

**REVIEW OF THE  
ATLANTIC STATES MARINE FISHERIES COMMISSION'S  
FISHERY MANAGEMENT PLAN FOR  
ATLANTIC STRIPED BASS  
(*Morone saxatilis*)**



**2005 FISHING YEAR**

Board Approved: August 16, 2006

**Prepared by the Striped Bass Plan Review Team**

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## I. Status of the Fishery Management Plan

<u>Date of FMP Approval:</u>	Original FMP: October 1981
<u>Amendments:</u>	Amendment 6: February 2003 (active January 2004)
<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
<u>Active Boards/Committees:</u>	Striped Bass Management Board, Advisory Panel, Technical Committee, Stock Assessment Subcommittee, Tagging Subcommittee, Plan Review Team, and Plan Development Team

Jurisdictions with a declared interest in striped bass are Maine through North Carolina, including Pennsylvania, the Potomac River Fisheries Commission, and the District of Columbia. Under the Atlantic Striped Bass Conservation Act (P.L. 98-613), implementation of the FMP is mandatory. Implementation of the FMP is monitored by the Commission's Striped Bass Management Board (Board) and Striped Bass Plan Review Team (PRT). Amendment 6 to the FMP was approved in February 2003, fully implemented by January 1, 2004, and completely replaces all previous Commission plans for Atlantic striped bass.

Amendment 6 addresses five limitations within the previous management program: potential inability of the management program contained in Amendment 5 to prevent the exploitation target in Amendment 5 from being exceeded; perceived decrease in availability or abundance of large striped bass in the coastal migratory population; a lack of management direction with respect to target and threshold biomass levels; inequitable impacts of regulations on the recreational, commercial, coastal and producer area sectors of the striped bass fisheries; and excessively frequent changes to the management program.

Amendment 6 establishes a control rule that sets both a target and a threshold for the fishing mortality rate and female spawning stock biomass (Table 1).

**Table 1. Amendment 6 Control Rule**

	<b>FISHING MORTALITY RATE</b>	<b>FEMALE SPAWNING STOCK BIOMASS</b>
<b>TARGET</b>	<b>F = 0.30*</b>	<b>38.6 million pounds</b>
<b>THRESHOLD</b>	<b>F = 0.41</b>	<b>30.9 million pounds</b>

*\*The target fishing mortality rate for the Chesapeake Bay and Albemarle-Roanoke stock is F=0.27*

The recreational striped bass fisheries are constrained by minimum size limits meant to achieve target fishing mortalities, rather than annual harvest quotas or caps. Most recreational fisheries are constrained by a two fish creel limit, a 365-day fishing season, and a 28 inch minimum size limit. Through Management Program Equivalency, Albemarle Sound/Roanoke River and Chesapeake Bay are granted the ability to employ different creel limits and smaller minimum size limits (18 inches) with the penalty of a target fishing mortality rate of 0.27.

The commercial striped bass fisheries are constrained by minimum size limits and state-by-state quotas. The same size standards regulate the commercial fisheries as the recreational fishery, except for a 20 inch size limit in the Delaware Bay shad gillnet fishery. Amendment 6 restores the coastal commercial quotas to the average reported landings from 1972-1979, except for Delaware's coastal commercial quota which remains at the level allocated in 2002 (193,447 pounds). The Chesapeake Bay and Albemarle Sound/Roanoke River commercial fisheries are managed to not exceed the 0.27 fishing mortality target.

States are granted the flexibility to deviate from these standards by submitting proposals for review by the Striped Bass Technical Committee and Advisory Panel and contingent upon the approval of the Management Board. Alternative proposals must be "conservationally equivalent" to the management standards, which has resulted in a wide variety of regulations among states (see Tables 7 and 8). These management measures were intended to maintain the fishing mortality rate (F) at or below the target F (0.30). With the Board's approval, some states (NH, MA, and CT) increased the recreational creel limit to two fish with the minimum size limit of 28 inches to comply with Amendment 6.

Amendment 6 implements a new planning horizon. Beginning in 2006, any management measures established by the Management Board will be maintained by the states for three years, unless a target or threshold is violated. Amendment 6 implemented an additional list of triggers, which if any (or all) are reached in any year will require the Management Board to alter the management program to ensure achievement of the Amendment 6 objectives.

The Exclusive Economic Zone (EEZ) remains closed to the harvest and possession of striped bass by both commercial and recreational fishermen. A recommendation, submitted to the Secretary of Commerce, was made in Amendment 6 to re-open federal waters to commercial and recreational fisheries.

## **II. Status of the Stocks**

At the 2006 Annual Winter Board Meetings, the Striped Bass Technical Committee submitted a request to the Striped Bass Management Board to bypass the 2006 annual update stock assessment in favor of having more time to prepare new methods and better data for the 2007 benchmark stock assessment. The Board approved this request, such that the most recent data on the status of the stock are derived from the 2005 stock assessment.

