unused quota from one year to the next is not permitted. Commercial harvest in the A/R is managed separately by the state of North Carolina with Commission oversight.

In general, the coastal commercial quota allocation is based on average landings during 1972-1979 and assuming a 28" minimum size limit. This historical base period was first used for management in 1989 when Amendment 4 required closed seasons in order to reduce commercial harvest to 20% of the base period. State-specific quotas were first implemented under Amendment 5 (1995) when the Commission declared the stock fully rebuilt; states were allocated 70% of their average landings during the 1972-1979 base period. Addendum III to Amendment 5 also granted producer-area status to the Delaware River and Bay, which allowed its commercial quota to be managed under a harvest-control model similar to that used in the Chesapeake Bay. Under Amendment 6 (2003), the quotas were increased to 100% of the base period, with some exceptions (see page 57 of [Amendment 6, Appendix 3](#) for details) and producer-areas were no longer used as a management tool. Of note, Delaware's quota was held at its last producer-area level under Amendment 6. The Amendment 6 quota allocations have since been reduced by 25% in 2015 (Addendum IV) and by an additional 18% in 2020

(Addendum VI) in response to declining stock status (Table 2). Throughout quota management, states have used CE to implement different commercial size limits resulting in changes to respective quota amounts.

Table 2. Changes in base quotas for Atlantic striped bass commercial fisheries by state and region since implementation of Amendment 6 in 2003. All quota amounts are in pounds.

State	Reference Period	Amendment 6		
	1972-1979 Average	Amend 6 † (2003)	Adden IV ° (2015)	Adden VI ^ (2020)
Maine	250	250	188	154
New Hampshire	5,750	5,750	4,313	3,537
Massachusetts	1,159,750	1,159,750	869,813	713,247
Rhode Island	243,625	243,625	182,719	148,889
Connecticut	23,750	23,750	17,813	14,607
New York	1,059,875	1,061,060	795,795	652,552
New Jersey	321,750	321,750	241,313	197,877
Delaware *	169,125	193,447	145,085	118,970
Maryland	131,560	131,560	98,670	74,396
Virginia	184,853	184,853	138,640	113,685
North Carolina	480,480	480,480	360,360	295,495
Maryland (Chesapeake Bay)		Set annually based on fishing mortality rate of F=0.27	3,120,247	2,588,603
PRFC (Chesapeake Bay)				
Virginia (Chesapeake Bay)				

*Quota combined for Delaware Bay and ocean region

†Beginning in 2003, quota reduced through CE for NY (892,293) and MD (126,396). Beginning in 2007, quota reduced through CE for RI (239,963)

°Addendum IV quota changed through CE for MD (90,727), RI (181,572), NJ (215,912)

^Addendum VI quota changed through CE MA (735,240), NY (640,718), NJ (215,912), DE (142,474), MD (ocean: 89,094; bay: 1,445,394), PRFC (572,861), VA (ocean: 125,034; bay: 983,393)

Under Amendment 5, the Chesapeake Bay quota was also based on average landings during the 1972-1979 base period, and split among the three jurisdictions based on their percent contribution to the 1994 harvest: Maryland = 52.359%, PRFC = 15.226%, and Virginia = 32.414%. Under Amendment 6, management in the Chesapeake Bay transitioned to a harvest control model where the commercial quota changed annually with exploitable biomass (Table 2). However, under Addendum IV the Chesapeake Bay quota was made static again and reduced to its 2012 harvest level minus 20.5%. Addendum VI further reduced the Chesapeake Bay commercial quota by 18%, although states pursued CE to lessen the impact of further cuts to the quota.

Unlike the commercial fishery in Chesapeake Bay, the ocean region regularly underutilizes the quota. The ocean quota underage is mainly attributed to designated game fish status in several states including Maine, New Hampshire, Connecticut, and New Jersey which collectively share about 10% of the commercial quota in the ocean region. Furthermore, the underage has increased in recent years since migratory striped bass have not been available to the ocean fishery in North Carolina resulting in zero harvest since 2012 (North Carolina holds 13% of the ocean quota) and raising questions about altered migratory pathways or preferred foraging areas as a result of climate change.

Statement of the Problem: For decades, the striped bass commercial quota allocation has been based on harvest data from the 1970s which may, or may not be an appropriate baseline. Harvester reporting during that time was not required and there is evidence that harvesters would sell fish in other states resulting in further inaccuracies in state estimates. No other ASMFC-managed species is managed with harvest data as old as that used for striped bass allocation. Additionally, the coastal commercial quota is not set annually based on changes in available biomass, but rather state-specific quotas are fixed in terms of pounds of fish until an assessment indicates removals need to be adjusted. Furthermore, within Chesapeake Bay there is an increasing disconnect from the 1970s base period over the years with the continued use of CE and other management actions that have occurred there.

