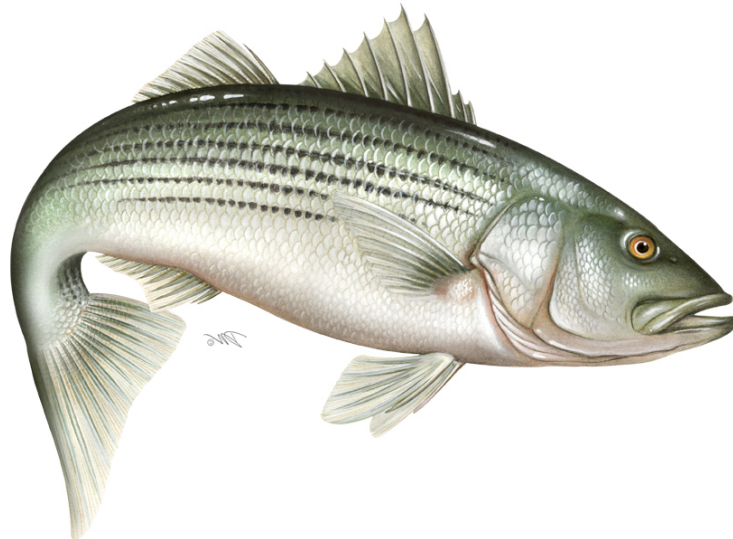


2011 REVIEW OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
FISHERY MANAGEMENT PLAN FOR

ATLANTIC STRIPED BASS
(Morone saxatilis)

2010 FISHING YEAR



Atlantic Striped Bass Plan Review Team

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Accepted by the Management Board November 8, 2011

Executive Summary

Atlantic striped bass from Maine through North Carolina are managed under Amendment 6 to the Interstate Fishery Management Plan, and Addendum I to Amendment 6. Addendum to the plan is currently being considered.

Stock status was estimated in 2011. The stock was not overfished and overfishing was not occurring in 2010, although total striped bass population abundance declined 37 percent from 2004. A benchmark assessment is planned and will undergo peer review in June 2013. The review of the juvenile abundance indices did not trigger any recommendations for management action. This was the first review based on the new definition of recruitment failure, as approved in Addendum II. The new definition of recruitment failure is defined as a value that is below 75% of all values in a fixed time series appropriate to each juvenile abundance index

Total striped bass harvest in 2010 is estimated at 2.9 million fish or 28.32 million pounds, which was similar in both number and weight to 2009. Recreational anglers harvested 1.9 million fish (21.34 million pounds) in 2010, while commercial fishermen harvested 1.03 million fish (6.98 million pounds). Dead discards from the recreational fishery are estimated at 0.6 million fish; commercial dead discards in 2010 are estimated at 0.2 million fish.

All states have implemented management programs consistent with Amendment 6. Management changes occurred for two commercial fisheries in 2010: Rhode Island eliminated the split season for the trap fishery and North Carolina required commercial fishing license holders to declare which of the three fisheries (beach seine, gill net, or trawl) they will be participating in for 2009/2010 quota season and remain in for the next three years. Two states exceeded their coastal commercial quotas in 2010, requiring reduced 2011 quotas. The Chesapeake Bay quota in 2010 was 9.48 million pounds and was not exceeded.

All states have implemented monitoring programs consistent with Amendment 6. Requirements vary by state, and may include monitoring commercial and/or recreational catch, effort, and catch composition, and performing juvenile abundance surveys, spawning stock surveys, and tagging programs.

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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
<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, 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.

The first enforceable plan, Amendment 3, was approved in 1985, and required size regulations to protect the 1982 year class, which was the first modest size cohort since the previous decade. The objective was to increase size limits to allow at least 95% of the females in the 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. That level was attained with the recruitment of the 1989 year class.

Consequently, Amendment 4 was adopted to allow state fisheries to reopen in 1990 under a target fishing mortality (F) of 0.25, which was half the estimated F needed to achieve maximum

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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 implemented to reduce the harvest to 20% of that in the historic period of 1972-1979. The amendment and its four addenda aimed to rebuild the resource, rather than maximize yield.

In 1995, coastal striped bass were declared restored by the Commission, and Amendment 5 was adopted to increase the target F to 0.33, midway between the existing F target (0.25) and F_{MSY} , which was revised to 0.40. Regulations were developed to allow 70% of the historic harvest and achieve the target F , although 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.

In 2003, Amendment 6 was adopted to address five limitations within the 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; 5) and excessively frequent changes to the management program. Amendment 6 was fully implemented by January 1, 2004, and 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.

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Amendment 6 modified the F targets and thresholds, and introduced a new set of biological reference points (BRPs) based on females spawning stock biomass (SSB), as well as a list of management triggers based on the BRPs. (The targets and thresholds were updated in 2008; see Sections II and IV for more information.) 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, Albemarle/Roanoke fisheries, and states with approved alternative regulations. The Chesapeake Bay and Albemarle/Roanoke regulatory programs are predicated on a more conservative F target than the coastal migratory stock, which allows 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. 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 gillnet fishery.

States are permitted the flexibility to deviate from these standards by submitting proposals for review by the Striped Bass Technical Committee, Advisory Panel, and Plan Review Team and contingent upon the approval of the 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 Tables 1 and 2). 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. In 2010, Addendum II modified the definition of recruitment failure from a value that is below 90% of all values in a fixed time series appropriate to each juvenile abundance index to a value that is below 75% of all values in a fixed time series appropriate to each juvenile abundance index.

The Exclusive Economic Zone (EEZ) has been closed to the harvest and possession of striped bass since 1990, with the exception of a defined route to and from Block Island in Rhode Island. A recommendation was made in Amendment 6, and submitted to the Secretary of Commerce, to re-open federal waters to commercial and recreational fisheries. Starting in July 2003 and continuing for several years, National Marine Fisheries Service (NMFS) took steps in the rulemaking process to consider the proposal. In September 2006, NMFS concluded that it would be imprudent to open the EEZ to striped bass fishing and chose not to proceed further in its rulemaking. Specifically, NMFS 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 NMFS' ability to immediately respond to an overfishing and/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).

Additionally, in October 2007, President George W. Bush issued an executive order 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 the resources, including State designation as gamefish where the State determines appropriate under applicable law, and

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to periodically review the status of the populations within US jurisdictional waters. The most recent report to Congress on the status of the striped bass population was submitted in 2010 (NOAA 2010).

II. Status of the Stocks

The most recent striped bass stock assessment was conducted by the Striped Bass Technical Committee, Stock Assessment Subcommittee, and Tagging Subcommittee in 2011 and includes data through 2010 (ASMFC 2011). Two models were included to assess stock status: an age-based statistical catch-at-age (SCA) model, and a tag-based catch equation (CE) model. Based on the results of both models and comparison to the biological reference points, below, Atlantic striped bass are not overfished and are not experiencing overfishing.

	<i>Female Spawning Stock Biomass</i>	<i>Fully-Recruited Fishing Mortality</i>
Threshold	$SSB_{1995} = 30,000$ metric tons	$F_{msy} = 0.34$
Target	$SSB_{threshold} \times 1.25 = 37,500$ metric tons	0.30 (0.27 in Chesapeake Bay and Albemarle/Roanoke)

The SCA model estimated that the resource remains at a high level with female spawning stock biomass (SSB) at 50,548 metric tons (mt), or 168% of the threshold and 134% of the target (Figure 1). The 2010 estimate of SSB was a decrease from the 2008 estimate of 55,500 mt and SSB estimates continue to be less than the time series maximum of 63,588 mt in 2004. Recruitment estimated in the SCA model as age-1 abundance averaged 13.5 million fish from 1994-2004 (Figure 2). The 2003 cohort (age 1 in 2004) remains the second largest year-class since 1982 at 20.8 million fish. The 2009 and 2010 estimates (7.1 million and 9.1 million, respectively) were near the average recruitment observed during 2005-2010 (8.1 million fish), but well below the 1994-2004 average. The SCA model estimated the 2010 fishing mortality rate (F) on age 8–11 fish to be $F=0.23$, which is well below the fishing mortality threshold and target (Figure 3).

Overall, the conclusion is that stock abundance has declined since the assessment time series high of 2004. The decrease in abundance is reflected in a decline in coastwide catch in 2009 and 2010, particularly in recreational discards comprised of smaller fish. The decline is more prevalent in areas largely dependent on contributions from the Chesapeake stocks (such as Maine) than areas such as New York that are dominated by the Hudson stock (Waldman et al 1990). Despite the decline in abundance, the spawning stock in 2010 remained relatively high due to the growth and maturation of the 2003 year class and the accumulation of spawning biomass from year classes prior to 1996.

Because Amendment 6 implemented distinct management programs for the Chesapeake Bay and Albemarle/Sound area with a fishing mortality target of 0.27, separate estimates of fishing mortality for the areas are required. The 2011 stock assessment includes the estimates for the Chesapeake Bay. Based on application of Maryland and Virginia tagging data to the CE model, Chesapeake Bay F estimates for fish 18 – 28 inches ranged from 0.01 to 0.15 throughout the time series (1987-2010), and was estimated at 0.16 for 2010.

