

Fishery Management Report No. 41
of the
Atlantic States Marine Fisheries Commission



**Amendment 6 to the
Interstate Fishery Management Plan
for Atlantic Striped Bass**

February 2003

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Atlantic States Marine Fisheries Commission
Atlantic Striped Bass Plan Development Team

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This Amendment was prepared under the guidance of the Atlantic States Marine Fisheries Commission's Atlantic Striped Bass Management Board. Technical assistance was provided by the Atlantic Striped Bass Technical Committee, the Striped Bass Stock Assessment Sub-Committee, and the Atlantic Striped Bass Advisory Panel.

Special assistance was provided by the Striped Bass Working Group; members of the group include: Gordon Colvin (New York Department of Environmental Conservation), Paul Diodati (Massachusetts Division of Marine Fisheries), Pat Keliher (Chair, Striped Bass Advisory Panel), Preston Pate (North Carolina Division of Marine Fisheries), and Eric Schwaab (Maryland Department of Natural Resources).

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DEDICATION



DR. EILEEN SETZLER-HAMILTON

This document is dedicated to the memory of Dr. Eileen Setzler-Hamilton. Throughout her life and in her work, Eileen was committed to the preservation of marine fisheries resources and the science that supports Atlantic coast fisheries management. For nearly a decade, Eileen was an active member of the Striped Bass Technical Committee, sharing her knowledge and passion of marine fisheries conservation for the betterment of Atlantic coast striped bass stocks. Over this time, Eileen participated in the development of Amendments 5 & 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass. Eileen will be forever a part of the states' legacy of restoring Atlantic coast striped bass fisheries.

EXECUTIVE SUMMARY

1.0 Introduction

The Atlantic striped bass (*Morone saxatilis*) has for centuries been one of the most important coastal species from Maine through Cape Hatteras, supporting valuable commercial and recreational fisheries. The popularity of this species to fishermen, the complex nature of its seasonal distribution, and decline in harvest and poor recruitment during the 1970's stimulated interest in the development of a cooperative interstate fisheries management plan. In 1981, the Atlantic States Marine Fisheries Commission (ASMFC) developed and adopted the *Interstate Fisheries Management Plan for Atlantic Striped Bass of the Atlantic Coast from Maine through North Carolina* (FMP). The FMP has been amended five times previously, most recently by *Amendment 5 to the Interstate Fishery Management Plan for Atlantic Striped Bass*. Under this management program, Atlantic striped bass have made the most significant recovery experienced for a coastal finfish species.

Amendment 5 established the management program for the recovered striped bass stock. Since 1995 the Commission has adopted five addenda to respond to changing circumstances in the fishery. In addition to these multiple addenda, management under Amendment 5 has become cumbersome due to the large range of management programs that are currently implemented by the states/jurisdictions. This amendment was developed to address the management complexity as well as a number of other issues that may arise with the continued management under Amendment 5. The issues include:

- 1) There is growing concern that the management program contained in Amendment 5 may not be appropriate to prevent the exploitation target in Amendment 5 from being exceeded.
- 2) Over the past few years many members of the fishing community have raised the concern that the availability or abundance of large striped bass in the coastal migratory population has decreased.
- 3) The biological reference points in Amendment 5 only address the exploitation rate of striped bass, there is no direction provided to the managers with respect to target or threshold biomass levels.
- 4) The Amendment 5 management program has had differential impacts on the recreational, commercial, coastal and producer area sectors of the striped bass fisheries.
- 5) Expanding the planning horizon for changes to the management program.

2.0 Goals, Objectives, Management Unit, Overfishing Definition

Amendment 6 to the Interstate Fishery Management Plan for Atlantic striped bass completely replaces all previous Commission management plans for Atlantic striped bass.

The Goal of Amendment 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass is:

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

In support of this goal, the following objectives are recommended for Amendment 6:

- 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.

Specification of Management Unit (2.4)

The management unit for this Amendment includes all coastal migratory striped bass stocks on the east coast of the United States, excluding the Exclusive Economic Zone. The coastal migratory striped bass stocks occur in the coastal and estuarine areas of all states and jurisdictions from Maine through North Carolina. (A discussion of the Albemarle-Roanoke stock and the Chesapeake Bay management area is included in *Section 2.4.1 and 2.4.2*, respectively).

Fishing Mortality Target & Threshold (2.5.1)

The striped bass fishing mortality threshold under Amendment 6 is the fishing mortality rate that allows for maximum sustainable yield (F_{msy}), currently estimated to be 0.41. Amendment 6 also establishes a fishing mortality target of $F=0.30$, which equates to an exploitation rate of 24%. This target ($F=0.30$) provides a higher long-term yield from the fishery and adequate protection to ensure that the striped bass population is not reduced to a level where the spawning potential is adversely affected.

There are two areas where the fishing mortality target is lower than the rest of the East Coast, the Chesapeake Bay and the Albemarle Sound/Roanoke River. To compensate for the smaller minimum size limit granted to both of these areas, the target fishing mortality is set a $F=0.27$.

Female Spawning Stock Biomass Target & Threshold (2.5.2)

Amendment 6 establishes a biomass target and threshold based on the sexually mature females in the striped bass population. The striped bass population was declared restored in 1995, at which time the female spawning stock biomass was estimated to be 30.7 million pounds (13,956 metric tons). Using a threshold only slightly greater than the restoration level, Amendment 6 sets the female spawning stock biomass threshold at 30.9 million pounds (14,000 mt). The female spawning stock biomass target is set at 125% of the spawning stock biomass threshold. This equates to a target of 38.6 million pounds (17,500 metric tons).

Amendment 6 Control Rule

	FISHING MORTALITY RATE	FEMALE SPAWNING STOCK BIOMASS
TARGET	$F = 0.30^*$	38.6 million pounds
THRESHOLD	$F = 0.41$	30.9 million pounds

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

Stock Rebuilding Targets (2.6.1)

Should the Atlantic striped bass population be declared overfished at anytime in the future, it is the intent under Amendment 6 to rebuild the female spawning stock biomass to the target level (38.6 million pounds) within the timeframe established in *Section 2.6.2*.

Stock Rebuilding Schedules (2.6.2)

If at anytime the Atlantic striped bass population is declared overfished and rebuilding needs to occur, the Management Board will determine the rebuilding schedule at that time. The only limitation imposed under Amendment 6 is that the rebuilding schedule is not to exceed 10 years.

Implementation Schedule (2.8)

Amendment 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass was approved by the Atlantic States Marine Fisheries Commission on February 26th, 2003. States are required to submit implementation proposals by May 1st, 2003. State proposals will be reviewed for approval during the June 2003 ASMFC meeting week. States are required to implement the provisions of Amendment 6 by January 1st, 2004, unless an specific alternative date is indicated in the jurisdiction's implementation proposal. States may begin to use the increase in the coastal commercial quota prior to the Management Board's approval of the implementation proposal, provided the state has at least a 28" minimum size limit in the commercial fishery and the state's coastal commercial landings do not exceed the quota listed in Table 4 *Section 4.3.2*

3.0 Monitoring Program Specifications/Elements

This amendment includes a number of required monitoring and data collection programs. These programs include juvenile surveys, spawning stock surveys, and fishery dependent data collection, which are detailed further in *Section 3*. The jurisdictions responsible for conducting these monitoring surveys are summarized in *Appendix 2*.

Amendment 6 also outlines a process for developing a bycatch reduction program. This process begins with developing a mandatory discard data collection program in the first two years of implementation. Following the implementation of the discard data collection program, a bycatch management program will be developed and ready for implementation four years after the implementation of Amendment 6.

Required Juvenile Abundance Index Surveys (3.1.2)

The following states are currently required to conduct juvenile abundance index surveys on an annual basis: Maine for the Kennebec River; New York for the Hudson River; New Jersey for the Delaware River; Maryland for the Chesapeake Bay tributaries; Virginia for Chesapeake Bay tributaries; and North Carolina for the Roanoke River/Albemarle Sound. *Appendix 2 Table 7* summarizes the juvenile abundance index surveys. *Section 3.1.1* describes the requirements for the juvenile abundance index protocol.

Assessment of Spawning Stock Biomass (3.2)

The following areas are required to conduct an annual spawning stock survey: Hudson River, Delaware River, Chesapeake Bay and Albemarle Sound/Roanoke River.

4.0 Management Programs Elements/Implementation

Planning Horizon (4.1)

Beginning in the third year after the implementation of Amendment 6, any management measures established by the Management Board will be maintained by the states for three years, unless a target or threshold is violated. The series of triggers listed in *Section 4.1* are associated with the three-year planning horizon to prevent overfishing of the striped bass resource. Upon reaching any (or all) of these triggers, the Management Board is required to alter the management program to ensure the objectives of Amendment 6 are achieved.

Recreational Management Program (4.2)

Bag Limits (4.2.1)

For all jurisdictions, recreational fisheries will be constrained by a two fish creel limit and 28 inches minimum size limit, except for the striped bass recreational fisheries in the Chesapeake Bay and the Albemarle Sound/Roanoke River.

Through Management Program Equivalency (*Section 4.6.2*), Albemarle Sound and Chesapeake Bay were granted the ability to implement a lower minimum size limit if these jurisdictions also implemented a lower target fishing mortality rate as a penalty. The Albemarle Sound's recreational striped bass fishery will be constrained by a 20-inch minimum size limit with the ability to request a minimum size limit no smaller than 18 inches through conservation equivalency. The Chesapeake Bay jurisdictions will implement an 18-inch minimum size limit for the recreational striped bass fishery. As a penalty for employing a smaller minimum size limit, a target fishing mortality rate of 0.27 will be applied to the Chesapeake Bay and Albemarle Sound/Roanoke River striped bass fisheries. The creel limits for both jurisdictions will be based on maintaining a target fishing mortality rate of 0.27.

Commercial Management Program (4.3)

Size Limits (4.3.1)

In each jurisdiction, the commercial fishery is constrained by the same size limit regime established for the jurisdiction's recreational fishery. All areas will maintain a 28-inch minimum size limit for the commercial fishery, except the Chesapeake Bay, Albemarle Sound and the Delaware Bay shad gillnet fishery. The Delaware Bay shad gillnet fishery is restricted to a 20-inch minimum size limit.

Through Management Program Equivalency (*Section 4.6.2*), Albemarle Sound and Chesapeake Bay were granted the ability to implement a lower minimum size limit if these jurisdictions also implemented a lower target fishing mortality rate as a penalty. The Albemarle Sound's commercial striped bass fishery will be constrained by a 20-inch minimum size limit with the ability to request a minimum size limit no smaller than 18 inches through conservation equivalency. The Chesapeake Bay jurisdictions will implement an 18-inch minimum size limit for the commercial striped bass fishery. As a penalty for employing a smaller minimum size limit, a target fishing mortality rate of 0.27 will be applied to the Chesapeake Bay and Albemarle Sound striped bass fisheries.

Allocation (4.3.2)

Each jurisdiction will be allocated 100% of the base period (1972-1979) average coastal commercial landings, except for the areas listed in the following subsections. The allocation of the coastal commercial quota to each jurisdiction can be found in Table 4. The derivation of the coastal commercial quotas is described in greater detail in *Appendix 3*. Commercial quotas are allocated on a calendar year basis. In the event that a jurisdiction exceeds its allocation, the amount in excess of its annual quota will be deducted from the state's allowable quota in the following year.

Coastal Commercial Allocation (in pounds) based on the average commercial landings in the coastal commercial fishery for the base period 1972-1979.

State	Allocation (lbs.)
Maine	250
New Hampshire	5,750
Massachusetts	1,159,750
Rhode Island	243,625
Connecticut	23,750
New York	1,061,060
New Jersey	321,750
Delaware	193,447
Maryland	131,560
Virginia	184,853
North Carolina	480,480

Chesapeake Bay (4.2.2.1)

The Chesapeake Bay jurisdictions will manage its striped bass fisheries so as not to exceed a target fishing mortality rate of $F=0.27$ with an 18 inch size limit. The area to be managed under a target fishing mortality rate of 0.27 is described in *Section 2.4.2*.

Delaware (4.2.2.2)

Delaware's commercial quota will be maintained at the level allocated to the jurisdiction in 2002 (193,447 pounds).

Albemarle Sound (4.2.2.3)

The state of North Carolina will manage the commercial striped bass fishery in the Albemarle Sound so as not to exceed a target fishing mortality of $F=0.27$. The striped bass regulations outlined in Amendment 6 for the Albemarle-Roanoke stock will cover the area described in *Section 2.4.1*.

For-Hire Fisheries Management Measures (4.4)

This Amendment proposes that the for-hire fisheries will be constrained through the same management program that will be established for the recreational fisheries.

De minimis Fishery Guidelines (4.6.3)

States may apply for *de minimis* status if, for the last two years, their combined average commercial and recreational landings (by weight) constitute less than one percent (1%) of the coastwide commercial and recreational landings for the same two-year period. When petitioning for *de minimis* status, the state should also propose the type of exemption associated with *de minimis* status. In addition to determining if the state meets the criteria for *de minimis* status, the Board will evaluate the proposed exemption to be certain it does not compromise the goals and objectives of Amendment 6. The States may petition the Atlantic Striped Bass Management Board at any time for *de minimis* status, if their fishery falls below the threshold level. Once *de minimis* status is granted, designated states must submit annual reports to the Management Board justifying the continuance of *de minimis* status. States must include *de minimis* requests as part of their annual compliance reports

Recommendations to the Secretaries of Commerce (4.9)

The Atlantic striped bass coastal migratory stock was declared recovered in 1995 and has since expanded to record levels of abundance. The Atlantic States Marine Fisheries Commission believes that the measures contained in Amendment 6 are necessary to prevent the overfishing of the Atlantic striped bass resource while allowing growth in both the commercial and recreational fishery. The management of striped bass in the exclusive economic zone (EEZ) is the responsibility of the Secretary of Commerce through the National Marine Fisheries Service (NMFS). The Atlantic States Marine Fisheries Commission recommends that the federal government promulgate all necessary regulations to implement complementary measures to those contained in *Section 4.2* and *4.3* in order to allow the harvest of striped bass in the EEZ. Specifically, the Commission recommends constraining the harvest of striped bass in the EEZ to a minimum size limit of 28 inches. The states should have the ability to adopt more restrictive regulations for fishermen and vessels licensed in their states. In addition, Amendment 6 calls for the Atlantic Striped Bass Management Board to make additional changes to Amendment 6 via adaptive management, and as such changes are made, the Board will recommend additional measures to the Secretary.

On an annual basis the fishery impacts on the resource will be evaluated by the Technical Committee and reported to the Management Board so that it may make appropriate EEZ management recommendations to the Secretary of Commerce at the end of each FMP planning horizon. Under this option, a management program would need to be established for the EEZ to compliment the state management programs and to ensure that the Goals and Objectives of this Amendment will be met.

5.0 Compliance

Mandatory Compliance Elements For States (5.1)

A state will be determined to be out of compliance with the provisions of this amendment, according to the terms of Section Seven of the ISFMP Charter if:

- its regulatory and management programs to implement *Section 4* have not been approved by the Atlantic Striped Bass Management Board; or
- it fails to meet any schedule required by *Section 5.1.2*, or any addendum prepared under adaptive management (*Section 4.6*); or
- it has failed to implement a change to its program when determined necessary by the Atlantic Striped Bass Management Board; or
- it makes a change to its regulations required under *Section 4* or any addendum prepared under adaptive management (*Section 4.6*), without prior approval of the Atlantic Striped Bass Management Board.

Regulatory Requirements (5.1.1.1)

States shall begin to implement Amendment 6 after final approval by the Commission. Each state must submit its required striped bass regulatory program to the Commission through the ASMFC staff for approval by the Atlantic Striped Bass Management Board. During the period from submission and until the Management Board makes a decision on a state's program, a state may not adopt a less protective management program than contained in this

amendment or contained in current state law.

The following lists the specific compliance criteria that a state/jurisdiction must implement in order to be in compliance with Amendment 6 to the Atlantic Striped Bass Fishery Management Plan:

1. All jurisdictions will implement a bag limit for the recreational fishery that restricts individuals to a 2 fish creel limit and a 28-inch minimum size, except for the Chesapeake Bay and the Albemarle Sound/Roanoke River. The Chesapeake Bay will implement a minimum size of 18-inches and Albemarle Sound/Roanoke River management area will implement a 20-inch minimum size limit. The creel limit for the Chesapeake Bay and the Albemarle Sound are based on maintaining a target fishing mortality rate of 0.27.
2. Each jurisdiction will implement 28-inch minimum size limit for its commercial fishery, except the Chesapeake Bay, Albemarle Sound striped bass commercial fisheries, and the Delaware Bay shad gillnet fishery. The Chesapeake Bay jurisdictions will implement an 18-inch minimum size limit as part of the management program to constrain the fishing mortality rate below 0.27. The commercial striped bass fishery in the Albemarle Sound and the Delaware Bay shad gillnet fishery will employ a 20-inch minimum size limit for striped bass.
3. All jurisdictions, except for the Chesapeake Bay and the Albemarle Sound, must implement a commercial fishery management program that will cap the commercial harvest of striped bass at the level identified in *Section 4.3.2* and Table 4.
4. North Carolina (for the Albemarle Sound) and the Chesapeake Bay jurisdictions will implement management measures that will prevent the harvest of striped bass from exceeding a target fishing mortality rate of 0.27.

Once approved by the Atlantic Striped Bass Management Board, states are required to obtain prior approval from the Board of any changes to their management program for which a compliance requirement is in effect. Other measures must be reported to the Board, but may be implemented without prior Board approval. A state can request permission to implement an alternative to any mandatory compliance measure only if that state can show to the Board's satisfaction that its alternative proposal will have the same conservation value as the measure contained in this management plan or any addenda prepared under Adaptive Management (*Section 4.6*). States submitting alternative proposals must demonstrate that the proposed action will not contribute to overfishing of the resource. All changes in state plans must be submitted in writing to the Board and to the Commission either as part of the annual FMP Review process or the Annual Compliance Reports.

Monitoring Requirements (5.1.1.2)

All state programs must include the mandatory monitoring requirements contained in *Sections 3.1, 3.2, and 3.3* and in *Appendix 2* Tables 7, 8 and 9. States must submit proposals for all intended changes to required monitoring programs which may affect the quality of the data, or the ability of the program to fulfill the needs of the fishery management plan. In the event that a state realizes it will not be able to fulfill its fishery independent monitoring requirements, it should immediately notify the Commission in writing. The Commission will work with the state to develop a plan to secure funding or plan an alternative program to satisfy the needs outlined in Amendment 6. If the plan is not implemented 90 days after it has been adopted, the state will be found out of compliance with Amendment 6.

Compliance Schedule (5.1.2)

States must implement Amendment 6 to the Atlantic Striped Bass Management Plan according to the following schedule:

- May 1st, 2003:** States must submit programs to implement the Amendment 6 for approval by the Atlantic Striped Bass Management Board.
- January 1st, 2004:**

All states must implement Amendment 6 through their approved

management programs. States may begin implementing management programs prior to this deadline if approved by the Management Board.