The estimate of total abundance for January 1, 2005 from the ADAPT VPA was 65.3 million age-1 and older fish. This estimate is about 1.2 million fish lower than the 2004 abundance but 10% higher than the average stock size for the previous five years. Population estimates were

calculated for the first time this year from tag-based F estimates using the catch equation. The 2004 population estimate of age 3+ fish was 48.5 million fish; that is, roughly 8 million fish higher than the 2003 estimate. This estimate is higher than the ADAPT VPA estimate of 39.2 million age 3+ fish at the beginning of 2004. This discrepancy in population estimates between the two approaches increased with older age classes. The tag-based approach estimated the 2004 population of age 7+ fish to be 17.1 million, whereas the ADAPT VPA estimated the age 7+ population to number 9.4 million fish. The abundance of older fish (age 13+) in the stock estimated from the ADAPT VPA increased from 382,000 fish at the beginning of 2003 to 547,000 fish on January 1, 2005.

The female spawning stock biomass for 2004 was estimated (from the VPA) at 54.8 million pounds, which is above the recommended biomass threshold of 30.9 millions pounds (13,956 mt) and the target SSB of 38.6 million pounds (17,500 mt). SSB has declined by 9% since 2002 when it peaked at 60.6 million pounds.

Recruitment of the 2004 cohort for all stocks combined is 12.7 million age-1 fish, which is close to the average age-1 recruitment observed since the stocks were declared recovered in 1995.

Based on VPA results, average age 8-11 fishing mortality in 2004 was estimated at  $F=0.40$  which is below the Amendment 6 threshold of 0.41 but exceeds the target of 0.30. However, it was the consensus of the Technical Committee members that this was likely an overestimate of the 2004 F given the uncertainty with the terminal year estimate from the VPA and the systematic positive bias observed in the retrospective analysis. The 2003 value of F from the 2005 VPA is 0.29, which is substantially lower than the terminal year F from the 2004 VPA run of 0.62. This is due not only to the addition of another year's worth of data, but to the modified suite of tuning indices used in the 2005 VPA and the inclusion of wave 1 (Jan./Feb.) estimates of recreational harvest mortality from NC and VA for 1996 – 2004 (see Data and Uncertainty section below).

The 2004 tag-based estimates of F using stock-specific, model-based estimates of fishing mortality and a constant M of 0.15 were as follows. For fish greater than 28 inches, the coast-wide average F was estimated as 0.29 and specific tagging program values ranged from 0.02 in the New York ocean haul survey (NYOHS) to 0.31 in the Maryland (MD) tagging program. This value was similar to the VPA F weighted by N value for age 7-11 fish of 0.32. For fish greater than 18 inches, the coast-wide average F was estimated as 0.29 and specific tagging program values ranging from 0.06 in the Virginia spawning stock (VARAP) program to 0.68 in the New Jersey Delaware Bay (NJDEL) program. This tag-based F estimate was greater than the VPA F weighted by N value for age 3-11 fish of 0.15.

The 2004 variable M tag-based estimates of F for fish greater than 28 inches indicated the coast-wide average F was 0.14, and specific tagging program values ranged from 0.09 in the VARAP program to 0.26 in the Delaware and Pennsylvania (DE-PA) tagging program. These F estimates were less than the VPA F weight by N, for age 7-11 fish, of 0.32. For fish greater than 18 inches, the coast-wide average was 0.11, and specific tagging program F estimates ranged from 0.05 in three different programs to 0.17 in the MD program. This tag-based F estimate is similar to the VPA F weighted by N value for age 3-11 fish of 0.15.

Chesapeake Bay fishing mortality in 2004 was estimated as  $F=0.16$  by the direct enumeration study. This  $F$  represents mortality during the June 2003 – June 2004 period, so it is not directly comparable to the average, weighted (by  $N$ ) VPA calendar-year  $F$  on age 3-8 striped bass that is equal to 0.12.

### III. Status of the Fishery

Total striped bass harvest (commercial and recreational) comprised 3.32 million fish in 2005, a 33.7% increase from 2002 (2.48 million fish) but only a 0.9% increase from 2004 (3.29 million fish). This increase in total harvest from 2004 to 2005 is attributable to the commercial harvest (1.0 million fish), which rose by 11.25% from 2004, rather than the recreational fishery (2.31 million fish), which fell by 3.0% from 2004. On the other hand, discard losses in the recreational fishery (1.52 million fish) rose by 17.5% from 2004 to 2005, meaning that the total recreational catch (harvest plus discard losses) rose by 2.0% from 2004. An estimate of commercial discard losses for 2005 is unavailable at this time. In 2004, commercial discard losses measured 0.52 million fish, or 36.38% of the total commercial catch for the year.