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In March 2010, the North Carolina Division of Marine Fisheries used the Age Structured Assessment Program (NOAA Fisheries Toolbox 2008a) to determine stock status (data through 2008). Currently, the stock is not experiencing overfishing. Fishing mortality on ages 4-6 striped bass has declined steadily since 2004 and was estimated at 0.10 in 2008. The JAI continues to fluctuate around the average observed since the stock was declared recovered in 1997. The age structure of the stock continues to expand, with an overall increase in abundance of age 9+ fish in the population. The current maximum age observed on the spawning grounds is 17 (captured during the 2008 sampling season). Estimated abundance of age 4-6 striped bass in the stock increased steadily and peaked in 2000 at about 550,000 fish. Age 4-6 abundance declined slightly and varied without trend at about 470,000 fish through 2006, and has since fallen to an estimated 336,000 fish in 2008. The low abundance of age 4-6 fish in 2008 is due to poor recruitment from the 2003 and 2004 year classes.

III. Status of the Fishery

Total striped bass harvest in 2010 (excluding Albemarle Sound/Roanoke River Management Area) is estimated at 2.9 million fish or 28.32 million pounds (Tables 3-6, Figure 6). The commercial and recreational fisheries harvested 34 and 66 percent by number and 25 and 75 percent by weight, respectively. Total harvest by number and weight decreased since 2009.

The commercial fishery landed an estimated 1.03 million fish (6.97 million pounds) in 2010, similar to 2009 landings of 1.04 million fish (7.2 million pounds; Tables 3 and 4; Figure 4). The Chesapeake Bay jurisdictions dominated the 2010 commercial landings; by pounds, Maryland landed 30.8%, Virginia landed 20.5%, and PRFC landed 9.75%. The 2010 commercial baywide landings of 4.1 million pounds in 2010 represent a slight decrease from the 2009 landings of 4.4 million pounds. Elsewhere along the coast, Massachusetts landed 17.5% and New York 11.2% of the total commercial landings, in pounds, and North Carolina, Delaware, and Rhode Island each landed less than 4%. The 2010 coastal commercial landings amount to 2.89 million pounds, a fractional increase from the 2009 coastal landings of 2.82 million pounds. Estimates of commercial dead discards in 2010 are 242,900 fish, representing 8.6% of the total fishery removals (Figure 4). The coastal commercial fishing year is from January 1 to December 31 in all jurisdictions except North Carolina, which operates on a December 1 to November 30 fishing year.

In 2010, the recreational fishery landed an estimated 1.9 million fish (21.33 million pounds), similar to the 2009 landings by number (1.91 million fish), but a fractional decrease in the 2009 landings by weight (21.46 million pounds; Tables 5 and 6). Recreational releases decreased for the fourth consecutive year to 6.42 million fish; releases peaked in 2006 at 25.88 million fish (Table 7). The 2010 recreational catch estimate of 8.37 million fish is the lowest on record since 1995, and represents a 70% decline from the peak in 2006 (Figure 5). Anglers are keeping more of the fish they catch in recent years or catching fewer sub-legal fish. The proportion of catch that is released declined to 76% in 2009, the lowest since 1986 (Figure 5). Using a 9% release mortality rate, recreational dead discards are estimated to be 0.578 million fish in 2010 (Table 7). Total recreational removals (landings and dead discards combined) in 2010 (2.53 million fish) was similar to the previous year. New York landed the largest percent of the coastwide recreational landings in number of fish (25.6%), followed by Maryland (23.9%), Massachusetts

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(18.1%), and New Jersey (16.1%). The remaining states each landed less than 5% of the 2010 recreational landings by number of fish. The recreational fishing year is from January 1 to December 31 in all jurisdictions.

See Figure 4 for the number of fish removed from the population by commercial and recreational harvest and discarding from 1982 to 2010.

IV. Status of Assessment Advice

The 2011 Atlantic striped bass stock assessment is an update to the 2007 benchmark stock assessment (NEFSC 2008a, NEFSC 2008b). The benchmark assessment was favorably peer reviewed at the 46th Stock Assessment Workshop (SAW). The Stock Assessment Review Committee (SARC) identified several topics deserving special attention or improvement in future assessments, including: examining sensitivity of assessment results to discard estimates and improving those estimates; age determination for striped bass older than about age 10; extracting more information out of the young-of-year indices; employing better methods of averaging multiple survey indices; using regional surveys to get direct information about differences in recruitment levels for the sub-stocks of the fishery; and better standardization of state surveys (NEFSC 2008a). The SARC found that the SCA model “best estimated parameters that could be judged against the current biological benchmarks.”

The SARC also advised the assessment team to re-estimate the F threshold (F_{msy}) based on data and stock estimates from the SCA model, and link the female SSB target and threshold to the SCA model’s 1995 SSB estimate. The assessment team undertook this work and in August 2008 the Board approved updated Amendment 6 BRPs (see Section II).

The next benchmark assessment is scheduled for peer review in June 2013 at the 56th SAW.

V. Status of Research and Monitoring

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 composition of these fisheries. Jurisdictions with substantial commercial fisheries and those agencies monitoring recreational fisheries are required to gather representative catch and effort data for these fisheries.

The management plan also requires certain states to monitor the striped bass population independent of the fishery. 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), Maryland (Upper Chesapeake Bay and Potomac River), Virginia (Rappahannock River and James River), and North Carolina (Roanoke River and Albemarle Sound). 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.

VI. Status of Management Measures and Issues

Status of Amendment 6

Amendment 6 and Addendum I to Amendment 6 provided the regulatory measures in 2009. Management requirements include size limits, bag limits, coastal commercial quotas, and regulatory measures in the Chesapeake Bay and Albemarle Sound/Roanoke River set to not exceed target fishing mortality rates.

In May 2009, the Management Board initiated the development of an addendum to consider options to roll over unused coastal commercial quota up to fifty percent, and approved sending the draft addendum out for public comment in August 2009. In November 2009, the Board voted for status quo management in regards to unused quota rollover.

In February 2010, the Management Board initiated the development of an addendum to consider options to increase the coastal commercial quota. The Board approved the draft addendum for public comment in May 2010, with the addition of an option to consider adopting a Technical Committee recommendation to revise the JAI management trigger. Adopting the Technical Committee recommendation would modify the definition of recruitment failure, such that each index would have a fixed numerical value indicating failure, rather than one that changes from year to year. The Board approved the revised JAI management triggers. 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.

Coastal Commercial Quota

Table 8 shows a history of coastal commercial quotas and harvests since the implementation of Amendment 6. In 2010, four states had coastal commercial quotas lower than their Amendment 6 allocation due to quota overages in 2009 and/or conservation equivalencies related to minimum size limits: Massachusetts (overage), Rhode Island (overage and size limit), New York (size limit), and Maryland (size limit).

In 2010, two states exceeded their coastal commercial quotas and should have their 2010 quotas reduced accordingly (Table 8). Massachusetts exceeded its adjusted coastal commercial quota by 86,616 pounds, resulting in an adjusted 2011 quota of 1,073,134 pounds. Rhode Island exceeded its adjusted coastal commercial quota by 10,651 pounds, for an adjusted 2011 quota of 232,974 pounds.

Chesapeake Bay Quota

Amendment 6 includes a separate management program for the Chesapeake Bay due to the size availability of striped bass in this area. Based on a target fishing mortality rate of $F=0.27$, Maryland, Virginia, and the Potomac River Fisheries Commission (PRFC) annually establish a bay-wide quota for resident fish using the Harvest Control Model. In 2010, the bay-wide quota was 9,489,794 pounds. Shares are allocated to Maryland, the PRFC, and Virginia based on historical harvest, and each jurisdiction then allocates portions of the quota to its recreational and commercial fisheries (Table 9). In 2010, the bay-wide harvest was 2.2 million pounds less than the quota. The Bay quota was the same in 2011.

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. Starting in 1993, the fishery has been controlled by a Board-approved harvest cap: 3,000 fish in 1993, 5,000 fish in 1994, 25,000 fish in 1995, and 30,000 fish in 1996-2003. From 2004 to 2006, quotas were based on the number of age 8+ striped bass in the population (0.95%), as determined by virtual population analysis (VPA), minus any overage from the previous year. For the 2007 season, the Board approved a target harvest of 30,000 fish (VPA calculated quota minus the 2006 overage, to be no less than 30,000 fish). In 2008, the Board approved non-quota management for the 2008 season, and in 2009, extending non-quota management until stock assessment indicates that corrective action is necessary to reduce F on the coastal stock. After several years of varying size limits in Maryland and the Potomac River to account for quota overages, a 28 inch size limit has been in place since 2008; Virginia's trophy fish size limit has been higher at 32 inches. The trophy season in Virginia is also shorter.

In 2010, the estimate of migrant fish harvested during the trophy season is 19,901 fish (19,765 fish in Maryland and 136 fish in Virginia [state compliance reports 2011]) and represents a 78% decrease from 2009. In pounds of fish, the estimate is 338,286 lbs total (336,246 lbs in Maryland and 2,040 lbs in Virginia). This is the smallest spring migrant harvest since 2002; see Table 10 for a history of spring trophy fishery quotas and harvests. In Maryland, the break down between private angler and charter boat harvest is 7,261 fish to 12,504 fish, respectively.

Wave-1 Recreational Harvest Estimates

Anecdotal 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 2008b). 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. The Striped Bass Technical Committee estimated North Carolina wave-1 harvest for 1996 – 2003 and Virginia wave-1 harvest for 1996 – 2008 for the 2009 update assessment. Table 11 provides these estimates, and is updated with the 2010 and 2011 wave-1 harvest estimates in North Carolina from the MRFSS. For this report, the Virginia Marine Resources Commission (VMRC) also provided preliminary estimates for wave-1 harvest in Virginia for 2009 and 2010 that are developed with the use of tag return data in Virginia and North Carolina.

Law Enforcement

The ASMFC Law Enforcement Committee provided the following report.