Public Comment Questions: Should this Amendment address commercial allocation or be considered in a future management action? Is the 1972-1979 landings period still an appropriate baseline for the coastal commercial allocation? Should other allocation approaches be considered? Should the coastwide quota be explicitly set on an annual basis, or following an updated stock assessment or benchmark? Should regions with the necessary data be able to use a harvest control rule where commercial quotas are set annually based on exploitable biomass?

ISSUE 10:
Other Issues

Background: The intent of this document is to solicit feedback on a broad range of issues for consideration in the next amendment for Atlantic striped bass. Stakeholder feedback should generally focus on **“How would you like management of the Atlantic striped bass fishery to look in the future?”**

After reading the above issues, are there any other topics that should be addressed in Amendment 7? Some examples may include:

- Impacts due to climate change, including possible loss of prey due to changing environmental conditions;
- Habitat degradation;
- Limited resources for law enforcement; and

- Research priorities

When providing comment on other management issues, it's important to indicate how the issue can be addressed through Board action.

**BACKGROUND
INFORMATION
ON THE MGMT
& STOCK
STATUS OF
ATLANTIC
STRIPED BASS**

Summary of Fishery Management

Atlantic striped bass (*Morone saxatilis*) have supported valuable commercial and recreational fisheries on the U.S. Atlantic coast for centuries. The Commission coordinates interstate management of the species in state waters (0-3 miles from shore), while management authority in the exclusive economic zone (3-200 miles) lies with NOAA Fisheries. The first Interstate FMP for the species was approved in 1981 in response to declining juvenile recruitment and depressed landings throughout the coast from Maine through North Carolina. The FMP and subsequent amendments and addenda focused on addressing the depleted spawning stock and recruitment failure. Despite these management efforts, the Atlantic striped bass stock continued to decline prompting many states (beginning with Maryland in 1985) to impose a complete harvest moratorium for several years until recruitment improved. State fisheries reopened in 1990 under Amendment 4 which aimed to rebuild the resource rather than maximize yield. The stock was ultimately declared rebuilt in 1995 and as a result, Amendment 5 to the Atlantic Striped Bass FMP was adopted which relaxed both recreational and commercial regulations along the coast.

The Atlantic striped bass fishery is currently managed through Amendment 6 to the FMP, which was implemented in 2003. Amendment 6 modified the BRPs, and established a list of management triggers based on the BRPs and juvenile recruitment. The coastal commercial quotas were restored to 100% of the states' average landings during the 1972-1979 historical base period at a 28" minimum size, with few exceptions (see Issue 9 on page 20). In the recreational fisheries, all states were required to implement a two-fish bag limit with a minimum size limit of 28 inches except for states with approved CE programs (see Issue 6 on page 15). The Chesapeake Bay and A/R regulatory programs were managed by a lower fishing mortality target than the ocean region, which allowed these jurisdictions to implement separate seasons, harvest caps, and size and bag limits as long as they remain under that fishing mortality target. No minimum size limit can be less than 18 inches under Amendment 6.

Five addenda to Amendment 6 have been implemented. Addendum I, approved in 2007, recommended research and angler education programs to address bycatch and release mortality. Addendum II, approved in 2010, modified the definition of recruitment failure so that each juvenile abundance index would have a fixed threshold for determining recruitment failure. Addendum III, approved in 2012,

requires all states with a commercial striped bass fishery to implement a uniform commercial harvest tagging program to improve compliance and enforcement.

Addendum IV, approved in 2014, established new coastwide fishing mortality reference points as recommended by the 2013 benchmark, eliminated the separate F rates used to manage the Chesapeake Bay and A/R regions, and changed commercial and recreational measures to reduce F to the new F target. To achieve this, the Addendum implemented a 25% reduction to coastal commercial quotas, a 1-fish bag limit and 28" minimum size limit in recreational ocean fisheries (equivalent to a 25% reduction in removals), and 20.5% reductions in the Chesapeake Bay commercial and recreational fisheries. Addendum VI, approved in 2019 in response to the 2018 benchmark assessment, implemented additional 18% reductions to fishery removals to end overfishing and again try to reduce F to the target. This required an 18% reduction to all commercial quotas (ocean and Chesapeake Bay), a 1-fish bag limit and 28" to less than 35" slot limit for ocean recreational fisheries, and a 1-fish bag limit and 18" minimum size limit for Chesapeake Bay recreational fisheries beginning in 2020. For 2021, the addendum also requires mandatory use of circle hooks while recreationally fishing with bait. CE was employed by some states to implement alternative recreational or commercial measures from the Addendum IV and Addendum VI standards described above. There is no Addendum V; an action was initiated under this title in 2017 to consider liberalizing regulations, but the action was postponed and ultimately replaced by the development of Addendum VI.