Recreational harvest (2.31 million fish) and discard losses (1.52 million fish) account for 60.3% and 39.7%, respectively, of the total 2005 recreational loss. Maryland recreational fisheries harvested 21.4% of total recreational landings in number, followed by Massachusetts (17.0%), Virginia (16.1%), New Jersey (13.8%), New York (10.9%), and North Carolina (6.8%). The remaining states each landed 5% or less of the total recreational landings in number.

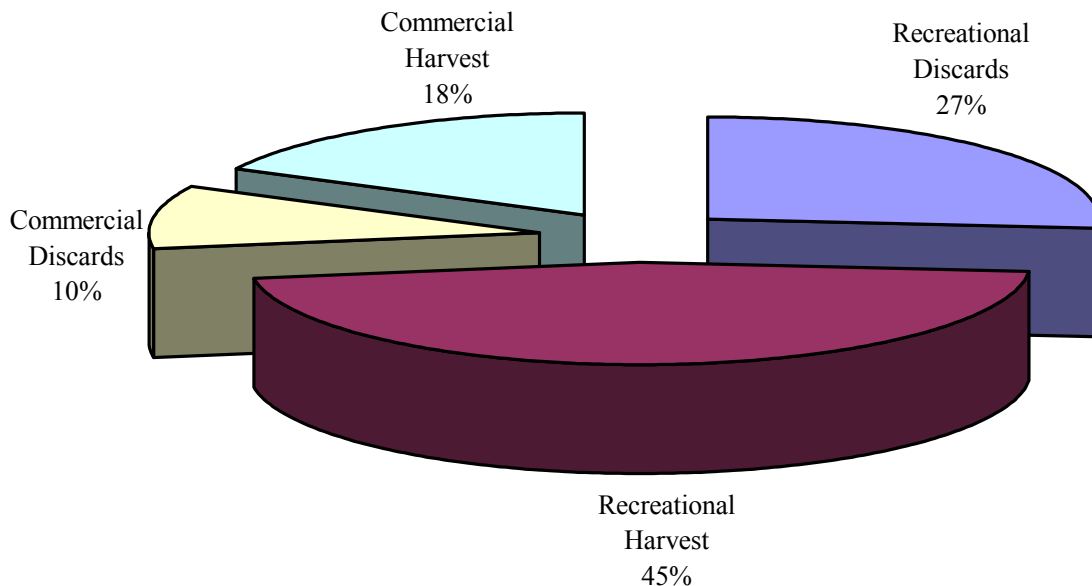
The commercial harvest (1.0 million fish) was dominated by Maryland's commercial fisheries, which made up 56.5% of the total commercial landings by number in 2005. Virginia accounted for 11.8% of the commercial landings by number, followed by PRFC (8.0%), New York (7.0%), North Carolina (6.6%), and Massachusetts (5.9%). The remaining states each landed 3% or less of the total commercial landings in number.

A reliable estimate for commercial discards is unavailable at the writing of this report. Thus, the 2004 data are used to portray the proportion of the total catch attributable to recreational harvest and discards and commercial harvest and discards (Figure 1).

**Table 2. Striped Bass Landings and Discards (numbers of fish) from 2002-2005**

	Recreational		Commercial	
	Harvest	Discard Losses	Harvest	Discard Losses
<b>2002</b>	1,828,367	1,118,538	654,062	168,201
<b>2003</b>	2,405,707	1,168,907	865,689	262,078
<b>2004</b>	2,381,823	1,373,430	907,328	518,847
<b>2005</b>	2,309,670	1,520,854	1,009,437	N/A

**Figure 1. 2004 Striped Bass Total Catch (5.2 million fish)**



#### **IV. Status of Assessment Advice**

The Atlantic striped bass coastwide stock assessment was peer reviewed by the 36<sup>th</sup> Stock Assessment Workshop/Stock Assessment Review Committee (SAW/SARC) in 2002 (NEFSC 2003). In addition to reviewing the results of the stock assessment, the SARC was asked to comment specifically on the model configuration of the VPA and provide advice on the plus grouping, oldest true age for fishing mortality, and the use of all striped bass fishery independent surveys. In the Stock Assessment Report for 2002, the Striped Bass Technical Committee, Stock Assessment Subcommittee, and Tagging Subcommittee have attempted to address the issues and advice provided by the SARC. The fully recruited  $F$  calculated in the 2002 assessment was based on ages 8-11 to conform to the biological reference points in Amendment 6. Consequently, the  $F$  estimate is not directly comparable with age 5-11  $F$ s used in previous assessments, effectively reporting fishing mortality has exceeded the target since 1997. The SAW/SARC will peer review the next Atlantic striped bass stock assessment in 2007.