Striped bass enforcement along the Atlantic Coast continues to have mixed results. Some areas have generally good compliance with regulations and easy enforcement while enforcement is more difficult in other areas. Maine is an example where there is generally high compliance and regulations are easily enforced. Striped bass fishing in Maine is exclusively recreational with one set of regulations. However, the Maine/New Hampshire border continues to be difficult to enforce with different regulations in each state. A differing regulation between border states continues to cause confusion between anglers, reduces support for fisheries management plans, and creates difficult enforcement situations for law enforcement officers in some areas.

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Other areas have improved compliance through extensive enforcement efforts that include auditing commercial records, covert operations, and high visibility patrols. The Chesapeake Bay region is one area that has seen improved compliance in the commercial fishery and some successes in specific areas of recreational fisheries. The impacts from high profile enforcement activities are historically of short to medium duration (a few years) unless backfilled with improved monitoring and correction of regulatory deficiencies. It is doubtful that there will be significant increases in enforcement presence in the near future and member states' ability to conduct covert operations or auditing of commercial records is limited at this time. At least one state still does not require tagging of commercially caught striped bass and several states that require tagging allow dealers to be the monitor of tags and fish with little to no auditing. Maryland recently passed new regulations clarifying and improving enforcement officers' authority to inspect striped bass dealers, their vehicles, and storage areas, as well as imposing significant administrative penalties for refusing to allow inspection. This language is also in the checking station and dealers license agreements that are signed by the business operators. Another improvement is the revamped fine schedule and revised point system which has already resulted in significant license suspensions for chronic violators.

The other major enforcement issue is the uncontrolled targeting of striped bass in the EEZ during the migration of spawning stock up and down the coast. Major efforts to reduce this fishery have not yielded sufficient results to provide effective deterrence. In August 2011 the LEC recommended the Policy Board request NOAA General Counsel to revisit the penalty schedule to explore increased penalty amounts and permit sanctions across any fisheries the violator may participate in. Additionally the LEC recommend the Policy Board request that NOAA General Counsel refer appropriate striped bass cases to USCG for consideration of USCG license suspension or revocation. NOAA Summary Settlement Fines have been doubled but are often considered just the cost of fishing. Although there may be significant cases in the future that originate in the EEZ with heavy fines and other sanctions, it is doubtful that this will have a significant long-term effect on compliance.

In summary, law enforcement efforts on striped bass remain a priority along the Atlantic Coast. Obtaining high compliance has been problematic in certain areas. Estimates of an illegal harvest of less than 10% may be well below the actual illegal harvest according to most states. Enforcement effort has been relatively constant each year even with increasing budget constraints.

Juvenile Abundance Indices

In response to the suite of management triggers introduced in Amendment 6, the Technical Committee annually examines the trends in all required JAI surveys. The Technical Committee is to recommend appropriate action to the Management Board if any JAI shows recruitment failure for three consecutive years. Recruitment failure is defined as a JAI lower than 75% of all other values in the dataset. (This definition is proposed for modification as part of Draft Addendum II; see Section VI – Status of Amendment 6.) The geometric mean is the preferred index of young-of-year striped bass abundance to model stock status.

For the 2011 review of the JAIs, the trigger analysis was performed with the 2008, 2008, and 2010 index values. Three consecutive years of recruitment failure did not occur in any of the

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surveyed areas, thus no action is triggered. Single years of recruitment failure did occur in Maine (2010), Maryland (2008), and North Carolina (2009).

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 a Technical Committee review, the PRT previously determined that North Carolina's FMP complies with the mandatory components of Amendment 6.

The A/R System is managed jointly for striped bass by the North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, which manages the Albemarle Sound Management Area (ASMA), and the North Carolina Wildlife Resources Commission, Division of Inland Fisheries, which manages the Roanoke River Management Area (RRMA). The 2004 FMP, which updated the 1994 FMP, set a target fishing mortality rate equal to 0.22 and threshold spawning stock biomass equal to 400,000 pounds for the A/R System. The annual total allowable catch (TAC) of 550,000 pounds is allocated evenly between the recreational and commercial fisheries, with 25% for the RRMA recreational fishery, 25% for the ASMA recreational fishery, and 50% for the ASMA commercial fishery.

Total 2010 harvest in the A/R System was estimated at 283,326 pounds, an increase from the 203,028 pounds harvested in 2009, but still 266,674 pounds below the 2010 TAC. Each sector harvested within its quota allocation.

A peer-reviewed statistical catch at age stock assessment model was completed in 2010 (see Section II for more results), at which time a Plan Development Team and Advisory Committee were convened to review the 2004 NC Estuarine Striped Bass FMP. The draft Amendment I NC Estuarine Striped Bass FMP was approved to go out for public comment by the NC Marine Fisheries Commission in September 2011.

VII. Annual State Compliance

Based on the annual state compliance reports, the Plan Review Team determines that each state/jurisdiction implemented a management program for 2010 that was approved by the Striped Bass Management Board and was consistent with the requirements of Amendment 6. Refer to Tables 1 and 2 for state-by-state regulations.

The following regulatory changes for 2010 were documented in the 2011 compliance reports:

- Rhode Island revised the opening date for the general category's first sub-period from June 1 to June 6 and eliminated the split season for the trap fishery that set aside 10,000 pounds of the gear's quota for the last few months of the year. Instead, the gear's whole quota is allowed during January 1 to December 31. The rule implementing a 500 pound limit per fish trap license per calendar day once eighty percent (80%) of the seasonal allocation is projected to be harvested remains in place.
- Maryland implemented new regulations to control pre-season catch and release effort in all areas during the pre-spawn season period of March 1 through the third Friday in April.

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The regulation prohibits the use of stinger hooks, requires barbless hooks to be used when trolling, requires the use of circle hooks or J hooks with a gap less than ½” when using bait, and restricts boats to the use of no more than six lines when trolling, regardless of the number of individuals on board the vessel.

- North Carolina implemented a new Atlantic Ocean commercial fishery regulation requiring commercial fishing license holders to declare which of the three fisheries (beach seine, gill net, or trawl) they will be participating in for 2009/2010 quota season. Once declared, they must remain in that fishery for the next three years. Bag limits will be set based on number of participants. The seasons will be opened and closed by proclamation.

The following regulatory changes for 2011 were documented in the 2011 compliance reports:

- Current management regulations in Maine prohibit commercial fishing and sale of striped bass caught in Maine waters. Changes to state law in 2011 now prohibit the sale of any recreationally or commercially caught striped bass from waters outside the State of Maine. This change closes a loophole that existed in state law for several years, though it is unclear how many individuals sold striped bass caught recreationally caught in other states.
- Massachusetts decreased the 2011 commercial quota to account for overage in 2010.
- Rhode Island decreased the 2011 commercial quota to account for overage in 2010. Additionally, allocation of the general category quota between the sub-periods will change to 80/20 (originally 75/25).
- The State of Connecticut began a spring (May 1 to June 30, 2011) striped bass recreational fishery in the Connecticut River under a slot limit (22.0 to 27.9 in.) using the State’s unused annual commercial quota (23,750 pounds). The quota of 4,025 fish (average weight in the slot = 5.90 pounds) will be monitored weekly by a voucher system.
- Maryland Chesapeake Bay recreational and commercial quotas were reduced in response to decreased estimates of coastal stock size. Additionally, the Maryland Chesapeake Bay commercial quota was further reduced to account for overage in 2010.
- As of January 1, 2011, all pound nets in the Potomac River must have at least six PRFC approved fish cull panels properly installed in each pound net to help release undersize fish. These fish cull panels were being used by some pound netters on a voluntary basis prior to 2011.

Following the first full year of implementation of an alternative management program approved by the Management Board, the PRT is responsible for evaluating the effects of the program. The Management Board approved a conservation equivalency proposal from New Jersey in May 2010 that would permit anglers to take 1 fish at 24 inches or greater and 1 fish at 32 inches or greater (rather than 2 fish at 28 inches or greater). The state has not implemented this proposal to date. The Management Board requested that the Technical Committee re-evaluate the conservation equivalency of the alternative measure three years post-implementation. Information was not available to evaluate the striped bass recreational fishing program in the Connecticut River at this time.

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Amendment 6 includes compliance requirements for monitoring programs (summarized in *Section V*). Compliance with these requirements is summarized in Table 12. The PRT found that all states carried out the required monitoring programs in the 2010 fishing year.