If a jurisdiction can not implement their striped bass regulations by the January 1st deadline, the jurisdiction must propose an alternative implementation date in their proposal. Subsequently, the Management Board must approve the revised implementation date for the jurisdiction.

Additionally, states may begin to land the increased coastal commercial quota prior to the Management Board's approval of the state's implementation proposal, provided the state has at least a 28" minimum size limit and do not exceed the quota allocation listed in Table 4.

Reports on compliance must be submitted to ASMFC by each jurisdiction annually, no later than May 15th. Allowances for late submissions will be permitted to allow for the inclusion of MRFSS recreational or NMFS commercial landings of striped bass through the previous calendar year.

6.0 Management and Research Needs

Amendment 6 contains a list of management and research needs that should be addressed in the future in order to improve the current state of knowledge of the Atlantic striped bass biology, stock assessment, population dynamics, and habitat issues. By no means are these lists of research needs all-inclusive, and they will be reviewed and updated annually through the Commission's FMP review process.

7.0 Protected Species

The Marine Mammal Protection Act and the Endangered Species Act require the federal government to take certain actions when fishing activities pose potential threats to protected or endangered species. The majority of commercial striped bass landings come from gillnets, pound nets, and hook and line fisheries. At this time the interaction between commercial striped bass fishing and protected or endangered species is limited. However, the pending actions of some of the federal marine mammal take reduction teams may have an effect on some of the gear types used in the directed striped bass fishery.

ACKNOWLEDGEMENTS

Amendment 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass was developed under the supervision of the Atlantic States Marine Fisheries Commission's Atlantic Striped Bass Management Board. Members of the Plan Development Team include: Robert Beal (ASMFC, chair), Jason Dilday (North Carolina Division of Marine Fisheries), Peter Fricke (National Marine Fisheries Service), Megan Gamble (ASMFC), Douglas Grout (New Hampshire Fish and Game Department), Wilson Laney (United States Fish and Wildlife Service), Gary Shepherd (National Marine Fisheries Service), Ivar Strand (University of Maryland), Victor Vecchio (New York Department of Environmental Conservation).

Appreciation is also extended to the many fishermen, representatives of conservation groups, and members of the public who have written letters and attended public hearings to express their opinions and ideas.

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	xi
TABLE OF CONTENTS	xii
LIST OF TABLES.....	xvi
LIST OF FIGURES.....	xvii
LIST OF FIGURES.....	xvii
1.0 INTRODUCTION	1
1.1 BACKGROUND INFORMATION.....	1
1.1.1 Statement of the Problem	2
1.1.2 Benefits of Implementation	3
1.1.2.1 Social and Economic Benefits.....	3
1.1.2.2 Ecological Benefits	3
1.2 DESCRIPTION OF THE RESOURCE	4
1.2.1 Species Life History	4
1.2.2 Stock Assessment Summary.....	4
1.3 DESCRIPTION OF THE FISHERY	6
1.3.1 Commercial Fishery	6
1.3.2 Recreational Fishery.....	6
1.3.3 Subsistence Fishing.....	10
1.3.4 Non-Consumptive Factors.....	10
1.3.5 Interactions with Other Fisheries, Species, or Users	10
1.4 HABITAT CONSIDERATIONS.....	10
1.4.1 Habitat Important to the Stocks.....	10
1.4.1.1 Geographic Range	10
1.4.1.2 Migrational Patterns.....	10
1.4.2 Identification and Distribution of Habitat and Habitat Areas of Particular Concern.....	11
1.4.2.1 Spawning and Egg Habitat:	11
1.4.2.2 Larvae Habitat	12
1.4.2.3 Juvenile Habitat.....	12
1.4.2.4 Adult Habitat.....	13
1.4.3 Present Condition of Habitats and Habitat Areas of Particular Concern.....	13
1.4.3.1 Chemical, Biological, and Physical Threats to Striped Bass Habitat.....	13
1.4.4 Ecosystem Considerations.....	14
1.4.4.1 Habitat management as an element of ecosystem management.....	14
1.4.4.2 Multispecies management as an element of ecosystem management.....	15
1.5 IMPACTS OF THE FISHERY MANAGEMENT PROGRAMS.....	16
1.5.1 Biological Impacts.....	16
1.6 LOCATION OF TECHNICAL DOCUMENTATION FOR AMENDMENT 6.....	16
1.6.1 Review of Resource Life History and Biological Relationships	16
1.6.2 Stock Assessment Document	17
1.6.3 Law Enforcement Assessment Document	17
1.6.4 Habitat Background Document	17
2.0 GOALS AND OBJECTIVES.....	17
2.1 HISTORY AND PURPOSE OF THE PLAN	17
2.1.1 History of Prior Management Actions.....	17
2.1.2 Purpose and Need for Action	19
2.2 GOAL	19
2.3 OBJECTIVES	19

2.4 SPECIFICATION OF MANAGEMENT UNIT	20
2.4.1 Albemarle-Roanoke Management Area	20
2.4.2 Chesapeake Bay Management Area	20
2.5 DEFINITION OF OVERFISHING	20
2.5.1 Fishing Mortality Target & Threshold	21
2.5.2 Female Spawning Stock Biomass Target & Threshold	22
2.6 STOCK REBUILDING PROGRAM (If necessary).....	22
2.6.1 Stock Rebuilding Targets	22
2.6.2 Stock Rebuilding Schedules.....	22
2.6.3 Maintenance of Stock Structure	22
2.7 RESOURCE COMMUNITY ASPECTS.....	22
2.8 IMPLEMENTATION SCHEDULE	23
3.0 MONITORING PROGRAM SPECIFICATIONS/ELEMENTS.....	23
3.1 ASSESSMENT OF ANNUAL RECRUITMENT	23
3.1.1 Requirements for Measurement and Use of Juvenile Indices.....	24
3.1.2 Required Juvenile Abundance Index Surveys	24
3.2 ASSESSMENT OF SPAWNING STOCK BIOMASS.....	24
3.2.1 Requirements for Monitoring Spawning Stock Biomass.....	25
3.3 ASSESSMENT OF FISHING MORTALITY TARGET AND MEASUREMENT	25
3.3.1 Definition	25
3.3.2 Target and Threshold Fishing Mortality Rates.....	25
3.3.3 Requirements for Fishing Mortality Rate Calculations	25
3.3.4 Tagging Studies/Program	26
3.4 SUMMARY OF MONITORING PROGRAMS	27
3.4.1 Catch and Landings Information.....	27
3.4.1.1 Commercial Catch and Effort Data Collection Programs	27
3.4.1.2 Quota Monitoring	28
3.4.1.3 Recreational Catch and Effort Data Collection Programs	28
3.4.1.4 For-Hire Catch/Effort Data Collection Programs.....	28
3.4.1.4 Discard, Release and Protected Species Interactions Monitoring Program.....	28
3.4.2 Biological Information	28
3.4.3 Social and Economic Information	29
3.4.3.1 Commercial Fisheries	29
3.4.3.2 Recreational Fisheries	29
3.4.4 Observer Programs.....	29
3.4.4.1 At-Sea Observer Program.....	29
3.4.4.2 Vessel Registration System.....	29
3.5 STOCKING PROGRAM.....	29
3.6 BYCATCH REDUCTION PROGRAM	29
3.6.1 Bycatch Monitoring and Research Program.....	29
3.6.2 Bycatch Management Program	30
3.7 HABITAT PROGRAM	30
4.0 MANAGEMENT PROGRAM IMPLEMENTATION	30
4.2 RECREATIONAL FISHERIES MANAGEMENT MEASURES	31
4.2.1 Bag Limits	31
4.3 COMMERCIAL FISHERIES MANAGEMENT MEASURES	32
4.3.1 Size Limits	32
4.3.2 Allocation.....	32
4.3.2.1 Chesapeake Bay.....	32
4.3.2.2 Delaware.....	33
4.3.2.3 Albemarle Sound.....	33
4.3.3 Commercial Tagging (Identification).....	33
4.4 FOR-HIRE FISHERIES MANAGEMENT MEASURES	33
4.5 HABITAT CONSERVATION AND RESTORATION	33

4.5.1 Preservation of Existing Habitat.....	33
4.5.2 Habitat Restoration, Improvement, and Enhancement	34
4.5.3 Avoidance of Incompatible Activities.....	34
4.5.4 Fisheries Practices	34
4.6 ALTERNATIVE STATE MANAGEMENT REGIMES.....	35
4.6.1 General Procedures	35
4.6.2 Management Program Equivalency.....	35
4.6.3 <i>De minimis</i> Fishery Guidelines	35
4.7 ADAPTIVE MANAGEMENT	36
4.7.1 General Procedures	36
4.7.2 Measures Subject to Change	36
4.7 EMERGENCY PROCEDURES	37
4.8 MANAGEMENT INSTITUTIONS.....	37
4.8.1 Atlantic States Marine Fisheries Commission and ISFMP Policy Board.....	37
4.8.2 Atlantic Striped Bass Management Board.....	37
4.8.3 Atlantic Striped Bass Plan Development/Review Team	37
4.8.4 Atlantic Striped Bass Technical Committee.....	38
4.8.5 Atlantic Striped Bass Stock Assessment Subcommittee	38
4.8.6 Atlantic Striped Bass Tagging Subcommittee	38
4.8.7 Atlantic Striped Bass Advisory Panel	38
4.8.8 Federal Agencies.....	38
4.8.8.1 <i>Management of the Exclusive Economic Zone</i>	38
4.8.8.2 <i>Federal Agency Participation in the Management Process</i>	38
4.8.8.3 <i>Consultation with the Fishery Management Councils</i>	38
4.9 RECOMMENDATION TO THE SECRETARIES FOR COMPLEMENTARY ACTIONS IN FEDERAL JURISDICTIONS	39
5.0 COMPLIANCE.....	39
5.1 MANDATORY COMPLIANCE ELEMENTS FOR THE STATES	39
5.1.1 Mandatory Elements of State Programs	40
5.1.1.1 <i>Regulatory Requirements</i>	40
5.1.1.2 <i>Monitoring Requirements</i>	41
5.1.1.3 <i>Research Requirements</i>	41
5.1.1.4 <i>Law Enforcement Requirements</i>	41
5.1.2 Compliance Schedule.....	41
5.1.3 Compliance Report Content.....	42
5.2 PROCEDURES FOR DETERMINING NON-COMPLIANCE.....	42
5.3 RECOMMENDED (NON-MANDATORY) MANAGEMENT MEASURES	42
5.3.1 Recommended Use of Circle Hooks	42
5.3.2 Spawning Area Closures	43
5.3.3 Survey of Inland Recreational Fishermen	43
5.4 ANALYSIS OF ENFORCEABILITY OF MANAGEMENT MEASURES	43
6.0 MANAGEMENT AND RESEARCH NEEDS	43
6.1 STOCK ASSESSMENT AND POPULATION DYNAMICS.....	43
6.2 RESEARCH AND DATA NEEDS	44
6.2.1 Biological	44
7.0 PROTECTED SPECIES.....	44
7.1 Marine Mammal Protection Act (MMPA) Requirements	44
7.2 Endangered Species Act (ESA) Requirements.....	45
7.3 Protected Species with Potential Fishery Interactions.....	45
7.4 Protected Species Interactions with Existing Fisheries	45
7.5 Population Status Review of Relevant Protected Species	48
7.6 Existing and Proposed Federal Regulations/Actions Pertaining to Relevant ProtectedSpecies	48
7.7 Identification of Current Data Gaps and Research Needs.....	48

8.0 REFERENCES	49
9.0 APPENDICES.....	53
Appendix 1: Details of Striped Bass PDT reference point calculations - January 31, 2002	53
Appendix 2: Summary of Fishery Dependent and Independent Monitoring Programs.....	55
Appendix 3. The Derivation of the Coastal Commercial Quota Allocation.....	57
Appendix 4: Atlantic Striped Bass Commercial and Recreational Regulations by state.....	59
Appendix 5: Compliance Report OuTLIne	62

LIST OF TABLES

Table 1. Atlantic coast striped bass commercial harvest in numbers at age by state, 2000.	8
Table 2. Total Atlantic Coast striped bass recreational landings in numbers at age by state, 2000.	9
Table 3. Amendment 6 Control Rule	21
Table 4. Coastal Commercial Allocation (in pounds) based on the average commercial landings in the coastal fishery for the base period 1972-1979.....	32
Table 5. Distribution of observed trips in the striped bass gillnet fishery.....	46
Table 6. Fishery Description and marine mammal species and stock incidentally killed/injured.....	46
Table 7. Summary of juvenile abundance index surveys including the state/agency responsible for conducting each survey.....	55
Table 8. Summary of spawning stock biomass surveys including the state/agency responsible for conducting each survey.....	55
Table 9. Required Fishery-Dependent Monitoring Programs Under Amendment 6.....	56
Table 10. Amendment 6 Allocation of the Coastal Commercial Quota (in pounds).....	57
Table 11. Commercial Striped Bass Landings (in pounds) from 1972-1979 (ASMFC 1990).	58
Table 12. The Derivation of the Amendment 6 coastal commercial quotas (in pounds) for New York, Maryland, Delaware and North Carolina.....	58
Table 13. State Commercial Fishery Regulations for Atlantic Striped Bass.....	59
Table 14. State Recreational Fishery Regulations for Atlantic Striped Bass.	60

LIST OF FIGURES

Figure 1. Striped bass population abundance from the 2000 VPA results.	5
Figure 2. Striped bass fishing mortality from the 2000 VPA results and the current target F.	6
Figure 3. Atlantic striped bass commercial landings from 1990-2000 (pounds).....	7
Figure 4. Atlantic striped bass recreational landings from 1982-2000 (pounds).	7

1.0 INTRODUCTION

Implementation of Amendment 5 and associated addenda to the Atlantic States Marine Fisheries Commission (ASMFC) Interstate Fishery Management Plan for Atlantic Striped Bass has resulted in the restored status of the east coast migratory stocks of striped bass. The striped bass stocks were declared restored when the estimated relative spawning stock biomass reached and exceeded the average level observed during the period from 1960 through 1972. The Striped Bass Management Board (Board) is committed to maintaining and possibly improving the catch rates, age structure, recruitment, and biomass of the striped bass stocks. This Amendment contains the management program necessary to fulfil the Board's commitment. Additionally, this Amendment establishes a management program that eliminates or minimizes the need to make annual changes in management measures.

1.1 BACKGROUND INFORMATION

The striped bass (*Morone saxatilis*) has historically been one of the most important recreational and commercial fishes in the region from Maine through North Carolina. Annual commercial landings of striped bass along the East Coast from the early 1960's to the mid-1970's generally ranged between 8 and 14 million pounds. Recreational harvests, while not well documented during that period, may have equaled commercial landings in magnitude.

Steady declines in the abundance of striped bass, particularly in the Chesapeake Bay stock, began in the early 1970s, as evidenced by drastic declines in commercial harvest and other indicators of striped bass abundance and spawning success. This decline in the commercial harvest and the perceived decline in production of striped bass precipitated a number of legislative and administrative actions aimed at stopping and reversing the striped bass decline. An amendment to the Anadromous Fish Conservation Act, passed in 1979, created the Emergency Striped Bass Study (ESBS) program. The objective of the program was to conduct research to identify factors contributing to the striped bass decline, monitor the status of the stocks, and assess the economic consequences of the decline. The ASMFC prepared in 1981 a coastwide management plan for anadromous stocks of striped bass along the Atlantic Coast as part of its Interstate Fishery Management Program. The Plan specified recommended management measures, focusing particularly on size limits and spawning period closures, which the individual states could implement to enhance the status of East Coast striped bass stocks. Because ASMFC did not have a direct regulatory authority over individual state fisheries, implementation of the Plan's recommendations were at the discretion of the individual states.

The decline in stocks continued, and concerns were raised that the actions recommended in the 1981 plan were insufficient to protect the remaining striped bass populations. The result of those concerns was promulgation of a series of amendments to the Plan, stipulating more stringent limitations of striped bass exploitation. Extensive studies were initiated with both federal and state funding, aimed at identifying factors which were contributing to the striped bass population decline. During the same period, Congress passed legislation (PL 98-613, the Atlantic Striped Bass Conservation Act) that provides for federal imposition of a moratorium on striped bass harvest in those states that fail to implement and enforce management measures contained in the ASMFC Plan. State compliance with the plan's requirements was rarely interrupted after passage of the act, and some states were compelled to take more severe action. For, example, the State of Maryland closed its striped bass fishery entirely from 1985-1989. This deviation from traditional state regulatory control over striped bass fisheries has resulted in very detailed analysis and evaluation of all existing and proposed regulations by all parties potentially affected.

The heightened sensitivity to the technical basis for and potential impact of current regulations led to the determination that the information base provided by the 1981 ASMFC plan was badly outdated, due particularly to the extensive amount of striped bass research and study which has gone on since the plan

was written. In addition, the first 4 amendments to the plan and the factual information supporting those amendments were not documented in a single source available to any interested party. The factors led the ASMFC Striped Bass Management Board to conclude that a rewrite of the Plan was in order. Also, Amendment 3 to the Plan specified that 95% of the females would be protected until a predetermined trigger based on the Maryland juvenile index was attained. Amendment 4 was needed to address management of a transitional fishery once the trigger was reached. The culmination of that process was the adoption of Amendment 4 to the Plan by the Commission in October 1989. That amendment and its addenda presented management guidelines and specifications which guided interstate striped bass management up to the point of adoption of Amendment 5.

The ASMFC adopted Amendment 5 in March of 1995 establishing a harvest level of striped bass that maintained a spawning stock biomass able to produce self-sustaining spawning stocks in each designated spawning area. Amendment 5 also established an extensive list of monitoring and reporting requirements that the states/jurisdictions in the Plan were required to complete. Amendment 5 and the 5 associated addenda currently guide the interstate management of striped bass until Amendment 6 is adopted and implemented.

Following the implementation of Amendment 5, the ASMFC conducted a number of workshops and Board discussions attempting to define a “quality striped bass fishery”. The ASFMC had very limited success in developing a definition for quality fisheries. During the course of the workshops it became evident that there is a wide range of quality fishery definitions. The definitions varied between and within sectors of the fishery. Due to this lack of a definition for a quality fishery, the Management Board is developing Amendment 6 to maximize the overall benefits of the available striped bass resource.

1.1.1 Statement of the Problem

The coastal migratory stocks of Atlantic Striped Bass are currently managed under Addendum V to Amendment 5 to the Interstate Fishery Management Program for Atlantic Striped Bass. This current management program has achieved and maintained a restored striped bass biomass since early 1995. However, in recent years the Management Board is growing increasingly concerned with continued reliance on this management approach. There are a series of limitations to the current management program that the Management Board has committed to addressing in this Amendment.