#### **V. Status of Research and Monitoring**

The management plan requires several jurisdictions to implement fishery dependent monitoring programs for striped bass. Table 6 summarizes state compliance with the fishery dependent and independent monitoring requirements. All jurisdictions with commercial fisheries (Massachusetts, Rhode Island, New York, Delaware, Maryland, Virginia, PRFC, and North Carolina) are required to define the catch composition (age, length, sex) of these fisheries. Jurisdictions with significant commercial fisheries (Massachusetts, New York, Maryland, Virginia, and PRFC) are required to collect catch and effort data. Jurisdictions with significant recreational fisheries (Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, Virginia, and PRFC) are required to follow specific guidelines for supplementing

MRFSS collection of catch composition data and catch and effort information from these fisheries.

In addition to fishery dependent monitoring programs, the management plan requires several states to monitor the striped bass population independent of the fishery. Juvenile abundance indices are determined by Maine, New York, New Jersey, Maryland, Virginia, and North Carolina. Spawning stock sampling is performed by New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. Tagging is conducted by state and federal agencies to determine survivorship and migration patterns in the coastal migratory stock (NMFS, USFWS, SEAMAP, Massachusetts, New York, New Jersey, Maryland, Virginia, and North Carolina).

## **VI. Status of Management Measures and Issues**

### ***Status of Amendment 6***

Amendment 6 was fully implemented by January 1, 2004, and provided the regulatory measures for the whole of the 2005 fishing year. At present, Addendum 1 to Amendment 6 of the Striped Bass FMP is under development. During the development of Amendment 6, the Striped Bass Management Board raised concerns over the impacts of discard mortality, estimated to account for more than 36% of all fishery-related removals in 2004, on the overall population. At that time the Board agreed to develop a data collection program to collect the information necessary to evaluate the accuracy of the current discard estimates. Based on the guidance in Amendment 6, the Board is developing Addendum 1 to establish the data collection program. The Draft Addendum 1 for Public Comment will be reviewed by the Board at the annual summer Board meeting, and, if approved, will enter the Public Comment Period in the fall of 2006.

Presently, the NOAA Fisheries maintains a ban on all striped bass fishing activity and possession of striped bass in the Exclusive Economic Zone (EEZ) with the exception of a defined route to and from Block Island in Rhode Island.

### ***Coastal Commercial Quota Overages***

Massachusetts and Rhode Island exceeded their 2004 quotas, so their 2005 coastal commercial quotas were reduced. New York and Maryland have 2005 quotas lower than their Amendment 6 quota allocations due to conservation equivalencies related to their minimum size limits. Massachusetts exceeded the adjusted 2005 coastal commercial quota by 9,775 pounds, resulting in an adjusted 2006 quota of 1,149,975 pounds (Table 3). Rhode Island exceeded the adjusted 2005 coastal commercial quota by 275 pounds, for an adjusted 2006 coastal commercial quota of 243,350 pounds.

**Table 3. Coastal Commercial Quota Overages & Adjusted Quotas (in pounds)**

	Amendment 6 Quota Allocation	2005 Quota	2005 Harvest	Overage	2006 Quota	2006 Harvest	Overage	2007 Quota
MA	1,159,750	1,094,962**	1,104,737	9,775	1,149,975			
RI	243,625	242,028**	242,303	275	243,350			
NY	1,061,060	828,293*	689,821	0	1,061,060			
NJ+	321,750	321,750	29,797	0	321,750			
DE	193,447	193,447	173,815	0	193,447			
MD	131,560	126,396*	46,871	0	131,560			
VA	184,853	184,853	184,734	0	184,853			
NC	480,480	480,480	440,889	0	480,480			

\* Quota reduced due to conservation equivalency

\*\* Quota reduced due to overage in 2004

+ Amendment 6 Coastal Commercial Quota applied to Recreational Bonus Fish Program; still managed as a quota

***Chesapeake Bay Commercial Quota Overages***

Amendment 6 implements 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  $F=0.27$ , a total target quota is established for the Chesapeake Bay and shares are allocated to Maryland, Virginia, and the Potomac River Fisheries Commission (PRFC). In 2005, the bay-wide quota of 4,337,310 lbs. was allocated among the three jurisdictions as shown in Table 4. In 2005, Virginia exceeded their allocation, but the amount (55,734 lbs.) was not enough to surpass the bay-wide quota because of below-quota landings in Maryland and PRFC. The 2006 Chesapeake Bay quota will be 4,479,613 lbs.

**Table 4. Chesapeake Bay Commercial Quota Overages and Adjusted Quotas (in pounds)**

<b>Chesapeake Bay 2005 Quota = 4,337,310 lbs. &amp; 2006 Quota = 4,479,613 lbs.</b>				
Jurisdiction	2005 Quota	2005 Harvest	Overage	2006 Quota
Maryland	2,066,322	2,008,687	0	2,134,116
Virginia	1,504,927	1,560,661	55,734	1,554,302
PRFC	766,061	533,456	0	791,195
<b>Total</b>	<b>4,337,310</b>	<b>4,102,804</b>	<b>0</b>	<b>4,479,613</b>