The following monitoring program changes were documented in the 2011 compliance reports or provided via personal communication:

- New York: Reporting on Hudson River shad fishery bycatch data was discontinued due to the closure of the fishery in 2010. NYSDEC recently closed the commercial gill net fishery in the river due to the poor condition of the Hudson River American shad stock. In order to continue to monitor striped bass bycatch in the Hudson River, we will now be compiling information on the reported number of striped bass taken in the bait (primarily river herring) gill net fishery.
- New Jersey: In 2010, New Jersey instituted new protocols for biological sampling in order to streamline the collection process and eliminate duplicate data or data not being used for the coastal assessment. A recent decrease in sample sizes necessitated a change in the methods used to collect samples resulting in the development of a new long-term plan. By targeting fishing tournaments and party/charter boats in the fall, New Jersey collected 275 scale samples and 33 otolith samples during two party boat trips and six tournaments. The size range of these fish was 21 to 50 inches with a mean size of 34.6 inches. New Jersey plans to continue this sampling in 2011 and hopes to expand sample size with data collection in the spring.
- North Carolina: Sampling was conducted five days a week throughout the season. Total samples collected (n=1,362) were well below the target sample size (n=2,208). In prior years, an average of 1,930 samples were collected with lost samples typically caused by inclement weather, damage to nets from boats, and nets fishing improperly due to floating grass or debris. Although sample size was lower in 2010, samples were collected throughout the season and the catch rates should be reflective of striped bass abundance in the sample area during this period.
- North Carolina: Due to funding cuts there were no harvest estimates for Recreational Commercial Gear License holders in 2010. Harvest estimates from 2002 – 2007 averaged ~2,000 pounds.
- Cooperative Winter Tagging Cruise: While NMFS continues to provide logistical support, sampling gear and administrative support, NOAA's historic provision of direct vessel support, or funding for vessel charter, was not forthcoming during 2011. The North Carolina Division of Marine Fisheries enabled charter of a sportfishing vessel to conduct pilot tagging of striped bass using hook and line. The single trip conducted was successful; however, further studies are needed to compare the survival rate of tagged striped bass captured by trawl with those captured by hook and line gear, preferably during multiple years. A more stable and dependable source of funding is needed to support vessel charter costs for conducting the Cruise and maintaining the data flow, which supports the Commission and members states' striped bass (and Atlantic sturgeon and spiny dogfish) management program.

Amendment 6 requires that all state programs include law enforcement capabilities adequate for successfully implementing state striped bass regulations. The adequacy of a state's enforcement

activity is monitored annually by reports of the ASMFC Law Enforcement Committee. The Law Enforcement Report is provided in *Section VI*.

VIII. Recommendations

Management Recommendations

- None

Research Recommendations

STOCK ASSESSMENT AND POPULATION DYNAMICS

High Priority

- Develop method to integrate catch-at-age and tagging models to produce a single estimate of F and stock status.
- Develop a spatial and temporal catch at age model incorporating tag-based movement information.
- 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.
- Continue improvements to statistical catch-at-age model as recommended by 46th SARC (e.g., include error from catch estimates, fit each sector of removals individually, run additional diagnostics, account for spatial differences in indices, incorporate stock-recruitment relationship).
- Review model averaging approach to estimate annual fishing mortality with tag-based models; review validity and sensitivity to year groupings.
- Evaluate to what extent rising natural mortality (M) among Chesapeake Bay stripers affects the existing F and SSB thresholds, which are based on a fixed M assumption (M = 0.15).

Medium Priority

- Improve methods for determining population sex ratio for use in estimates of spawning stock biomass and biological reference points.
- Evaluate the overfishing definition relative to uncertainty in biological parameters.
- Develop studies to provide information on gear-specific discard mortality rates and to determine the magnitude of bycatch mortality (ongoing, G. Nelson).
- Develop refined and cost-efficient fisheries-independent coastal population index for striped bass stocks.
- Examine methods to estimate annual variation in natural mortality (ongoing, Striped Bass Tagging Subcommittee).
- Examine causes of different tag-based survival estimates among programs estimating similar segments of the population.
- Evaluate truncated matrices and covariate-based tagging models.
- Develop reliable estimates of poaching loss from striped bass fisheries.
- Develop maturity ogive applicable to coastal migratory stock.

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- Improve estimates of striped bass harvest removals in coastal areas during wave 1 and in inland waters of all jurisdictions year-round.
- Develop tag-based reference points.

Low Priority

- Develop simulation models to look at the implications of overfishing definitions relative to development of a striped bass population that will provide “quality” fishing. Quality fishing must first be defined.
- Examine issues with time saturated tagging models for the ≥ 18 inch length group.

RESEARCH AND DATA NEEDS

High Priority

- Continue in-depth analysis of migrations, stock compositions, etc. using mark-recapture data. Continue evaluation of striped bass dietary needs and relation to health condition.
- 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.
- Develop field or modeling studies to aid in estimation of natural mortality or other factors affecting the tag return rate.

Medium Priority

- Continue to conduct research to determine limiting factors affecting recruitment and possible density implications.
- Evaluate the percentage of fishermen using circle hooks.
- 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.
- 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.

Low Priority

- 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.

Habitat Recommendations

A comprehensive list of habitat research, conservation, and restoration recommendations is provided in Greene et al. (2009).

IX. References

Atlantic States Marine Fisheries Commission (ASMFC). 2011. 2011 Stock Assessment for Atlantic Striped Bass. Washington (DC): ASMFC. A report prepared by the Atlantic Striped Bass Technical Committee. 281 p.

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- National Oceanic and Atmospheric Administration (NOAA). 2010. 2009 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. 30 p.

X. Figures

Figure 1. Striped bass spawning stock biomass (SSB) estimates and biological reference points

Source: ASMFC 2011

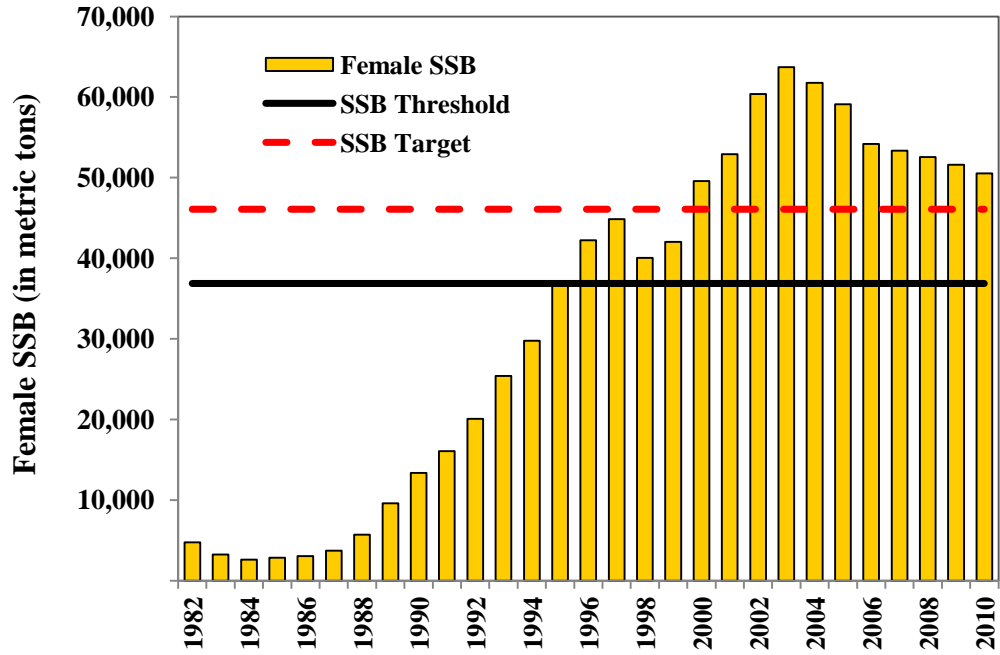


Figure 2. Striped bass abundance and recruitment estimates.

Source: ASMFC 2011

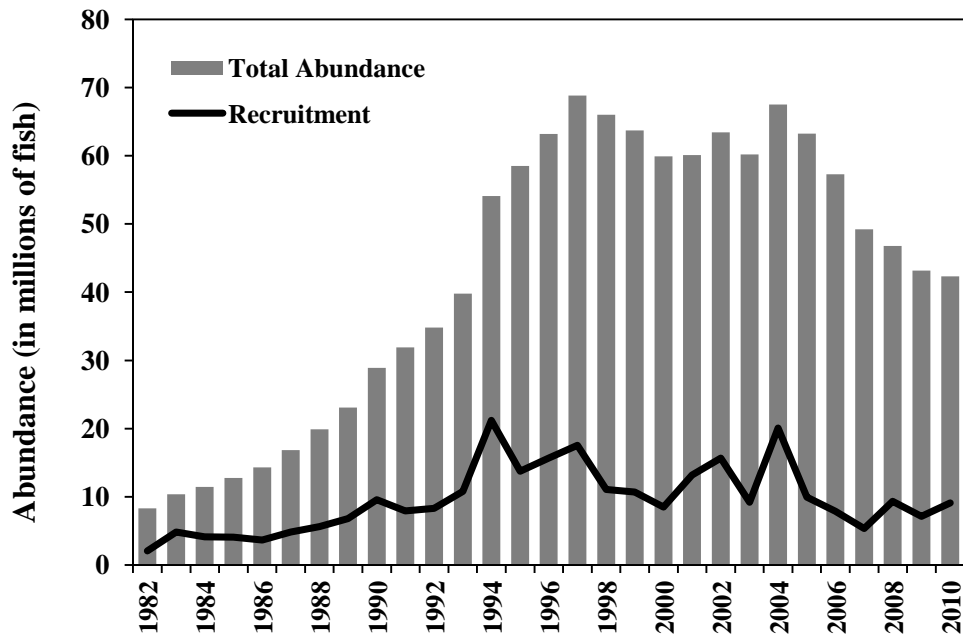


Figure 3. Striped bass fishing mortality (F) estimates from the statistical-catch-at-age (SCA) model and biological reference points