Amendment 5 contains a series of recreational size and bag limits that the states are required to use to manage their recreational fisheries. Since the approval of Amendment 5, a number of the states have voluntarily implemented management programs that are more restrictive than those established in Amendment 5. The Board’s concern is that a relatively high exploitation level has been achieved in recent years even though some of the states with large striped bass fisheries did not “fully implement” the size and bag limits established in Amendment 5 (see *Section 1.2.2*). Specifically, some of the coastal states, such as New York and Massachusetts, limit their recreational fishermen to one fish, when Amendment 5 allows the coastal states to implement a two fish recreational bag limit. Also, the minimum size limits implemented in the Delaware Bay and Hudson River are more restrictive than required by Amendment 5. Further, the Chesapeake Bay states have not fully landed their model-generated quotas (for a description of the 2001 state regulations see *Appendix 4: Tables 7 and 8*). This situation presents the possibility that if all states had availed themselves of the opportunities in Amendment 5 the exploitation targets may be significantly exceeded.

Recent concerns over the perceived reduction in the availability or abundance of large striped bass in the coastal migratory population has led managers and fishermen to question whether the biological reference points in Amendment 5 are appropriate. The most recent stock assessment information (see *Section 1.2.2*) indicates that the female spawning stock biomass reached a peak in about 1996 and decreased by about 2

million pounds (about 5%) through 1999. One of the objectives of this Amendment is to increase the population of age 15 and older striped bass. The biological reference points for striped bass will vary based on the objectives of the management program. Due to the longevity of striped bass, the range of reference points necessary to achieve different objectives can be quite extensive.

Under Amendment 5, the Management Board is currently guided by the information on exploitation and stock structure that is developed annually through the virtual population analysis (VPA). The VPA generated exploitation rate is the primary measure that is used to guide management decisions. The use of this single factor has caused frequent and rapid changes to the management program in the last couple of years. Amendment 6 establishes a system that allows the Management Board to weigh a number of biological factors when making future management decisions. This approach is intended to result in less frequent but better-informed changes in the management program.

Since the implementation of Amendment 5, in 1995, the performance of different striped bass fisheries has been differentially impacted. One of the major differential impacts has been between the coastal commercial and recreational fisheries. Specifically, the landings from the coastal commercial fisheries have been held constant, due to constant quotas, while the landings from the coastal recreational fisheries have shown a steady increase, due to increased participation and increased availability of striped bass. The quotas established for the Chesapeake Bay have also increased since the implementation of Amendment 5, which has resulted in the restrictions on the commercial and recreational fisheries being relaxed. This Amendment must address the allocation of striped bass while considering the impacts on the different sectors of the fishery.

1.1.2 Benefits of Implementation

This Amendment is intended to manage exploitation to maintain an age structure that enhances spawning potential, implement a control rule to maintain stock size, implement a coastwide management approach to achieve the management objectives, define and foster quality recreational and for-hire fisheries, and economically viable commercial fisheries, and implement a long term management regime. This Amendment also provides a mechanism for monitoring the health of the striped bass population and a management regime and structure that is both flexible and broad based.

1.1.2.1 Social and Economic Benefits

Maintaining the stability of the overall Atlantic striped bass population will enhance the economic and social benefits attributable to this population in the ASMFC member states and the nation. Economic benefits would include use (e.g. consumptive use values related to commercial and recreational fishing, etc.) and non-use values (e.g. existence values, etc.) for current and future generations. The alternative state management (“conservation equivalency”) approach for striped bass will also be beneficial because it facilitates flexibility for state fishery management agencies to address socioeconomic considerations within their own states while achieving conservation targets. In addition, the identification of monitoring requirements and research needs important to considering the socioeconomic aspects of striped bass management at the state and regional level should increase the likelihood of implementing and/or continuing those monitoring and research tasks.

1.1.2.2 Ecological Benefits

Recovery of major migratory striped bass populations throughout the species range on the east coast (e.g., the Roanoke River, Chesapeake Bay, Delaware River and Hudson River populations) has restored the species to its historic normative position as an important component of coastal oceanic, estuarine and riverine ecosystems in the region. Striped bass play an important role in these ecosystems as predators on mobile planktonic invertebrates (in the larval stage; see Doroshev 1970, Markle and Grant 1970 and Bason 1971), on larger aquatic invertebrates and small fishes (in the juvenile stage; see Shapovalov 1936,

Ware 1971), and on schooling clupeid fishes (as adults; see Stevens 1958, Ware 1971, Manooch 1973). They serve as prey species for other sympatric piscivorous fish (Hill et al. 1989) as well as for other non-fish predators. Older age fish that spend much of their time in the ocean may play a role similar to that of other anadromous species, in that they transfer nutrients from the sea to the inland portions of rivers and estuaries, providing an energy subsidy and increasing production as a result. While some of these ecological functions may be fulfilled by other species during times when striped bass populations are depressed, early accounts of the species abundance suggests that the stock level presently being maintained by ASMFC management is much closer to normative levels.

1.2 DESCRIPTION OF THE RESOURCE

In recent years there has increasing concern over the health of striped bass. A series of on-going studies are being conducted by state management agencies and academic institutions to survey the health of striped bass throughout its range. The majority of the studies are focusing on two diseases that have appeared in the striped bass population. The first disease is Ulcerative Dermatitis Syndrome, which results in lesions on the body of striped bass. The second disease is Mycobacteriosis, which results in a variety of external and internal symptoms including skin lesions, stunted growth, emaciation, and internal nodules. Coupled with appearance of diseases in the population are concerns over the nutritional health of striped bass. There are also a number of studies being conducted to evaluate the availability of prey for striped bass and the relation of nutritional health to the prevalence of disease in the population. The Management Board and the Technical Committee will encourage collaboration between striped bass health research, monitoring and stock assessment efforts in order to project potential effects of health and nutritional problems on the striped bass stock. These projections could then be used to determine if the management program or assessment methodologies need to be altered in response to fish health or prey availability.

This brief resource description is summarized from the reports and papers referenced in *Section 1.6.1* and is intended only to provide the reader basic information necessary to understand how Atlantic Coast migratory striped bass relate to essential habitats, and the significance of the commercial and recreational striped bass fisheries to the economy and the culture of the Atlantic Coast.

1.2.1 Species Life History

The striped bass is a long-lived (at least up to 29 years of age, Merriman 1941, Secor et al. 1995) species which normally spends the majority of its adult life in the coastal estuaries or the ocean, migrating north and south seasonally, and ascending rivers to spawn in the spring. Mature female striped bass (age 4 and older) produce large quantities of eggs, which are fertilized by mature males (age 2 and older) as they are released into waters of riverine spawning areas. The fertilized eggs drift downstream with currents while developing, eventually hatching into larvae. The larvae and postlarvae begin feeding on microscopic animals during their downstream journey. After their arrival in the nursery areas, located in river deltas and the inland portions of the coastal sounds and estuaries, they mature into juveniles. They typically remain in coastal sound and estuaries for two to four years, and then migrate to the Atlantic Ocean. In the ocean, fish tend to move north during the summer and to the south during the winter. Important wintering grounds for the mixed stocks are located from offshore New Jersey as far south as Cape Hatteras, NC historically including the North Carolina sounds. With warming water temperatures in the spring, the mature adult fish migrate to the riverine spawning areas to complete their life cycle. In general, the Chesapeake Bay spawning areas produce the majority of coastal migratory striped bass.

1.2.2 Stock Assessment Summary

The conclusion of the striped bass stock assessment for 2001 is that the overall abundance of the stock is very high and the fishing mortality remains below the target fishing mortality (2001 F target = 0.31) (ASMFC 2001). The abundance increased steadily between 1982 and 1997 but has remained stable since

(See Figure 1). The VPA results indicate fishing mortality increased steadily until 1999 but decreased slightly in 2000. Average fishing mortality (F) for ages 4 to 13 in 2000 was equal to 0.28 (exploitation rate of 23%) (See Figure 2). The 1998 and 1999 average F for ages 4 to 13 was 0.32 in both years. Mean instantaneous fishing mortality (F) from the coastal mixed stock tagging programs for striped bass tagged at twenty-eight inches and greater in total length {believed to represent those fish fully recruited to the coastal fisheries} was 0.22 in 2000. There was a noticeable shift in the exploitation pattern in the 2000 fishery. In previous years, bass in older age classes experienced the highest proportion of mortality while the recent assessment showed a proportional shift to younger age groups. This was likely the result of changes in management policies that were enacted during 2000 intended to reduce mortality of older fish to levels approaching target F.

The fishing mortality estimate calculated using the catch at age model (VPA) and the tagging model produced comparable trends but different absolute values. Population abundance as of January 1, 2001 was 45.6 million fish and has remained stable since 1997.

Figure 1. Striped bass population abundance from the 2000 VPA results.

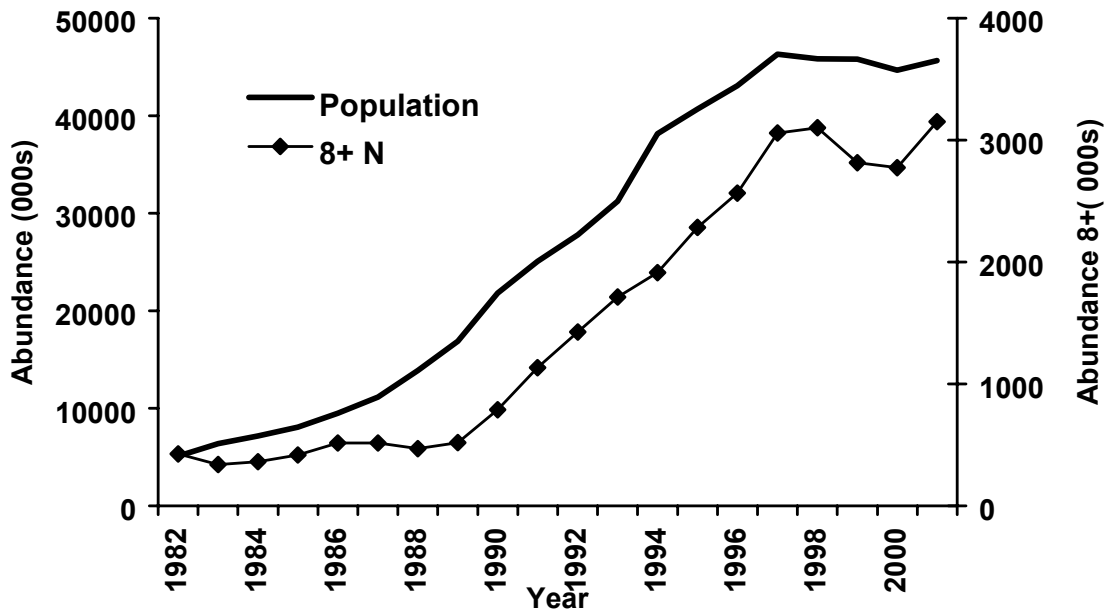
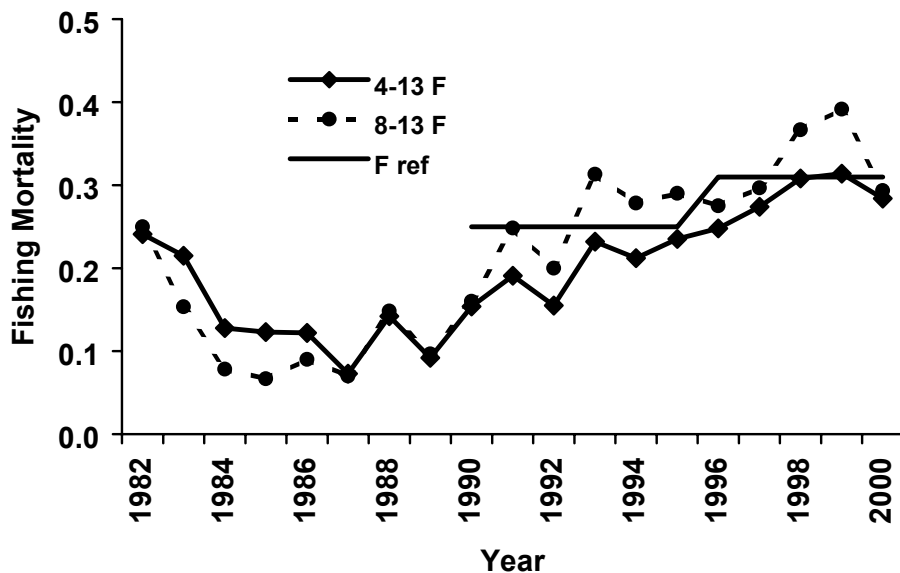


Figure 2. Striped bass fishing mortality from the 2000 VPA results and the current target F.



1.3 DESCRIPTION OF THE FISHERY

1.3.1 Commercial Fishery

The reported commercial harvest of striped bass peaked at almost 15 million pounds in 1973. (Note: there is evidence that the unreported commercial landings during the 1970's may have been equal in magnitude to the commercial landings). The harvest then declined by 77 percent to 3.5 million pounds in 1983. Since the reopening of the fishery in 1990, the landings have been allowed to slowly increase, peaking at nearly 6.6 million pounds in 2000 (Figure 3). The commercial landings have peaked at a lower level than the recreational landings, due to commercial landings being capped through quotas, while recreational landings are regulated by size/bag limits with no restriction on the total catch in most areas.

The predominant gear types in the commercial fisheries are gillnets, pound nets, and hook and line. Commercial fisheries operate in 8 of the 14 jurisdictions regulated by the Commission's FMP. Commercial fishing for striped bass is prohibited in New Jersey, Pennsylvania, Connecticut, New Hampshire, Maine and the District of Columbia. Massachusetts allows commercial fishing with hook and line gear only, while other areas allow net fisheries. The largest commercial landings are from Maryland, Virginia, Massachusetts, Potomac River Fisheries Commission, and New York (Table 1).

1.3.2 Recreational Fishery

Since 1979, the first year recreational harvest was surveyed by the Marine Recreational Fisheries Statistics Surveys (MRFSS), recreational harvest has ranged from 28 to 73 percent of the total harvest. However, the MRFSS estimates of harvest are not considered reliable until 1981. Recreational harvest in weight of striped bass dropped from a high of over 3.0 million pounds in 1983 to 0.7 million pounds in 1989. Following the re-opening of the fishery, the recreational harvest has grown from a low of 2.2 million pounds in 1990 to a high of 17.1 million pounds in 2000 (Figure 3).

In 2000, the states with the largest proportion of recreational harvest were Maryland, New Jersey, Virginia, New York, and Massachusetts. Recreational releases in 2000 were 16.3 million fish which resulted in a hooking mortality loss of an estimated 1.3 million fish. Discarded fish from Massachusetts and Maryland represent 63% of the total number of fish discarded (Table 2).

Figure 3. Atlantic striped bass commercial landings from 1990-2000 (pounds).

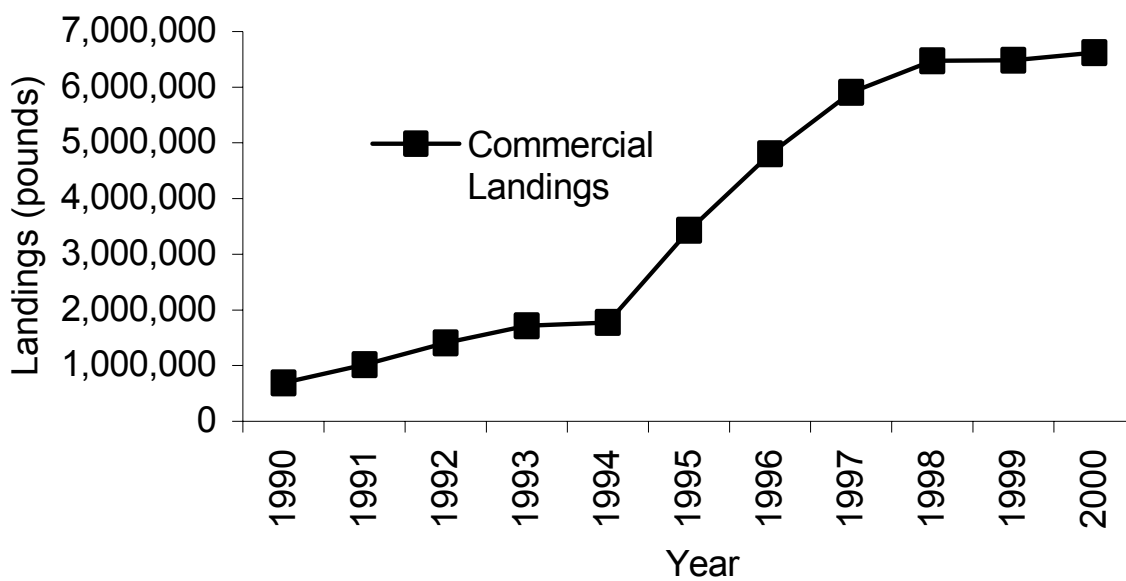


Figure 4. Atlantic striped bass recreational landings from 1982-2000 (pounds).

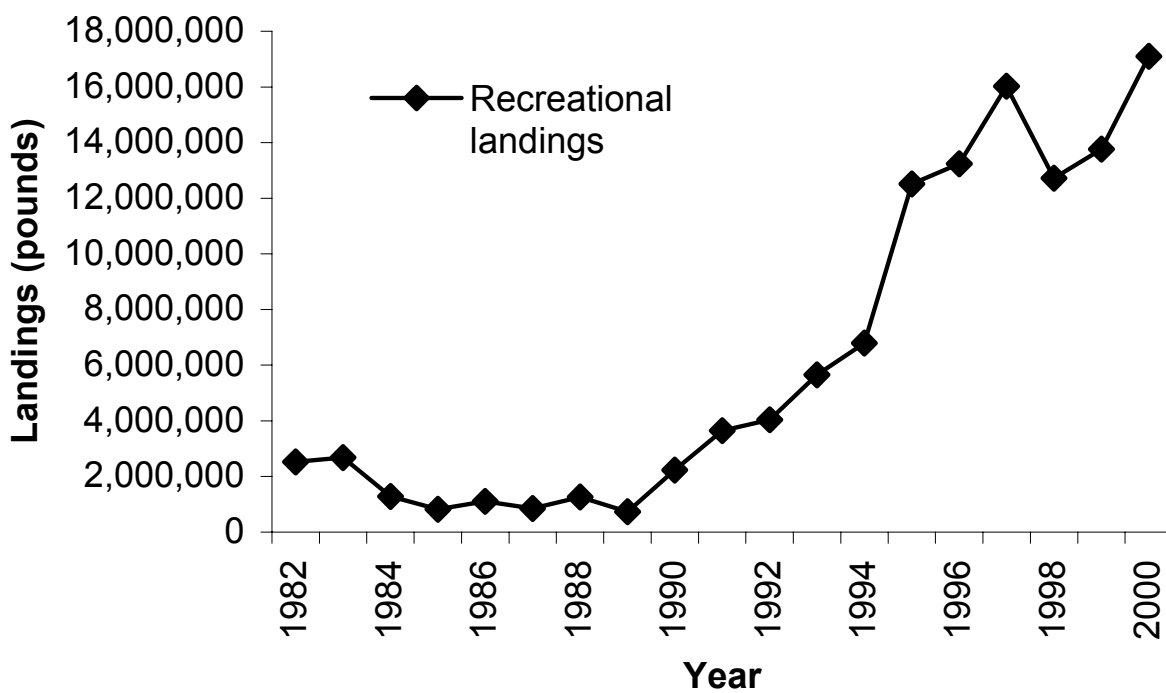


Table 1. Atlantic coast striped bass commercial harvest in numbers at age by state, 2000.