***Chesapeake Bay Spring Trophy Fishery***

In December 2003, the Atlantic Striped Bass Management Board approved a new methodology to establish the annual quota for the Chesapeake Bay spring trophy fishery. Every year, the Chesapeake Bay states must submit a harvest report for the current year's spring trophy fishery and propose a new quota for the subsequent year. The cap on the trophy fishery is based on the number of age 8+ striped bass in the population as determined annually by the ADAPT VPA output. In 2005, the Chesapeake Bay spring trophy fishery harvested 65,664 fish, exceeding the



adjusted quota by 29,720 fish. This overage would have resulted in a 2006 quota of 25,488 fish, but the Board approved a 2006 payback through a combination of direct payback of 13,720 fish through increased minimum size, and payback, the remainder in kind, through future additional Maryland effort controls. Table 5 summarizes the quotas, harvests, overages, and adjusted quotas for 2004-2006.

**Table 5. Chesapeake Bay Spring Trophy Fishery (in numbers of fish)**

	2004	2005	2006
<b>Quota</b>	40,624	40,624	55,208
<b>Previous year overage</b>	13,900	4,680	13,720*
<b>Adjusted quota*</b>	26,724	35,944	41,488
<b>Harvest</b>	31,404	65,664	
<b>Overage</b>	4,680	29,720	

\* The 2005 overage of 29,720 fish was adjusted to a direct payback of 13,720 fish under an increased minimum size limit and future additional Maryland effort controls.

### ***Law Enforcement***

The 2005 Law Enforcement Committee reports that the FMP for Striped bass is enforceable as written. Striped bass enforcement is a high priority with all Atlantic States and a significant amount of effort has been expended to obtain overall compliance.

Joint Enforcement Agreements between the NMFS/OLE, USCG, and individual states have significantly improved both enforcement and compliance in the EEZ. It is still difficult and time consuming to determine the origin of striped bass found aboard ocean fishing vessels near the EEZ. Several major EEZ cases have, however, been made in recent years including one in North Carolina resulting in an 18 month jail sentence and one in Maryland resulting in heavy fines, suspended jail, and loss of fishing privileges.

### ***Juvenile Abundance Indices***

In response to the suite of management triggers introduced in Amendment 6, the PRT summarizes the results from the juvenile abundance indices. The PRT would recommend action to the Management Board if any JAI were to show recruitment failure for three consecutive years in a row. Recruitment failure is defined as a JAI lower than 75% of all other values in the dataset. The geometric mean is the preferred index of YOY striped bass abundance to model stock status. The juvenile abundance indices in New Jersey, Maryland, Virginia, and North Carolina indicate that the 2005 year class is above the time series average. The 2005 Hudson River YOY index was below the long-term average (as it was in 2004). The Maine survey in the Kennebec/Androscooggin estuary reported the highest CPUE in the nineteen-year time series. No management action is necessary based on the JAIs.

### ***Albemarle/Roanoke Striped Bass FMP***

The Commission's Interstate FMP for Atlantic Striped Bass requires North Carolina to inform the Commission of changes to the Albemarle-Roanoke Striped Bass FMP. While the Commission's approval of North Carolina's management plan is not required, 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 management plan was last revised in 1994, so the updated FMP explores harvest options and identifies management measures and research needs to promote recovery of striped bass stock in the central and southern area. It defines both the Albemarle Sound management area and the Roanoke River management area. Because this stock is managed independently from the coastal migratory stock, it contains a separate target fishing mortality rate ( $F_{\text{target}} = 0.22$ ) and threshold spawning stock biomass (400,000 pounds). The annual total allowable catch is allocated to the three fisheries: 25% to the Roanoke River recreational fishery, 25% to the Albemarle Sound recreational fishery, and 50% to the Albemarle Sound commercial fishery. The FMP implements overage penalties for future overages, but specifies that no overage penalties would be applied to the Roanoke River overages from 1994-2002 due to a significant underage in 2003. The FMP addresses habitat and environmental issues, catch and release mortality in hook and release fisheries, discards in the multispecies gillnet fishery, enforcement of creel limits, and maintains the Albemarle Sound Management Area boundary line.

No regulation changes occurred during the 2005 fishing year. Presently, there are no recreational or commercial changes proposed for the 2006 fishing year. However, with the recreational harvest in the Albemarle Sound Management Area still falling ~70,000 lbs. short of the TAC in 2005 despite increased allowable harvest days, the North Carolina Division of Marine Fisheries is investigating increasing the daily creel limit from two fish per person to three fish per person.

## **VII. Annual State Compliance**

Based on the annual state compliance reports, the Plan Review Team determined that each state/jurisdiction implemented a management program that was approved by the Striped Bass Management Board for the 2005 fishing year and was consistent with the requirements of Amendment 6 (Tables 7 and 8).