Source: ASMFC 2011

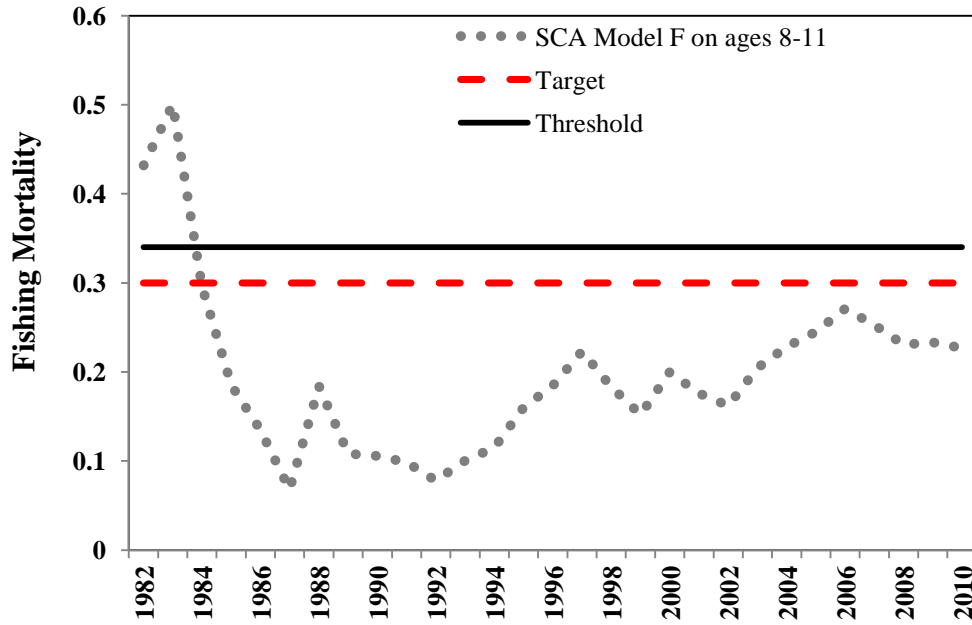


Figure 4. Commercial and recreational landings and dead discards, 1982-2010

Sources: ASMFC 2011.

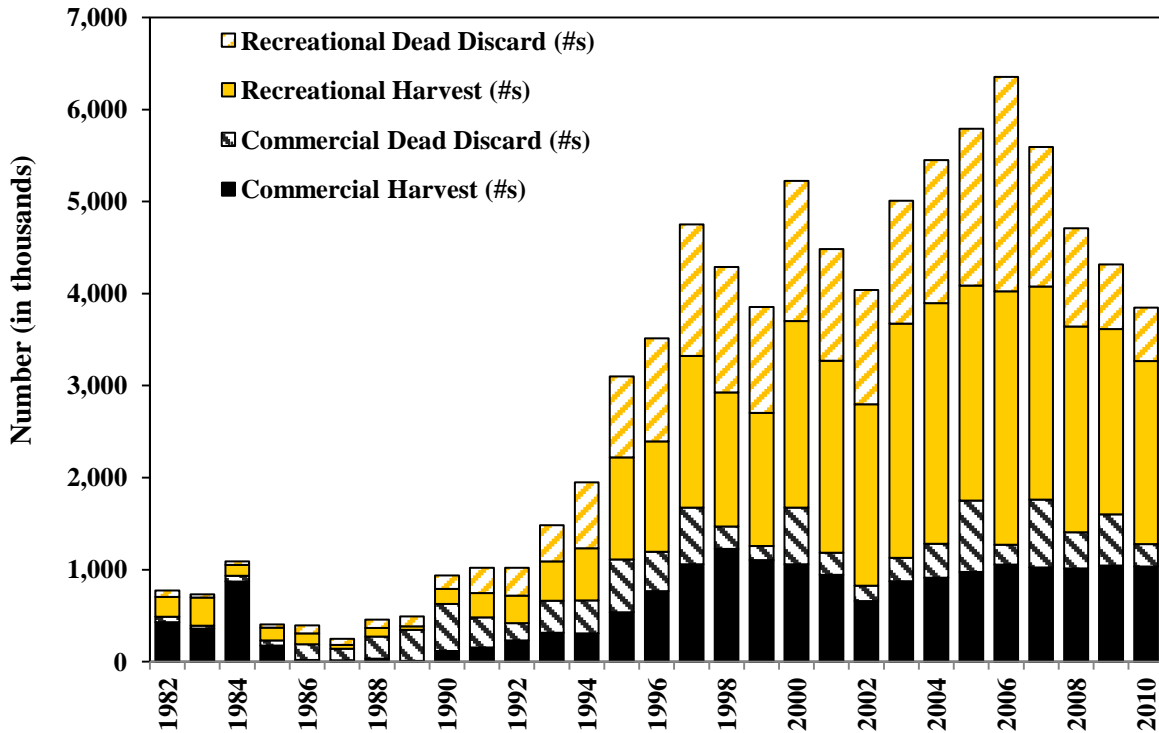


Figure 5. Recreational catch and the proportion of fish released, 1982-2010

Source: personal communication with NMFS Fisheries Statistics Division, Silver Spring, MD

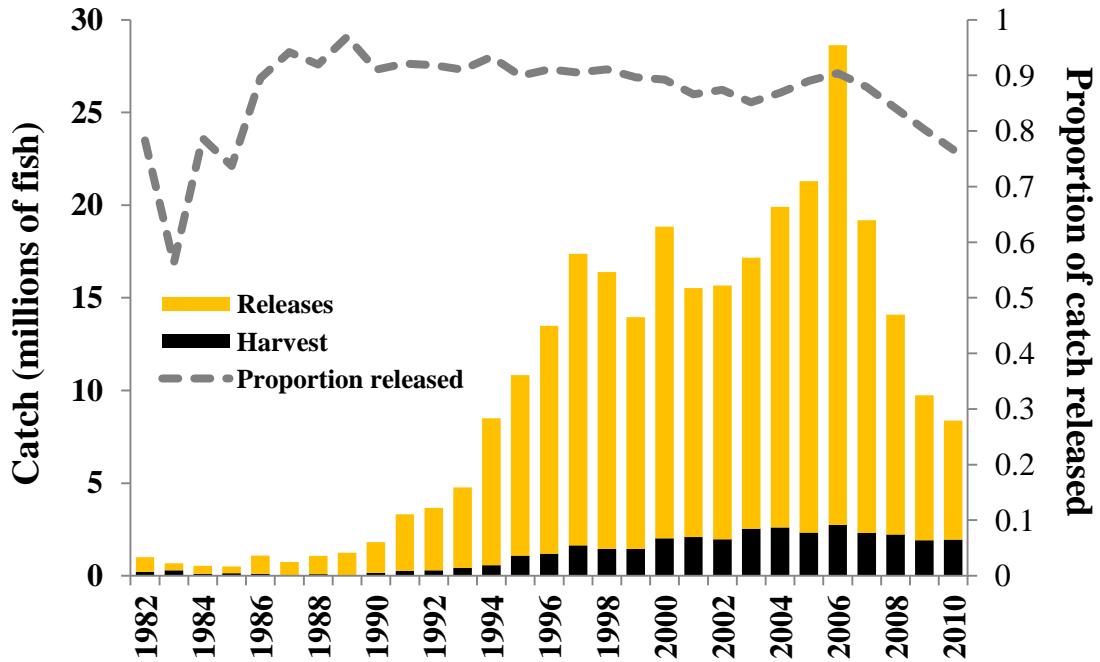
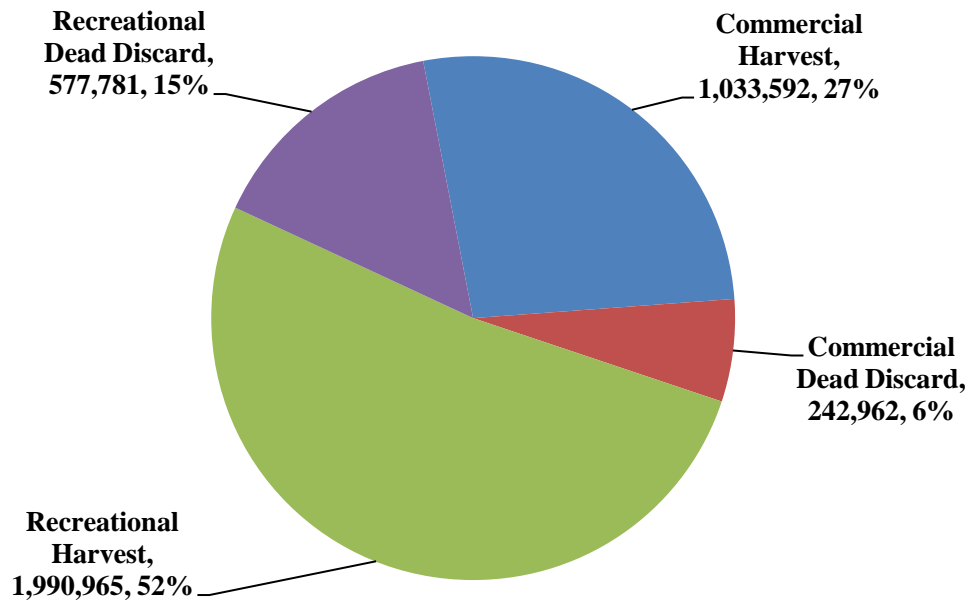


Figure 6. 2010 Striped Bass Total Catch (in numbers)

