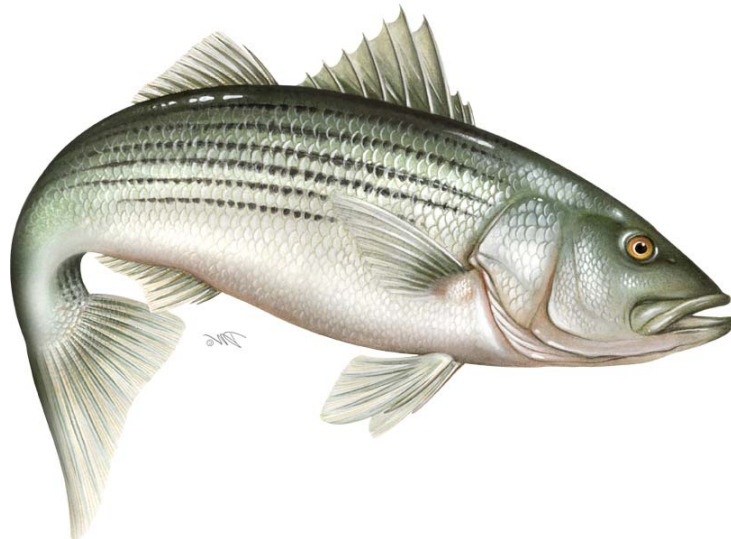


2017 REVIEW OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
FISHERY MANAGEMENT PLAN FOR

ATLANTIC STRIPED BASS
(Morone saxatilis)

2016 FISHING SEASON



Atlantic Striped Bass Plan Review Team

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Approved October 19, 2017

Executive Summary

Atlantic striped bass from Maine through North Carolina are managed under Amendment 6 and Addenda I-IV to the Interstate Fishery Management Plan.

A benchmark stock assessment was peer reviewed by the 57th Stock Assessment Review Committee and approved by the Board for management use in October 2013. Addendum IV to Amendment 6 was approved by the Board in October 2014, and implemented prior to the start of the 2015 fishing season. The addendum contained new fishing mortality reference points, and required coastal and Chesapeake Bay states/jurisdictions to reduce removals by 25 and 20.5%, respectively, in order to reduce F to a level at or below the new target.

In 2016, total Atlantic striped bass removals (i.e., commercial and recreational harvest plus dead discards, excluding harvest of the Albemarle-Roanoke stock from internal coastal waters of North Carolina) was estimated at 3.58 million fish, which is a 19% increase relative to 2015. Total striped bass harvest in 2016 is estimated at 2.14 million fish or 24.7 million pounds. The recreational fishery harvested 1.52 million fish (19.9 million pounds) in 2016, while the commercial fishery harvested 614,469 fish (4.82 million pounds). Dead discards from the recreational and commercial fisheries are estimated at 1.04 million fish and 404,815 fish, respectively.

In 2016, all states implemented management and monitoring programs consistent with Amendment 6 and Addenda I-IV. Monitoring requirements vary by state, and may include monitoring commercial and recreational catch, effort, and catch composition; monitoring commercial tagging programs; and performing juvenile abundance surveys, spawning stock surveys, and research tagging programs. In 2016, three states exceeded their coastal commercial quota allocation. Massachusetts exceeded its quota by 68,927 pounds, Rhode Island by 32 pounds, and Virginia by 589 pounds. However, the total coastal and Chesapeake Bay commercial quotas were not exceeded.

For the 2017 review of JAIs, the analysis evaluates the 2014, 2015, and 2016 JAI values. No state's JAI met the criteria for recruitment failure, although Maryland's and New York's 2016 JAI values were below the Q1 threshold.

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I. Status of the Fishery Management Plan

<u>Date of FMP Approval:</u>	Original FMP – 1981
<u>Amendments:</u>	Amendment 1 – 1984 Amendment 2 – 1984 Amendment 3 – 1985 Amendment 4 – 1989; Addendum I – 1991, Addendum II – 1992, Addendum III – 1993, Addendum IV – 1994 Amendment 5 – 1995; Addendum I – 1997, Addendum II – 1997, Addendum III – 1998, Addendum IV – 1999, Addendum V – 2000 Amendment 6 – 2003; Addendum I – 2007, Addendum II – 2010, Addendum III – 2012, Addendum IV – 2014
<u>Management Unit:</u>	Migratory stocks of Atlantic striped bass from Maine through North Carolina
<u>States With Declared Interest:</u>	Maine - North Carolina, including Pennsylvania
<u>Additional Jurisdictions:</u>	District of Columbia, Potomac River Fisheries Commission, National Marine Fisheries Service, United States Fish and Wildlife Service
<u>Active Boards/Committees:</u>	Atlantic Striped Bass Management Board, Advisory Panel, Technical Committee, Stock Assessment Subcommittee, Tagging Subcommittee, Plan Review Team, and Plan Development Team

The Atlantic States Marine Fisheries Commission (Commission) developed a fisheries management plan (FMP) for Atlantic Striped Bass in 1981 in response to declining juvenile recruitment and landings. The FMP recommended increased restrictions on commercial and recreational fisheries, such as minimum size limits and harvest closures on spawning grounds. Two amendments were passed in 1984 recommending additional management measures to reduce fishing mortality. To strengthen the management response and improve compliance and enforcement, the Atlantic Striped Bass Conservation Act (P.L. 98-613) was passed in late 1984, which mandated the implementation of striped bass regulations passed by the Commission, and gave the Commission authority to recommend to the Secretaries of Commerce and Interior that states be found out of compliance when they failed to implement management measures consistent with the FMP.

The first enforceable plan under the Striped Bass Act, Amendment 3, was approved in 1985, and required size regulations to protect the 1982-year class, which was the first modest size cohort in the previous decade. The objective was to increase size limits to allow at least 95% of the females in the 1982 cohort to spawn at least once. Smaller size limits were permitted in producer areas than along the coast. Several states, beginning with Maryland in 1985, opted for a more conservative approach and imposed a total moratorium on striped bass landings for several years. The amendment contained a trigger mechanism to reopen the fisheries when the 3-year moving average of the Maryland juvenile abundance index (JAI) exceeded an arithmetic mean of 8.0 which was attained with the recruitment of the 1989 year class. Also, in 1985, the Commission determined the Albemarle Sound-Roanoke River (A-

R) stock in North Carolina contributed minimally to the coastal migratory population, and was therefore allowed to pursue an alternative management program.

Consequently, Amendment 4, implemented in 1989, aimed to rebuild the resource rather than maximize yield. The amendment allowed state fisheries to reopen under a target fishing mortality (F) of 0.25, which was half the estimated F needed to achieve maximum sustainable yield (MSY). The amendment allowed an increase in the target F once spawning stock biomass (SSB) was restored to levels estimated during the late 1960s and early 1970s. The dual size limit concept was maintained, and a recreational trip limit and commercial season was implemented to reduce the harvest to 20% of that in the historic period of 1972-1979. A series of four addenda were implemented from 1990-1994 to maintain protection of the 1982 year class.

In 1990, to provide additional protection to striped bass and ensure the effectiveness of state regulations, NOAA Fisheries passed a final rule (55 Federal Register 40181-02) prohibiting possession, fishing, (i.e., catch and release fishing), harvest and retention of Atlantic striped bass in the Exclusive Economic Zone (EEZ), with the exception of a defined transit zone within Block Island Sound. Atlantic striped bass may be possessed and transported through this defined area, provided that the vessel is not used to fish while in the EEZ and the vessel remains in continuous transit.

In 1995, Chesapeake Bay, Delaware Bay and Hudson River striped bass were declared recovered by the Commission (the A-R stock was declared recovered in 1997), and Amendment 5 was adopted to increase the target F to 0.33, midway between the existing F target (0.25) and F_{MSY} , and increased again to 0.40 after two years of implementation. Regulations were developed to achieve the target F (including measures aimed to restore commercial harvest to 70% of the average landings during the 1972-1979 historical period) and states were allowed to submit proposals for alternative regulations that were conservationally equivalent. From 1997-2000, a series of five addenda were implemented to respond to the latest stock status information and adjust the regulatory regime to achieve each change in target F.

In 2003, Amendment 6 was adopted to address five limitations within the existing management program: 1) potential inability to prevent the Amendment 5 exploitation target from being exceeded; 2) perceived decrease in availability or abundance of large striped bass in the coastal migratory population; 3) a lack of management direction with respect to target and threshold biomass levels; 4) inequitable effects of regulations on the recreational and commercial fisheries, and coastal and producer area sectors; and 5) excessively frequent changes to the management program. Amendment 6 completely replaced all previous Commission plans for Atlantic striped bass.

The goal of Amendment 6 is to perpetuate, through cooperative interstate 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. In support of this goal, the following objectives are included:

- 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.

Amendment 6 modified the F target and threshold, and introduced a new set of biological reference points (BRPs) based on female (SSB), as well as a list of management triggers based on the BRPs. The coastal commercial quotas for striped bass were restored to 100% of the states' average landings during the 1972-1979 historical period, except for Delaware's coastal commercial quota which remained at the level allocated in 2002. 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 the Chesapeake Bay fisheries, fisheries that operate in the A-R (i.e., internal coastal waters of NC), and states with approved alternative regulations. The Chesapeake Bay and A-R regulatory programs were predicated on a more conservative F target than the coastal migratory stock, which allowed these jurisdictions to implement separate seasons, harvest caps, and size and bag limits as long as they remain under that F target. No minimum size limit can be less than 18 inches under Amendment 6. The same minimum size standards regulate the commercial fisheries as the recreational fisheries, except for a minimum 20 inch size limit in the Delaware Bay spring American shad gillnet fishery.

States are permitted the flexibility to deviate from these standards by submitting proposals for review to the Striped Bass Technical Committee (TC), Advisory Panel (AP), and Plan Review Team (PRT) and contingent upon the approval of the Atlantic Striped Bass Management (Board). A state may request a change only if it can demonstrate that the action is "conservationally equivalent" to the management standards or will not contribute to the overfishing of the resource. This practice has resulted in a variety of regulations among states (see Table 8 and Table 9).

In 2007, Addendum I was implemented to establish a bycatch monitoring and research program to increase the accuracy of data on striped bass discards and also recommend development of a web-based angler education program. Also in 2007, President George W. Bush issued an Executive Order (E.O. 13449) prohibiting the sale of striped bass (and red drum) caught within the EEZ. The order also requires the Secretary of Commerce to encourage management for conservation of resources, including State designation as gamefish where the state determines appropriate under applicable law, and to periodically review the status of the populations within US jurisdictional waters.

In 2010, Addendum II was approved. The addendum established a new definition of recruitment failure such that each index would have a fixed threshold indicating failure, rather than a threshold that changes annually with the addition of each year's data. The new definition of recruitment failure is "a value that is below 75% of all values in a fixed time series appropriate to each juvenile abundance index."

In 2012, Addendum III was approved. The addendum requires all states and jurisdictions with a commercial fishery to implement a uniform commercial harvest tagging program. The addendum was initiated in response to significant poaching events in the Chesapeake Bay and aims to limit illegal harvest of striped bass.

In 2014, Addendum IV was approved. The addendum was initiated in response to the 2013 benchmark assessment which indicated a steady decline in SSB since the mid-2000s. The addendum established new F reference points (i.e., target and threshold), and a suite of regulatory measures to reduce F to a level at or below the new target by 2016. Prior to the start of the 2015 fishing season, all jurisdictions were required to implement regulations to achieve a 25% reduction from 2013 removals for the coastal fisheries and a 20.5% reduction from 2012 removals for Chesapeake Bay fisheries. Additionally, since tagging studies conducted on the A-R stock demonstrate that the stock contributes minimally to the total coastwide complex (Callihan et al. 2014), Addendum IV defers management of the A-R stock (i.e., internal coastal waters) to the state of North Carolina using A-R stock-specific BRPs approved by the Board. Striped bass in the ocean waters of North Carolina continue to be managed under Amendment 6 and Addenda I-IV.