Amendment 6 has several compliance requirements as part of the Interstate striped bass management program including both monitoring and regulatory requirements that are enforceable through the Atlantic Striped Bass Conservation Act. The monitoring requirements for each jurisdiction are summarized in *Section V* of this report. Compliance with these requirements is summarized in Table 6. The PRT found all states carried out the required monitoring programs and implemented the mandatory regulatory requirements in the 2005 fishing year.

Amendment 6 also requires states to submit annual law enforcement activity reports. These reports, in a standardized format, detail the effort and success involved in enforcing striped bass regulations in each jurisdiction. For the 2005 fishing year, the states submitted their law enforcement reports to the Commission's Law Enforcement Coordinator and one Law Enforcement Report was submitted on behalf of all the states in the striped bass management unit. The striped bass law enforcement report is summarized in *Section VI* of this report.

**Table 6. Status of compliance with monitoring and reporting requirements.**  
 (Y = compliance standards met, N = compliance standards not met, N/A = not applicable)

State	Fishery-independent monitoring	Fishery-dependent monitoring	Annual reporting
ME	Y	N/A	Y
NH	N/A	N/A	Y
MA	Y	Y	Y
RI	N/A	N/A	Y
CT	N/A	Y	Y
NY	Y	Y	Y
NJ	Y	Y	Y
PA	Y	N/A	Y
DE	Y	Y	Y
MD	Y	Y	Y
PRFC	N/A	Y	Y
DC	N/A	N/A	Y
VA	Y	Y	Y
NC	Y	Y	Y

## VIII. Recommendations

### Regulatory Recommendations

All of the jurisdictions with a declared interest in the management of Atlantic striped bass had regulations in place for the 2005 fishing year that were in compliance with Amendment 6 to the Interstate Fishery Management Plan for Atlantic striped bass.

- 1) The 2006 coastal commercial quota for Massachusetts, Rhode Island, and Virginia should be lowered by the amount over the 2005 allocation (Table 3).
- 2) The 2006 Chesapeake Bay Spring Trophy quota should be lowered by the amount over the 2005 allocation (Table 5).

### Management Recommendations

- 1) Enhance the current Plan Review Team with state representation, compensating for the void left by the departure of Kim McKown.

### Research Recommendations

## STOCK ASSESSMENT AND POPULATION DYNAMICS

### *High Priority*

- Conduct analysis on current state and federal fishery dependent and independent monitoring programs to determine which, if any, accurately reflect population status.
- Develop method to integrate VPA and tagging models to produce a single estimate of F and stock status.
- Evaluate alternative catch at age models for striped bass.
- Examine reporting rates by commercial and recreational fishermen using high reward tags.
- Develop studies to provide information on gear-specific discard mortality rates and to determine the magnitude of bycatch mortality, including factors that influence their magnitude and means of reducing or eliminating this source of mortality. Additionally, increase sea sampling of commercial fisheries to better estimate levels of discards.
- Review relationship between tag-based survival estimates and VPA estimate of mortality in a management framework.
- Develop maturity ogive applicable to coastal migratory stock.
- 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.

### *Medium Priority*

- Improve methods for determining population sex ratio for use in estimates of spawning stock biomass and biological reference points.
- Develop refined and cost-efficient coastal monitoring regime for striped bass stocks.
- Quota calculation methods should be refined which allow better estimates among various components of the fishery.
- Examine methods to estimate annual variation in natural mortality.
- Examine causes of different survival estimates among programs estimating similar segments of the population.
- Evaluate truncated matrices and covariate-based tagging models.
- Examine differences between R/M exploitation and survival rates.

### *Low Priority*

- An evaluation of the overfishing definition should be made relative to uncertainty in biological parameters.
- Simulation models should be developed 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  $\geq 18$  inch length group.

## RESEARCH AND DATA NEEDS

### *High Priority*

- Continue in-depth analysis of migrations, stock compositions, etc. using mark-recapture data.

***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.

***Low Priority***

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

**Table 7. Summary of Atlantic Striped Bass Recreational Regulations for 2004 & 2005 and Approved Changes for 2006.**

(All regulations are subject to change. Readers should contact their state fisheries offices for detailed regulations.)