STATE	AGE															Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Maine																
Hampshire						23	1,230	4,501	12,048	11,643	6,193	2,796	1,064	489	268	40,256
Rhode Island				9	51	421	1,763	1,830	2,335	1,850	753	286	76	29	15	9,418
Connecticut																0
New York				1,212	6,129	8,824	29,232	6,601	1,684	606	539			67		54,894
Hudson																0
New Jersey																
			237	6,370	8,472	5,727	3,864	398	73		47					25,188
Maryland		42,471	165,210	218,116	125,929	40,507	20,150	5,661	6,892	1,587	784	307	113	51		627,777
PRFC		6,188	24,072	31,781	18,349	5,902	2,936	825	1,004	231	114	45	17	7		91,471
Virginia		1,495	20,351	44,117	24,194	47,116	21,606	16,630	19,396	4,879	984	717	698	44		202,227
North Carolina						48	699	1,566	2,072	1,758	265	72			0	6,480
Total		50,392	217,223	308,665	183,467	129,662	58,722	40,821	43,463	15,987	5,230	2,281	1,413	386		1,057,712

Table 2. Total Atlantic Coast striped bass recreational landings in numbers at age by state, 2000.

STATE	AGE															Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Maine	0	0	818	28,472	18,714	9,366	1,483	241	0	0	0	0	0	0	0	59,094
New Hampshire	0	0	0	0	0	30	292	535	1,232	1,065	572	238	85	63	16	4,128
Massachusetts	0	0	0	0	836	9,227	42,006	37,441	31,387	26,828	13,626	7,721	2,203	2,157	2,101	175,533
Rhode Island	0	351	5,609	4,231	3,076	12,029	21,763	11,581	9,959	9,445	5,779	2,944	1,189	398	484	88,838
Connecticut	0	0	101	4,778	7,619	8,081	17,968	3,995	2,195	2,219	1,654	1,060	536	291	124	50,620
New York	0	0	0	457	27,260	79,190	106,795	23,087	8,727	7,215	2,125	930	1,139	1,297	864	259,085
Hudson River																
New Jersey	0	0	2,603	21,789	85,877	93,898	88,165	56,432	23,494	10,483	3,536	2,510	1,561	64	39	390,450
Delaware	0	0	0	0	0	2,769	15,402	7,735	3,405	3,558	2,049	1,148	340	186	1,152	37,743
Pennsylvania																
Maryland	0	0	19,640	134,793	144,199	93,336	41,966	25,486	11,252	9,926	5,354	2,748	1,567	198	222	490,688
Dist. Columbia																
PRFC	0	0	1,260	8,650	9,254	5,988	2,645	1,600	686	604	313	155	97	0	22	31,275
Virginia	0	0	4,083	45,064	117,316	44,608	63,425	16,104	9,513	12,554	4,582	2,007	2,725	1,101	1,272	324,354
North Carolina	0	0	0	0	754	948	1,613	2,181	1,891	3,628	761	416	0	0	0	12,193
Total	0	351	34,115	248,234	414,904	359,469	403,524	186,418	103,742	87,525	40,351	21,877	11,441	5,754	6,297	1,924,001

1.3.3 Subsistence Fishing

Subsistence fishing is often described as, catching fish in order to provide necessary food. Often fishing can provide a less expensive alternative to purchasing food. The data describing the exact magnitude of subsistence fishing for striped bass does not exist. However, anecdotal information provides that fishermen, usually fishing from shore, do rely to some degree on fish they catch for food. It is unclear if any of these subsistence fishermen target striped bass, but it is likely that if a striped bass were caught it would be kept for food.

1.3.4 Non-Consumptive Factors

Hook and release fishing for striped bass is often considered a non-consumptive use of the striped bass resource. A large number of fishermen coastwide target striped bass with the intention of releasing all of the fish that are caught. This practice takes place during open and closed striped bass seasons.

Hook and release fishing does cause a certain amount of mortality in striped bass, which is currently estimated to be 8%. Therefore, the practice of hook and release fishing is not entirely non-consumptive and does have a rather substantial impact on the overall population of striped bass. In 2000, 16.3 million fish were released by recreational anglers and for stock assessment purposes it is assumed that 1.3 million (8%) of these fish eventually die due to the stress or wounds from hook and release fishing.

1.3.5 Interactions with Other Fisheries, Species, or Users

Studies are currently being conducted to evaluate the interactions between striped bass, bluefish, weakfish and prey species, such as Atlantic menhaden. ASMFC has contracted out for the development of a dynamic trophic model or a multispecies model to determine the effect of the abundance for a suite of species has on each other (see *Section 1.4.4.2 Multispecies management as an element of ecosystem management*). As the abundance of striped bass has increased striped bass are more frequently encountered as bycatch in other fisheries, but the data on discard and frequency of interactions is limited.

Amendment 6 creates a bycatch and discard mortality monitoring program to determine which fisheries are catching striped bass as bycatch and to evaluate the discard mortality associated with the gear used in these fisheries (see section 3.6). As more information becomes available, Atlantic States Marine Fisheries Commission intends to incorporate the data into the Atlantic striped bass management program.

1.4 HABITAT CONSIDERATIONS

1.4.1 Habitat Important to the Stocks

1.4.1.2 Geographic Range

Atlantic coastal migratory striped bass live along the eastern coast of North America from the St. Lawrence River in Canada to the Roanoke River and other tributaries of Albemarle Sound in North Carolina. Stocks which occupy coastal rivers from the Tar-Pamlico River in North Carolina south to the St. Johns River in Florida are believed primarily endemic and riverine and apparently do not presently undertake extensive Atlantic Ocean migrations as do stocks from the Roanoke River north (Richkus 1990). Striped bass are also naturally found in the Gulf of Mexico from the western coast of Florida to Louisiana (Musick et al. 1997). Striped bass were introduced to the Pacific Coast using transplants from the Atlantic Coast in 1879. Striped bass also were introduced into rivers, lakes, and reservoirs throughout the US, and to foreign countries such as Russia, France and Portugal (Hill, 1989).

1.4.1.2 Migrational Patterns

Migration of striped bass occurs at juvenile and adult stages. Migratory patterns for all life stages vary by location, but in general juveniles migrate downstream in summer and fall, while adults migrate upriver to spawn in spring, afterwards returning to the ocean and moving north along the coast in summer and fall, and south during the winter (Shepherd, 2000).

Juvenile striped bass migration varies by locations. In Virginia, the movement of young bass during their first summer was downstream into waters of higher salinity (Setzler et al. 1980). In the Hudson River, the bass began migrating in July. Migration was documented through an increase in the number of juvenile striped bass caught along the beaches and subsequent decline in the numbers in the channel areas after mid-July. Downstream migration continues through late summer, and by the fall, juveniles start to move offshore into Long Island Sound (Raney, 1952).

Juvenile striped bass rarely complete coastal migrations, but even though fish that are under the age of two are non-migratory, many do leave their birthplaces when they are two or more years old. From Cape Hatteras, North Carolina, to New England, fish may migrate in groups along the coast. They migrate north in the summer and south in the winter, however, the extent of the migration varies between sexes and populations (Hill, 1989). Larger bass, typically the females, tend to migrate farther distances. However, striped bass are not usually found more than 6 to 8 km offshore (Bain, 1982). These coastal migrations are not associated with spawning and usually begin in early spring, but this time period can be prolonged by the migration of bass that are spawning.

Some areas along the coast are used as wintering grounds for adult striped bass. The inshore zones between Cape Henry, Virginia, and Cape Lookout, North Carolina, serve as the wintering grounds for the migratory segment of the Atlantic coast striped bass population (Setzler et al. 1980). There are three groups of fish that are found in nearshore ocean waters of Virginia and North Carolina between the months of November and March, the wintering period. These three groups are bass from Albemarle and Pamlico Sounds, North Carolina, fish from the Chesapeake Bay, and large bass that spend the summer in New Jersey and north (Holland & Yelverton, 1973). Based on tagging studies conducted under the auspices of the Southeast Area Monitoring and Assessment Program (SEAMAP) each winter since 1988, striped bass wintering off Virginia and North Carolina range widely up and down the Atlantic Coast, at least as far north as Nova Scotia, and represent all major migratory stocks (U.S. Fish and Wildlife Service and National Marine Fisheries Service, unpublished data).

1.4.2 Identification and Distribution of Habitat and Habitat Areas of Particular Concern

1.4.2.1 Spawning and Egg Habitat:

Striped bass spawn in freshwater or nearly freshwater of Atlantic Coast rivers and estuaries. They spawn above the tide in mid-February in Florida but in the St. Lawrence River they spawn in June or July. The bass spawn in turbid areas as far upstream as 320 km from the tidal zone (Hill, 1989). The tributaries of the Chesapeake Bay are the primary spawning areas for striped bass, but other major areas include the Hudson River, Delaware Bay and the Roanoke River. Spawning is triggered by increased water temperature (Shepherd, 2000). Spawning occurs between 10 and 23 degrees Celsius, but optimal temperature for spawning is between 17 and 19 degrees Celsius. No spawning occurs below 13 degrees Celsius or above 22 degrees Celsius (Bain, 1982). Spawning is characterized by brief excursions to the surface by females surrounded by males, accompanied by much splashing. Females release eggs in the water. This is where fertilization occurs (Raney, 1952). Striped bass do not eat during spawning but they may eat heavily before and afterward. Spawning occurs in the late afternoon and early evening as well as late evening and early morning.

An egg is only viable for about an hour for fertilization. Following fertilization the fertilized eggs are spherical, non-adhesive, and semi-buoyant and will harden within one to two hours at 18 degrees Celsius (Hill, 1989). Eggs need adequate water velocity, from either current or tidal flow, to keep them suspended in the water column.

Survival of striped bass eggs is dependent on environmental conditions. A temperature range of 17-19 degrees Celsius is important for egg survival as well as for maintaining appropriate dissolved oxygen

levels (Bain, 1982). Reductions in dissolved oxygen levels decreased the probability of the eggs surviving, evidenced by the association of low dissolved oxygen levels and the absence of eggs and larvae in the Delaware River (Chittenden, 1971). Water currents are also an important factor for the survival of the eggs. Minimum water velocities of 30 cm/sec are needed to keep the eggs suspended, and fluctuations in the water velocity causes changes in the size of the oil globule surrounding the eggs (Albrecht, 1964). The oil gives the egg buoyancy, so if there is a slower water velocity, than the oil globule will be larger to give the egg more buoyancy. Without the buoyancy, the eggs sink to the bottom, where the sediment may smother them. It is possible for the eggs to hatch if the sediment is coarse and not sticky or muddy, but that survival is limited (Bayless, 1968). Eggs hatch from about 30 hours at 22 degrees Celsius to about 80 hours at 11 degrees Celsius (Hill, 1989).

1.4.2.2 Larvae Habitat

Yolk-sac larvae occur in open water but ultimately form schools and migrate inshore. The fin fold larvae and larger larvae have been collected in mid-channel areas near the bottom. Occurrence of fin fold larvae varied with the time of day and the depth of the river (Hill, 1989). Striped bass larvae usually stay in the open surface waters of estuaries.

There are three stages of larval development. These are: yolk-sac larvae, finfold larvae, and post-finfold larvae (Hill, 1989). The yolk-sac larvae occur right after hatching and usually lasts for about 3 to 9 days. They are 2.0 to 3.7 mm in length and contain an easily identified yolk-sac. The yolk-sac is the main source of energy for the striped bass during this time. Also during this time, the mouth has not been formed and the eyes are not pigmented (Mansueti, 1958). This phase is finished when the yolk-sac is absorbed. The finfold phase lasts for about 11 days and the striped bass reach a length of 12mm. The last phase is the post-finfold larvae which lasts for about 20 to 30 days and the larvae reach a length of 20 mm (Bain, 1982)

Survival of the larvae depends on three main factors: temperature, salinity, and dissolved oxygen. The optimal temperature for larvae is 18 to 21 degrees Celsius, but temperatures of 12 to 23 degrees Celsius have been and can be tolerated (Bain, 1982). Studies have shown that striped bass larvae do better and have a higher survival rate when they are in low salinity waters rather than freshwater (Setzler et al. 1980). The third factor, dissolved oxygen, is equally critical for larvae as it was for the egg stage. A reduction in the dissolved oxygen level, reduces the chances of survival of the larvae (Turner and Farley, 1971). Other factors that also influence the survival of striped bass larvae include turbulence. While at first it is necessary for the larvae to reside in turbulent waters to maintain position, the larvae quickly become motile and then are able to maintain position on their own (Doroshev, 1970).

Striped bass larvae feed only on mobile planktonic food. They pass the prey repeatedly in order to aim and rush at the prey successfully. It was found that the first successful feeding of a 9-day- old larvae occurred at concentrations of 15,000 *Cyclops* nauplii and copepodites per liter. By the 11th and 12th day, when the air bladder of the larvae is filled, the prey concentration may be reduced to 2,000 and 5,000 per liter. By days 40 to 50, the striped bass feed on plankton and epibenthos and by days 50 to 80, the food of the striped bass larvae includes mysid shrimp, gammarid amphipods, and fish up to 20 mm in length (Doroshev, 1970).

1.4.2.3 Juvenile Habitat

Juvenile striped bass are able to tolerate a wider range in environmental conditions. The habitat requirements for the juvenile fish are much like the habitat required for the adult bass. As the juvenile bass grow, they migrate to nearshore areas and then to higher salinity areas of an estuary (Raney, 1952). Juvenile striped bass prefer clean, sandy bottoms but they have been found in gravel beaches, rock bottoms, and soft mud areas. They are usually found in schools of as many as several thousand fish.

However, the location of the schools depends on the age of the fish (Hill, 1989).

Striped bass become juveniles at about 30 mm, when the fins are fully developed. At this point they resemble adults. Bluefish, weakfish, and other piscivores prey on striped bass (Buckel et al. 1999, Hartman and Brandt 1995b). The location of the striped bass determines the content of its diet. In the diet of the stock from the York River, where the salinity was higher than other places, the fish fed on mysids. In the James River, where the salinity was lower, the same sized fish fed mostly on insects. This and other evidence showed that there is a relationship between the diet of the stock of striped bass and the salinity of the habitat in which the fish live (Setzler et al. 1980).

1.4.2.4 Adult Habitat

Mature adult striped bass leave the estuaries and migrate along the coast where they have similar temperature and dissolved oxygen requirements as juvenile bass (Bain, 1982). Tagging studies indicate that fish from all stocks range widely along the Atlantic Coast, generally remaining in state (0-3 miles) waters but in some areas entering the Exclusive Economic Zone (EEZ; 3-200 miles). Studies are presently underway, using Geographic Information Systems (GIS) analysis, to characterize the habitats used by striped bass when they are in nearshore waters during the summer, fall and winter months. Schools of striped bass which winter off North Carolina use nearshore habitats from the surf zone to beyond the state-EEZ boundary line.

1.4.3 Present Condition of Habitats and Habitat Areas of Particular Concern

1.4.3.1 Chemical, Biological, and Physical Threats to Striped Bass Habitat

The main chemical threats to striped bass include residual chlorine, chlorinated hydrocarbons, and monocyclic aromatic hydrocarbons. Residual chlorine causes 50% mortality in eggs when the concentration is 0.22 ppm, and there is 50% mortality in larvae when the concentration is 0.20 ppm (Hill, 1989). However, there are now substitutes for chlorine that are being used because chlorine has been shown to cause many problems not only for aquatic biota but also for humans. One substitute is ozone. Even though ozone is a good substitute for chlorine, studies have shown that ozone also has a detrimental affect on striped bass eggs (Kosak-Channing and Helz, 1979). Eggs that were exposed to .05 mg/L and .10 mg/L of ozone in an estuarine environment were delayed in hatching, but 70% of the eggs hatched in the freshwater under the expected time frame. Chlorine tests were done as well, and they showed that chlorine was also a predominant factor for mortality. There was 6% mortality when they eggs were exposed to .06 mg/L of ozone for 12 hours, but there was 100% mortality when they were exposed for 36 hours. From these data, conclusions were that the effects of ozone and the effects of chlorine to striped bass eggs were about the same. It was also concluded that ozone can have more of an affect if discharged in fresh industrial or municipal treated wastewater located near striped bass spawning areas (Hall et al. 1981).

Other chemicals toxic to striped bass include benzene, copper, zinc, cadmium, mercury, and aluminum. Exposure to sublethal levels of benzene for 24 hours increases the respiratory rates of juveniles and if they are exposed for longer periods of time, reversible narcosis can occur (Brocksen & Bailey, 1973). When striped bass are exposed to 6.9 ppm of benzene for 24 hours there is 50% mortality in juveniles (Benville & Korn, 1977). Copper and zinc have an affect on yolk-sac larvae, but eggs are unaffected by these metals. Juveniles can develop lesions in their gill tissue as well as impaired respiration when they are exposed to cadmium and mercury. Low pH and high aluminum levels can severely alter epidermal microridge structures in larvae (Rulifson, 1986). A pH of 5-6.5 in the absence of contaminants causes significant mortality to 11-13 day old fish and a pH of 5.5 is toxic to 159-day-old fish (Buckler et al. 1987).

Change in temperature caused by industrial discharge is also a threat to striped bass. The heated water

discharged from many power plants can cause thermal shock in the fish with the severity depending on the life stage (Schubel et al. 1976). Eggs are more sensitive and more greatly subjected to mortality from the high temperatures. Larvae and juveniles decrease in their susceptibility as they grow older, and there is not usually higher than 50% mortality of thermal shock in adults (Hill, 1989).

Historically, the main physical threats to striped bass were channelization, creation of dams, and land reclamation. In coastal regions, 50% of the original estuarine areas important to striped bass have been lost to filling, road construction, or real estate development (Clark, 1967). In the South Atlantic region, dam construction restricts the upstream migration on the Roanoke, Tar, Neuse, and Pee Dee rivers (Baker, 1969). In recent years, efforts have been undertaken to restore access to historic striped bass spawning habitats through the provision of fishways or through removal of impediments to migration.

1.4.4 Ecosystem Considerations

Because of their complex life cycle, the ecosystem used by east coast migratory striped bass is vast and variable and the cooperative management approach embodied by ASMFC is necessary. Adult fish use nearshore oceanic waters within both state waters and the EEZ. Fish are present in mixed assemblages during the winter off New Jersey, Virginia and North Carolina and during the summer off New England and in Canadian waters. During spring spawning seasons, adult fish return to inland rivers, spawn in either fresh or tidal fresh waters and return to the sea. Eggs, larvae and juveniles develop in inland fresh or brackish waters and spend up to five or six years in estuaries before undertaking ocean migrations.