While NOAA Fisheries continues to implement a ban on the possession, fishing (i.e., catch and release fishing), harvest and retention of striped bass in the EEZ, Amendment 6 includes a recommendation to the Secretary of Commerce to consider reopening the EEZ to commercial and recreational striped bass fisheries. In July 2003 and continuing for several years, NOAA Fisheries took steps in the rulemaking process to consider the recommendation. In September 2006, NOAA Fisheries concluded that it would be imprudent to open the EEZ to striped bass fishing and chose not to proceed further in its rulemaking. Specifically, NOAA Fisheries concluded that "(1) it could not be certain, especially after taking into account the overwhelming public perception that large trophy sized fish congregate in the EEZ, that opening the EEZ would not increase effort and lead to an increase in mortality that would exceed the threshold, and (2) both the Commission's and NOAA Fisheries ability to immediately respond to an overfishing or overfished situation is a potential issue, particularly given the timeframe within which Amendment 6 was created, and given the lag time in which a given year's data is available to management" (71 FR 54261-54262).

II. Status of the Stocks

Atlantic Striped Bass Stocks

The 2013 benchmark stock assessment for Atlantic striped bass was peer-reviewed at the 57th Stock Assessment Workshop (SAW)/Stock Assessment Review Committee (SARC). Based on recommendations by the 46th SAW/SARC in 2007, the statistical catch-at-age (SCA) model was generalized to allow specification of multiple fleets (an ocean fleet, a Chesapeake Bay fleet, and commercial discard fleet), different stock-recruitment relationships, and year- and age-specific natural mortality rates, among other changes. New F reference points were chosen to link the target and threshold F with the target and threshold female SSB. The 2013 assessment, and the new F reference points, were approved by the Board for management use at its October 2013 meeting.

The 2013 SCA model was updated in 2016 to estimate F, SSB, abundance, and recruitment of striped bass during 1982-2015. Based on results of the 2016 stock assessment update, and in comparison to the biological reference points below, Atlantic striped bass are not overfished and are not experiencing overfishing.

	<i>Female SSB</i>	<i>Fully-Recruited F</i>
<i>Threshold</i>	SSB ₁₉₉₅ = 57,626 metric tons	0.22
<i>Target</i>	SSB _{threshold} X 1.25 = 72,032 metric tons	0.18

In 2015, female SSB was estimated at 58,853 metric tons (mt) (129.7 million pounds) which is above the SSB threshold but below the SSB target (Figure 1). The 2015 estimate is a decrease from the 2014 estimate of 63,918 mt (140.9 million pounds). In 2015, recruitment (age-1 abundance) was estimated at 122.7 million fish which is above average for the most recent 20 years (98.0 million fish) and is the second highest value since 2005; the 2012 estimate (i.e., the 2011 year-class) was 123.9 million fish (Figure 1). In 2015, fully-recruited F was estimated at 0.16 which is below both the F threshold and F target (Figure 2). Overall, the conclusion is that female SSB has declined since the 2003 time series high. Although there appears to be an increasing trend in recreational catch over the last five years, the decline in SSB may be reflected in the coastwide harvest which has been decreasing from about 2007 to present (Figure 5). A new benchmark assessment is currently underway and scheduled for completion at the end of the 2018.

Albemarle Sound-Roanoke River Striped Bass Stocks

The most recent A-R benchmark stock assessment (data through 2012) utilized the ASAP3 statistical catch-at-age model. The model was peer reviewed by an outside panel of experts and approved for management use by the Board in October 2014. The model incorporated all commercial and recreational harvest and discard data for the A-R stock, as well as abundance data from fishery independent surveys conducted by North Carolina Division of Marine Fisheries (NCDMF) and North Carolina Wildlife Resources Commission staff. The benchmark assessment produced new BRPs and annual harvest quota to prevent overfishing. The model was most recently updated in 2016 with catch and index data through 2014. Based on results of the 2016 update, and in comparison to the BRPs below, A-R Atlantic striped bass are not overfished and are not experiencing overfishing.

	<i>F</i>	<i>Female SSB</i>	<i>Total Allowable Landings (TAL)</i>
Threshold	0.41	772,588 lbs.	275,000 lb (split evenly between recreational and commercial sectors)
Target	0.33	965,735 lbs.	

In 2014, female SSB was estimated at 2,024,583 pounds which is above the peak in 2003 and the highest value in the time series (1982-2014; Figure 3). In 2014, F was estimated at 0.06 which is below both the F threshold and target (Figure 4). Caution should be used, however, when evaluating the estimate of SSB and F in the last year of the assessment. The estimated SSB value in 2014 is the largest value in the entire time series and is likely an overestimate, based on past years of retrospective bias exhibited by the model. Subsequent assessments, incorporating additional years of data and possibly a revised stock-recruit relationship, may reduce the magnitude of the 2014 value. (Flowers, J., et al. 2016). A-R striped bass experienced a period of unusually strong recruitment (number of age-1 fish entering the population) from 1994-2001 followed by a period of lower recruitment from 2002-2013 and higher recruitment again in 2014 and 2015 (Figure 1).

Overall, the trends in the A-R stock abundance are quite similar to the Atlantic striped bass stocks described above, with a steady decline in female SSB since about 2003. Total stock abundance reached its peak in the late 1990s, declined gradually through about 2005 and peaking again in 2012 before declining again. A new benchmark A-R stock assessment with data through 2016 is currently underway and is scheduled to be completed at the end of 2018.

III. Status of the Fishery

Chesapeake Bay and Coastal Atlantic Striped Bass Fisheries

In 2016, total Atlantic striped bass removals (i.e., commercial and recreational harvest plus dead discards, excluding harvest from the A-R stock) was estimated at 3.58 million fish, which is a 19% increase relative to 2015. In 2016, total striped bass commercial and recreational harvest (excluding harvest from the A-R) was estimated at 24.7 million pounds or 2.14 million fish, which is a 7% increase by weight and a 9% increase by number relative to 2015 (Table 1 and Figure 5). In 2016, the commercial and recreational fisheries harvested 20 and 80%, respectively by weight, and 29 and 71% by number.

In 2016, the commercial fishery (coastal and Chesapeake Bay combined) harvested 4.82 million pounds or 614,469 fish, which is 8,988 less fish than that harvested in 2015, but only a slight decrease from 2015 by weight (2,277 pounds) indicating an increase in the average weight of fish harvested in 2016 relative to 2015 (Table 2 and Table 3; Figure 6). The Chesapeake Bay jurisdictions accounted for 62% of 2016 commercial landings by weight; Maryland landed 30%, Virginia landed 22%, and PRFC landed 10%. Additional landings came from Massachusetts (19%), New York (12%), Rhode Island (4%), and Delaware (3%). Total commercial dead discards were estimated at 404,815 fish, which is below average for the last 10 years (Table 6). It is important to note, however, that commercial discard estimates are based on the ratio of tags returned from the recreational fishery to those from the commercial fishery and continue to be a source of uncertainty in the stock assessment.

In 2016, the coastal and Chesapeake Bay combined recreational harvest (A + B1) was estimated at 19.9 million pounds or 1.52 million fish which is a 9% increase by weight and a 14% increase by number from 2015 landings (Table 4 and Table 5; Figure 7). The coastal recreational harvest was 14.7 million pounds which is 56,251 pound more than 2015 (<1% increase). The Chesapeake Bay-wide recreational harvest was 5.15 million pounds and represents nearly a 47% increase in Chesapeake Bay harvest from 2015.

In 2016, recreational releases (B2) were estimated at 11.5 million fish which is a 37% increase from 2015 (8.40 million fish) indicating anglers released more of the fish they caught in 2016 relative to 2015 (Table 6 and Figure 7). The 2016 recreational catch estimate (13.0 million fish) is the highest estimate since 2008 (15.0 million fish) but is still 50% less than the peak in 2006. In 2016, the proportion of catch released was estimated at 88%. Using a 9% post-release mortality rate, recreational dead discards are estimated at 1.04 million fish, which is a 37% increase relative to 2015. Total recreational removals (harvest and dead discards combined) in 2016 was 2.56 million fish which is an 18% increase from 2015 (2.09 million fish). Maryland landed the largest percentage of the total recreational harvest in number of fish¹ (39%), followed by New York (19%), New Jersey (18%), Massachusetts (9%) and Virginia (7%). The remaining states each landed 4% or less of the 2016 recreational landings by number of fish (Table 4 and Table 5).

Albemarle Sound and Roanoke River Atlantic Striped Bass Fisheries

In 2016, total commercial and recreational harvest in the Albemarle Sound Management Area (ASMA) and the Roanoke River Management Area (RRMA) was 202,815 pounds (57,126 fish). Commercial harvest in the ASMA was 123,111 pounds (31,072 fish). Recreational harvest in the ASMA was 14,486 pounds (4,794 fish), and recreational harvest in the RRMA was 65,218 pounds (21,260 fish).

IV. Status of Research and Monitoring

Amendment 6 and its Addenda I-IV set the regulatory and monitoring measures for the coastwide striped bass fishery in 2016.

The management plan requires certain jurisdictions to implement fishery-dependent monitoring programs for striped bass. All jurisdictions with commercial fisheries or substantial recreational fisheries are required to define the catch and effort composition of these fisheries. Additionally, all states and jurisdictions with a commercial fishery must implement a commercial tagging program pursuant to Addendum III to Amendment 6.

The management plan also requires certain states to monitor the striped bass population independent of the fisheries. Juvenile abundance indices are required from Maine (Kennebec River), New York (Hudson River), New Jersey (Delaware River), Maryland (Chesapeake Bay tributaries), Virginia (Chesapeake Bay tributaries), and North Carolina (Albemarle Sound). Spawning stock sampling is mandatory for New York (Hudson River), Pennsylvania (Delaware River), Delaware (Delaware River),

¹ In terms of pounds of fish, New Jersey landed the largest proportion of the total recreational harvest (28%) in 2016, followed by New York (26%), Maryland (22%) and Massachusetts (10%).

Maryland (Upper Chesapeake Bay and Potomac River), Virginia (Rappahannock River and James River), and North Carolina (Albemarle Sound-Roanoke River). Amendment 6 requires NOAA Fisheries, USFWS, Massachusetts, New York, New Jersey, Maryland, Virginia, and North Carolina to continue their tagging programs, which provide data used to determine survivorship and migration patterns.

V. Status of Management Measures and Issues

Coastal Commercial Quota

In 2016, one state had a coastal commercial quota lower than their Addendum IV allocation due to quota overages in 2015 (Rhode Island exceeded its quota by 6,903 pounds resulting in an effective quota of 174,669 in 2016). In 2016, the total coastal commercial quota was 2,838,715 pounds and was not exceeded, however three states exceeded their coastal commercial allocation; Massachusetts by 68,927 pounds, Rhode Island by 32 pounds, and Virginia by 589 pounds. The 2016 commercial quotas and harvest and 2017 commercial quotas are listed in Table 7, by state.

Chesapeake Bay Quota

In 2016, per Addendum IV, the Chesapeake Bay-wide quota was 3,120,247 pounds. Shares are allocated to Maryland, the PRFC, and Virginia based on historical harvest. In 2016, the bay-wide quota was not exceeded and all bay-jurisdictions maintained harvest below its respective quota (Table 7).