Source: 2010 state compliance reports



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XI. Tables

Table 1. Summary of Atlantic Striped Bass Commercial Regulations in 2011

STATE	SIZE LIMITS	SEASONAL QUOTA	OPEN SEASON
ME	Commercial fishing prohibited		
NH	Commercial fishing prohibited		
MA	34" min.	1,159,750 lb. (minus any overage from previous year) Hook & line only	7.12 until quota reached; 5 fish/day on Sun; 30 fish/day Tues-Thurs
RI	Floating fish trap: 26" min. General category (mostly rod & reel): 34" min.	Total: 239,963 lb. (minus any overage from previous year) Split 39:61 between trap and general category. Gill netting prohibited.	Trap: 1.1 until quota reached; if 80% quota harvested before 8.26, a 500 lb/trap/day limit is imposed; from 8.27–12.31, 10,000 lb. quota set-aside available. General Category: 6.1-8.31 or 75% quota; 9.13-12.31 or 100% quota; 5 fish/day Sun-Thu.
CT	Commercial fishing prohibited		
NY	24–36" Ocean only (Hudson River closed to commercial harvest)	828,293 lb. (minus any overage from previous year). Pound nets, gill nets (6-8" stretched mesh), hook & line.	7.1 – 12.15 Gill nets <6 or >8", 7 fish/trip; trawls 21 fish/trip. Gill nets prohibited in Great South, South Oyster, and Hempstead Bays.
NJ	Commercial fishing prohibited		
PA	Commercial fishing prohibited		
DE	28" minimum except 20" spring gillnet in DE Bay/River & Nanticoke River (5.5" max mesh & 0.28mm max twine)	193,447 lb. (minus any overage from previous year)	Gillnet: 2.15-5.31 (3.1-31 for Nanticoke) & 11.15-12.31; drift nets only 2.15-28 & 5.1-31; no fixed nets in DE River Hook and Line: 4.1–12.31 Except 4.1-5.31 closed spawning areas
MD	Bay and Rivers: 18–36" Ocean: 24"	Bay and River: 2,254,831 lbs (part of Baywide quota) Gear specific quotas and landing limits Ocean: 126,396 lb. (minus any overage from previous year)	Bay Pound Net: 6.1-11.30, Mon-Sat Bay Haul Seine: 6.7-11.30, Mon-Fri Bay Hook & Line: 6.7-11.30, Mon-Thu Bay Drift Gill Net: 1.1-2.28, 12.1-12.31, Mon-Fri Ocean Drift Gill Net & Trawl: 1.1-4.30, 11.1-12.31, Mon-Fri

2010 Striped Bass FMP Review

(Table 1 continued – Summary of commercial regulations in 2011)

STATE	SIZE LIMITS	SEASONAL QUOTA	OPEN SEASON
PRFC	18” min all year 36” max 2.15–3.25	835,960 lbs (part of Baywide quota)	Hook & line: 2.15-3.25, 6.1-12.31 Pound Net & Other: 2.15-3.25, 6.1-12.15 Gill Net: 1.1-3.25
DC	Commercial fishing prohibited		
VA	Bay and Rivers: 18” min, 28” max & complimentary gill net mesh size limit 3.26–6.15 Ocean: 28” minimum	Bay and Rivers: 1,538,022 lbs in 2010 (part of Baywide quota) Ocean: 184,853 lb. (minus any overage from previous year)	Bay and Rivers: 2.1-12.31 Ocean: 2.1-12.31
NC	Albemarle Sound: 18” Ocean: 28”	Albemarle Sound: 275,000 lb Ocean: 480,480 lb. (minus any overage from previous year) split 160,160 lbs each to beach seine, gill net & trawl	Albemarle Sound: 1.1-4.30, 10.1-12.31; daily trip limit ranging from 5 to 15 fish; striped bass cannot exceed 50% by weight of total finfish harvest; season and daily trip limits set by proclamation. Ocean: gear requirements; open days and trip limits for beach seine, gill net, and trawl set via proclamation

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Table 2. Summary of Atlantic Striped Bass Recreational Regulations in 2011

STATE	SIZE LIMITS	BAG LIMIT	OTHER	OPEN SEASON
ME	20 – 26” OR ≥40”	1 fish	Hook & line only	All year, except spawning areas are closed 12.1 – 4.30 and catch and release only 5.1 – 6.30
NH	1 fish 28–40” & 1 fish >28”	2 fish	No netting; no gaffing; must be landed with head and tail intact; no culling	All year
MA	28” min	2 fish	Hook & line only	All year
RI	28” min	2 fish		All year
CT	28” min, except Connecticut River Bonus Program: 22-28”	2 fish, except CR Bonus: 1 fish	CR Bonus Quota: 4,025 fish	All year, except CR Bonus 5.4-6.30 (limited to I-95 bridge to MA border)
NY	Ocean Private: 1 fish 28-40” & 1 fish > 40” Ocean Charter: 28” min Hudson River: 18” min DE River: 28” min	Ocean: 2 fish Hudson R.: 1 fish DE River: 2 fish	Angling or spearing only	Ocean: 4.15 – 12.15 Hudson River: 3.16 – 11.30 Delaware River: All year
NJ	28” min	2 fish, plus 1 additional through Bonus Program	Bonus program quota: 321,750 lb. No netting. Non-offset circle hooks required 4.1-5.31 in DE River if using natural bait.	All year except 1.1-2.28 in intra-coastal waters plus 4.1-5.31 in lower DE River
PA	Non-tidal DE River: 28” min; Delaware Estuary: 28” min. except 20-26” from 4.1-5.31	2 fish		Year round
DE	28” min. except 20-26” from 7.1-8.31 in Del. River, Bay & tributaries	2 fish	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)

2010 Striped Bass FMP Review

(Table 2 continued – Summary of recreational regulations in 2011)

STATE	SIZE LIMITS	BAG LIMIT	OTHER	OPEN SEASON
MD	Susquehanna Flats (SF): 18-26" Chesapeake Bay Trophy: 28" min Chesapeake Bay Regular: 18" min with 1 fish > 28" Ocean: 28" min	SF: 1 fish Chesapeake Bay Trophy: 1 fish Chesapeake Bay Regular: 2 fish Ocean: 2 fish	SF: non-off set circle hook if baited hooks & gap>0.5" Chesapeake Bay Quota: 2,956,463 lbs (part of Baywide quota; includes Susquehanna Flats harvest, excludes trophy harvest)	SF: 3.1-5.31; catch & release only 3.1-5.3 Chesapeake Bay Trophy: 4.18-5.15 (most tribs closed) Chesapeake Bay Regular: 5.16-12.15 (most tribs closed until 6.1) Ocean: All year
PRFC	Trophy: 28" Regular: 18" min with 1 fish > 28"	Trophy: 1 fish Regular: 2 fish	Quota: 683,967 lbs. (part of Baywide quota; excludes trophy harvest)	Trophy: 4.18 -5.15 Regular: 5.16-12.31
DC	18" min with 1 fish > 28"	2 fish	Hook & line only	5.16-12.31
VA	Bay/Coastal Trophy: 32" min (28" Potomac tribs) CB Spring: 18-28"; 1 fish >32" CB Fall: 18-28"; 1 fish >34" Potomac Tribs: 18-28"; 1 fish >28" Ocean: 28"	Bay/Coastal Trophy: 1 fish CB Spring: 2 fish CB Fall: 2 fish Potomac Tribs: 2 fish Ocean: 2 fish	Hook & line, rod & reel, hand line only Chesapeake Bay Quota: 1,538,022 lbs in 2010 (part of Baywide quota; excludes trophy harvest)	Bay Trophy: 5.1-6.15 (open 4.18 Potomac tribs) Coastal Trophy: 5.1-5.15 CB Spring: 5.16-6.15 (no fish >32" in spawning areas) CB Fall: 10.4-12.31 Potomac Tribs: 5.16-12.31 Ocean: 1.1-3.31, 5.16-12.31
NC	Roanoke River: 2 fish 18- 22" OR 1 fish 18-22" and 1 fish >27" Albemarle Sound: 18" min. Ocean: 28" min	Roanoke River: 2 fish Albemarle Sound: 3 fish Ocean: 2 fish	Roanoke River quota: 137,500 lb. Albemarle Sound quota: 137,500 lb.	Roanoke River: 3.1 – 4.30 (single barbless hook required 3.1-6.30 from Roanoke Rapids dam downstream to US 258 bridge) Albemarle Sound: Spring 1.1 – 4.30; Fall 10.1-12.31 Ocean: All year

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Table 3. Commercial harvest (pounds) of migratory striped bass by state, 1982-2010

Source: 2011 State Compliance Reports

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	PRFC	VA	NC	Total
1982			643,100	270,300	6,000	470,900		25,700	478,000	136,053	53,683	92,462	2,176,198
1983			224,000	196,400	2,200	309,500		6,800	379,000	164,245	54,349	52,796	1,389,290
1984			107,200	54,500	2,000	595,300			816,000	783,140	15,351	14,501	2,387,992
1985	1,414		118,800	61,200	5,500	469,040				222,196	59,577		937,727
1986			97,300	11,100		1,100				29,370	1,205		140,075
1987			78,600	500						57,945	2,178		139,223
1988			79,553							115,251	62,095		256,899
1989			199,900			300							200,200
1990		37	148,000	4,000		81,870		6,509	2,887	169,060	267,735	9,797	689,895
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		33	788,171	119,679		491,790		187,096	2,377,393	653,266	1,538,220	389,454	6,545,102
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		203	1,206,305	245,204		741,668		181,974	1,899,539	772,333	1,668,307	604,824	7,320,357
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

Notes: All harvests are based on the calendar year. MD and VA harvests include Chesapeake Bay harvest. NC is Atlantic Ocean only.