The EEZ has been closed to the harvest, possession, and targeting of striped bass since 1990, with the exception of a defined route to and from Block Island in Rhode Island to allow for the transit of vessels in possession of striped bass legally harvested in adjacent state waters. In addition, an Executive Order issued in 2017 prohibits the sale of striped bass from the EEZ. In 2018, the Consolidated Appropriations Act directed NOAA Fisheries (in consultation with ASMFC) to review the federal moratorium once the 2018 benchmark was completed, and consider lifting the ban, however, there has not been any movement by NOAA on this directive as of late.

Summary of Stock Status

The 2018 Benchmark Stock Assessment is the latest and best information available on the status of the coastwide striped bass stock for use in fisheries management. The assessment was peer-reviewed at the 66th Northeast Regional Stock Assessment Review Committee (SARC) meeting in November 2018. The accepted assessment model is a forward projecting statistical catch-at-age (SCA) model which uses catch-at-age data and fishery-dependent and -independent survey indices to produce annual estimates of female SSB, F, and recruitment. Notably, the 2018 benchmark was the first assessment for striped bass to use the improved MRIP survey methods to estimate recreational fishery catches. The new time

series of recreational catch estimates is on average 2.3 times higher than the values used in previous stock assessments, resulting in higher estimates of stock size.

The reference points currently used for management are based on stock conditions in 1995, the year the stock was declared rebuilt (see Issue 2 on page 6). The biomass threshold is the level of SSB in 1995, the biomass target is 125% of the threshold, and the fishing mortality threshold and target are the levels of fishing mortality projected to achieve the biomass reference points over the long-term, respectively. The specific values of these reference points have been updated after each benchmark stock assessment based on the time series of SSB estimates.

The results of the 2018 benchmark indicate that the Atlantic striped bass stock is overfished and overfishing is occurring. Female SSB in 2017 was estimated at 68,576 metric tons (151 million pounds), which is below the SSB threshold of 91,436 metric tons (202 million pounds) (Figure 3). Female SSB peaked in 2003 and has been declining since then; SSB has been below the threshold level since 2013. Total F in 2017 was estimated at 0.31, which is above the fishing mortality threshold of 0.24 (Figure 2). Total fishing mortality has been at or above the threshold in 13 of the last 15 years of the assessment (2003-2017). Striped bass experienced a period of lower recruitment from 2005-2011 (Figure 3) which contributed to the steep decline in SSB that the stock has experienced since 2010. Recruitment was high in 2012, 2015, and 2016 (corresponding to strong 2011, 2014, and 2015 year classes), but estimates of age-1 striped bass were below average in 2013, 2014, and 2017.

Ecological Reference Points

In August 2020, the Atlantic Menhaden Management Board approved the use of ecological reference points (ERP) for menhaden management. The ERP assessment uses the Northwest Atlantic Coastal Shelf Model of Intermediate Complexity for Ecosystems (NWACS-MICE) to develop Atlantic menhaden ERPs that account for Atlantic menhaden's role as a forage fish. NWACS-MICE is an ecosystem model that focuses on four key predator species (striped bass, bluefish, weakfish, and spiny dogfish) and three key prey species (Atlantic menhaden, Atlantic herring, and bay anchovy). These species were chosen because diet data indicate they are top predators of Atlantic menhaden or are key alternate prey species for those predators. The tool allows managers to evaluate the tradeoffs between Atlantic menhaden harvest and predator abundance to set reference points that take into account menhaden's role as a forage fish. ERPs for the management of Atlantic menhaden are as follows:

ERP target: The maximum fishing mortality rate on Atlantic menhaden that sustains Atlantic striped bass at their biomass target when striped bass are fished at their F target

ERP threshold: The maximum fishing mortality rate on Atlantic menhaden that keeps Atlantic striped bass at their biomass threshold when striped bass are fished at their fishing mortality rate target.

Atlantic striped bass is the focal species for the ERP definitions because it is the most sensitive predator fish species to Atlantic menhaden harvest in the model, so an ERP target and threshold that sustained striped bass would likely provide sufficient forage for other predators under current ecosystem conditions.