Chesapeake Bay Spring Trophy Fishery

Recreational fishermen in the Chesapeake Bay are permitted to take adult migrant fish during a limited seasonal fishery, commonly referred to as the Spring Trophy Fishery. From 1993 to 2007 the fishery operated under a quota. Beginning in 2008, the Board approved non-quota management until stock assessment indicates that corrective action is necessary to reduce F on the coastal stock. The Spring Trophy Fishery is managed via bag limits and size restrictions. In 2016, the estimate of migrant fish harvested during the trophy season was 74,349 fish (74,139 fish in Maryland and 210 fish in Virginia) and represents a twofold increase from the 2015 estimate of 30,779 fish (2016 and 2017 state compliance reports).

Wave-1 Recreational Harvest Estimates

Evidence suggests that North Carolina, Virginia, and possibly other states have had sizeable wave-1 (January/February) recreational striped bass fisheries beginning in 1996 (NEFSC 2013b). The Marine Recreational Information Program (MRIP), formerly the Marine Recreational Fisheries Statistics Survey (MRFSS), has sampled for striped bass in North Carolina during wave-1 since 2004. Other states are not currently covered during wave-1.

However, striped bass distributions on their overwintering grounds during December through February has changed significantly since the mid-2000s. The migratory portion of the stocks has been well offshore in the EEZ (>3 miles) effecting both Virginia's and North Carolina's striped bass winter ocean fisheries in recent years. Furthermore, North Carolina has reported zero striped bass landings during wave-1 in the ocean for 2012-2016.

Addendum II: Juvenile Abundance Index Analysis

Amendment 6 requires the following states to conduct striped bass young-of-year juvenile abundance index (JAI) surveys on an annual basis: Maine for the Kennebec River; New York for the Hudson River; New Jersey for the Delaware River; Maryland for the Maryland Chesapeake Bay tributaries; Virginia for the Virginia Chesapeake Bay tributaries; and North Carolina for the A-R stock.

The PRT (including members of the TC) annually reviews trends in all required JAIs. Per Addendum II to Amendment 6, recruitment failure is defined as a value that is below 75% (the first quartile, or Q1) of all values in a fixed time series appropriate to each JAI. If any survey's JAI falls below their respective Q1 for three consecutive years, then appropriate action should be recommended by the TC to the Management Board. The Management Board is the final arbiter in all management decisions.

For the 2017 review of JAIs, the analysis evaluates the 2014, 2015, and 2016 JAI values. No state's JAI met the criteria for recruitment failure (Figure 8). Maine's JAI was below the Q1 threshold in 2015, near the long-term average in 2014, and slightly below average in 2016. New York's 2016 JAI value was below the Q1 threshold, but the JAI was slightly above average in 2014 and 2015. New Jersey's JAI was above average in 2014 and 2016, but was below average in 2015. Maryland's JAI was below the Q1 threshold in 2016, well above average in 2015 (the 2015 value is the 7th highest in the time series), and slightly below average in 2014. Virginia's JAI was below average in 2016 and slightly above average in 2015 and 2014. North Carolina's JAI for the A-R stock was slightly below average in 2016 but well above average in 2015 and 2014.

Addendum III: Commercial Fish Tagging Program

Addendum III to Amendment 6 includes compliance requirements for monitoring commercial fishery tagging programs. In 2016, The PRT determined that all states implemented commercial tagging programs consistent with the requirements of Addendum III. Table 10 describes commercial tagging program requirements by state.

Albemarle-Roanoke Striped Bass FMP

The Interstate FMP for Atlantic Striped Bass requires North Carolina to inform the Commission of changes to striped bass management in the Albemarle Sound/Roanoke River (A-R) System. North Carolina must adhere to the compliance criteria in Amendment 6. After review, the PRT determined that North Carolina's FMP is consistent with the mandatory components of Amendment 6.

Estuarine striped bass in North Carolina are currently managed under Amendment 1 to the North Carolina Estuarine Striped Bass Fishery Management Plan (FMP) and its subsequent revision (NCDMF 2014). It is a joint plan between the North Carolina Marine Fisheries Commission (NCMFC) and the North Carolina Wildlife Resources Commission (NCWRC). Amendment 1, adopted in 2013, lays out separate management strategies for the Albemarle Sound-Roanoke Rive (A-R) stock and the estuarine (non-migratory) Central and Southern striped bass stocks in the Tar/Pamlico, Neuse, and Cape Fear rivers. Management programs in Amendment 1 utilize annual total allowable landings (TAL), daily possession limits, open and closed harvest seasons, gill net mesh size and yardage restrictions, seasonal attendance requirements, barbless hook requirements in some areas, minimum size limits, and slot limits to maintain a sustainable harvest and reduce regulatory discard mortality in all sectors.

Amendment 1 also maintains the stocking regime in the central and southern systems and the harvest moratorium on striped bass in the Cape Fear River and its tributaries (NCDMF 2013). Striped bass fisheries in the Atlantic Ocean of North Carolina are managed under ASMFC's Amendment 6 and subsequent addenda to the Interstate FMP for Atlantic Striped Bass.

Law Enforcement Reporting

States are asked to report and summarize law enforcement cases that occurred the previous season in annual compliance reports. In 2016, reported law enforcement cases (e.g., the number of warnings and citations) were similar to those reported in 2015. The most common violations were recreationally harvested fish under the legal size limit and possessing fish in excess of the bag limit.

VI. Annual State Compliance and Plan Review Team Recommendations

The following regulatory changes occurred in 2016:

- Maryland: effective June 1, 2016, the ocean recreational fishery bag and size limit changed from one fish at 28" minimum size to two fish at 28-38" total length slot size limit, or greater than 44", through conservation equivalency.

In 2016, and based on the annual state compliance reports, the PRT determined that each state and jurisdiction implemented a management program consistent with the requirements of Amendment 6 and addenda I-IV (Table 11). Refer to Table 8 and Table 9 for 2016 striped bass fishing regulations by state.

Amendment 6 includes compliance requirements for monitoring programs (summarized in *Section IV*). Compliance with these requirements is summarized in Table 11. The PRT determined that each state and jurisdictions carried out the required monitoring programs in the 2016 fishing year. No monitoring program changes were documented in the 2017 compliance reports, or provided via personal communication.

Addendum III to Amendment 6 includes compliance requirements for monitoring commercial fishery tagging programs. The PRT determined that all states and jurisdictions with commercial striped bass fisheries implemented a commercial tagging program consistent with the requirements of Addendum III. Table 10 describes each state's program requirements.

VII. Research Recommendations

The following categorized and prioritized research recommendations were developed by the 2013 Benchmark Stock Assessment Subcommittee and the 57th SARC:

Fishery-Dependent Priorities

High

- Continue collection of paired scale and otolith samples, particularly from larger striped bass, to facilitate development of otolith-based age-length keys and scale-otolith conversion matrices.¹

Moderate

- Develop studies to provide information on gear specific discard mortality rates and to determine the magnitude of bycatch mortality.²
- Improve estimates of striped bass harvest removals in coastal areas during wave 1 and in inland waters of all jurisdictions year round.
- Evaluate the percentage of fishermen using circle hooks.³

Fishery-Independent Priorities

Moderate

- Develop a refined and cost-efficient, fisheries-independent coastal population index for striped bass stocks.
 - The PRT recommends the SBTC be tasked with exploring whether the Cooperative Winter Tagging Cruise, NEAMAP, and/or NMFS Trawl Survey datasets would prove useful in this respect.

Modeling / Quantitative Priorities

High

- Develop a method to integrate catch-at-age and tagging models to produce a single estimate of F and stock status.⁴
- Develop a spatially and temporally explicit catch-at-age model incorporating tag based movement information.⁵
 - The PRT recommends that the SAS be tasked with reviewing recent published literature examining tag-based movement information to see if they would contribute to the development of such a model (e.g., Callihan et al. 2014)
- Review model averaging approach to estimate annual fishing mortality with tag based models. Review validity and sensitivity to year groupings.⁶
- Develop methods for combining tag results from programs releasing fish from different areas on different dates.
- Examine potential biases associated with the number of tagged individuals, such as gear specific mortality (associated with trawls, pound nets, gill nets, and electrofishing), tag induced mortality, and tag loss.⁷
- Develop field or modeling studies to aid in estimation of natural mortality or other factors affecting the tag return rate.

Moderate

- Develop maturity ogives applicable to coastal migratory stocks.
- Examine methods to estimate annual variation in natural mortality.⁸
- Develop reliable estimates of poaching loss from striped bass fisheries.
- Improve methods for determining population sex ratio for use in estimates of SSB and biological reference points.
- Evaluate truncated matrices and covariate based tagging models.

Low

- Examine issues with time saturated tagging models for the 18 inch length group.
- Develop tag based reference points.

Life History, Biological, and Habitat Priorities

High

- Continue in-depth analysis of migrations, stock compositions, etc. using mark-recapture data.⁹
- Continue evaluation of striped bass dietary needs and relation to health condition.¹⁰
- Continue analysis to determine linkages between the mycobacteriosis outbreak in Chesapeake Bay and sex ratio of Chesapeake spawning stock, Chesapeake juvenile production, and recruitment success into coastal fisheries.

Moderate

- Examine causes of different tag based survival estimates among programs estimating similar segments of the population.
- Continue to conduct research to determine limiting factors affecting recruitment and possible density implications.
- Conduct study to calculate the emigration rates from producer areas now that population levels are high and conduct multi-year study to determine inter-annual variation in emigration rates.

Low

- Determine inherent viability of eggs and larvae.
- Conduct additional research to determine the pathogenicity of the IPN virus isolated from striped bass to other warm water marine species, such as flounder, menhaden, shad, and largemouth bass.

Management, Law Enforcement, and Socioeconomic Priorities

Moderate

- Examine the potential public health trade-offs between the continued reliance on the use of high minimum size limits (28 inches) on coastal recreational anglers and its long-term effects on enhanced PCB contamination among recreational stakeholders.^{11, 13}
- Evaluate striped bass angler preferences for size of harvested fish and trade-offs with bag limits.

Habitat Recommendations

- Passage facilities should be designed specifically for passing striped bass for optimum efficiency at passing this species.
- Conduct studies to determine whether passing migrating adults upstream earlier in the year in some rivers would increase striped bass production and larval survival, and opening downstream bypass facilities sooner would reduce mortality of early emigrants (both adult and early-hatched juveniles).
- All state and federal agencies responsible for reviewing impact statements and permit applications for projects or facilities proposed for striped bass spawning and nursery areas shall ensure that those projects will have no or only minimal impact on local stocks, especially natal rivers of stocks considered depressed or undergoing restoration.¹¹
- Federal and state fishery management agencies should take steps to limit the introduction of compounds which are known to be accumulated in striped bass tissues and which pose a threat to human health or striped bass health.

- Every effort should be made to eliminate existing contaminants from striped bass habitats where a documented adverse impact occurs.
- Water quality criteria for striped bass spawning and nursery areas should be established, or existing criteria should be upgraded to levels that are sufficient to ensure successful striped bass reproduction.
- Each state should implement protection for the striped bass habitat within its jurisdiction to ensure the sustainability of that portion of the migratory stock. Such a program should include: inventory of historical habitats, identification of habitats presently used, specification of areas targeted for restoration, and imposition or encouragement of measures to retain or increase the quantity and quality of striped bass essential habitats.
- States in which striped bass spawning occurs should make every effort to declare striped bass spawning and nursery areas to be in need of special protection; such declaration should be accompanied by requirements of non-degradation of habitat quality, including minimization of non-point source runoff, prevention of significant increases in contaminant loadings, and prevention of the introduction of any new categories of contaminants into the area. For those agencies without water quality regulatory authority, protocols and schedules for providing input on water quality regulations to the responsible agency should be identified or created, to ensure that water quality needs of striped bass stocks are met.¹²
- ASMFC should designate important habitats for striped bass spawning and nursery areas as HAPC.
- Each state should survey existing literature and data to determine the historical extent of striped bass occurrence and use within its jurisdiction. An assessment should be conducted of those areas not presently used for which restoration is feasible.