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Table 4. Commercial harvest (numbers) of migratory striped bass by state, 1982-2010, and annual dead discard estimates

Sources: 2011 State compliance reports (landings); ASMFC 2011 (dead discards)

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	PRFC	VA	NC	Total	Dead Discards
1982			26,183	52,896	207	74,935		12,794	189,089	54,421	14,905	3,200	428,630	57,624
1983			9,528	48,173	83	66,334		5,806	147,079	63,171	15,962	1,405	357,541	40,127
1984			5,838	8,878	192	70,472		12,832	392,696	372,924	6,507	532	870,871	65,639
1985	90		7,601	7,173	350	52,048		1,359		82,550	23,450		174,621	62,734
1986			3,797	2,668						10,965	251		17,681	174,024
1987			3,284	23						9,884	361		13,552	125,066
1988			3,388							19,334	10,588		33,310	245,552
1989			7,402										7,402	338,827
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	656,416	87,643	165,583	25,562	1,058,181	216,743
1998			43,315	8,835		45,149		31,386	780,893	93,299	204,911	16,040	1,223,828	326,031
1999			40,838	11,559		49,795		34,841	650,022	90,575	205,143	21,010	1,103,783	236,620
2000			40,256	9,418		54,894		25,188	627,777	91,471	202,227	6,480	1,057,711	666,996
2001			40,248	10,917		58,296		34,373	538,808	87,809	148,346	22,936	941,733	310,900
2002			44,897	11,653		47,142		30,440	296,635	80,300	127,211	15,784	654,062	168,201
2003			55,433	15,497		68,354		31,530	439,482	83,090	161,778	13,823	868,987	262,078
2004			60,632	16,040		70,367		28,406	461,064	91,980	147,998	31,014	907,501	518,847
2005			59,966	14,949		70,560		26,336	569,964	80,615	119,244	26,572	968,206	776,951
2006			69,986	15,429		73,528		30,212	655,951	92,288	109,395	2,798	1,049,587	216,753
2007			54,265	12,205		78,287		30,717	598,495	86,695	140,602	16,621	1,017,887	726,700
2008			61,076	16,616		73,263		31,866	594,655	81,720	134,603	12,903	1,006,702	395,400
2009			59,258	16,800		82,574		21,590	618,076	89,693	138,304	9,032	1,035,327	558,255
2010			67,802	17,256		81,896		18,562	584,554	90,258	160,595	12,670	1,033,592	242,962

Note: All harvests are based on the calendar year. MD and VA harvests include Chesapeake Bay harvest. NC is Atlantic Ocean only.

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Table 5. Recreational harvest (pounds) of migratory striped bass by state, 1982-2010

Source: personal communication with NMFS. Note: All harvests based on the calendar year. MD and VA harvests include Chesapeake Bay. NC is Atlantic Ocean only.

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC	Total
1982	2,663		2,003,948	16,012	110,964	61,438	327,024					2,522,049
1983	13,031	7,061	248,917	16,340	310,798	275,033	1,662,403	29	149,351			2,682,963
1984			33,697	12,879	91,705	896,770	58,616	139,626	44,262			1,277,555
1985	140,951		224,788		41,144	210,815	190,555		8,825	3,585		820,663
1986			298,816	97,961	21,537	33,115	644,394		3,104	5,362		1,104,289
1987		2,987	269,459	69,793	13,307	278,578	159,556		40,818	19,976		854,474
1988		13,549	421,317	108,182	47,536	348,920	136,374		1,058	178,626	972	1,256,534
1989	15,221		295,227	59,346	100,688	236,730	25,520					732,732
1990	60,483	11,363	319,092	73,349	193,011	505,440	588,974	18,115	12,967	443,751		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	3,882	3,644,785
1992	107,693	44,612	972,116	203,108	196,278	921,201	746,343	25,677	613,174	187,852	16,197	4,034,251
1993	11,953	28,115	1,113,446	292,429	400,067	1,575,938	874,296	52,540	794,853	505,742	3,029	5,652,408
1994	66,451	66,017	1,686,049	109,818	355,829	1,974,759	438,080	63,832	1,096,409	870,140	71,195	6,798,579
1995	45,933	67,992	1,504,390	436,061	671,647	3,296,025	3,141,222	175,347	2,057,450	955,822	158,096	12,509,985
1996	44,802	102,271	1,291,706	950,978	915,418	4,809,381	1,736,508	281,481	1,560,389	1,340,414	199,675	13,233,023
1997	185,178	206,904	2,891,970	927,921	920,465	4,449,564	821,784	232,186	1,962,947	2,813,471	607,978	16,020,368
1998	178,584	114,342	2,973,456	671,847	989,923	2,318,291	1,333,329	236,926	1,908,344	1,581,560	415,585	12,722,187
1999	98,623	84,255	1,822,818	886,668	824,031	3,171,344	3,342,372	100,541	1,137,940	1,741,857	556,922	13,767,371
2000	269,325	71,370	2,618,216	1,160,305	515,962	4,050,569	4,286,040	369,030	2,100,854	2,005,721	187,276	17,634,668
2001	290,233	223,072	3,644,561	1,138,978	628,044	2,996,805	5,341,867	382,498	2,072,943	2,140,713	608,617	19,468,331
2002	383,270	152,342	4,304,883	1,192,296	600,482	2,813,596	4,133,678	266,920	1,423,515	2,648,115	602,586	18,521,683
2003	253,910	281,549	4,889,036	1,502,455	1,251,538	3,409,573	4,258,557	292,167	2,808,923	2,789,745	848,416	22,585,869
2004	171,741	121,566	5,466,059	1,169,587	921,737	2,388,825	5,458,534	311,025	2,333,042	3,101,870	5,574,787	27,018,773
2005	322,996	291,662	5,093,748	1,590,072	1,643,946	3,936,227	3,793,471	254,018	3,533,652	2,655,119	2,195,043	25,309,954
2006	385,598	212,012	4,907,270	873,965	1,388,296	4,820,089	6,623,538	206,432	3,541,582	4,133,292	2,153,231	29,245,305
2007	316,331	73,283	4,784,948	1,407,549	1,718,924	5,767,505	2,441,469	112,071	3,178,237	1,729,112	1,048,581	22,578,010
2008	238,452	92,179	5,516,183	732,564	1,799,097	7,009,424	4,743,038	209,995	2,637,998	1,767,646	938,703	25,685,279
2009	288,741	146,004	4,525,166	1,093,321	877,614	4,380,891	3,807,088	313,296	4,558,773	1,259,314	209,856	21,460,064
2010	109,531	53,962	4,062,205	1,037,147	1,050,820	6,480,208	4,693,882	193,723	2,552,257	389,775	714,145	21,337,655

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Table 6. Recreational harvest (numbers) of migratory striped bass by state, 1982- 2009

Source: personal communication with NMFS. Note: All harvests based on the calendar year. MD and VA harvests include Chesapeake Bay. NC is Atlantic Ocean only. Values for North Carolina (1996-2003) and Virginia (1996-2008) include Technical Committee estimates of wave 1 harvest.

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC	Total
1982	929		83,933	1,757	50,081	21,278	58,294		984			217,256
1983	7,212	4,576	39,316	1,990	42,826	43,731	127,912	135	31,746			299,444
1984			3,481	1,230	5,678	57,089	13,625	16,571	16,789			114,463
1985	11,862		66,019	670	15,350	23,107	13,145		2,965	404		133,522
1986			29,434	3,291	1,760	27,477	36,999		14,077	1,585		114,623
1987		90	10,807	2,399	522	14,191	9,279		4,025	2,442		43,755
1988		647	21,050	5,226	2,672	20,230	12,141		133	24,259	347	86,705
1989	738		13,044	4,303	5,777	12,388	1,312					37,562
1990	2,912	617	20,515	4,677	6,082	24,799	44,878	2,009	736	56,017		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	250,731	35,996	1,199,957
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	45,768	1,457,057
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	58,876	2,085,130
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	36,886	10,359	400,252	84,814	75,244	242,623	448,524	25,178	380,461	633,018	278,270	2,615,629
2005	68,638	26,026	368,422	112,918	114,965	298,387	327,016	19,955	490,275	403,792	104,997	2,335,391
2006	72,827	14,748	339,994	73,650	83,390	313,464	489,319	19,076	648,644	607,344	90,753	2,753,209
2007	71,443	7,070	347,102	102,112	109,856	370,722	206,275	10,095	679,024	366,964	45,502	2,316,165
2008	49,172	6,642	343,347	56,056	112,972	448,271	318,115	16,994	442,280	396,950	44,890	2,235,689
2009	52,997	10,761	336,470	75,051	72,901	329,402	269,162	21,762	530,395	213,406	7,375	1,919,682
2010	18,749	5,089	354,157	79,450	87,557	501,728	314,698	14,838	469,161	71,175	39,971	1,956,573

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Table 7. Recreational releases (numbers) of migratory striped bass by state, 1982-2009, and annual dead discard estimates

Source: personal communication with NMFS. Note: All harvests based on the calendar year. MD and VA harvests include Chesapeake Bay. NC is Atlantic Ocean only.