There are increasing attempts to incorporate ecosystem management into fisheries management. Ecosystem management can be interpreted as a.), the incorporation of the protection and enhancement of habitat features that contribute to fish production into the fishery management process and b.), the consideration of how the harvest of one species might impact other species in an ecosystem and incorporating that relationship in management decisions. The process of considering more than one species in fisheries management decisions is also called multispecies management.

1.4.4.1 Habitat management as an element of ecosystem management

Biologists, fisheries managers and fishermen all recognize that habitat quality is one of the keys to maintaining and improving fish stocks for harvest. Increasing demands for seafood and recreation requires that fisheries regulations provide for maximizing yield, minimizing bycatch and rebuilding and maintaining adequate spawning stocks. We cannot effectively manage fish by only issuing regulations governing sizes, seasons and catch limits. If the habitat that supports aquatic communities is degraded and unable to support fish life, or much reduced levels of fish, we cannot manage to provide adequate fish for food or recreational experiences.

At the federal level, the coastal Regional Fisheries Management Councils' fisheries management plans (FMPs) and Federal EEZ FMPs all now are required to define Essential Fish Habitat (EFH) and to be proactive in protecting it. A report to Congress by an Ecosystems Principles Advisory Panel, Ecosystem-Based Fishery Management, recommended that Regional Management Councils develop Fisheries Ecosystem Plans that recognizes the interrelationships between species and the habitat needs of the managed species. The ASMFC FMP process has habitat protection as one of its objectives. Each of the cooperating states of the ASMFC features habitat protection in its state waters as an element of fisheries management.

Fisheries managers recognize that society must provide for agriculture, housing, commerce and transportation for our present and growing population. However the natural system is most productive when all its parts are intact and healthy. Those components of an unaltered watershed, forested uplands, wetlands and tidal and nontidal streams, interact to produce those desired qualities of aesthetics, timber,

fish, animals and birds. As a result of man's activities, 40% of the forest cover and 56% of the wetlands in the Chesapeake watershed has been lost since Colonial times. Modern development patterns including suburban sprawl and increasing demands for highways are still converting forest and agricultural lands into permanently developed areas. Non-point source pollution from agriculture, suburban lawns and paved urban landscapes increases. Treated effluent from sewage treatment plants increases.

Habitat management, within the context of fisheries management, was traditionally practiced by manipulating physical structures in the water in order to benefit aquatic life, identifying point source pollution sources, removing stream blockages and planting streamside trees. These traditional practices are still being carried out and have demonstrated benefit. However, fisheries management must go beyond that and enlist and support those environmental protection and restoration activities outside the traditional scope of fish management. Fisheries management agencies are usually without the broad habitat preservation and habitat alteration permitting official responsibilities that is required for habitat management in modern times.

As natural features are reduced or removed, production of coastal fishery resources may be reduced. With the active involvement of fisheries management agencies in strategic planning, application of regulatory controls and permits that features protection of environmental quality and production of fish as objectives, human needs can be provided for and the impact on natural features minimized or eliminated. An ecosystem-based management approach would integrate the disparate management and planning activities of government into a framework that focuses on whole, ecologically functioning systems, not just the system's parts.

Within each of the coastal states, variously named departments of natural resources, environment, coastal resources or health have the primary responsibilities for programs that protect, promote and enhance environmental quality for state residents. Federal agencies such as the Environmental Protection Agency, Department of Commerce, Department of Interior and the Army Corps of Engineers have important permitting, research and advisory roles in environmental protection. It is the sum of the actions of these agencies, which seek to maintain a quality environment, with healthy land, water and air components, that one can define broadly as one component of ecosystem management. Fisheries management agencies must integrate their fish production objectives with activities of these habitat management agencies.

1.4.4.2 Multispecies management as an element of ecosystem management

Management of fisheries, under ASMFC, has been essentially the single species approach, which does not incorporate the linkages and dependencies among components of ecosystems that affect community structure. It has been this way out of necessity because of the overwhelming complexity of the linkages between habitat and productivity, predation, competition and the effects of fisheries. Analytical tools, e.g. mathematical models and computing power, are becoming more refined and can be applied to the problem. The benefits are that species can be better managed with increasing benefits to ecosystem stability, productivity of interacting species and optimized harvests to man. In the Atlantic coastal region, this process of defining how the jurisdictions will go about managing species in a multispecies context can be defined as an element of ecosystem management.

Multispecies interactions can be divided into two major topics, 1) technical interactions and 2) biological interactions. Technical interactions include a single fishing gear harvesting more than one species with one or several of the species being underutilized or unwanted. These interactions are typically dealt with in single species fishery management plans as bycatch and discard issues that affect yields, productivity, and profitability. Biological interactions are those in which trophic linkages exist between harvested species (Miller, *et al.* 1996). Harvest of prey species may affect growth and abundance of predators. Harvest of a predator species may affect abundance of a competing predator. Some harvested species

may have important roles in nutrient cycling or ecosystem function. Consideration of the food web relationships and ecological roles as part of the management strategy for many species is a developing trend in fisheries management.

The Atlantic States Marine Fisheries Commission is investigating the options for incorporating multispecies management decisions into its interstate management plans. Atlantic menhaden are an important commercially harvested species with a significant role as a forage fish for many species of predatory fish and is of particular importance to striped bass (Hartmann and Brandt 1995, Austin and Walter 1999). Menhaden may also have a role in nutrient transport between estuarine and oceanic waters.

ASMFC contracted for the development of a dynamic trophic model to evaluate: 1) the nature and magnitude of linkages among menhaden and its key predators; 2) the current utilization of menhaden: a) as a directed fishery, b) its role in the ecosystem (forage base), and c) sustainability of the stock; 3) optimal size or age composition of menhaden to balance its ecological role with the goals of a fishery; 4) any adjustments to the biological reference points from single species management when predation is included in multispecies modeling. The final model was delivered to ASMFC in 2002 (Garrison and Link 2002)

A subcommittee of the Menhaden Technical Committee reviewed the multispecies model (memo: Menhaden Multi-species Subcommittee Meeting, July 1-2, 2002). The Subcommittee approved the input data and model formulation. "Overall, the subcommittee agrees that results of this model will have utility in improving in improving fisheries management for Atlantic menhaden. The model is useful for evaluating the processes controlling menhaden mortality, particularly at early ages, resulting from predation and fishing mortality."

Although much further work remains to be done, the model also demonstrates that multispecies information can be incorporated into the assessment framework. The range of species for which ASMFC coordinates management and the complexity of the coastal environment offers many opportunities to develop conceptual and mechanistic models to explore ecosystem relationships and translate findings into management actions.

1.5 IMPACTS OF THE FISHERY MANAGEMENT PROGRAMS

1.5.1 Biological Impacts

Amendment 6 implements a fishing mortality target that is slightly more conservative than the previous management program for Atlantic striped bass. Prior to the Amendment 6 management program, striped bass did not have a biomass target and threshold. A biomass target and threshold provide the Management Board with an additional reference point to evaluate the status of the striped bass resource and management program. To safeguard against any negative impacts resulting from exceeding the F target or the spawning stock biomass threshold, Amendment 6 also implements a suite of triggers to initiate Board action to change the striped bass management program. Amendment 6 also restores the coastal commercial fishery to the average landings during 1972-1979, provided jurisdictions implement a 28-inch minimum size limit. The impact to the stock is expected to be negligible because it is a 4% increase to the total recreational and commercial striped bass landings at time when the stock has expanded to record levels of abundance.

1.6 LOCATION OF TECHNICAL DOCUMENTATION FOR AMENDMENT 6

1.6.1 Review of Resource Life History and Biological Relationships

A more comprehensive description of the Atlantic Coast migratory stock of striped bass are referred to the Source Document for Amendment 6 (ASMFC, in preparation) and to previous documents which have comprehensively reviewed this stock or its components (Bain and Bain 1982, Hill et al. 1989, ASMFC

1990, ASMFC 1998). Further information that summarizes recent research on Atlantic coastal migratory striped bass and the fisheries in each jurisdiction is provided in the biennial report to Congress and the Atlantic States Marine Fisheries Commission prepared by the US Departments of Commerce and Interior to comply with the Atlantic Striped Bass Conservation Act (P.L. 98-613; See USDOC and USDOJ, 1999).

1.6.2 Stock Assessment Document

The 2001 Stock Assessment Report for Atlantic Striped Bass (ASMFC 2001) was used to indicate the current condition of this stock. This document and its annual updates can be requested from the Atlantic States Marine Fisheries Commission.

1.6.3 Law Enforcement Assessment Document

ASMFC's Law Enforcement Committee has prepared a document entitled Guidelines for Resource Managers on the Enforceability of Fishery Management Measures (October 2000) which can be used to evaluate the effectiveness of enforcing fishery management measures.

1.6.4 Habitat Background Document

The ASMFC is undertaking preparation of a Habitat Background Document, which will address habitat requirements and use for all diadromous species under ASMFC management. The availability of this document will be publicized upon its completion.

2.0 GOALS AND OBJECTIVES

2.1 HISTORY AND PURPOSE OF THE PLAN

2.1.1 History of Prior Management Actions

Atlantic striped bass have been managed by the states under the Commission's fishery management plan and amendments since the early 1980s. Striped bass are currently managed under Addendum V to Amendment 5 to the FMP. Amendment 5 includes goals to prevent overfishing, maintain a sustainable spawning stock biomass, achieve equitable management measures among jurisdictions, and identify critical habitats.

Amendment 5 also includes management requirements for the commercial and recreational striped bass fisheries. The management requirements for the recreational fishery were a 20-inch minimum size in producer areas and 28-inch minimum size in coastal areas and a two-fish bag limit along the coast and in the Chesapeake Bay (Tables 3-5 Amendment 5). The Amendment includes tables that allow jurisdictions to alter these preferred measures, while maintaining the conservation goals of the Amendment.

The management approach constrains the commercial fishery by the same size limit regime established for recreational fisheries in producer and coastal areas. In addition, commercial fisheries in each state are limited to a flexible statewide quota. The state commercial quotas are based on state allocations during the period 1972-1979 (with the exception of the Chesapeake Bay which is calculated for recreational and commercial fisheries based on annual estimates of achieving a 23% exploitation rate ($F=0.28$) based on annual tag and return studies).

From 1995 through 1999, all of the states that are included in the Atlantic Striped Bass Management Plan implemented management programs that are consistent measures with Amendment 5. A number of states implemented modified management based on conservation equivalency. For instance, some of the producer areas implemented an 18-inch minimum size limit with a shortened fishing season, or in the case of the Chesapeake Bay states, a reduced catch quota. Other states voluntarily implemented management

programs that are more conservative than those required by the plan.

Based on the requirements in Amendment 5, the states developed striped bass management programs that changed annually from 1995 through 1998. In order to reduce the frequency of changes to the management program, the Management Board developed Addendum III to Amendment 5 to maintain the 1998 fishing regulations through 1999 and 2000.

During the two year period established in Addendum III (1999 and 2000), an addendum or amendment was to be developed to refine the management program detailed in Amendment 5. Amendment 5 includes interim reference points that may or may not be appropriate for the long-term management of striped bass. This addendum or amendment would have considered alternative reference points such as age-structure targets, biomass targets, and other fishing mortality targets. It was also intended to establish the virtual population analysis (VPA) as the basis for evaluating the management program (i.e., estimating fishing mortality and biomass).

However, Addendum III included a provision that if the 1998 fishing mortality estimate was significantly above the target, the states could take action in 1999 to reduce harvest to safe levels for the year 2000. The Management Board met on August 5, 1999 to review the results of the 1999 striped bass stock assessment. This assessment indicated that the 1998 fishing mortality on fully recruited (age 4 and older) striped bass exceeded the target and equaled the overfishing definition established in Amendment 5. Therefore, the Management Board decided that the management program for year 2000 needed to be altered to reduce fishing mortality.

In order to instruct the states on reducing the fishing mortality rate for year 2000, the Management Board developed Addendum IV. Under this Addendum, the states were required to implement management measures to reduce the fishing mortality on striped bass age 8 and older by 14%. The Addendum also included a provision to allow states that implemented management measures that were more conservative than the benchmarks in Amendment 5 to receive credit toward the required reduction. The states and jurisdictions are currently implementing these management programs.

The final provision contained in Addendum IV required states to implement management changes during 2001 to reduce fishing mortality to the targets contained in Amendment 5 unless Amendment 6 is completed prior to January 1, 2001. Therefore, initially the Amendment was scheduled for approval in October of 2000 in order to allow the states sufficient time to implement any necessary management changes by January 1, 2001.

The Management Board met again during the summer of 2000 to review the results of the 2000 striped bass stock assessment and determine what actions were necessary under Addendum IV. This assessment indicated that the 1998 and 1999 estimates of fishing mortality on striped bass essentially equaled the target contained in Amendment 5. Therefore, the Management Board determined that no additional reductions in fishing mortality were required, and further that the reductions taken in 2000 may not have been necessary. Based on this determination the Board developed Addendum V which requires the states/jurisdictions to implement management programs for 2001 and 2002 that are identical or equivalent (through conservation equivalency) to the measures that were in place during 1998/1999 or 2000. Under this addendum states also have the option of implementing management measures that satisfy the management benchmarks that were in place in 1998/1999 or 2000.

During the two-year implementation period of Addendum V, the Board committed to developing and approving Amendment 6 to the FMP.

2.1.2 Purpose and Need for Action

The purpose of this Amendment is to address long-term scientific, management, and policy issues relative to East Coast striped bass fisheries. This management program developed through this Amendment is intended to maximize the benefits of the currently strong striped bass population. This program is also intended to prevent overfishing as well as prevent the population from becoming overfished.

There are a series of limitations to the current management program that the Management Board has committed to addressing in this Amendment. These issues are more fully described in *Section 1.1.1*, and summarized below.

The issues to be addressed include:

1. There is growing concern that the management program contained in Amendment 5 may not be appropriate to prevent the exploitation target in Amendment 5 from being exceeded.
2. Over the past few years many members of the fishing community have raised the concern that the availability or abundance of large striped bass in the coastal migratory population has decreased.
3. The biological reference points in Amendment 5 only address the exploitation rate of striped bass, there is no direction provided to the managers with respect to target or threshold biomass levels.
4. The Amendment 5 management program had differential impacts on the recreational, commercial, coastal and producer area sectors of the striped bass fisheries.
5. The Board desired an expanded planning horizon for changes to the management program.

2.2 GOAL

The Goal of Amendment 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass is:

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

2.3 OBJECTIVES

In support of this goal, the following objectives are recommended for Amendment 6:

1. 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.
2. Manage fishing mortality to maintain an age structure that provides adequate spawning potential to sustain long-term abundance of striped bass populations.
3. 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.
4. Foster quality and economically viable recreational, for-hire, and commercial fisheries.
5. Maximize cost effectiveness of current information gathering and prioritize state obligations in order to minimize costs of monitoring and management.
6. Adopt a long-term management regime that minimizes or eliminates the need to make annual changes or modifications to management measures.
7. 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.

2.4 SPECIFICATION OF MANAGEMENT UNIT

The management unit includes all coastal migratory striped bass stocks on the East Coast of the United States, excluding the Exclusive Economic Zone (3-200 nautical miles offshore), which is managed separately by NOAA Fisheries. The coastal migratory striped bass stocks occur in the coastal and estuarine areas of all states and jurisdictions from Maine through North Carolina. Inclusion of these states in the management unit is also congressionally mandated in the Atlantic Striped Bass Conservation Act (PL 98-613).

2.4.1 Albemarle-Roanoke Management Area

However, the Albemarle-Roanoke stock is currently managed as a non-coastal migratory stock by the state of North Carolina under the auspices of ASFMC. The Albemarle-Roanoke management unit is defined as the striped bass inhabiting the Albemarle, Currituck, Croatan, and Roanoke Sounds and their tributaries, including the Roanoke River. The Virginia/North Carolina line bound these areas to the north and a line from Roanoke Marshes Point to the Eagle Nest Bay bounds the area to the south. The Bonner Bridge at Oregon Inlet defines the ocean boundary of the Albemarle-Roanoke management area.

There has been some debate in recent years whether to continue to include the Albemarle-Roanoke stock of striped bass in the management unit based on the argument that historical and recent tagging studies have suggested very limited migration of this stock into the Atlantic Coastal area. With such little mixing of Albemarle-Roanoke fish with other coastal migratory stocks, it is difficult to include the Albemarle-Roanoke stock in current coastwide stock assessment because methods used assume that fish from various stocks are equally mixed on the coast. On the other hand, fish tagged on the spawning grounds of Chesapeake Bay, Hudson River, and Delaware River have been recovered in the Albemarle Sound–Roanoke River area (USFWS tagging data). This indicates that coastal migratory fish from other stocks mix with Albemarle-Roanoke fish in North Carolina waters, which argues for having the stock remain within the management unit.

The Technical Committee will continue to monitor the contribution of the Albemarle-Roanoke stock to the coastal migratory population and make recommendations to the Management Board regarding future management.

2.4.2 Chesapeake Bay Management Area

The Chesapeake Bay management area is defined as the striped bass residing between the baseline from which the territorial sea is measured as it extends from Cape Henry to Cape Charles to the upstream boundary of the fall line. Unlike the Albemarle-Roanoke stock, the striped bass in the Chesapeake Bay are unquestionably part of the coastal migratory stock and is part of the coastal migratory striped bass management unit. Amendment 6 implements a separate management program for the Chesapeake Bay due to the size availability of striped bass in this area.

2.5 DEFINITION OF OVERFISHING

A common approach in fisheries management for evaluating the need for management action as determined by stock status is through the use of a control rule. A control rule is based on the level of : 1) exploitation/fishing mortality rate (F) and 2) stock biomass. Overfishing is defined relative to the rate of removals from the population as determined by the fishing mortality on the stock. The level of spawning stock biomass in a stock as the result of fishing mortality is the basis for determining if a stock has become overfished. A biomass target or threshold determines the condition of the stock whereas the mortality rate determines how fast the population is moving toward achieving the appropriate level of biomass.

The intent of this Amendment is to establish a control rule to accurately categorize the status of the stock

by considering both fishing mortality and spawning stock biomass, simultaneously. The management program developed through this Amendment will be designed to achieve the target F and spawning stock biomass levels. Also, the use of fishing mortality and spawning stock biomass targets and thresholds will provide managers with a series of factors to use when evaluating the status of the stock. *Section 4.0* provides a series of potential triggers associated with the targets and thresholds that will be established through this Amendment. These triggers are designed to direct the managers if fishing mortality exceeds the target or threshold, or the spawning stock biomass falls below the target or threshold. Table 3 summarizes the control rule implemented through Amendment 6.

Appendix 1 describes the details of the Technical Committee’s reference point calculations that were incorporated into this document. It was the Technical Committee’s intent to evaluate the available analyses and establish the range of options that were included in public comment draft of this document.