Footnotes

- ¹ The Fish and Wildlife Service has archived otolith samples from known-age (CWT-tagged), stocked fish, for which scale ages were derived as well. These fish were collected during past Cooperative Winter Tagging Cruises and the otoliths, once aged, will increase our sample size, and since these are known-age fish, will also allow an examination of extent that which reader error affects both otolith age, and scale age.
- ² Literature search and some modeling work completed.
- ³ Work ongoing in New York through the Hudson River Angler Diary, Striped Bass Cooperative Angler Program, and ACCSP e-logbook.
- ⁴ Model developed, but the tagging data overwhelms the model. Issues remain with proper weighting.
- ⁵ Model developed with Chesapeake Bay and the rest of the coast as two fleets. However, no tagging data has been used in the model.
- ⁶ Work ongoing by Striped Bass Tagging Subcommittee to evaluate the best years to use for the IRCR and the periods to use for the MARK models.
- ⁷ Gear specific survival being examined in Hudson River.
- ⁸ Ongoing work by the Striped Bass Tagging Subcommittee
- ⁹ Ongoing through Cooperative Winter Tagging Cruise and striped bass charter boat tagging trips. See Cooperative Winter Tagging Cruise 25 Year Report, in preparation.
- ¹⁰ Plans for a stomach content collection program in the Chesapeake Bay by the Chesapeake Bay Ecological Foundation.
- ¹¹ Ongoing in New York.
- ¹² Significant habitat designations completed in the Hudson River and New York Marine Districts.
- ¹³ Samples collected from two size groups (≥ 28 inches and 20-26 inches) in Pennsylvania and processed by the Department of Environmental Protection to compare contamination of the two size groups.

VIII. References

- Atlantic States Marine Fisheries Commission (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. Arlington, VA.
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- National Oceanic and Atmospheric Administration (NOAA). 2012. 2011 Biennial Report to Congress on the Progress and Findings of Studies on Striped bass Populations. Washington (DC): US Department of Congress, NOAA National Marine Fisheries Service. 38 p.

IX. Tables

Tables 1 – 6 report harvest and discard estimates from 1990-2016 due to space constraints.

Table 1. Total harvest of Atlantic striped bass by sector, 1990-2016. Source: MRIP and ACCSP, 2016 estimates queried August 2 and July 28, 2017, respectively. Previous year's estimates may differ from MRIP due to routine updates. Estimates exclude inshore harvest from the A-R.

Year	Commercial Landings		Recreational (A+B1)		Total	
	Pounds	Numbers	Pounds	Numbers	Pounds	Numbers
1990	689,895	115,636	2,226,545	163,242	2,916,440	278,878
1991	1,471,703	153,798	3,643,994	262,469	5,115,697	416,267
1992	1,434,495	230,714	4,026,657	300,180	5,461,152	530,894
1993	1,749,628	312,860	5,651,079	428,719	7,400,707	741,579
1994	1,776,176	307,443	6,777,886	565,167	8,554,062	872,610
1995	3,390,937	534,914	12,425,549	1,089,182	15,816,486	1,624,096
1996	3,367,185	766,518	13,123,332	1,175,112	16,490,517	1,941,630
1997	5,882,643	1,108,612	15,714,071	1,648,127	21,596,715	2,756,739
1998	6,443,874	1,233,089	12,457,222	1,457,062	18,901,096	2,690,151
1999	6,545,102	1,103,812	13,478,473	1,446,388	20,023,575	2,550,200
2000	6,698,988	1,057,712	17,498,212	2,025,113	24,197,199	3,082,825
2001	6,235,788	952,820	19,144,159	2,085,127	25,379,947	3,037,947
2002	5,999,275	658,091	18,219,143	1,973,171	24,218,418	2,631,262
2003	7,072,686	874,817	24,771,639	2,545,052	31,844,325	3,419,869
2004	7,320,357	913,160	29,184,709	2,550,747	36,505,066	3,463,907
2005	7,134,538	973,572	30,222,991	2,441,938	37,357,529	3,415,510
2006	6,783,628	1,054,664	31,044,414	2,788,125	37,828,042	3,842,789
2007	7,050,692	1,023,358	26,994,977	2,523,500	34,045,669	3,546,859
2008	7,188,715	1,010,955	30,595,742	2,466,018	37,784,457	3,476,973
2009	7,215,818	1,043,512	22,937,526	2,040,680	30,153,344	3,084,191
2010	6,979,612	1,030,938	22,994,782	1,986,415	29,974,394	3,017,353
2011	6,783,239	931,570	27,235,091	2,230,256	34,018,330	3,161,826
2012	6,514,238	839,540	19,269,083	1,545,614	25,783,321	2,385,154
2013	5,816,204	765,797	26,411,290	2,120,768	32,227,494	2,886,565
2014	5,937,662	766,610	24,062,167	1,782,868	29,999,829	2,549,478
2015	4,820,489	620,034	18,184,192	1,338,080	23,004,681	1,958,114
2016	4,818,212	614,469	19,879,730	1,524,474	24,697,425	2,138,943
3 yr avg	5,192,121	668,119	20,708,696	1,550,559	25,900,645	2,218,678
10 yr avg	6,312,488	864,962	23,856,458	1,959,688	30,168,894	2,824,650

Table 2. Commercial harvest (pounds) of Atlantic striped bass by state, 1990-2015. Source: ACCSP, 2016 estimates queried July 28, 2017. Previous year's estimates may differ from ACCSP due to routine updates. Commercial harvest and sale prohibited in ME, NH, CT, and NJ. * includes fish taken for personal consumption. ^ North Carolina estimates are from the Atlantic Ocean only.

Year	ME	NH	MA*	RI	CT	NY	NJ	DE	MD	PRFC	VA	NC^	Total
1990			148,000	4,000		81,870		6,509	2,887	169,060	267,735	9,797	689,858
1991			235,000	28,000		105,163		21,079	191,066	216,755	668,454	6,186	1,471,703
1992			239,200	39,000		226,611		17,795	552,451	127,398	204,338	27,702	1,434,495
1993			262,600	40,000		109,362		28,032	916,764	142,742	213,665	36,463	1,749,628
1994			199,600	39,810		171,279		33,897	884,970	149,891	204,124	92,605	1,776,176
1995			782,000	113,461		500,784		38,198	856,568	198,478	557,741	343,707	3,390,937
1996			696,815	122,562		504,350		117,560	1,523,293	346,834		55,771	3,367,185
1997			785,942	96,519		460,762		165,978	2,030,061	731,114	1,153,743	458,524	5,882,643
1998			822,000	94,663		484,900		163,169	2,368,393	726,179	1,476,502	308,068	6,443,874
1999			788,171	119,679		491,790		187,096	2,377,393	653,266	1,538,220	389,454	6,545,069
2000			779,736	111,812		542,659		140,634	2,411,554	666,001	1,883,856	162,736	6,698,988
2001			815,054	129,654		633,095		198,802	1,774,758	658,676	1,675,469	350,280	6,235,788
2002			924,870	129,172		518,573		160,560	1,852,634	521,048	1,592,910	299,508	5,999,275
2003			1,055,439	246,312		753,261		188,419	1,813,727	676,574	1,856,831	482,123	7,072,686
2004			1,206,305	245,204		741,668		181,974	1,899,539	772,333	1,668,307	604,824	7,320,154
2005			1,104,737	242,303		689,821		173,815	2,055,558	533,456	1,746,247	588,601	7,134,538
2006			1,312,168	238,797		688,446		185,987	2,207,350	673,508	1,413,914	63,458	6,783,628
2007			1,040,328	240,627		729,743		188,668	2,336,886	599,261	1,534,799	380,380	7,050,692
2008			1,160,122	245,988		653,100		188,719	2,326,023	611,789	1,714,564	288,410	7,188,715
2009			1,138,291	234,368		789,891		192,311	2,394,620	727,197	1,549,145	189,995	7,215,818
2010			1,224,356	249,520		782,402		185,410	2,150,577	680,496	1,434,219	272,632	6,979,612
2011			1,163,865	228,163		854,731		188,620	1,976,473	694,151	1,434,636	242,600	6,783,239
2012			1,219,665	239,913		681,399		194,324	1,928,982	733,789	1,509,940	6,226	6,514,238
2013			1,004,459	231,280		823,801		191,424	1,755,712	623,792	1,185,736	0	5,816,204
2014			1,138,507	217,037		531,456		167,902	1,926,612	603,068	1,353,080	0	5,937,622
2015			865,753	188,475		509,135		144,068	1,471,493	536,357	1,105,208	0	4,820,489
2016			938,740	174,701		560,803		136,536	1,465,317	500,602	1,041,513	0	4,817,695

Table 3. Commercial harvest (numbers) of Atlantic striped bass by state and annual dead discard estimates, 1990-2016. Source: ACCSP, 2016 estimates queried July 28, 2017. Previous year's estimates may differ from ACCSP due to routine updates. Commercial harvest and sale prohibited in ME, NH, CT, and NJ. * includes fish taken for personal consumption. ^ North Carolina estimates are from the Atlantic Ocean only.

Year	ME	NH	MA*	RI	CT	NY	NJ	DE	MD	PRFC	VA	NC^	Total	Commercial Discards
1990			5,927	784		11,784		698	534	38,884	56,222	803	115,636	510,011
1991			9,901	3,596		15,426		3,091	31,880	44,521	44,970	413	153,798	327,167
1992			11,532	9,095		20,150		2,703	119,286	23,291	42,912	1,745	230,714	186,601
1993			13,099	6,294		11,181		4,273	211,089	24,451	39,059	3,414	312,860	347,839
1994			11,066	4,512		15,212		4,886	208,914	25,196	32,382	5,275	307,443	359,518
1995			44,965	19,722		43,704		5,565	280,051	29,308	88,274	23,325	534,914	515,454
1996			38,354	18,570		39,707		20,660	415,272	46,309	184,495	3,151	766,518	394,824
1997			44,841	7,061		37,852		33,223	706,847	87,643	165,583	25,562	1,108,612	216,745
1998			43,315	8,835		45,149		31,386	790,154	93,299	204,911	16,040	1,233,089	326,032
1999			40,838	11,559		49,795		34,841	650,022	90,575	205,143	21,040	1,103,812	236,619
2000			40,256	9,418		54,894		25,188	627,777	91,471	202,227	6,480	1,057,712	666,997
2001			40,248	10,917		58,296		34,373	549,896	87,809	148,346	22,936	952,820	310,900
2002			48,926	11,653		47,142		30,440	296,635	80,300	127,211	15,784	658,091	168,201
2003			61,262	15,497		68,354		31,531	439,482	83,091	161,777	13,823	874,817	261,974
2004			66,556	15,867		70,367		28,406	461,064	91,888	147,998	31,014	913,160	465,642
2005			65,332	14,949		70,560		26,336	569,964	80,615	119,244	26,573	973,572	798,544
2006			75,062	15,429		73,528		30,212	655,951	92,288	109,396	2,799	1,054,664	194,524
2007			57,634	13,934		78,287		31,090	598,495	86,695	140,602	16,621	1,023,358	606,599
2008			65,330	16,616		73,263		31,866	594,655	81,720	134,603	12,903	1,010,955	308,715
2009			63,875	20,725		82,574		21,590	618,076	89,693	138,303	8,675	1,043,512	611,944
2010			65,277	17,256		81,896		19,830	584,554	90,258	159,197	12,670	1,030,938	254,841
2011			63,309	14,344		87,349		20,517	490,969	96,126	148,063	10,814	931,490	617,457
2012			66,394	14,953		66,897		15,738	472,517	90,616	111,891	323	839,329	792,861
2013			62,570	13,825		76,206		17,679	399,118	78,006	117,697	0	765,101	525,581
2014			60,619	10,468		52,903		14,894	370,661	81,429	175,324	0	766,298	931,391
2015			42,250	11,325		44,809		10,990	300,929	69,981	139,750	0	620,034	299,566
2016			48,044	11,693		50,780		17,584	286,092	70,737	129,539	0	614,469	404,815

Table 4. Recreational harvest (numbers) of Atlantic striped bass by state, 1990- 2016. Source: MRIP, 2016 estimates queried August 2, 2017. Previous year's estimates may differ from MRIP due to routine updates. ^ North Carolina estimates are from the Atlantic Ocean only.