Summary of the Fishery

The Atlantic striped bass fishery is predominantly recreational with the sector accounting for 88% of total harvest by weight since 2005 and 82% in terms of numbers of fish (Table 3 and Table 4). In 2019, total removals (commercial and recreational combined, including harvest and dead releases) was estimated at 5.47 million fish; the recreational sector accounted for 87% of total removals by number.

Commercial Fishery

The commercial fishery is managed via a quota system resulting in relatively stable landings since implementation of Amendment 6 in 2003 (see Issue 9 on page X). From 2004 to 2014, coastwide commercial harvest averaged 6.8 million pounds (1 million fish) annually (Table 3 and Table 4). From 2015-2019, commercial landings decreased to an average of 4.7 million pounds (619,279 fish) due to implementation of Addendum IV and a reduction in the commercial quota. Commercial discards are estimated to account for <2% of total removals per year since 2004 (Table 3 and Table 4).

There are two sets of quota allocations; one to all states (Maine through North Carolina, excluding Pennsylvania) for harvest in the ocean, and a second allocation to Maryland, PRFC, and Virginia for harvest in Chesapeake Bay. Although the regional allocations are about equal, the majority of commercial harvest comes from Chesapeake Bay; roughly 60% by weight and 80% in numbers of fish since 1990. The differences between landings in weight and in numbers of fish is primarily attributed to the availability of smaller fish and lower size limits in Chesapeake Bay relative to the ocean fishery. Additionally, the ocean fishery tends to underutilize its allocations due to lack of availability in state waters (particularly off of North Carolina) and designated game fish status in some states (Maine, New Hampshire, Connecticut and New Jersey).

Recreational Fishery

The recreational fishery is managed via bag and size limits and therefore recreational catch and harvest vary from year to year with changes in angler effort and the size and availability of fish. From 2004-2014, recreational harvest averaged 54.8 million pounds (4.6 million fish) annually (Table 3 and Table 4). From 2015-2019, recreational harvest averaged 33.6 million pounds (2.8 million fish) in part due to declining biomass and implementation of Addendum IV.

The vast majority of recreational striped bass catch is released alive either due to angler preference or regulation; roughly 90% annually since 1990. Based on peer reviewed literature, a 9% release mortality rate is used to estimate the number of fish that die as a consequence of being caught and released. Despite this low rate, the popularity of striped bass as a targeted recreational species means that catch and release fishing contributes a significant source of mortality to the stock each year. In 2019, recreational anglers caught and released an estimated 28.8 million fish, of which 2.60 million are assumed to have died which represents 47% of total striped bass removals in 2019 (Table 3).

A large proportion of recreational harvest comes from Chesapeake Bay. From 2004-2014, 33% of recreational harvest in numbers of fish came from Chesapeake Bay. From 2015-2018, that percentage increased to 45%, likely as a result of the strong 2011, 2014, and 2015 year classes moving through the fishery. The majority of recreational harvest in the ocean fishery comes from Massachusetts, New York, and New Jersey.

References

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Northeast Fisheries Science Center (NEFSC). 2018a. 66th Northeast Regional Stock Assessment Workshop (66th SAW) Assessment Report. US Dept Commer. Northeast Fish Sci Cent Ref Doc. 19-08; 719 p.

Northeast Fisheries Science Center (NEFSC). 2018b. 66th Northeast Regional Stock Assessment Workshop (66th SAW) Assessment Summary Report. US Dept Commer. Northeast Fish Sci Cent Ref Doc. 19-01; 45 p.

Tables

Table 3. Total striped bass removals (harvest plus release mortality) by sector in numbers of fish, 1990-2019. Note: Harvest is from ACCSP/MRIP, release mortality is from ASMFC. Estimates exclude inshore harvest from North Carolina.