2.5.1 Fishing Mortality Target & Threshold

The fishing mortality (F) rate, chosen as the biological reference point, represents the fishing pressure on striped bass fully recruited to the fishery. Consequently, the annual estimate of fishing mortality calculated from the VPA and tagging data should also represent fully recruited ages in order to produce the correct comparison. Since the exploitation pattern may change resulting from regulatory adjustments, it is possible that the age at full recruitment may differ from the age 4 currently used. The threshold and targets listed below are associated with the current exploitation pattern (i.e. size limits), the exact values will change with the implementation of a different size limit regime.

The striped bass fishing mortality threshold under Amendment 6 is the fishing mortality rate that allows for maximum sustainable yield (F_{msy}), currently estimated to be 0.41. Amendment 6 also establishes a fishing mortality target of $F=0.30$, which equates to an exploitation rate of 24%. This target ($F=0.30$) provides a higher long-term yield from the fishery and adequate protection to ensure that the striped bass population is not reduced to a level where the spawning potential is adversely affected.

There are two areas where the fishing mortality target is lower than the rest of the East Coast, the Chesapeake Bay and the Albemarle Sound/Roanoke River. To compensate for the smaller minimum size limit granted to both of these areas, the target fishing mortality is set a $F=0.27$.

The Management Board will evaluate both sets of reference points before proposing changes to or additional management measures to this amendment. In general, if the current F exceeds the threshold level of 0.41, the Board should take steps to reduce the fishing mortality rate to the target level. When the fishing mortality threshold ($F=0.41$) is exceeded, overfishing of the striped bass population is occurring. If F exceeds the target, but is below the threshold, the Board should consider steps to reduce F to the target level. If the current F is below the target F, then no action would be necessary to reduce F.

Table 3. Amendment 6 Control Rule

	FISHING MORTALITY RATE	FEMALE SPAWNING STOCK BIOMASS
TARGET	$F = 0.30^*$	38.6 million pounds
THRESHOLD	$F = 0.41$	30.9 million pounds

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

2.5.2 Female Spawning Stock Biomass Target & Threshold

Amendment 6 establishes a biomass target and threshold based on the sexually mature females in the striped bass population that is sexually mature. The striped bass population was declared restored in 1995, at which time the female spawning stock biomass was estimated to be 30.7 million pounds (13,956 metric tons). Using a threshold only slightly greater than the restoration level, Amendment 6 sets the female spawning stock biomass threshold at 30.9 million pounds (14,000 mt). The female spawning stock biomass target is set at 125% of the spawning stock biomass threshold. This equates to a target of 38.6 million pounds (17,500 metric tons).

The striped bass population will be considered overfished when the female spawning stock biomass falls below the threshold spawning stock biomass level (30.9 million pounds). If the female SSB falls below its threshold level, the Board would have to take action that would allow the stock to rebuild. If SSB is above the threshold, but below the target, no action would be required. The use of the word “target” is not intended to imply that the management program will try to limit the population from expanding beyond the target level. In other words, when the population is above the target it is not the intent to reduce the population back to target levels.

2.6 STOCK REBUILDING PROGRAM (IF NECESSARY)

The stock of striped bass is considered restored and is currently **not considered** overfished. However, should the stock be declared overfished or depleted, the Management Board will take action to recover the stock to the desired target level (as defined in *Section 2.5*). Should it be determined that overfishing is occurring (F greater than threshold defined in *Section 2.5*) the Management Board will take action to reduce the fishing mortality rate on the stock to at least the desired target level. If fishing mortality exceeds the threshold **and** biomass is below the threshold level, the Management Board must act to reduce fishing mortality to the desired target level or lower.

2.6.1 Stock Rebuilding Targets

Should the Atlantic striped bass population be overfished at anytime in the future, it is the intent under Amendment 6 to rebuild the female spawning stock biomass to the target level (38.6 million pounds) within the timeframe established in *Section 2.6.2*.

2.6.2 Stock Rebuilding Schedules

If at anytime the Atlantic striped bass population is declared overfished and rebuilding needs to occur, the Management Board will determine the rebuilding schedule at that time. The only limitation imposed under Amendment 6 is that the rebuilding schedule is not to exceed 10 years.

2.6.3 Maintenance of Stock Structure

Using the annual outputs from the VPA model, the Technical Committee will monitor the status of the age structure in the striped bass population. If the technical committee identifies a persistent change in the age structure that could jeopardize recruitment then the Management Board could modify the exploitation pattern to increase survival of target age classes. In addition, if an individual stock exceeds threshold limits for biomass or exploitation the Board should consider management changes for that stock.

2.7 RESOURCE COMMUNITY ASPECTS

Due to the unique and important role that striped bass play in the ecosystem, management considerations should be broader than just traditional fisheries management. Striped bass serve not only as an important recreational and prey species for fishermen, but also as prey for other aquatic and avian predators (various predators at each life stage), as well as predators themselves on other species which form the basis of

significant fisheries such as those for Atlantic menhaden, American lobster, weakfish, blue crabs, and others.

Concerns have been raised recently regarding the health of striped bass, relative to the impact caused by a recovered stock and the decrease in important prey species, such as Atlantic menhaden. These concerns have been voiced primarily in the Chesapeake Bay region and have led to recent studies of the interactions between menhaden abundance and the health of striped bass, bluefish and weakfish (Hartman and Brandt 1995a, 1995b; Austin and Walter 1998).

The present development of a multispecies model (Atlantic Menhaden Plan Development Team 2001) by the Commission to address Atlantic menhaden management needs will also benefit striped bass. The Commission's modeling will examine the interaction between various levels of abundance of menhaden and three of its main fish predators: striped bass, bluefish and weakfish. Once complete, the model should allow the Technical Committee to estimate how much menhaden should be allocated for predator-prey interactions, including an allocation for striped bass. Actual data will be evaluated and modeled before any real estimates of how much annual production of menhaden could be allocated for its various ecological roles. Once these quantities are determined, an estimate of how much production is available for striped bass can be justified. The model, with additional refinements, will also allow managers to evaluate the effect of changing menhaden abundance on the striped bass population.

2.8 IMPLEMENTATION SCHEDULE

Amendment 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass was approved by the Atlantic States Marine Fisheries Commission on February 26th, 2003. States are required to submit implementation proposals by May 1st, 2003. State proposals will be reviewed for approval during the June 2003 ASMFC meeting week. States are required to implement the provisions of Amendment 6 by September 1st, 2003, unless an specific alternative date is indicated in the jurisdiction's implementation proposal. States may begin to use the increase in the coastal commercial quota prior to the Management Board's approval of the implementation proposal, provided the state has at least a 28" minimum size limit in the commercial fishery and the state's coastal commercial landings does not exceed the quota listed in Table 4 *Section 4.3.2*

3.0 MONITORING PROGRAM SPECIFICATIONS/ELEMENTS

This Amendment encourages all state fishery management agencies to pursue full implementation of the Atlantic Coastal Cooperative Statistics Program (ACCSP) across all fisheries, which will meet the monitoring and reporting requirements of this Amendment. Until such time as the ACCSP is fully implemented, this Amendment encourages state fishery management agencies to implement data collection programs consistent with the ACCSP standards (please refer to the ACCSP Program Design document for specific reporting requirements and standards). The ACCSP partners are the 15 Atlantic coastal states (Maine - Florida), the District of Columbia, the Potomac River Fisheries Commission, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the three fishery management Councils, and the Atlantic States Marine Fisheries Commission. Participation by program partners in the ACCSP does not relieve states from their responsibilities in collating and submitting harvest/monitoring reports to the Commission as may be required under this Amendment.

3.1 ASSESSMENT OF ANNUAL RECRUITMENT

Annual juvenile recruitment (appearance of juveniles in the ecosystem) of striped bass which comprise the Atlantic Coast migratory population is measured in order to provide an indication of future stock abundance. When low numbers of juvenile fish (age 0) are produced in a given year, recreational and

commercial catches from that yearclass may be lower four years later when surviving fish become available to the fisheries. Recruitment is measured by sampling current year juvenile fish abundance in nursery areas. Currently, these juvenile abundance indices are determined annually for stocks in the Kennebec River, Hudson River, Delaware River, Chesapeake Bay and its tributaries, and Roanoke River/Albemarle Sound. Since there is a time delay of several years between the measurement of recruitment and initial harvest of those fish, managers have ample time to protect yearclasses that have not yet been exploited.

Under Amendment 6, the juvenile index values serve as input to the virtual population analysis (VPA), which is used to estimate future population levels. These juvenile indices can also serve as another indicator of the status, and future status, of the striped bass population.

3.1.1 Requirements for Measurement and Use of Juvenile Indices

1. The sampling protocol (stations, sampling intensity and gear type) shall be consistent throughout the period for which the index is to be used. For new indices, the following information will be required: details of the sampling design of the study yielding the data used to develop the index; a description of the analyses performed; and a presentation of the results of those analyses. The Technical Committee shall review any such submittal and either accept or reject it. If rejected, the Committee will provide a written explanation to the sponsor explaining the reasons for rejection.
2. In order to be validated, the index should exhibit a significant ($p < 0.05$) positive correlation to either the magnitude of future landings (lagged 2-7 years) from the stock, or to the relative abundance of the same yearclass later in life (i.e., relative abundance of juveniles versus the relative abundance of yearling fish of the same yearclass).
3. The Management Board may require juvenile abundance surveys in additional river systems to evaluate the level of striped bass productivity.
4. The Technical Committee shall annually examine trends in all required Juvenile Abundance Index surveys. If any JAI shows recruitment failure (i.e., JAI is lower than 75% of all other values in the dataset) for three consecutive years, then appropriate action should be recommended to the Management Board. The Management Board shall be the final arbiter in all management decisions.

3.1.2 Required Juvenile Abundance Index Surveys

The following states are currently required to conduct juvenile abundance index surveys on an annual basis: Maine for the Kennebec River; New York for the Hudson River; New Jersey for the Delaware River; Maryland for the Chesapeake Bay tributaries; Virginia for Chesapeake Bay tributaries; and North Carolina for the Roanoke River/Albemarle Sound. Appendix 2 Table 7 summarizes the juvenile abundance index surveys.

3.2 ASSESSMENT OF SPAWNING STOCK BIOMASS

In recent years, the Striped Bass Technical Committee and Stock Assessment Sub-committee have refined the VPA so that it will provide a reliable estimate of the fishing mortality rate on each yearclass of striped bass. The Technical Committee does note that there is some uncertainty associated with the age specific estimates of fishing mortality due to ageing errors and uncertainty in the commercial discard estimates. The VPA also provides an estimate of the spawning stock biomass as well as total biomass. Since the VPA must be tuned with fishery-independent data, it is critical that each of the following areas are surveyed annually for spawning stock assessment: Hudson River, Delaware River, Chesapeake Bay, and Albemarle Sound/Roanoke River.

3.2.1 Requirements for Monitoring Spawning Stock Biomass

1. The Technical Committee shall examine output from the VPA model annually, and use those estimates to evaluate the status of the striped bass stock relative to the female spawning stock biomass targets and thresholds in this Amendment.
2. Jurisdictions bordering the Hudson River, Delaware River, Chesapeake Bay, and Albemarle Sound/Roanoke River (currently New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina) shall be responsible for conducting spawning stock assessment surveys in those river systems. Accepted studies for fulfilling this requirement currently include: **New York:** Hudson River haul seine survey and shad by-catch analysis; **Maryland:** Gill net surveys; **Virginia:** spring pound net survey; **North Carolina:** spring electroshocking survey of spawning stock; **Pennsylvania-New Jersey-Delaware:** Delaware River electroshocking/gill net survey (See Appendix 2 Table 7). Any changes to the survey methodology must be reviewed by the Technical Committee and approved by the Management Board prior to implementation.
3. The Technical Committee shall annually compare trends in relative spawning stock size derived from fishery-independent spawning stock surveys and the VPA results. If these estimates differ significantly, then the Technical Committee shall examine all available information to determine if modifying the fishery regulations is warranted.

3.3 ASSESSMENT OF FISHING MORTALITY TARGET AND MEASUREMENT

3.3.1 Definition

Total mortality of wild striped bass has essentially two components: natural mortality (M) and fishing mortality (F). Fishing Mortality is the rate at which fish are removed from the population by human activities. These activities include both intentional legal harvest (F_{dir} or directed fishing mortality), and background or non-harvest mortality which includes poaching, bycatch, and hook and release mortality. Background mortality and directed mortality together equal total fishing mortality.

3.3.2 Target and Threshold Fishing Mortality Rates

The target fishing mortality is defined as $F=0.30$ and the threshold fishing mortality is $F=0.41$. See *Section 2.5.1* for a full description of the target and threshold fishing mortality rates included in this amendment.

3.3.3 Requirements for Fishing Mortality Rate Calculations

1. Catch composition information will be gathered by those states/jurisdictions with commercial fisheries (currently Massachusetts, Rhode Island, New York, Delaware, Maryland, Virginia, Potomac River Fisheries Commission, and North Carolina) and by those states with significant recreational fisheries (Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, Virginia, and the Potomac River Fisheries Commission). Samples shall be representative of location and seasonal distribution of catch, and appropriate biological data shall be collected.
2. Representative catch and effort data will be gathered by those states with significant commercial fisheries (currently Massachusetts, New York, Delaware, Maryland, Virginia, and the Potomac River Fisheries Commission) and by those agencies monitoring recreational fisheries (National Marine Fisheries Service, Rhode Island, Connecticut, New York, New Jersey, Maryland, Virginia, and the Potomac River Fisheries Commission).
3. Striped bass tagging programs currently executed by the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Southeastern Monitoring and Assessment Program, Massachusetts Division of Marine Fisheries, New York Department of Environmental Conservation, New Jersey Department

of Environmental Protection, Maryland Department of Natural Resources, Virginia Marine Resources Commission, and North Carolina Division of Marine Fisheries will be continued to generate estimates of migration and mortality rates.

4. Except as noted below, member states will implement appropriate regulations to ensure that the fishing mortality targets and thresholds are not exceeded.
5. Each year the Technical Committee shall develop an estimate of fishing mortality for comparison with the target and threshold established in this amendment. The Technical Committee shall use the VPA output, the results of the tagging study analyses and additional analyses (ASPIC, etc) if available to develop an annual estimate of fishing mortality.

3.3.4 Tagging Studies/Program

Tagging of fish with individually-numbered tags is a proven technique for determining movement and migration routes and rates, growth rates and patterns, estimation of mortality/survival, estimation of population size (if assumptions are met), stock identification and determination of movement/migration corridors and habitat use. The use of more sophisticated electronic tags can provide additional habitat information such as temperature (of both water and fish body), depth and specific location. The species' Advisory Panel, Stock Assessment Subcommittee, Technical Committee and/or Management Board (for ASMFC), Advisory Panel or Committee (for Fishery Management Councils) and working groups for International Fisheries Commissions may decide to recommend that tagging studies be performed. Alternatively, such studies may be initiated independently by one or more of the partners in the fishery management process.

Fish tagging is a technical activity which is usually conducted by scientific personnel; however a number of other entities have become involved in or conducted their own tagging studies. Should a new tagging study be proposed for striped bass, a number of considerations should be addressed. Any proposed study must have stated objectives, which directly relate to scientific or management purposes. A second important consideration is whether a species can be tagged with minimal mortality, as the utility of study data will be highly questionable if handling/tagging mortality is high. The ideal tag should be one which has a unique alpha-numeric identifier and organization contact information, is easily implanted, has a high rate of retention, is readily visible to potential recoverers without increasing an animal's susceptibility to predation, and remains permanently legible, or in the case of internally-embedded coded wire (CWT) or passive integrated transponder (PIT) tags, is easily and consistently detectable. The implantation location and type of CWT or PIT tags should be fully coordinated with other investigators tagging the same species. Tag number sequences and colors of externally visible tags should be coordinated with other investigators conducting similar studies, via the Interstate Tagging Committee, to ensure that duplication does not occur, and contact information for recoveries and returns should be clearly imprinted on the tag. Tagging should be conducted in a consistent manner by personnel who have been properly trained. Consideration should be given to requiring certification of both professional staff and volunteer angler taggers by the sponsoring organization, in order to increase both the efficiency of tagging and the survival of tagged fish through minimization of handling/tagging mortality. The ASMFC Interstate Tagging Committee is in the process of developing a certification for tagging programs, for which sponsoring organizations may wish to apply.

Tagging studies should be highly publicized among the fishing public to maximize the rate of return from both commercial and recreational sectors. In most cases, efforts should be undertaken to accurately measure the rate of tag encounter and reporting. Ideally each study conducted should assess short-term tagging (handling) mortality; short and long-term tag loss; and reporting rates for each fishery sector. Advertised/promised rewards should be provided promptly upon receipt of data. Study managers should

insist on complete and accurate return information. Numbers of animals tagged should be sufficiently high to ensure that the desired information will be produced by the study. Careful and appropriate study design (i.e., purpose, location, sample size, duration, recapture procedures, analysis) is vital to ensure success. Prior to study implementation, a repository for any resultant data should be specified, and long-term commitments made by the sponsoring program, and resources made available to analyze and publish the results. Funds should be provided/reserved to process recaptured tagged fish reported after the program has ended. In angler programs, participants with tagging kits should be notified when the program has ended. All incoming tagging data should be added to the existing database until no additional data are received. Failure to respond to reports of recaptured fish will be detrimental to surrounding tagging programs. Tag reporting apathy develops in anglers when they do not receive replies from the tagging entity.

Investigators may wish to consider collaboration with existing tag database managers (e.g. NMFS Northeast Fishery Science Center, Woods Hole, MA, 02543; or U.S. Fish and Wildlife Service, Fishery Resources Office, Annapolis, MD, 410-263-2604, Atlantic States Marine Fisheries Commission, 1444 Eye Street, NW, 6th Floor, Washington, DC 20005, 202-289-6400) for data entry and analysis. Studies should not be undertaken without adequate consideration of all of these issues. The Interstate Tagging Committee strongly encourages programs which are implemented with: 1) connection to an agency or scientific entity for study design and data analyses; 2) an established constituent base to promote the program; 3) training for individuals on proper fish handling and tagging techniques; and 4) identified research needs and objectives.

Any public or private entity proposing new tagging studies should seek guidelines from and provide a proposal to the Interstate Tagging Committee for review and coordination prior to initiation of any study. The proposal should use the ASMFC's Protocols for Tagging Programs as guidance in developing the proposed study. If the proposed study is an integral component of the FMP, study design should ideally be reviewed and approved by the Stock Assessment Subcommittee and/or Technical Committee as well, during the FMP review process. Tagging studies outside the ASMFC jurisdiction may choose not to participate in the ASMFC review process.

The ASMFC's Interstate Tagging Committee was developed to serve as a technical resource for jurisdictions other than the ASMFC, as well as for private, non-profit tagging groups, who may plan to tag. Protocols have been developed by the Committee as a source of information, advice and coordination for all Atlantic coast tagging programs. A copy of the protocol is available on the ASMFC web site. Copies of proposals for review and coordination should be provided to the Interstate Tagging Coordinator at the ASMFC.