Year	ME	NH	MA	RI	CT	NY	NJ^	DE	MD	VA	NC^	Total
1990	2,912	617	20,515	4,677	6,082	24,799	44,878	2,009	736	56,017	0	163,242
1991	3,265	274	20,799	17,193	4,907	54,502	38,300	2,741	77,873	42,224	391	262,469
1992	6,357	2,213	57,084	14,945	9,154	45,162	41,426	2,400	99,354	21,118	967	300,180
1993	612	1,540	58,511	17,826	19,253	78,560	64,935	4,055	104,682	78,481	264	428,719
1994	3,771	3,023	74,538	5,915	16,929	87,225	34,877	4,140	199,378	127,945	7,426	565,167
1995	2,189	3,902	73,806	29,997	38,261	155,821	254,055	15,361	355,237	149,103	11,450	1,089,182
1996	1,893	6,461	68,300	60,074	62,840	225,428	127,952	22,867	337,415	244,746	17,136	1,175,112
1997	35,259	13,546	199,373	62,162	64,639	236,902	67,800	19,706	334,068	518,483	96,189	1,648,127
1998	38,094	5,929	207,952	44,890	64,215	166,868	88,973	18,758	391,824	383,786	45,773	1,457,062
1999	21,102	4,641	126,755	56,320	55,805	195,261	237,010	8,772	263,191	411,873	65,658	1,446,388
2000	62,186	4,262	181,295	95,496	53,191	270,798	402,302	39,543	506,462	389,126	20,452	2,025,113
2001	59,947	15,291	288,032	80,125	54,165	189,714	560,208	41,195	382,557	355,020	58,873	2,085,127
2002	71,907	12,857	308,749	78,190	51,060	202,075	416,455	29,149	282,429	411,248	109,052	1,973,171
2003	57,765	24,878	407,100	115,471	95,983	313,761	391,842	29,522	525,191	455,812	127,727	2,545,052
2004	48,816	8,386	445,745	83,990	102,844	263,096	424,208	25,429	368,682	548,768	230,783	2,550,747
2005	83,617	24,940	340,743	110,490	141,290	376,894	411,532	20,438	533,929	293,161	104,904	2,441,938
2006	75,347	13,521	314,987	75,811	115,214	367,835	509,606	20,159	669,140	547,482	79,023	2,788,125
2007	53,694	6,348	315,409	101,400	118,549	474,062	289,656	8,465	765,169	353,372	37,376	2,523,500
2008	59,152	5,308	377,959	51,191	108,166	685,589	309,411	26,934	415,403	401,155	25,750	2,466,018
2009	62,153	8,587	344,401	71,427	60,876	356,311	283,024	19,539	501,845	326,867	5,650	2,040,680
2010	17,396	5,948	341,045	70,108	92,806	538,374	320,413	16,244	457,898	102,405	23,778	1,986,415
2011	18,105	32,704	255,507	88,635	63,288	674,844	393,194	18,023	445,171	146,603	94,182	2,230,256
2012	11,624	14,498	377,931	61,537	64,573	424,522	168,629	25,399	262,143	134,758	0	1,545,614
2013	23,143	17,657	298,945	218,236	143,373	490,855	345,008	19,520	477,295	118,686	0	2,152,718
2014	20,750	6,415	277,138	103,516	86,763	409,342	225,910	8,774	583,028	67,486	0	1,789,122
2015	4,720	1,828	170,770	39,857	70,522	262,181	284,257	3,101	406,371	94,473	0	1,338,080
2016	10,557	4,325	131,793	58,247	48,830	290,423	271,451	2,442	595,902	110,504	0	1,524,474

Table 5. Recreational harvest (pounds) of Atlantic striped bass by state, 1990-2016. Source: MRIP, 2016 estimates queried August 2, 2017. Previous year's estimates may differ from MRIP due to routine updates. ^ North Carolina estimates are from the Atlantic Ocean only.

Year	ME	NH	MA	RI	CT^	NY	NJ^	DE	MD	VA	NC	Total
1990	60,483	11,363	319,092	73,349	193,011	505,440	588,974	18,115	12,967	443,751	0	2,226,545
1991	58,177	6,731	440,605	496,723	125,309	1,053,589	643,571	25,501	456,954	333,743	3,091	3,643,994
1992	107,693	44,612	972,116	203,109	196,278	921,201	746,343	25,677	613,174	187,852	8,602	4,026,657
1993	11,953	28,115	1,113,446	292,428	400,067	1,575,938	874,296	52,540	794,853	505,742	1,701	5,651,079
1994	66,451	66,017	1,686,049	109,817	355,829	1,974,759	438,080	63,832	1,096,409	870,140	50,503	6,777,886
1995	45,933	67,992	1,504,390	436,058	671,647	3,296,025	3,141,222	175,347	2,057,450	955,822	73,663	12,425,549
1996	44,802	102,271	1,291,706	950,973	915,418	4,809,381	1,736,508	281,481	1,560,389	1,340,414	89,989	13,123,332
1997	185,178	206,904	2,891,970	927,919	920,465	4,449,564	821,784	232,186	1,962,947	2,813,471	301,683	15,714,071
1998	178,584	114,342	2,973,456	671,841	989,923	2,318,291	1,333,329	236,926	1,908,344	1,581,560	150,626	12,457,222
1999	98,623	84,255	1,822,818	886,666	824,031	3,171,344	3,342,372	100,541	1,137,940	1,741,857	268,026	13,478,473
2000	269,325	71,370	2,618,216	1,160,304	515,962	4,050,569	4,286,040	346,905	2,100,854	2,005,721	72,946	17,498,212
2001	290,233	223,072	3,644,561	1,138,974	628,044	2,996,805	5,341,867	382,498	2,072,943	2,140,713	284,449	19,144,159
2002	383,270	152,342	4,304,883	1,192,295	600,482	2,813,596	4,133,678	299,561	1,423,515	2,648,115	267,406	18,219,143
2003	253,910	281,549	5,120,554	1,502,455	1,537,899	4,687,685	4,545,515	303,909	2,975,437	2,789,745	772,981	24,771,639
2004	226,200	98,995	6,112,746	1,386,138	1,617,561	3,727,105	5,548,167	330,623	2,347,752	2,956,310	4,833,112	29,184,709
2005	381,058	281,114	5,097,821	1,732,581	2,173,638	5,537,432	5,958,454	286,777	4,612,417	1,996,840	2,164,859	30,222,991
2006	323,355	179,181	4,832,355	999,300	2,030,878	6,028,409	7,067,533	260,134	3,868,944	3,694,529	1,759,796	31,044,414
2007	232,328	68,142	5,136,580	1,584,354	1,468,499	7,913,817	3,718,451	99,800	3,504,041	2,392,258	876,707	26,994,977
2008	271,768	73,807	5,763,763	751,507	1,868,335	10,925,408	4,696,090	333,149	2,728,048	2,657,976	525,891	30,595,742
2009	329,064	113,705	4,786,895	1,123,434	835,970	5,004,604	4,238,319	275,410	4,278,145	1,791,058	160,922	22,937,526
2010	104,117	67,409	4,270,401	1,096,369	1,259,008	6,997,089	5,382,743	251,853	2,630,802	481,147	453,844	22,994,782
2011	91,705	370,798	3,504,522	1,257,302	758,623	8,969,762	6,197,026	241,149	2,640,309	1,160,914	2,042,981	27,235,091
2012	57,509	163,804	5,489,928	851,460	815,545	6,540,024	2,376,866	360,106	1,260,490	1,353,351	0	19,269,083
2013	102,437	233,039	4,193,416	3,043,251	2,286,969	8,624,422	4,945,069	253,062	2,203,319	526,306	0	26,411,290
2014	100,213	78,310	4,397,183	2,161,265	1,783,224	7,552,788	4,133,460	107,421	3,251,151	497,152	0	24,062,167
2015	63,878	30,614	2,701,724	798,394	1,262,377	4,620,923	5,145,204	34,808	3,095,910	430,360	0	18,184,192
2016	128,324	45,719	2,048,238	1,001,147	799,458	5,188,892	5,476,495	40,602	4,312,637	838,218	0	19,879,730

Table 6. Commercial Discards, Recreational Releases and Recreational Dead Discards (numbers) of Atlantic striped bass by state, 1990-2016. Source: MRIP, 2016 estimates queried August 2, 2017. Previous year's estimates may differ from MRIP due to routine updates. Estimates exclude inshore harvest from the A-R.

Year	Commercial Dead Discards	Recreational Releases (B2)	Recreational [^] Dead Discards	Total Dead Discards	%Com	%Rec
1990	510,011	1,653,594	148,823	658,834	77%	23%
1991	327,167	3,061,047	275,494	602,661	54%	46%
1992	186,601	3,367,397	303,066	489,667	38%	62%
1993	347,839	4,344,569	391,011	738,850	47%	53%
1994	359,518	7,930,839	713,776	1,073,293	33%	67%
1995	515,454	9,743,862	876,948	1,392,401	37%	63%
1996	394,824	12,288,668	1,105,980	1,500,804	26%	74%
1997	216,745	15,718,341	1,414,651	1,631,396	13%	87%
1998	326,032	14,928,367	1,343,553	1,669,585	20%	80%
1999	236,619	12,514,721	1,126,325	1,362,944	17%	83%
2000	666,997	16,808,809	1,512,793	2,179,790	31%	69%
2001	310,900	13,444,497	1,210,005	1,520,905	20%	80%
2002	168,201	13,693,056	1,232,375	1,400,577	12%	88%
2003	261,974	14,611,333	1,315,020	1,576,994	17%	83%
2004	465,642	17,053,333	1,534,800	2,000,442	23%	77%
2005	798,544	18,078,899	1,627,101	2,425,645	33%	67%
2006	194,524	23,343,299	2,100,897	2,295,421	8%	92%
2007	606,599	16,110,023	1,449,902	2,056,501	29%	71%
2008	308,715	12,510,987	1,125,989	1,434,704	22%	78%
2009	611,944	7,970,813	717,373	1,329,317	46%	54%
2010	254,841	6,258,081	563,227	818,068	31%	69%
2011	617,457	5,932,480	533,923	1,151,380	54%	46%
2012	792,861	5,191,891	467,270	1,260,131	63%	37%
2013	525,581	8,539,986	768,599	1,294,180	41%	59%
2014	931,391	7,282,547	655,429	1,586,820	59%	41%
2015	299,566	8,397,456	755,771	1,055,337	28%	72%
2016	404,815	11,503,542	1,035,319	1,440,134	28%	72%
3 yr avg	545,257	9,061,182	815,506	1,360,764	38%	62%
10 yr avg	535,377	8,969,781	807,280	1,342,657	40%	60%

[^] Dead discards are estimated by multiplying the number of released fish by a mortality rate of 9%.

Table 7. Commercial Quotas, Harvests, Overages, and Adjusted Quotas (in pounds)

Source: ACCSP, queried July 28, 2017.