Year	Commercial		Recreational		Total Removals
	Harvest	Release Mortality	Harvest	Release Mortality	
1990	93,888	46,912	578,897	442,811	1,162,508
1991	158,491	88,486	798,260	715,478	1,760,714
1992	256,476	184,638	869,779	937,611	2,248,505
1993	314,483	113,410	789,037	812,404	2,029,333
1994	325,401	162,970	1,055,523	1,360,872	2,904,765
1995	537,412	189,819	2,287,578	2,010,689	5,025,498
1996	854,094	263,510	2,487,422	2,600,526	6,205,552
1997	1,076,460	337,085	2,774,981	2,969,781	7,158,307
1998	1,215,219	353,224	2,915,390	3,259,133	7,742,966
1999	1,223,572	339,103	3,123,496	3,140,905	7,827,075
2000	1,216,812	208,415	3,802,477	3,044,203	8,271,906
2001	931,412	175,656	4,052,474	2,449,599	7,609,141
2002	928,085	191,561	4,005,084	2,792,200	7,916,931
2003	854,326	130,646	4,781,402	2,848,445	8,614,819
2004	879,768	158,311	4,553,027	3,665,234	9,256,339
2005	970,403	141,415	4,480,802	3,441,928	9,034,549
2006	1,047,648	153,276	4,883,961	4,812,332	10,897,218
2007	1,015,226	159,830	3,944,679	2,944,253	8,063,988
2008	1,027,837	107,778	4,381,186	2,391,200	7,908,000
2009	1,049,959	130,819	4,700,222	1,942,061	7,823,061
2010	1,031,430	133,970	5,388,440	1,760,759	8,314,599
2011	944,777	85,848	5,006,358	1,482,029	7,519,013
2012	870,606	197,412	4,046,299	1,847,880	6,962,196
2013	784,379	111,580	5,157,760	2,393,425	8,447,144
2014	750,263	113,080	4,033,746	2,172,342	7,069,431
2015	621,952	88,497	3,085,725	2,307,133	6,103,307
2016	606,087	87,827	3,500,434	2,981,430	7,175,777
2017	592,670	91,338	2,939,777	3,420,645	7,044,430
2018	625,177	90,092	2,244,766	2,826,667	5,786,702
2019	650,511	78,990	2,150,935	2,589,045	5,469,481

Table 4. Total recreational and commercial striped bass harvest by sector in pounds and numbers of fish, 1990-2019. Note: Harvest is from ACCSP/MRIP. Estimates exclude inshore harvest from North Carolina.

Year	Numbers of Fish			Pounds		
	Commercial	Recreational	Total	Commercial	Recreational	Total
1990	93,888	578,897	672,785	715,902	8,207,515	8,923,417
1991	158,491	798,260	956,751	966,096	10,640,601	11,606,697
1992	256,476	869,779	1,126,255	1,508,064	11,921,967	13,430,031
1993	314,483	789,037	1,103,520	1,800,176	10,163,767	11,963,943
1994	325,401	1,055,523	1,380,924	1,877,197	14,737,911	16,615,108
1995	537,412	2,287,578	2,824,990	3,775,586	27,072,321	30,847,907
1996	854,094	2,487,422	3,341,516	4,822,874	28,625,685	33,448,559
1997	1,076,460	2,774,981	3,851,441	6,077,751	30,616,093	36,693,844
1998	1,215,219	2,915,390	4,130,609	6,552,111	29,603,199	36,155,310
1999	1,223,572	3,123,496	4,347,068	6,474,290	33,564,988	40,039,278
2000	1,216,812	3,802,477	5,019,289	6,719,521	34,050,817	40,770,338
2001	931,412	4,052,474	4,983,886	6,266,769	39,263,154	45,529,923
2002	928,085	4,005,084	4,933,169	6,138,180	41,840,025	47,978,205
2003	854,326	4,781,402	5,635,728	6,750,491	54,091,836	60,842,327
2004	879,768	4,553,027	5,432,795	7,317,897	53,031,074	60,348,971
2005	970,403	4,480,802	5,451,205	7,121,492	57,421,174	64,542,666
2006	1,047,648	4,883,961	5,931,609	6,568,970	50,674,431	57,243,401
2007	1,015,226	3,944,679	4,959,905	7,047,179	42,823,614	49,870,793
2008	1,027,837	4,381,186	5,409,023	7,190,701	56,665,318	63,856,019
2009	1,049,959	4,700,222	5,750,181	7,216,792	54,411,389	61,628,181
2010	1,031,430	5,388,440	6,419,870	6,996,713	61,431,360	68,428,073
2011	944,777	5,006,358	5,951,135	6,789,792	59,592,092	66,381,884
2012	870,606	4,046,299	4,916,905	6,516,868	53,256,619	59,773,487
2013	784,379	5,157,760	5,942,139	5,819,678	65,057,289	70,876,967
2014	750,263	4,033,746	4,784,009	5,937,949	47,948,610	53,886,559
2015	621,952	3,085,725	3,707,677	4,829,997	39,898,799	44,728,796
2016	606,087	3,500,434	4,106,521	4,831,442	43,671,532	48,502,974
2017	592,670	2,939,777	3,532,447	4,816,395	37,961,037	42,777,432
2018	625,177	2,244,766	2,869,943	4,770,463	23,069,028	27,839,491
2019	650,511	2,150,935	2,801,446	4,199,502	23,556,287	27,755,789