3.4 SUMMARY OF MONITORING PROGRAMS

The mandatory fishery dependent and independent monitoring programs, required under Amendment 6, are summarized in Appendix 2, Table 7, 8 and 9.

3.4.1 Catch and Landings Information

3.4.1.1 Commercial Catch and Effort Data Collection Programs

The ACCSP commercial data collection program will be a mandatory, trip-based system with all fishermen and dealers required to report a minimum set of standard data elements (refer to the ACCSP Program Design document for details). Submission of commercial fishermen and dealer reports will be required by the 10th of each month.

Any marine fishery products landed in any state must be reported by a dealer or a marine resource harvester acting as a dealer in that state. Any marine resource harvester or aquaculturist who sells, consigns, transfers,

or barter marine fishery products to anyone other than a dealer would themselves be acting as a dealer and would therefore be responsible for reporting as a dealer.

3.4.1.2 Quota Monitoring

The ACCSP will require tracking of all commercial quotas through an Interactive Voice Response (IVR) system. A minimum set of standard data elements will be collected through all IVR systems (refer to the ACCSP Program Design document for details). Under the ACCSP quota monitoring program, any ACCSP partner could authorize another partner to act as agents for collection of specific data elements. Any IVR system implemented by an ACCSP partner must collect complete quota management information for all species managed under a quota type system if there is a realistic possibility that the quota or TAC for that species could be taken during an allocation period. Any ACCSP partner monitoring commercial quotas must submit weekly reports to the responsible partner by the most expedient method no later than Thursday noon following the end of the reporting week. Any ACCSP partner monitoring quotas must electronically submit detailed data to the responsible partner as required in this FMP [or Amendment] or using the minimum standards required by the ACCSP (refer to the ACCSP Program Design document for details). (move to monitoring)

3.4.1.3 Recreational Catch and Effort Data Collection Programs

The ACCSP recreational data collection program for private/rental and shore modes of fishing will be conducted through a combination telephone and intercept survey. Recreational effort data will be collected through a telephone survey with random sampling of households until such time as a more comprehensive universal sampling frame is established. Recreational catch data will be collected through an access-site intercept survey. A minimum set of standard data elements will be collected in both the telephone and intercept surveys (refer to the ACCSP Program Design document for details). The ACCSP will implement research and evaluation studies to expand sampling and improve the estimates of recreational catch and effort.

3.4.1.4 For-Hire Catch/Effort Data Collection Programs

The ACCSP is conducting an evaluation study to determine the best method(s) of data collection for for-hire fisheries. A minimum set of standard data elements will be collected in all for-hire catch/effort surveys (refer to the ACCSP Program Design document for details).

3.4.1.4 Discard, Release and Protected Species Interactions Monitoring Program

The ACCSP will require a combination of quantitative and qualitative methods for monitoring discard, release, and protected species interactions in commercial, recreational, and for-hire fisheries. Commercial fisheries will be monitored through an at-sea observer program and several qualitative programs, including strandings, entanglements, trend analysis of logbook reported data, and port sampling. Recreational fisheries will be monitored through add-ons to existing intercept surveys and additional questions added to the telephone survey. For-hire fisheries will be monitored through an at-sea observer program and several qualitative programs (refer to the ACCSP Program Design for details).

3.4.2 Biological Information

The ACCSP will require the collection of baseline biological data on commercial, for-hire, and recreational fisheries. Biological data for commercial fisheries will be collected through port sampling programs and at-sea observers. Biological data for recreational fisheries will be collected in conjunction with the access-intercept survey. Biological data for for-hire fisheries will be collected through existing surveys and at-sea observer programs. A minimum set of standard data elements will be collected in all biological sampling programs (refer to the ACCSP Program Design document for details). Priorities and target sampling levels will be determined by the ACCSP Biological Review Panel, in coordination with the Discard/Release Prioritization Committee.

3.4.3 Social and Economic Information

3.4.3.1 Commercial Fisheries

The ACCSP will require the collection of baseline social and economic data on all commercial fisheries. A minimum set of standard data elements will be collected on all commercial socio-economic surveys (refer to the ACCSP Program Design document for details).

3.4.3.2 Recreational Fisheries

The ACCSP will require the collection of baseline social and economic data on all recreational fisheries through add-ons to existing recreational catch/effort surveys. A minimum set of standard data elements will be collected on all recreational socio-economic surveys (refer to the ACCSP Program Design document for details).

3.4.4 Observer Programs

3.4.4.1 At-Sea Observer Program

The ACCSP at-sea observer program is a mandatory program. As a condition of state and/or federal permitting, vessels should be required to carry at-sea observers when requested. A minimum set of standard data elements will be collected through the ACCSP at-sea observer program (refer to the ACCSP Program Design document for details). Specific fisheries priorities and sampling levels will be determined by the Discard/Release Prioritization Committee.

3.4.4.2 Vessel Registration System

The ACCSP has recommended the development of a standardized fishing vessel registration system. A minimum set of standard data elements will be collected through the ACCSP vessel registration system (refer to the ACCSP Program Design document for details).

3.5 STOCKING PROGRAM

Information on stocking programs can be found in the Source Document for Amendment 6. With the current population at high levels the use of stocking to enhance the population is not recommended at this time.

3.6 BYCATCH REDUCTION PROGRAM

Under this amendment, the Management Board will be developing a bycatch data collection and management program. However, if prior to the completion of this work the Board identifies a significant discard problem, the Board may require the state/jurisdictions to make management changes to reduce the impacts of discards.

In general, states shall undertake every effort to reduce or eliminate the loss of striped bass from the general population due to bycatch discard mortality. The Technical Committee shall examine trends in estimated by-catch annually.

3.6.1 Bycatch Monitoring and Research Program

The issue of striped bass discards from the commercial and recreational fisheries has increased in importance as the population has rebuilt through the 1990's. However, the data on the magnitude of discards and the mortality associated with these discards is limited. In order to increase the accuracy of the discard data, the Striped Bass Management Board will, through the adaptive management program, develop a mandatory data collection program. The program will be developed during the first two years of implementation of this amendment.

The following two paragraphs generally describe the data collection program and research projects that need to be established to address the discard data deficiencies.

The MRFSS collects information on the number of striped bass released alive from recreational fishermen, however, the mortality of these released fish has been the source of debate for a number of years. Currently, the Technical Committee applies an 8% mortality rate to all released striped bass. To further refine this mortality estimate, there are two additional pieces of information that need to be determined. First, recreational fishermen need to be surveyed to determine the proportional use of different gear type and fishing practices (e.g. fly fishing, live bait fishing, circle hooks, treble hooks, etc). The second piece of information that needs to be determined is the mortality rate associated with each of the particular gear types and fishing practices.

The latest stock assessment for striped bass (2001) noted that there is considerable uncertainty in the estimate of discard mortality from commercial fisheries. As in recreational fishing, two data elements need to be collected to increase the accuracy of the commercial discard estimates; (1) at-sea observers need to be placed on commercial vessels that are targeting striped bass as well as vessels that may encounter striped bass to collect information on the number of fish that are being discarded from the various commercial gear types and (2) scientific studies need to be conducted to determine the discard mortality associated with all of the commercial gear types that are currently encountering striped bass.

3.6.2 Bycatch Management Program

Following the implementation of the discard data collection program, the Management Board will develop a bycatch management program. This program will be designed to implement penalties for “excessive” bycatch problems and/or incentives to states/jurisdictions that implement measures to minimize the impact of discards.

This program will be developed through the adaptive management process and should be ready for implementation four years after the implementation of this Amendment.

3.7 HABITAT PROGRAM

Habitats essential for maintaining striped bass populations include spawning, nursery, and wintering areas and migration corridors. Each state jurisdiction is responsible for periodic review and monitoring of those habitats located within state waters to ensure adequate: water and substrate quality; the quantity, timing and duration of freshwater inflows to spawning and nursery areas; water, substrate quality and integrity of wintering areas; and open and free access to migration corridors, especially ocean inlets. Federal agencies will work with state partners in addressing these needs in state waters and in the EEZ. Commission staff will work with agency partners to develop detailed maps of striped bass habitat use, by life stage, to provide a basis for regulatory review of proposed federal or state actions which could adversely affect striped bass populations. Parameters of particular concern to which jurisdictions should be attentive include: nutrient loading; long-term adverse changes in water quality; hypoxia events; toxic organism outbreaks; substrate extraction in areas used by striped bass (e.g., proposed Corps of Engineers sand mining off NJ and NC, as well as navigational dredging); and projects which could potentially jeopardize striped bass habitat quality or access.

4.0 MANAGEMENT PROGRAM IMPLEMENTATION

4.1 PLANNING HORIZON

Beginning in the third year after the implementation of Amendment 6, any management measures established by the Management Board will be maintained by the states for three years, unless a target or threshold is violated. The series of triggers listed below are associated with the three-year planning horizon to prevent overfishing the striped bass resource. Upon reaching any (or all) of these triggers, the

Management Board is required to alter the management program to ensure the objectives of Amendment 6 are achieved.

Management Triggers:

- 1) If the Management Board determines that the fishing mortality threshold is exceeded in any year, the Board must adjust the striped bass management program to reduce the fishing mortality rate to a level that is at or below the target within one year.
- 2) If the Management Board determines that the biomass has fallen below the threshold in any given year, the Board must adjust the striped bass management program to rebuild the biomass to the target level within the timeframe established in *Section 2.6.2*.
- 3) If the Management Board determines that the fishing mortality target is exceeded in two consecutive years and the female spawning stock biomass falls below the target within either of those years, the Management Board must adjust the striped bass management program to reduce the fishing mortality rate to a level that is at or below the target within one year.
- 4) If the Management Board determines that the female spawning stock biomass falls below the target for two consecutive years and the fishing mortality rate exceeds the target in either of those years, the Management Board must adjust the striped bass management program to rebuild the biomass to a level that is at or above the target within the timeframe established in *Section 2.6.2*.
- 5) The Management Board shall annually examine trends in all required Juvenile Abundance Index surveys. If any JAI shows recruitment failure (i.e., JAI is lower than 75% of all other values in the dataset) for three consecutive years, then the Management Board will review the cause of the recruitment failure (e.g. fishing mortality, environmental conditions, disease etc.) and determine the appropriate management action. The Management Board shall be the final arbiter in all management decisions.

4.2 RECREATIONAL FISHERIES MANAGEMENT MEASURES

To achieve target fishing mortality rates, the Atlantic striped bass recreational fisheries will be constrained by minimum size limits. Jurisdictions may use additional regulations to ensure the target fishing mortality rate is not exceeded (i.e. fishing seasons or harvest caps). If a jurisdiction uses harvest caps in its recreational fishery, any amount over the cap shall be subtracted from the following year's recreational quota.

4.2.1 Bag Limits

For all jurisdictions, recreational fisheries will be constrained by a two fish creel limit and 28 inches minimum size limit, except for the striped bass recreational fisheries in the Chesapeake Bay and the Albemarle Sound/Roanoke River.

Through Management Program Equivalency (*Section 4.6.2*), Albemarle Sound and Chesapeake Bay were granted the ability to implement a lower minimum size limit if these jurisdictions also implemented a lower target fishing mortality rate as a penalty. The Albemarle Sound's recreational striped bass fishery will be constrained by a 20-inch minimum size limit with the ability to request a minimum size limit no smaller than 18 inches through conservation equivalency. The Chesapeake Bay jurisdictions will implement an 18-inch minimum size limit for the recreational striped bass fishery. As a penalty for employing a smaller minimum size limit, a target fishing mortality rate of 0.27 will be applied to the Chesapeake Bay and Albemarle Sound/Roanoke River striped bass fisheries. The creel limits for both jurisdictions will be based on maintaining a target fishing mortality rate of 0.27.

4.3 COMMERCIAL FISHERIES MANAGEMENT MEASURES

To achieve the target fishing mortality rates, Amendment 6 employs minimum size limit and a state-by-state quota to regulate the Atlantic striped bass commercial fisheries.

4.3.1 Size Limits

In each jurisdiction, the commercial fishery is constrained by the same size limit regime established for the jurisdiction's recreational fishery. All areas will maintain a 28-inch minimum size limit for the commercial fishery, except the Chesapeake Bay, Albemarle Sound and the Delaware Bay shad gillnet fishery. The Delaware Bay shad gillnet fishery is restricted to a 20-inch minimum size limit.

Through Management Program Equivalency (*Section 4.6.2*), Albemarle Sound and Chesapeake Bay were granted the ability to implement a lower minimum size limit if these jurisdictions also implemented a lower target fishing mortality rate as a penalty. The Albemarle Sound's commercial striped bass fishery will be constrained by a 20-inch minimum size limit with the ability to request a minimum size limit no smaller than 18 inches through conservation equivalency. The Chesapeake Bay jurisdictions will implement an 18-inch minimum size limit for the commercial striped bass fishery. As a penalty for employing a smaller minimum size limit, a target fishing mortality rate of 0.27 will be applied to the Chesapeake Bay and Albemarle Sound striped bass fisheries.

4.3.2 Allocation

Each jurisdiction will be allocated 100% of the base period (1972-1979) average coastal commercial landings, except for the areas listed in the following subsections. The allocation of the coastal commercial quota to each jurisdiction can be found in Table 4. The derivation of the coastal commercial quotas is described in greater detail in *Appendix 3*. Commercial quotas are allocated on a calendar year basis. In the event that a jurisdiction exceeds its allocation, the amount in excess of its annual quota will be deducted from the state's allowable quota in the following year.

Table 4. Coastal Commercial Allocation (in pounds) based on the average commercial landings in the coastal fishery for the base period 1972-1979.

State	Allocation (lbs.)
Maine	250
New Hampshire	5,750
Massachusetts	1,159,750
Rhode Island	243,625
Connecticut	23,750
New York	1,061,060
New Jersey	321,750
Delaware	193,447
Maryland	131,560
Virginia	184,853
North Carolina	480,480

4.3.2.1 Chesapeake Bay

The Chesapeake Bay jurisdictions will manage its striped bass fisheries so as not to exceed a target fishing mortality rate of $F=0.27$ with an 18 inch size limit. The area to be managed under a target fishing mortality rate of 0.27 is described in *Section 2.4.2*.

4.3.2.2 Delaware

Delaware's commercial quota will be maintained at the level allocated to the jurisdiction's commercial fishery in 2002 (193,447 pounds).

4.3.2.3 Albemarle Sound

The state of North Carolina will manage the commercial striped bass fishery in the Albemarle Sound so as not to exceed a target fishing mortality of $F=0.27$. The striped bass regulations outlined in Amendment 6 for the Albemarle-Roanoke stock will cover the area described in *Section 2.4.1*.

4.3.3 Commercial Tagging (Identification)

All jurisdictions that currently tag commercially caught striped bass with non-removable tags are encouraged to continue to individually tag each striped bass. Any jurisdiction tagging commercially caught striped bass at the time Amendment 6 was implemented must notify the Commission through the annual compliance report if the jurisdiction plans to discontinue the tagging program. Each tag is should include the following:

- 1) State of Landing
- 2) Unique numerical identifier
- 3) Year the tag is valid

Tagging (identification) of commercially caught striped bass identifies fish that were caught from wild populations versus fish harvested from aquaculture operations. Commercial tagging allows law enforcement officials to determine if fish are in violation of the minimum size limits in the state of landing.

4.4 FOR-HIRE FISHERIES MANAGEMENT MEASURES

For-hire fisheries will be managed through the management regime established in *Section 4.1*

4.5 HABITAT CONSERVATION AND RESTORATION

Each State should implement protection for striped bass habitat within its jurisdiction in order to ensure the sustainability of that portion of the migratory stock is either produced or resides within its boundaries.

Such a program should inventory historical habitats, identify habitats presently used and specify those targeted for recovery, and impose or encourage measures to retain or increase the quantity and quality of striped bass essential habitats.

4.5.1 Preservation of Existing Habitat

1) States in which striped bass spawning occurs should notify in writing the appropriate federal and state regulatory agencies of the locations of habitats used by striped bass. Regulatory agencies should be advised of the types of threats to striped bass populations and recommended measures which should be employed to avoid, minimize or eliminate any threat to current habitat quantity or quality.

2) Where available, States should seek to designate striped bass essential habitats for special protection. Tools available include High Quality Waters, Outstanding Resource Waters, and Habitat Areas of Particular Concern (as defined by ASMFC, see Stephan *et al.* 1998) designations. Designations should, where possible, be accompanied by requirements of nondegradation of habitat quality, including minimization of nonpoint source runoff, prevention of significant increases in contaminant loadings, and prevention of the introduction of any new categories of contaminants into the area (via restrictions on National Pollutant Discharge Elimination System (NPDES) discharge permits for facilities in those areas).

3) State fishery regulatory agencies should develop protocols and schedules for providing input on water quality regulations to the responsible agency, to ensure that water quality needs for striped bass are met.

4) State fishery regulatory agencies should develop protocols and schedules for providing input on Federal permits and licenses required by the Clean Water Act, Federal Power Act, and other appropriate vehicles, to ensure that striped bass habitats are protected.

5) Water quality criteria for striped bass spawning and nursery areas should be established or existing criteria should be upgraded to levels which are sufficient to ensure successful reproduction (reference Richkus (1990) for suggested criteria. Any action taken should be consistent with Federal Clean Water Act guidelines and specifications.

6) All State and Federal agencies responsible for reviewing impact statements and permit applications for projects or facilities proposed for striped bass spawning and nursery areas shall ensure that those projects will have no or only minimal impact on local stocks. Natal rivers of stocks considered depressed or undergoing restoration are of special concern. Any project which would result in the elimination of essential habitat should be avoided.

4.5.2 Habitat Restoration, Improvement, and Enhancement

1) Each State should survey existing literature and data to determine the historical extent of striped bass occurrence and use within its jurisdiction. An assessment should be conducted of those areas not presently used for which restoration is feasible.

2) Every effort should be made to eliminate existing contaminants from striped bass habitats where a documented adverse impact occurs (e.g. PCBs from the Hudson River).

3) States should work in concert with the USFWS and NMFS, Office of Habitat Conservation, to identify hydropower dams which pose significant impediment to striped bass migration and target them for appropriate recommendations during FERC relicensing.

4.5.3 Avoidance of Incompatible Activities

1) Federal and State fishery management agencies should take steps to limit the introduction of compounds which are known to be accumulated in striped bass tissues and which pose a threat to human health or striped bass health (see Table 10.1 in ASMFC (1990)).

2) Each State should establish windows of compatibility for activities known or suspected to adversely affect striped bass such as navigational dredging, bridge construction, and dredged material disposal and notify the appropriate construction or regulatory agencies in writing.

3) Projects involving water withdrawal (e.g. power plants, irrigation, water supply projects) should be scrutinized to ensure that adverse impacts resulting from impingement, entrainment, and/or modification of flow and salinity regimes due to water removal will not adversely impact on striped bass stocks.