States & Jurisdictions	2004 Fishing Year			2005 Fishing Year			FY 2006
	Seasonal Quota (lbs)	Size & Bag Limit	Open Season	Seasonal Quota (lbs)	Size & Bag Limit	Open Season	Changes?
Maine	none	1 fish 20"-26" or 1 fish above 40"	All Year H&L only Spawn areas: 5.1 - 11.30 & C&R only 5.1 - 6.30	none	1 fish 20"-26" or 1 fish above 40"	All Year H&L only Spawn areas: 5.1 - 11.30 & C&R only 5.1 - 6.30	
New Hampshire	none	2 fish 28" min; 1 of which can be >40"	All Year	none	2 fish 28" min; 1 of which can be >40"	All Year	
Massachusetts	none	2 fish 28" min	All Year	none	2 fish 28" min	All Year	
Rhode Island	none	2 fish 28" min	All Year	none	2 fish 28" min	All Year	
Connecticut	none	2 fish 28" min	All Year	none	2 fish 28" min	All Year	
New York Hudson  Ocean Charter/Delaware	none	1 fish 18" min	3.15 - 11.30	none	1 fish 18" min	3.15 - 11.30	
	none	1 fish 28" min	4.15 - 12.15	none	1 fish 28-40" and 1fish > 40"	4.15 - 12.15	
	none	2 fish 28" min	All Year	none	2 fish 28" min	All Year	
New Jersey  Bonus Program	none	1.1-9.26: 1 fish 24"-28" 2nd fish >=28" 9.27-12.31: 1 fish 24"-28", 2nd fish >=34"	Intra-coastal: 3.1 - 12.31 DE River spawning area: 3.1 - 3.31 and 6.1 - 12.31	none	1 fish 24"-28" and 1 fish >=34"	Intra-coastal: 3.1 - 12.31 DE River spawning area: 3.1 - 3.31 & 6.1 - 12.31	2 fish 28" min
	321,750	28" min, need tag	All Year	321,750	28" min, need tag	All Year	
Pennsylvania	none	2 fish 28"	All Year Tidal DE: 3.1-3.31, 6.1 - 12.31	none	2 fish 28"	Tidal DE River: 3.1-3.31, 6.1 - 12.31; Non-tidal: all year	
Delaware	none	2 fish 28"	All Year DE River spawning area: 1.1 - 3.31 and 6.1 - 12.31	none	2 fish 28"	All Year DE River spawning area: 1.1 - 3.31 and 6.1 - 12.31	

**Table 7 continued. Summary of Atlantic Striped Bass Recreational Regulations for 2004 & 2005 and Approved Changes for 2006.**

(All regulations are subject to change. Readers should contact their state fisheries offices for detailed regulations.)

States & Jurisdictions	2004 Fishing Year			2005 Fishing Year			FY 2006	
	Seasonal Quota (lbs)	Size & Bag Limit	Open Season	Seasonal Quota (lbs)	Size & Bag Limit	Open Season	Changes?	
Maryland	Trophy	part of 26,724 fish Bay cap	1 fish/day 28" min	4.17 - 5.15	part of 35,944 fish Bay cap	1 fish/day 28" min	4.16 - 5.15	part of 25,488 fish Bay cap; 4.15-5.15; 33" min
	Summer/Fall	2,534,100	5.16 - 12.15: 2 fish 18" - 28" or 1 fish 18" - 28", 2nd fish above 28"; Brewer Channel to MD/VA line only 6.1 - 12.15: same - all areas open	2,795,611	5.16 - 5.31: 2 fish 18" - 28" or 1 fish 18" - 28" and 1 fish > 28"; Brewer Channel to MD/VA line only 6.1 - 12.15: same - all areas open			
	Ocean	none	2 fish 28" min	All Year	none	2 fish 28" min	All Year	
Washington DC	none	2 fish 18" - 36"	5.1 - 7.31 & 9.1 - 11.14	none	2 fish 18" - 36"	5.1 - 11.19		
PRFC	Trophy	part of 26,724 fish Bay cap	1 fish 28" min	4.17 - 5.14	part of 35,944 fish Bay cap	1 fish 28" min	4.16 - 5.15 Lower river only	part of 25,488 fish Bay cap; 4.15-5.15
	Summer/Fall	568,148	2 fish 18" min, 1 can be >28"	5.15 - 12.31	626,777	2 fish 18" min, 1 can be >28"	5.15 - 12.31	
Virginia	Spring	1,701,748	2 fish 18" - 28"	5.16 - 6.15	1,504,927	2 fish 18" - 28"	5.16 - 6.15	1,554,302
	Trophy	part of 26,724 fish Bay cap	1 fish 32" min	4.17 - 5.14	part of 35,944 fish Bay cap	1 fish 32" min	4.16 - 5.14	part of 25,488 fish Bay cap; 4.15-5.15
	Fall	1,701,748	2 fish 18" min	10.4 - 12.31	1,504,927	CB: 2 fish 18" min, 1>34 PT: 2 fish 18"-28"	10.4 - 12.31 5.16 - 12.31	1,554,302
	Ocean	none	2 fish 28" min	1.1 - 3.31 & 5.16 - 12.31	none	2 fish 28" min	1.1-3.31 & 5.16-12.31	
North Carolina	Albemarle	Spring: 68,500 Fall: 68,500	2 fish 18" min	Wed, Fri, Sat, Sun	Spring: 68,750 Fall: 68,750	2 fish 18" min	Wed, Fri, Sat, Sun	
	Roanoke	137,500	2 fish 18" min no fish 22" - 27"	Zone 1: 3.15 - 4.30 Zone 2: 3.1 - 4.15	137,500	2 fish 18" min no fish 22" - 27"	Zone 1: 3.15 - 4.30 Zone 2: 3.1 - 4.15	
	Ocean	none	2 fish 28" min	All Year	none	2 fish 28" min	All Year	reporting regs

**Table 8. Atlantic Striped Bass Commercial Fishery Regulations for 2004 & 2005 and Approved Changes for 2006.**

(All regulations are subject to change. Readers should contact their state fisheries offices for detailed regulations.)