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC	Total	Dead Discards [^]
1982	687		6,441	2,551	643,187	12,297	87,648		30,376			783,187	70,487
1983			34,018	5,444		1,469	117,807		213,487	11,997		384,222	34,580
1984	1,887		98,405	85,135	31,176	40,469	52,930		104,095	8,775		422,872	38,058
1985	81,153	93	12,360	40,567	26,946	57,540	5,524	702	147,103	2,598		374,586	33,713
1986	4,379		442,298	2,014	10,494	123,842			390,063	7,528		980,618	88,256
1987	18,106	435	93,660	63,849	78,434	253,986	56,697	16,988	118,395	7,611		708,161	63,734
1988	4,528	6,699	209,632	23,347	25,532	92,611	486,306	2,455	132,250	5,631		988,991	89,009
1989	16,028	4,822	193,067	38,007	125,370	365,712	265,958	4,807	114,269	72,766		1,200,806	108,073
1990	12,542	15,518	339,511	67,509	89,490	265,099	254,384	14,411	420,084	175,046		1,653,594	148,823
1991	67,490	6,559	448,735	30,975	301,476	756,663	166,198	38,334	1,036,011	208,350	256	3,061,047	275,494
1992	31,177	27,613	779,814	120,410	292,259	799,149	413,506	36,932	749,959	115,899	679	3,367,397	303,066
1993	373,064	14,979	833,566	100,993	271,318	694,107	308,253	89,543	1,556,848	100,374	1,524	4,344,569	391,011
1994	363,703	43,501	2,102,514	138,989	489,967	1,132,707	568,047	103,992	2,785,392	197,022	5,005	7,930,839	713,776
1995	505,758	285,486	3,280,882	356,324	507,124	1,209,585	694,889	115,363	2,401,277	370,949	16,225	9,743,862	876,948
1996	1,626,705	292,820	3,269,746	314,336	1,051,612	1,436,091	776,165	99,372	2,545,238	759,916	116,667	12,288,668	1,105,980
1997	1,417,976	279,298	5,417,751	606,746	722,708	1,018,892	736,734	130,073	4,019,987	1,232,323	135,853	15,718,341	1,414,651
1998	691,378	243,301	7,184,358	613,421	1,026,192	884,626	488,319	185,016	2,641,680	796,372	173,704	14,928,367	1,343,553
1999	649,816	145,730	4,576,208	360,121	704,025	1,228,628	1,152,682	105,696	2,387,615	940,755	263,445	12,514,721	1,126,325
2000	942,593	209,606	7,382,031	541,516	926,367	1,373,069	885,289	151,838	3,244,731	1,022,040	129,729	16,808,809	1,512,793
2001	870,522	164,336	5,410,899	377,474	1,107,707	824,278	965,650	162,677	2,890,054	620,947	49,953	13,444,497	1,210,005
2002	1,392,200	238,003	5,718,984	530,402	696,976	588,155	715,099	114,650	2,928,589	706,729	63,269	13,693,056	1,232,375
2003	846,708	260,167	4,361,710	448,707	843,037	1,083,808	925,885	169,012	4,652,800	970,554	48,945	14,611,333	1,315,020
2004	748,388	196,806	5,891,661	669,975	1,079,304	1,492,703	1,323,535	151,179	3,738,523	1,767,596	230,356	17,290,026	1,556,102
2005	3,024,291	512,771	4,839,752	741,022	1,713,541	1,348,377	1,197,440	224,841	3,753,328	1,484,540	109,535	18,949,438	1,705,449
2006	4,062,579	567,892	8,657,473	1,356,245	1,682,372	1,578,167	2,101,816	245,682	3,895,798	1,689,642	37,713	25,875,379	2,328,784
2007	1,105,347	288,985	5,772,100	740,941	1,831,899	1,456,055	1,494,572	251,074	2,998,085	913,849	16,195	16,869,102	1,518,219
2008	470,237	83,533	3,641,258	435,629	2,372,205	1,277,102	1,452,248	260,733	1,405,613	442,048	14,002	11,854,608	1,066,915
2009	247,157	65,587	2,490,380	358,484	1,281,439	922,277	719,181	152,557	1,218,342	355,140	3,666	7,814,210	703,279
2010	191,442	44,424	1,922,058	211,940	777,433	1,097,322	506,745	78,767	1,445,550	123,022	21,097	6,419,800	577,782

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

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Table 8. Coastal commercial quotas and harvests (pounds)

	Am 6 Allocation	2003 Quota [^]	2003 Harvest	2003 Difference	2004 Quota	2004 Harvest	2004 Difference	2005 Quota	2005 Harvest	2005 Difference	2006 Quota	2006 Harvest	2006 Difference
MA	1,159,750	1,036,880	1,055,439	18,559	1,141,191	1,206,305	65,114	1,094,636	1,104,737	10,101	1,149,649	1,312,168	162,519
RI	243,625	242,159	246,312	4,153	239,472	245,204	5,732	237,893	242,303	4,410	239,215	238,797	-418
NY	1,061,060	828,293	753,261	-75,032	828,293	741,668	-86,625	828,293	689,821	-138,472	828,293	688,446	-139,847
NJ+	321,750	321,750	121,410	-200,340	321,750	81,870	-239,880	321,750	29,866	-291,884	321,750	23,656	-298,094
DE	193,447	193,447	188,419	-5,028	193,447	181,974	-11,473	193,447	173,815	-19,632	193,447	185,987	-7,460
MD	131,560	126,396	98,149	-28,247	126,396	115,453	-10,943	126,396	46,871	-79,525	126,396	91,093	-35,303
VA	184,853	184,853	159,786	-25,067	184,853	160,301	-24,552	184,853	184,734	-119	184,853	194,934	10,081
NC~	480,480	480,480	434,369	-46,111	480,480	421,645	-58,835	480,480	454,521	-25,959	480,480	352,036	-128,444

	2007 Quota*	2007 Harvest	2007 Difference	2008 Quota	2008 Harvest	2008 Difference	2009 Quota	2009 Harvest	2009 Difference	2010 Quota	2010 Harvest	2010 Difference	2011 Quota
MA	997,231	1,040,328	43,097	1,116,653	1,160,122	43,469	1,116,281	1,138,291	22,010	1,137,740	1,224,356	86,616	1,073,134
RI	239,963	240,627	664	239,299	245,988	6,689	233,274	234,368	1,094	238,869	249,520	10,651	232,974
NY	828,293	729,743	-98,550	828,293	653,100	-175,193	828,293	789,891	-38,402	828,293	782,402	-45,891	828,293
NJ+	321,750	13,615	-308,135	321,750	7,345	-314,405	321,750	10,330	-311,420	321,750	12,833	-308,917	321,750
DE	193,447	188,668	-4,779	193,447	188,719	-4,728	193,447	192,311	-1,136	193,447	185,410	-8,037	193,447
MD	126,396	96,301	-30,095	126,396	118,005	-8,391	126,396	127,327	931	125,465	44,802	-80,663	126,396
VA	174,772	165,587	-9,185	184,853	164,400	-20,453	184,853	140,420	-44,433	184,853	127,836	-57,017	184,853
NC~	480,480	424,723	-55,757	480,480	299,162	-181,318	480,480	189,995	-290,485	480,480	272,632	-207,848	480,480

[^] Beginning in 2003, NY and MD quotas reduced due to conservation equivalency; MA and RI quotas reduced in 2003 due to quota overages in previous year.

* Beginning in 2007, RI quota reduced due to conservation equivalency.

+ NJ quota applied to recreational bonus fish program

~ NC harvests and quotas are for the December 1 to November 30 fishing year

Table 9. Chesapeake Bay Quotas and Harvests (pounds), 2010

Year: 2010	Jurisdiction	Quota	Harvest
<i>Commercial Fisheries</i>	Maryland	2,098,863	2,105,775
	PRFC	794,727	680,496
	Virginia	1,538,022	1,306,383
	Subtotal	4,431,612	4,092,654
<i>Recreational Fisheries</i>	Maryland	2,857,054	2,783,515
	PRFC	650,232	*
	Virginia	1,538,022	389,775
	Subtotal	5,045,308	3,173,290
Chesapeake Bay Total		9,476,920	7,265,944

Notes: Maryland and Virginia recreational harvested are MRFSS estimates of Bay harvest; in the case of Maryland, the estimate of migratory fish harvested during the spring trophy season from Horne et al. (2009) is subtracted. Recreational harvest in the Potomac River is included in Maryland and Virginia harvest estimates. The PRFC recreational quota includes the charter boat quota of 72,248 pounds.

Table 10. Chesapeake Bay Spring Trophy Fishery Quotas and Harvests (numbers of fish)
(Source: Horne et al. 2009, except the 2009 harvest estimate, which includes an updated estimate of Virginia's harvest from that state's 2010 compliance report.)

Year	Quota	Harvest
1992	NA	1,013
1993	3,000	2,719
1994	5,000	3,672
1995	25,000	42,634
1996	30,000	11,613
1997	30,000	21,222
1998	30,000	10,021
1999	30,000	17,051
2000	30,000	26,748
2001	30,000	25,728
2002	30,000	14,839
2003	30,000	43,900
2004	40,624	31,404
2005	40,624	65,664
2006	41,488	67,771
2007	30,000*	36,328
2008	NA	36,166
2009	NA	90,782
2010	NA	19,901

* In 2007, the 30,000 fish allowance was a target not a quota.

Table 11. Estimated wave-1 recreational harvest (numbers of fish) in North Carolina and Virginia for use in striped bass stock assessments

(Yellow shading indicates estimates developed by the Striped Bass Technical Committee; green shading indicates estimates from the MRFSS (with PSE in parentheses); grey shading indicates estimates developed by the VMRC; and an asterisk (*) indicates preliminary estimates and NA = not available.)

Year	North Carolina	Virginia
1996	18,860	5,985
1997	49,037	83,793
1998	15,088	89,778
1999	18,860	107,734
2000	7,544	53,867
2001	18,860	53,867
2002	75,442	89,778
2003	79,214	53,867
2004	139,528 (31.7)	155,616
2005	72,050 (25.4)	35,991
2006	85,884 (22.9)	84,144
2007	36,909 (26.3)	121,273
2008	44,012 (26.9)	190,153
2009	7,375 (32.4)	92,866
2010	39,971 (30.2)	34,392
2011	82,876* (29.8)	NA

Table 12. Status of compliance with monitoring and reporting requirements, 2010

(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)

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