Atlantic Coast					
State	Add IV Quota†	2016 Quota	2016 harvest	overage	2017 Quota
Maine *	188	188	-		188
New Hampshire *	4,313	4,313	-		4,313
Massachusetts	869,813	869,813	938,740	68,927	800,886
Rhode Island	182,719	174,669	174,701	32	181,540
Connecticut **	17,813	17,813	-		17,813
New York	795,795	795,795	560,803		795,795
New Jersey **	241,313	241,313	-		241,313
Delaware	145,085	145,085	136,536		145,085
Maryland	98,670	90,727	32,636		90,727
Virginia	138,640	138,640	139,229	589	138,051
North Carolina ^	360,360	360,360	0		360,360
Coastal Total	2,854,706	2,838,715	1,982,645	69,548	2,776,070
Chesapeake Bay					
Jurisdiction	Add IV Quota	2016 Quota	2016 harvest	overage	2017 Quota
Maryland	1,471,888	1,471,888	1,432,681		1,471,888
Virginia	1,064,997	1,064,997	902,284		1,064,997
PRFC	583,362	583,362	500,602		583,362
Chesapeake Bay Total	3,120,247	3,120,247	2,835,567		3,120,247
Total Commercial	5,974,953	5,965,864	4,818,212		5,896,317

* Commercial harvest/sale prohibited, with no re-allocation of quota.

** Commercial harvest/sale prohibited, with re-allocation of quota to the recreational fishery.

^ North Carolina estimates are from the Atlantic Ocean only.

† 25% reduction from Amendment 6 quota allocations. Quota reduced through conservation equivalency for MD (90,727 lbs) and RI (181,572 lbs)

Table 8. Summary of Atlantic Striped bass commercial regulations in 2016. Source: Annual State Compliance Reports. Minimum sizes and slot size limits are in total length (TL). *commercial quota reallocated to recreational bonus fish program

STATE	SIZE LIMITS	SEASONAL QUOTA	OPEN SEASON
ME	Commercial fishing prohibited		
NH	Commercial fishing prohibited		
MA	34" minimum size	869,813 lbs. Hook & line only	6.23 until quota reached, Monday and Thursdays only; 15 fish/day with commercial boat permit; 2 fish/day with rod and reel permit (striped bass endorsement required for both permits)
RI	Floating fish trap: 26" minimum size General category (mostly rod & reel): 34" min.	Total: 181,572 lbs., split 39:61 between the trap and general category. Gill netting prohibited.	Trap: 4.1 – 12.31, or until quota reached; unlimited possession limit until quota reached General Category: 5.29-8.31, 9.8-12.31, or until quota reached. Closed Fridays and Saturdays during both seasons. 5 fish/vessel/day possession limit.
CT*	Commercial fishing prohibited; bonus program: 22 – <28" slot size limit, 5.1 – 12.31 (voucher required)		
NY	28-38" minimum size (Hudson River closed to commercial harvest)	795,795 lb. Pound nets, gill nets (6-8" stretched mesh), hook & line.	6.1 – 12.15, or until quota reached. Limited entry permit only.
NJ*	Commercial fishing prohibited; bonus program: 1 fish at 24 – <28" slot size limit, 5.1 – 12.31 (permit required)		
PA	Commercial fishing prohibited		
DE	Gillnet: 20" min in DE Bay/River during spring season. 28" in all other waters/seasons. Hook and Line: 28" min	Gillnet: 137,831 lbs. Hook and line: 14,509 lbs.	Gillnet: 2.15-5.31 (2.15-3.30 for Nanticoke River) & 11.15-12.31; drift nets only 2.15-28 & 5.1-31; no fixed nets in DE River. No trip limit. Hook and Line: 4.1–12.31, 200 lbs/day trip limit

(Table 8 continued – Summary of commercial regulations in 2016)

STATE	SIZE LIMITS	SEASONAL QUOTA	OPEN SEASON
MD	Bay and Rivers: 18–36” Ocean: 24” minimum	Bay and River: 1,471,888 lbs. (part of Bay-wide quota). Gear specific quotas and landing limits. Ocean: 90,727 lbs.	Bay Pound Net: 6.1-12.31, Mon-Sat Bay Haul Seine: 6.1-12.30, Mon-Fri Bay Hook & Line: 6.1-12.29, Mon-Thu Bay Drift Gill Net: 1.1-2.29, 12.1-12.31, Mon-Thu Ocean: 1.1-5.31, 10.1-12.31, Mon- Fri
PRFC	18” min all year; 36” max 2.15–3.25 (1.1-3.1 for H&L fisheries)	583,362 lbs (part of Bay-wide quota). Allocated by gear and season.	Hook & line: 1.1-3.1, 6.1-12.31 Pound Net & Other: 2.15-3.25, 6.1-12.15 Gill Net: 1.1-3.25, 11.9-12.31 Misc. Gear: 2.15-3.25, 6.1-12.15
DC	Commercial fishing prohibited		
VA	Bay and Rivers: 18” min, and 28” max size limit 3.26–6.15 Ocean: 28” min	Bay and Rivers: 1,064,997 lbs Ocean: 138,640 lbs. (ITQ- system for both areas)	Bay and Rivers: 1.16-12.31 Ocean: 1.16-12.31
NC	Ocean: 28”	360,360 lbs. (split between gear types). Number of fish allocated to each permit holder. Allocation varies by permit.	Seine fishery was open for 120 days, 150 fish/permit Gill net fisher was open for 45 days, 50 fish/permit Trawl fishery was open for 70 days, 100 fish/permit

Table 9. Summary of Atlantic Striped bass recreational regulations in 2016. Source: Annual State Compliance Reports. Minimum sizes and slot size limits are in total length (TL).

STATE	SIZE LIMITS	BAG LIMIT	GEAR RESTRICTIONS	OPEN SEASONS
ME	≥ 28" minimum size	1 fish/day	Hook & line only; circle hooks only when using live bait	All year, except spawning areas are closed 12.1 – 4.30 and catch and release only 5.1 – 6.30
NH	≥ 28" minimum size	1 fish/day	Gaffing and culling prohibited	All year
MA	≥ 28" minimum size	1 fish/day	Hook & line only; no high-grading	All year
RI	≥ 28" minimum size	1 fish/day	None	All year
CT	≥ 28" minimum size	1 fish/day	Spearing and gaffing prohibited	All year
NY	Ocean and Delaware River: 28" minimum size Hudson River: 18-28" slot limit, or ≥40"	1 fish/day	Angling only. Spearing permitted in ocean waters. Catch and release only during closed season.	Ocean: 4.15 – 12.15 Hudson River: 4.1 – 11.30 Delaware River: All year
NJ	1 fish at 28 to < 43", and 1 fish ≥ 43"			Closed 1.1 – 2.28 in all waters except in the Atlantic Ocean, and 4.1 – 5.31 in the lower Delaware River and tributaries (spawning ground closure)
PA	Upstream from Calhoun St Bridge: 1 fish at ≥ 28" minimum size Downstream from Calhoun St Bridge: 1 fish at ≥ 28" minimum size, from 4.1 – 5.31, a 2 fish at 21-25" slot size limit			
DE	28" min, no harvest 38-43" (inclusive). In Del. River, Bay & tributaries, may only harvest 20-25" slot from 7.1-8.31	2 fish/day	Hook & line, spear (for divers) only. Circle hooks required in spawning season.	All year except 4.1-5.31 in spawning grounds (catch & release allowed).

(Table 9 continued – Summary of recreational regulations in 2016)

STATE	SIZE LIMITS	BAG LIMIT	OTHER	OPEN SEASON
MD	Ocean: 28" min^ Bay Trophy: 28 to ≤36" slot, OR ≥40" Bay Summer/Fall: (2) 20-28" slot OR (1) 20-28" slot, (1) > 28" minimum size	Ocean: 1 fish/day Bay Trophy: 1 fish/day Bay Summer/Fall: 2 fish/day	See compliance report for specifics.	Ocean: All year Bay SF: 1.1-5.3 Bay Spring (C&R): 3.1-4.15 Bay Trophy: 4.16-5.15 Bay Summer/Fall: 5.16-12.20
PRFC	Spring Trophy: 35" minimum size limit Summer/Fall: 20" min with 1 fish >28"	Trophy: 1 fish Summer/Fall: 2 fish	No more than two hooks or sets of hooks for each rod or line	Spring Trophy: 4.16 -5.15 Summer/Fall: 5.16-12.31
DC	2 fish at ≥ 20" minimum, only one fish >28"		Hook & line only	5.16-12.31
VA	Ocean: 28" Bay/Coastal Trophy: 36" min (28" max in tribs) CB Spring: 20-28"; only 1 fish can be >36" CB Spring: 20-28"; only 1 fish can be >28"	Ocean: 1 fish/day Bay/Coast Trophy: 1 fish/day Bay Spring/Fall: 2 fish/day	Hook & line, rod & reel, hand line only. Gaffing is illegal in Virginia marine waters.	Ocean: 1.1-3.31, 5.16-12.31 Bay/Tribs Trophy: 5.1-6.15 Coastal Trophy: 5.1-5.15 Bay Spring: 5.16-6.15 Bay Fall: 10.4-12.31
NC	Ocean: 28" min size	Ocean: 1 fish/day	No gaffing allowed.	Ocean: All year

^ 2 fish at 28-38" slot size limit, or >44", effective June 1

Table 10. Status of Commercial Tagging Programs by state for 2016.

State	Number of Participants	Number of Tags Issued	Number of Tags Used	Point of Tag (sale/harvest)	¹ Biological Metric (Y/N)	Year, State and Unique ID on Tag (Y/N)	Size Limit on Tag (Y/N)	Number of Tag Colors and Tag Color by Gear, season, or area	Annual Tag Color Change (Y/N)
MA	110	65,120	48,044	Sale	Y	Y	Y	one tag color	Y
RI	30	14,290	11,617	Sale	Y	Y	N	two tag colors by gear	Y
NY	437	70,400	49,326	Harvest	Y	Y	N	One tag color	Y
DE*	111 (gill net) 117 (H&L)	41,615	17,584	Both	Y	Y	N	Harvest: two tag colors by gear Sale: one tag color	Y
MD	1052	460,610	328,495	Harvest	Y	Y	N	Three tag colors by gear and permit	Y
PRFC	350	77,585	70,737	Harvest	Y	Y	N	Five tag colors by gear	N
VA	405	153,500	139,750	Harvest	Y	Y	Y	two tag colors by area	Y
NC	92	40,486	29,706	Sale	Y	Y	Y	Three tag colors by area	N

¹ States are required to allocate commercial tags to permit holders based on a biological metric. Most states used the average weight per fish from the previous year, or some variation thereof. Actual biological metric used is to be included in State Annual Commercial Tag Reports.