States & Jurisdictions	2004 Fishing Year			2005 Fishing Year			2006 Fishing Year
	Commercial Quota (lbs)	Size Limit	Season	Commercial Quota (lbs)	Size Limit	Season	Changes?
Maine							
New Hampshire							
Massachusetts	1,141,517*	34" min; 30 fish/day	H&L only. 7.11 - 8.10; no landings Thurs-Sat	1,094,962**	34" min	H&L only. 7.12 - 8.10; 5 fish/day on Sun, 30 fish/day Tues-Thurs	1,149,975 lbs.***
Rhode Island	Total: 243,625 Trap: 97,745 H&L: 146,175	Traps: 28" min H&L: 34" min	Traps: 1.1 to 8.26 90% of quota 8.27 - 12.31 10% of quota H&L: 6.1 - 8.26, 4fish/day, 75% 10.1 - 12.31, 3 fish/day, 25%	Total: 242,028** Trap: 97,450 H&L: 146,175	Traps: 28" min H&L: 34" min	Traps: 1.1 to 8.26 90% of quota 8.27 - 12.31 10% of quota H&L: 6.1 - 8.31, 4fish/day, 75% 9.1 - 12.31, 3 fish/day, 25%	Total: 243,350*** Trap: 97,340 H&L: 146,010
Connecticut							
New York (Hudson)							
Ocean	828,293	24"-36"	7.1 - 12.15	828,293	24"-36"	7.1 - 12.15	Trawl bycatch trip limit = 21 fish per vessel
New Jersey							
Pennsylvania							
Delaware	193,447	28" min except spring gillnet in DE Bay/River & Nanticoke River = 20" min	Gillnet: 2.15 - 5.31 & 11.15 - 12.31 H&L: 4.1 - 12.31 Spawning Areas: 1.1 - 3.31 & 6.1 - 12.31	193,447	28" min except spring gillnet in DE Bay/River & Nanticoke River = 20" min	Gillnet: 2.15 - 5.31 & 11.15 - 12.30 H&L: 4.1 - 12.31 Spawning Areas: 1.1 - 3.31 & 6.1 - 12.31	
Maryland****							
Bay & River	Total: 1,873,000 Gillnet: 758,565 H&L: 646,185 LbNet/Haul Seine: 468,250	18" - 36"	Gillnet: 1.1-2.29 & 12.1 - 12.31 H&L: 6.14 - 11.30 Lb Net/Haul Seine: 6.1 - 11.30	Total: 2,066,322 Gillnet: 836,860 H&L: 712,881 LbNet/Haul Seine: 516,581	18" - 36"	Gillnet: 1.3-2.28 & 12.1 - 12.31 H&L: 6.14 - 11.30 (Mon-Thurs) Lb Ne/Haul Seine: 6.1 - 11.30	Total quota increased to 2,134,116 lbs Haul Seine: 6.7-11.30
Ocean	126,936*	24"	1.1-4.30 & 11.1-12.31	126,396	24"	1.1-4.30 & 11.1-12.31	131,560 lb.
Washington DC							
PRFC****	694,403	18" - 28"/36"	All gears have a season	766,061	18" - 28"/36"	All gears have a season	791,195 lb.
Virginia****							
Bay & River	1,364,154	18" min 28" max	2.1 - 12.31 Max Size: 3.26 - 6.15	1,504,927	18" min 18"-28"	2.1 - 12.31 3.26 - 6.15	1,554,302 lb.
Ocean	184,853	28"	2.1 - 12.31	184,853	28"	2.1 - 12.31	184,853 lb.
North Carolina							
Albemarle	275,000	1.6 - 3.19: 18" min, 5 fish/operation 3.20 - 4.14: 18" min, 10 fish/operation 10.27 - 12.31: 18" min, 5 fish/operation		275,000	18"	1.6 - 3.19: 5 fish/operation 3.20 - 4.14: 10 fish/operation 10.27 - 12.31: 5 fish/operation	
Ocean	480480	28"	Seasons based on gear	480480	28"	Season & trip limit based on gear	No beach seine

\* Overage in 2003 required a reduction in 2004 quota

\*\* Overage in 2004 required a reduction in 2005 quota

\*\*\* Overage in 2005 required a reduction in 2006 quota

\*\*\*\* Baywide Quota: 2005 (4,337,310 lbs.) 2006 (4,479,613 lbs.)

-NY Quota is less than AM6 value because of slot limit cons. equiv.

-MD quota is less than Am6 value because of lower size cons. equiv.