* the number of tags issued represent the combined total from tags used by harvesters and weigh stations, such that each fish has two tags

Table 11. Status of compliance with monitoring and reporting requirements in 2016. JAI = juvenile abundance index survey, SSB = spawning stock biomass survey, tag = participation in coastwide tagging program, Y = compliance standards met, N = compliance standards not met, NA = not applicable, R = recreational, C = commercial

Jurisdiction	Fishery-independent monitoring		Fishery-dependent monitoring		Annual reporting
	Requirement(s)	Status	Requirement(s)	Status	Status
ME	JAI	Y	composition, catch and effort (R)	NA	Y
NH	NA	NA	composition, catch and effort (R)	NA	Y
MA	tag	Y	composition, catch & effort (C&R), tag program	Y	Y
RI	NA	NA	composition (C&R), catch & effort (R), tag program	Y	Y
CT	NA	NA	composition, catch & effort (R)	Y	Y
NY	JAI, SSB, tag	Y	composition, catch & effort (C&R), tag program	Y	Y
NJ	JAI, tag	Y	composition, catch & effort (R)	Y	Y
PA	SSB	Y	composition, catch and effort (R)	NA	Y
DE	SSB, tag	Y	composition, catch & effort (C), tag program	Y	Y
MD	JAI, SSB, tag	Y	composition, catch & effort (C&R), tag program	Y	Y
PRFC	NA	NA	composition, catch & effort (C&R), tag program	Y	Y
DC	NA	NA	composition, catch and effort (R)	NA	Y
VA	JAI, SSB, tag	Y	composition, catch & effort (C&R), tag program	Y	Y
NC	JAI, SSB, tag	Y	composition, catch & effort (C&R), tag program	Y	Y

X. Figures

Figure 1. Atlantic striped bass spawning stock biomass (SSB) and recruitment estimates (age-1 fish), and biological reference points, 1982-2015. Source: 2016 Stock Assessment Update

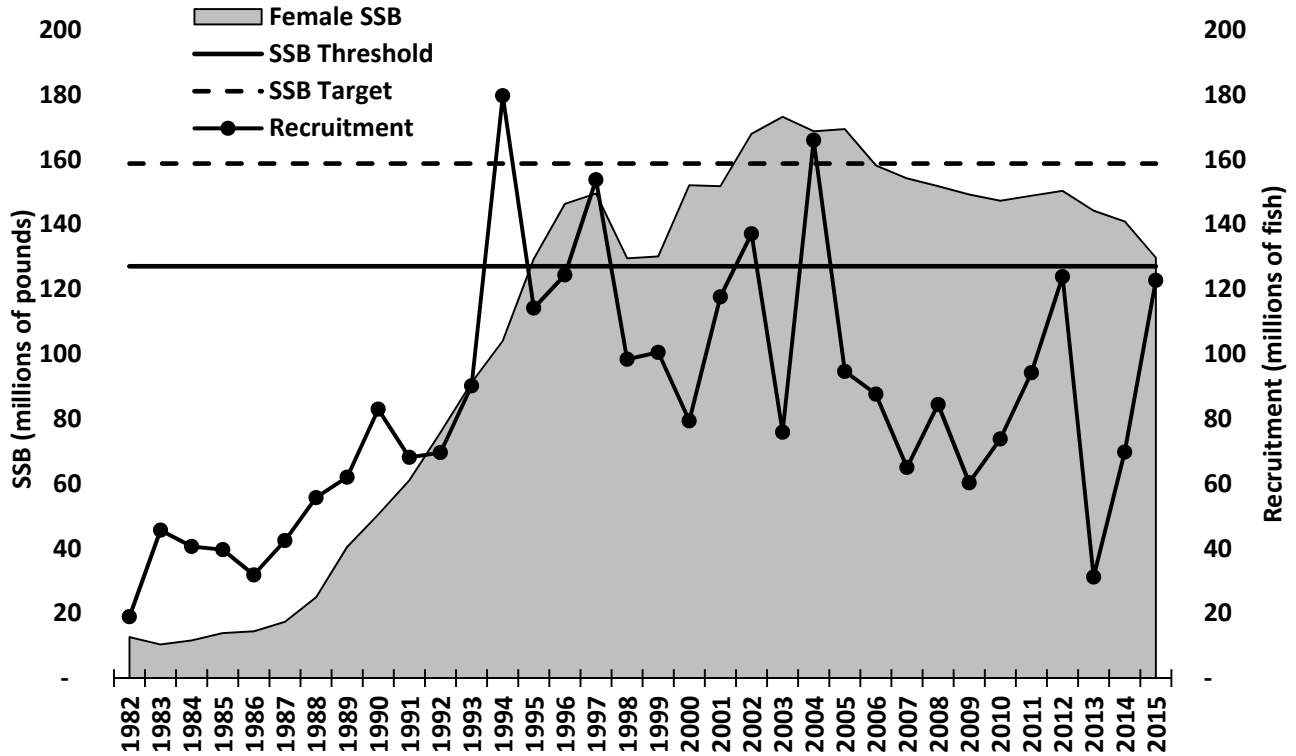


Figure 2. Atlantic striped bass fishing mortality rate (F) estimates, and biological reference points, 1983-2015. Source: 2016 Stock Assessment Update

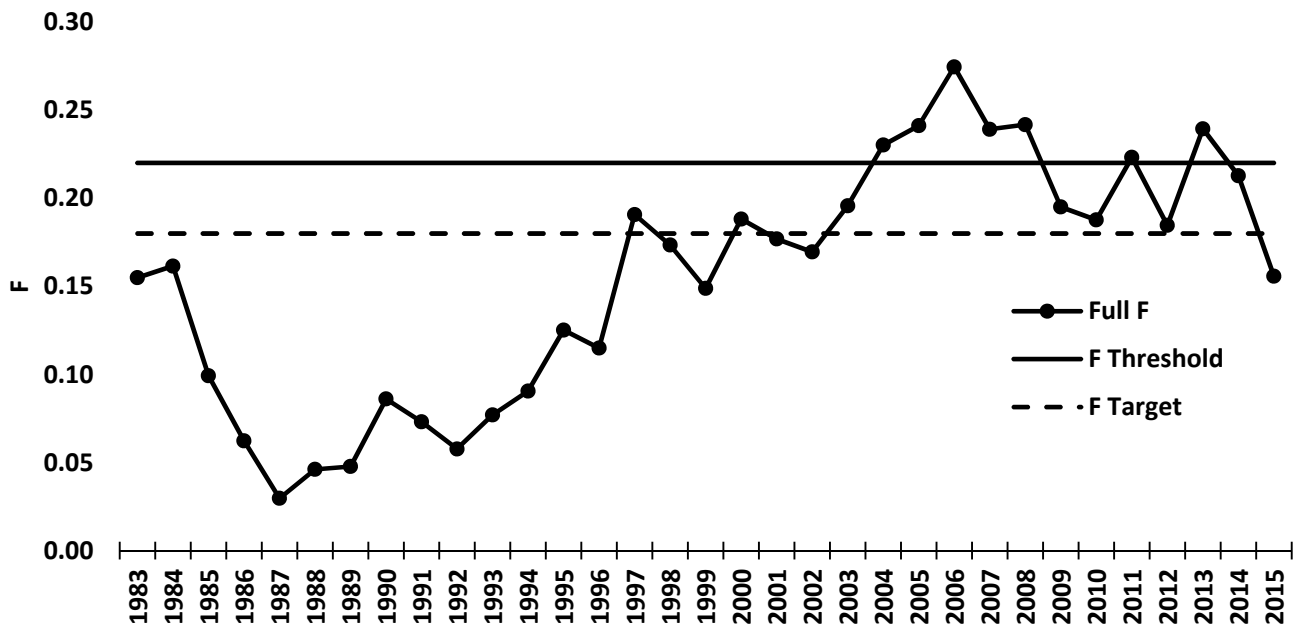


Figure 3. Albemarle/Roanoke striped bass female spawning stock biomass and recruitment (abundance of age-1), and biological reference points, 1982-2014. Source: Stock Status of Albemarle Sound-Roanoke River Striped bass, 2016

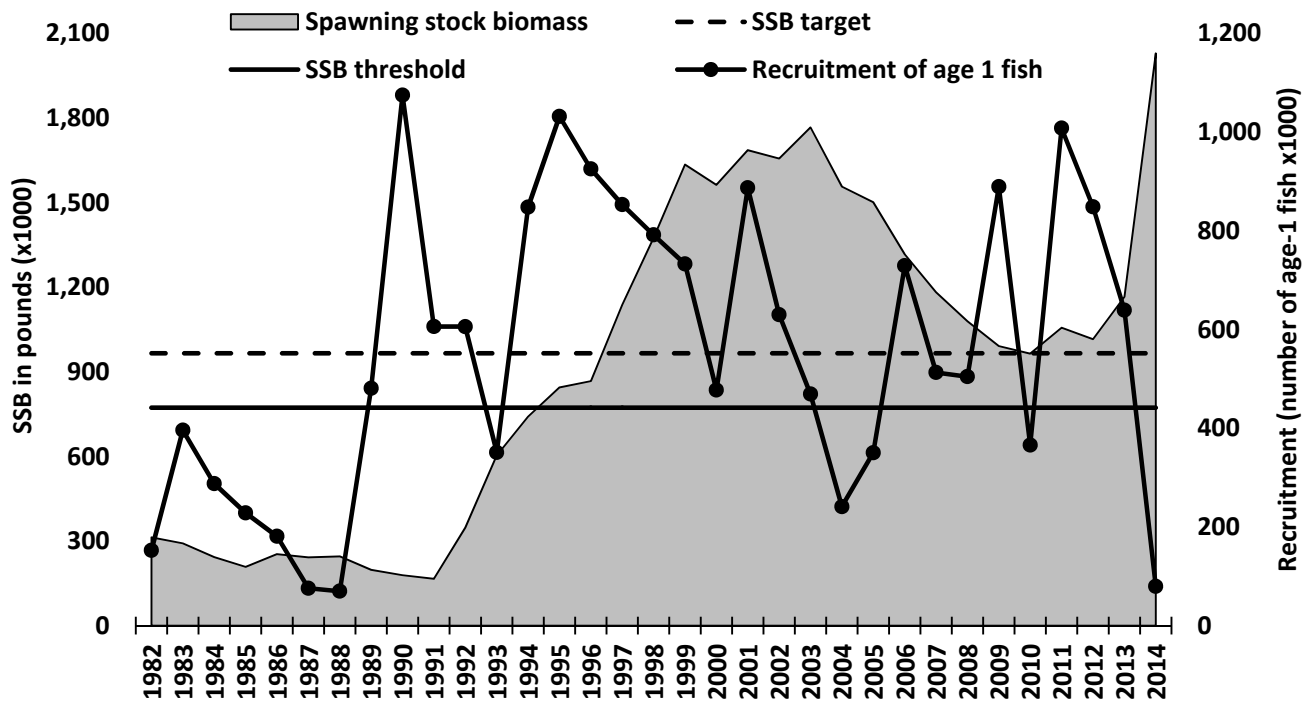


Figure 4. Albemarle-Roanoke striped bass fishing mortality (F) estimates, and biological reference points, 1982-2014. Source: Stock Status of Albemarle Sound-Roanoke River Striped bass, 2016.

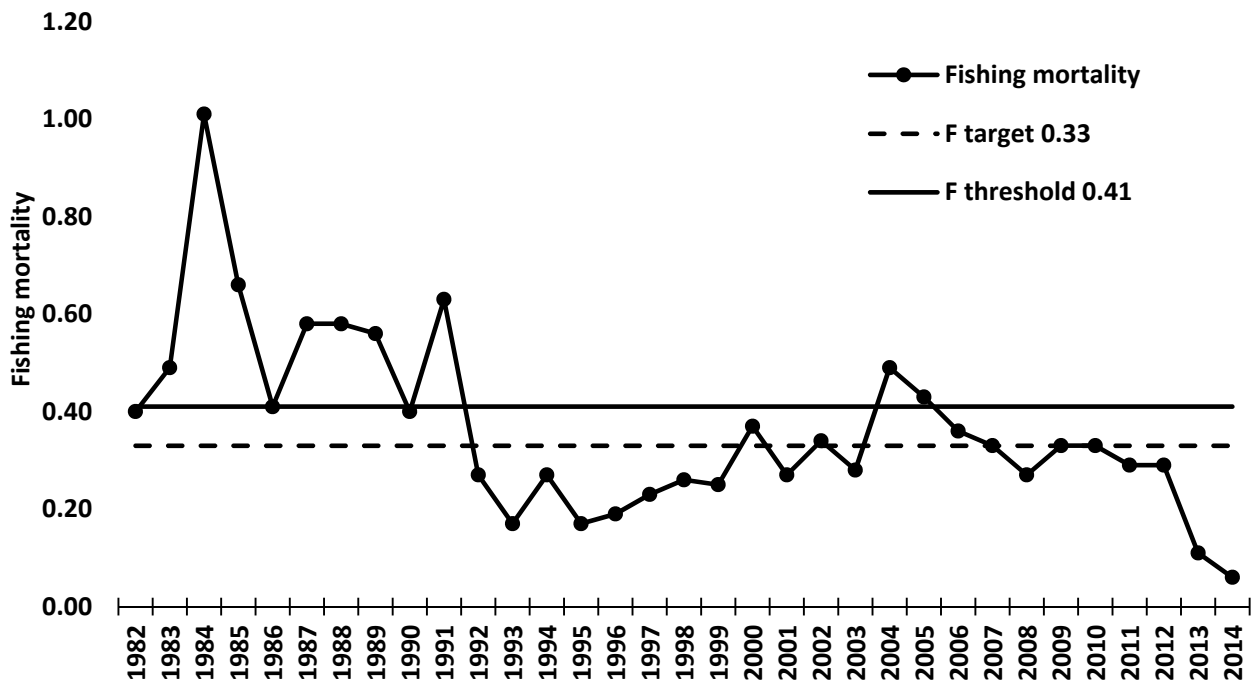


Figure 5. Total removals in millions of fish by sector, 1982-2016. Source: MRIP and ACCSP, 2016 estimates queried August 2 and July 28, 2017, respectively. Previous year's estimates may differ from MRIP due to routine updates. Estimates exclude inshore harvest from the A-R.

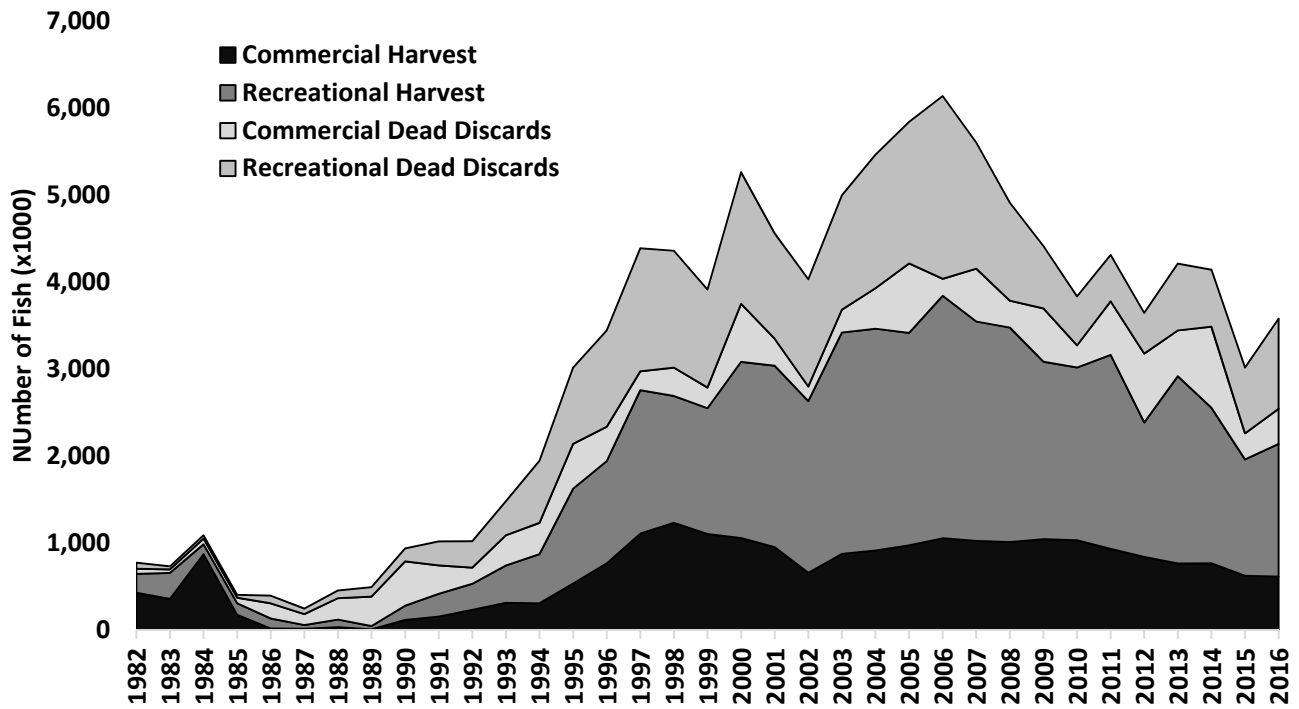


Figure 6. Commercial landings, in pounds, of migratory Striped bass, by state, 1990-2015.

Source: ACCSP, 2016 estimates queried July 28, 2017. Previous year's estimates may differ from ACCSP due to routine updates. Commercial harvest and sale prohibited in ME, NH, CT, and NJ. * includes fish taken for personal consumption. NC is ocean only.

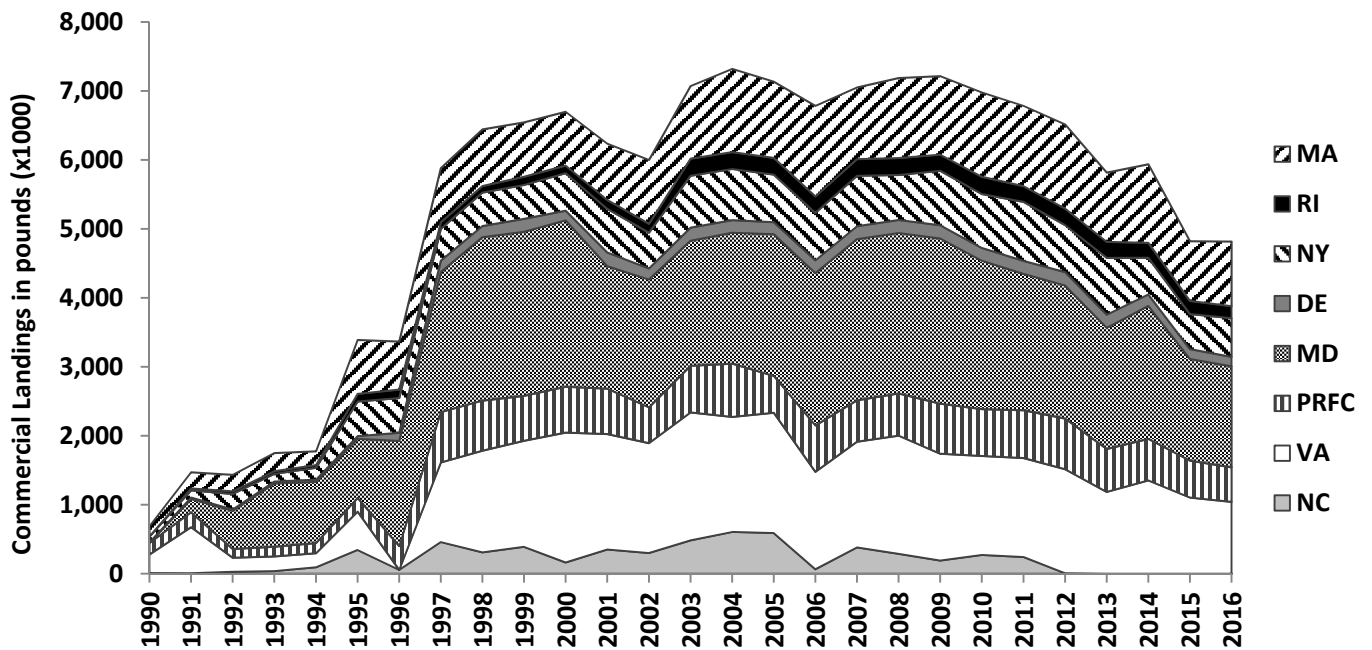


Figure 7. Recreational catch (A + B1 + B2), harvest (A + B1) and the proportion of fish released, 1982- 2015. Source: Marine Recreational Information Program (MRIP) queried June 26, 2016. Estimates may differ from MRIP depending on date queried.

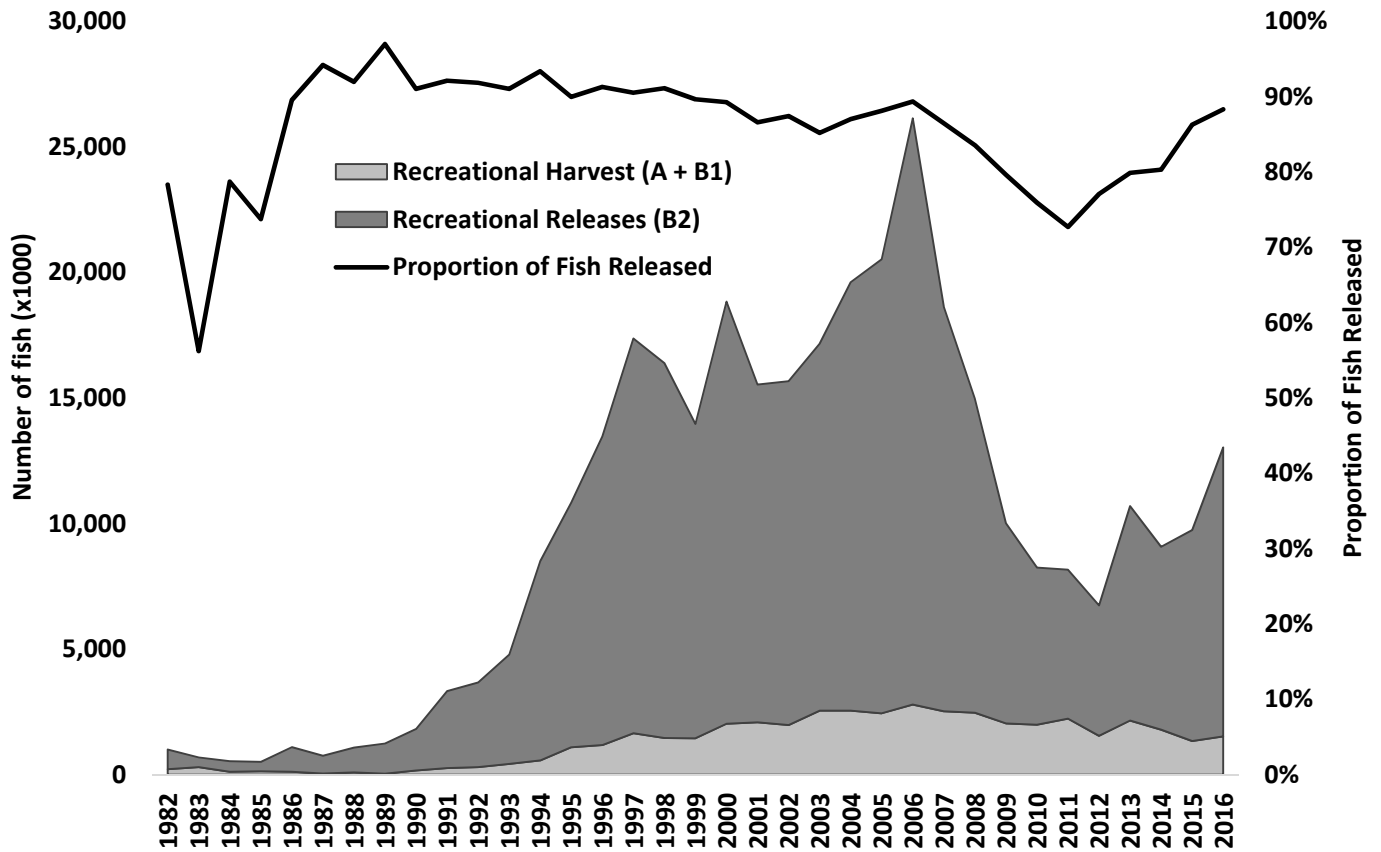


Figure 8. Juvenile abundance index analysis for Maine, New York, Jew Jersey, Maryland, Virginia, and North Carolina. Source: Annual State Compliance Reports. Q1 = first quartile, which is the value that is below 75% of all values in a specified time series. An open bar in the last three years indicates a value below the Q1 threshold.