4) Each state which encompasses spawning rivers within its jurisdiction should develop water use and flow regime guidelines which are protective of striped bass spawning and nursery areas and which will ensure the long-term health and sustainability of the stock.

4.5.4 Fisheries Practices

The use of any fishing gear deemed by management agencies to have an unacceptable impact on striped bass habitat should be prohibited within appropriate essential habitats (e.g. trawling in spawning areas or primary nursery areas should be prohibited).

4.6 ALTERNATIVE STATE MANAGEMENT REGIMES

Once approved by the Atlantic Striped Bass Management Board, a state may not relax its regulatory program without the approval of the Board, except that more restrictive measures can be implemented by states without Board approval. A state can request a change only if that state can demonstrate to the Board's satisfaction that the action will not contribute to the overfishing of the resource. All changes in state plans must be submitted in writing to the Board.

4.6.1 General Procedures

A state may submit a proposal for a change to its regulatory program or any mandatory compliance measure under this amendment to the Commission, including a proposal for *de minimis* status. Such changes shall be submitted to the Chair of the Plan Review Team, who shall distribute the proposal to the Management Board, the Plan Review Team, the Technical Committee, the Stock Assessment Subcommittee, and the Advisory Panel.

The Plan Review Team is responsible for gathering the comments of the Technical Committee, the Stock Assessment Subcommittee, and the Advisory Panel, and presenting these comments as soon as possible to the Management Board for decision.

The Atlantic Striped Bass Management Board will decide whether to approve the state proposal for an alternative management program if it determines that it is consistent with the management program detailed in this Amendment.

4.6.2 Management Program Equivalency

The Striped Bass Technical Committee (and/or Plan Review Team) will review any alternative state proposals under this section and provide to the Striped Bass Management Board its evaluation of the adequacy of such proposals. It is the responsibility of the state to demonstrate that the proposed management program is equivalent to standards included in this Amendment. Under no circumstances will states be allowed to institute minimum sizes below 18 inches in alternative management regimes.

Following the first full year of implementation of an alternate management program, the Plan Review Team will have the responsibility of evaluating the effects of the program to determine if the measures were actually equivalent with the standards in this Amendment. The PRT will report to the Management Board on the performance of the alternate program.

4.6.3 *De minimis* Fishery Guidelines

The ASMFC Interstate Fisheries Management Program Charter defines *de minimis* as "a situation in which, under existing condition of the stock and scope of the fishery, conservation, and enforcement actions taken by an individual state would be expected to contribute insignificantly to a coastwide conservation program required by a Fishery Management Plan or amendment (ASMFC 2000).

States may apply for *de minimis* status if, for the last two years, their combined average commercial and recreational landings (by weight) constitute less than one percent (1%) of the coastwide commercial and recreational landings for the same two-year period. When petitioning for *de minimis* status, the state should also propose the type of exemption associated with *de minimis* status. In addition to determining if the state meets the criteria for *de minimis* status, the Board will evaluate the proposed exemption to be certain it does not compromise the goals and objectives of Amendment 6. The States may petition the Atlantic Striped Bass Management Board at any time for *de minimis* status, if their fishery falls below the threshold level. Once *de minimis* status is granted, designated states must submit annual reports to the Management Board justifying the continuance of *de minimis* status. States must include *de minimis* requests as part of their annual compliance reports.

4.7 ADAPTIVE MANAGEMENT

The Atlantic Striped Bass Management Board may vary the requirements specified in this Amendment as a part of adaptive management in order to conserve the striped bass resource or reflect changes in the striped bass fishery.

4.7.1 General Procedures

The Plan Review Team will monitor the status of the fishery and the resource and report on the status to the Atlantic Striped Bass Management Board annually, or when requested to do so by the Management Board. The Plan Review Team will consult with the Technical Committee, the Stock Assessment Subcommittee and the Advisory Panel in making such review and report. The report will contain recommendations concerning proposed adaptive management revisions to the management program.

The Atlantic Striped Bass Management Board will review the report of the Plan Review Team, and may consult further with the Technical Committee, the Stock Assessment Subcommittee or the Advisory Panel. The Management Board may direct the PRT to prepare an addendum to make any changes it deems necessary. The addendum shall contain a schedule for the states to implement its provisions.

The Plan Review Team will prepare a draft addendum as directed by the Management Board, and shall distribute it to all the states for review and comment. A public hearing will be held in any state that requests one. The Plan Review Team will also request comment from federal agencies and the public at large. After a 30-day review period, the Plan Review Team will summarize the comments and prepare a final version of the addendum for the Management Board.

The Management Board shall review the final version of the addendum prepared by the Plan Review Team, and shall also consider the public comments received and the recommendations of the Technical Committee, the Stock Assessment Subcommittee and the Advisory Panel; and shall then decide whether to adopt or revise and adopt the addendum.

Upon adoption of the addendum implementing adaptive management by the Management Board, states shall prepare plans to carry out the addendum, and submit them to the Management Board for approval according to the schedule contained in the addendum.

4.7.2 Measures Subject to Change

The following measures are subject to change under adaptive management upon approval by the Atlantic Striped Bass Management Board:

- (1) Overfishing definition;
- (2) Rebuilding targets and schedules;
- (3) Recreational management program, including:
 - a) Mandatory use of circle hooks;
 - b) Prohibition of the use of treble hooks;
 - c) Prohibition of bait fishing in spawning areas;
 - d) Closure during warm weather periods;
- (4) Commercial management program;
- (5) Monitoring programs;
- (6) State reporting requirements;
- (7) Bycatch monitoring and reductions provisions;
- (8) Law enforcement reporting requirements;
- (9) Implementation schedule;

(10) Any other management measures currently included in Amendment 6.

4.7 EMERGENCY PROCEDURES

Emergency procedures may be used by the Atlantic Striped Bass Management Board to require any emergency action that is not covered by or is an exception or change to any provision in Amendment 6. Procedures for implementation are addressed in the ASMFC Interstate Fisheries Management Program Charter, Section 6(c)(10).

4.8 MANAGEMENT INSTITUTIONS

The management institutions for Atlantic striped bass shall be subject to the provisions of the ISFMP Charter (ASMFC 2000). The following is not intended to replace any or all of the provisions of the ISFMP Charter. All Committee roles and responsibilities are included in detail in the ISFMP Charter and are only summarized here.

4.8.1 Atlantic States Marine Fisheries Commission and ISFMP Policy Board

The Atlantic States Marine Fisheries Commission and the Interstates Fisheries Management Program Policy Board are generally responsible for the oversight and management of the Commission's fisheries management activities. The Commission must approve all fishery management plans and amendments thereto, including this Amendment 6; and must also make all final determinations concerning state compliance and noncompliance. The ISFMP Policy Board reviews recommendations of the various Management Boards and, if it concurs, forwards them to the Commission for action.

4.8.2 Atlantic Striped Bass Management Board

The Atlantic Striped Bass Management Board is established by the Commission's ISFMP Policy Board and is generally responsible for carrying out all activities under this Amendment. It establishes and oversees the activities of the Plan Development Team, Plan Review Team, the Technical Committee, Stock Assessment Subcommittee, Tagging Subcommittee, and Striped Bass Advisory Panel. Among other things, the Management Board makes changes to the management program under adaptive management, approved state programs implementing the amendment and alternative state programs under *Section 4.6*. The Management Board reviews the status of state compliance with the FMP at least annually, and if it determines that a state is out of compliance, reports that determination to the ISFMP Policy Board under the terms of the ISFMP Charter.

4.8.3 Atlantic Striped Bass Plan Development/Review Team

The Striped Bass Plan Development Team (PDT) and the Striped Bass Plan Review Team (PRT) will be composed of a small group of scientists and/or managers whose responsibility is to provide all of the technical support necessary to carry out and document the decisions of the Atlantic Striped Bass Management Board. An ASMFC Fishery Management Plan Coordinator chairs both groups. The Striped Bass PDT/PRT is directly responsible to the Board for providing information and documentation concerning the implementation, review, monitoring and enforcement of Amendment 6. The Striped Bass PDT/PRT shall be comprised of personnel from state and federal agencies who have scientific and management ability and knowledge of spiny dogfish. The PDT will be responsible for preparing all documentation necessary for the development of Amendment 6, using the best scientific information available and the most current stock assessment information. The PDT will either disband or assume inactive status upon completion of Amendment 6. Alternatively, the Board may elect to retain PDT members as members of the PRT or appoint new members. The PRT will provide annual advice concerning the implementation, review, monitoring, and enforcement of Amendment 6 once the Commission has adopted it.

4.8.4 Atlantic Striped Bass Technical Committee

The Technical Committee will consist of one representative from each jurisdiction and federal agency with an interest in the striped bass fishery. The Management Board, at its discretion, may approve the membership of additional individuals to serve on the Technical Committee. Its role is to act as a liaison to the individual state/jurisdictional agencies, providing information to the management process and review and make recommendations concerning the management program. The Technical Committee has the responsibility for developing an annual status of the stock report. The Technical Committee will report to the Management Board.

4.8.5 Atlantic Striped Bass Stock Assessment Subcommittee

The Stock Assessment Subcommittee will consist of those scientists with the expertise in the assessment of striped bass populations. Its role is to assess striped bass populations and provide scientific advice concerning the implications of proposed or potential management alternatives, or to respond to other scientific questions of the Management Board. The Stock Assessment Subcommittee will report to the Technical Committee.

4.8.6 Atlantic Striped Bass Tagging Subcommittee

The Tagging Subcommittee will consist of those scientists with the expertise in analysis of tag and recapture data for striped Bass. Its role is to assess the available data for inclusion in the assessment of the striped bass populations, which will be provided to the Stock Assessment Subcommittee for inclusion in the annual status of the stock report. The Tagging Subcommittee is also responsible for responding to Management Board questions using the available tagging data, when possible. The Tagging Subcommittee will report to the Technical Committee.

4.8.7 Atlantic Striped Bass Advisory Panel

The Advisory Panel will consist of industry representatives with expertise in striped bass fisheries. The individuals may represent, but are not limited to, the recreational fishing industry, commercial fishing industry, or for-hire fishing industry. Its role is to provide input on management decisions that are being considered by the Management Board. The Advisory Panel is responsible for reporting directly to the Management Board.

4.8.8 Federal Agencies

4.8.8.1 Management of the Exclusive Economic Zone

Management of striped bass in the EEZ is within the Jurisdiction of the Secretary of Commerce. The responsibilities of the Secretary of Commerce are detailed in the Atlantic Striped Bass Conservation Act (P.L. 98-613.)

4.8.8.2 Federal Agency Participation in the Management Process

The Commission has accorded the United States Fish and Wildlife Service (USFWS) and the NMFS voting status on the ISFMP Policy Board and the Atlantic Striped Bass Management Board in accordance with the Commission's ISFMP Charter. The NMFS and USFWS also participate on the Atlantic Striped Bass Plan Development Team, Technical Committee, and Stock Assessment Sub-Committee. In addition, the USFWS participates on the Tagging Subcommittee.

4.8.8.3 Consultation with the Fishery Management Councils

At the time of adoption of Amendment 6, none of the three East Coast Regional Fishery Management Councils had implemented a management plan for striped bass nor had they indicated the intent to develop a plan.

4.9 RECOMMENDATION TO THE SECRETARIES FOR COMPLEMENTARY ACTIONS IN FEDERAL JURISDICTIONS

The Atlantic striped bass coastal migratory stock was declared recovered in 1995 and has since expanded to record levels of abundance. The Atlantic States Marine Fisheries Commission believes that the measures contained in Amendment 6 are necessary to prevent the overfishing of the Atlantic striped bass resource while allowing growth in both the commercial and recreational fishery. The management of striped bass in the exclusive economic zone (EEZ) is the responsibility of the Secretary of Commerce through the National Marine Fisheries Service (NMFS). The Atlantic States Marine Fisheries Commission recommends that the federal government promulgate all necessary regulations to implement complementary measures to those contained in *Section 4.2* and *4.3* in order to allow the harvest of striped bass in the EEZ. Specifically, the Commission recommends constraining the harvest of striped bass in the EEZ to a minimum size limit of 28 inches. The states should have the ability to adopt more restrictive regulations for fishermen and vessels licensed in their states. In addition, Amendment 6 calls for the Atlantic Striped Bass Management Board to make additional changes to Amendment 6 via adaptive management when overfishing is occurring or the stock is overfished. As necessary changes are made, the Board will recommend additional measures to the Secretary.

On an annual basis the fishery impacts on the resource will be evaluated by the Technical Committee and reported to the Management Board so that it may make appropriate EEZ management recommendations to the Secretary of Commerce at the end of each FMP planning horizon. Under this option, a management program would need to be established for the EEZ to compliment the state management programs and to ensure that the Goals and Objectives of this Amendment will be met.

5.0 COMPLIANCE

Full implementation of the provisions of this Amendment is necessary for the management program to be equitable, efficient and effective. States/Jurisdictions are expected to implement these measures faithfully under state laws. Although the Atlantic States Marine Fisheries Commission does not have the authority to directly compel state/jurisdictional implementation of the measures, it will continually monitor the effectiveness of state/jurisdictional implementation and determine whether states/jurisdictions are in compliance with the provisions of this Amendment. This section sets forth the specific elements that the Commission will consider in determining state/jurisdictional compliance with this fishery management plan, and the procedures that will govern the evaluation of compliance. Additional details of the procedures are found in the ASMFC Interstate Fisheries Management Program Charter (ASMFC 2000).

5.1 MANDATORY COMPLIANCE ELEMENTS FOR THE STATES

A state will be determined to be out of compliance with the provisions of this amendment, according to the terms of Section Seven of the ISFMP Charter if:

- its regulatory and management programs to implement *Section 4* have not been approved by the Atlantic Striped Bass Management Board; or
- it fails to meet any schedule required by *Section 5.1.2*, or any addendum prepared under adaptive management (*Section 4.6*); or
- it has failed to implement a change to its program when determined necessary by the Atlantic Striped Bass Management Board; or
- it makes a change to its regulations required under *Section 4* or any addendum prepared under adaptive management (*Section 4.6*), without prior approval of the Atlantic Striped Bass Management Board.

5.1.1 Mandatory Elements of State Programs

To be considered in compliance with this amendment, all state programs must include management measures for Atlantic striped bass fisheries consistent with the requirements listed throughout *Section 4.0*, except that a state may propose an alternative management program under *Section 4.6*, which, if approved by the Management Board, may be implemented as an alternative regulatory requirement for compliance.

5.1.1.1 Regulatory Requirements

States shall begin to implement Amendment 6 after final approval of the state's implementation proposal by the Commission. Each state must submit its required striped bass regulatory program to the Commission through the ASMFC staff for approval by the Atlantic Striped Bass Management Board. During the period from submission and until the Management Board makes a decision on a state's program, a state may not adopt a less protective management program than contained in this amendment or contained in current state law.

The following lists the specific compliance criteria that a state/jurisdiction must implement in order to be in compliance with Amendment 6 to the Atlantic Striped Bass Fishery Management Plan:

- 1. All jurisdictions will implement a bag limit for the recreational fishery that restricts individuals to a 2 fish creel limit and a 28-inch minimum size, except for the Chesapeake Bay and the Albemarle Sound/Roanoke River. The Chesapeake Bay will implement a minimum size of 18-inches and Albemarle Sound/Roanoke River management area will implement a 20-inch minimum size limit. The creel limit for the Chesapeake Bay and the Albemarle Sound are based on maintaining a target fishing mortality rate of 0.27.**
- 2. Each jurisdiction will implement 28-inch minimum size limit for its commercial fishery, except the Chesapeake Bay, Albemarle Sound striped bass commercial fisheries and the Delaware Bay shad gillnet fishery. The Chesapeake Bay jurisdictions will implement an 18-inch minimum size limit as part of the management program to constrain the fishing mortality rate below 0.27. The commercial striped bass fishery in the Albemarle Sound and the Delaware Bay shad gillnet fishery will employ a 20-inch minimum size limit for striped bass.**
- 3. All jurisdictions, except for the Chesapeake Bay and the Albemarle Sound, must implement a commercial fishery management program that will cap the commercial harvest of striped bass at the level identified in *Section 4.3.2* and Table 4.**
- 4. North Carolina (for the Albemarle Sound) and the Chesapeake Bay jurisdictions will implement management measures that will prevent the harvest of striped bass from exceeding a target fishing mortality rate of 0.27.**

Once approved by the Atlantic Striped Bass Management Board, states are required to obtain approval from the Board prior to making any changes to their management program for which a compliance requirement is in effect. Other measures must be reported to the Board, but may be implemented without prior Board approval. A state can request permission to implement an alternative to any mandatory compliance measure only if that state can show to the Board's satisfaction that its alternative proposal will have the same conservation value as the measure contained in this management plan or any addenda prepared under Adaptive Management (*Section 4.6*). States submitting alternative proposals must demonstrate that the proposed action will not contribute to overfishing of the resource. All changes in state plans must be submitted in writing to the Board and to the Commission either as part of the annual FMP Review process or the Annual Compliance Reports.

5.1.1.2 Monitoring Requirements

All state programs must include the mandatory monitoring requirements contained in *Sections 3.1, 3.2, and 3.3* and in *Appendix 2 Tables 6, 7 and 8*. States must submit proposals for all intended changes to required monitoring programs, which may affect the quality of the data or the ability of the program to fulfill the needs of the fishery management plan. State proposals for making changes to required monitoring programs will be submitted to the Technical Committee at least two weeks prior to its spring or fall meeting. Proposals must be on a calendar year basis. The Technical Committee will make recommendations to the Management Board concerning whether the proposals are consistent with Amendment 6.

In the event that a state realizes it will not be able to fulfill its fishery independent monitoring requirements, it should immediately notify the Commission in writing. The Commission will work with the state to develop a plan to secure funding or plan an alternative program to satisfy the needs outlined in Amendment 6. If the plan is not implemented 90 days after it has been adopted, the state will be found out of compliance with Amendment 6.

5.1.1.3 Research Requirements

A prioritized list of research needs for spiny dogfish was created during the development of this FMP and can be found in *Section 6.0*. The PDT and Technical Committee will annually re-prioritize the research needs for striped bass as part of the FMP Review Process. Appropriate programs for meeting these needs may be implemented under *Section 4.6* (Adaptive Management) through the Commission's addendum process including the opportunity for public comment.

5.1.1.4 Law Enforcement Requirements

All state programs must include law enforcement capabilities adequate for successfully implementing a state's striped bass regulations. The adequacy of a state's enforcement activity will be monitored annually by reports of the ASMFC Law Enforcement Committee to the Striped Bass Plan Review Team (ASMFC 2002). The first reporting period under Amendment 6 will cover the 2003 calendar year.

5.1.2 Compliance Schedule

States must implement Amendment 6 to the Atlantic Striped Bass Management Plan according to the following schedule:

- | | |
|--------------------------------------|---|
| May 1st, 2003: | States must submit programs to implement the Amendment 6 for approval by the Atlantic Striped Bass Management Board. |
| January 1st, 2004: | All states must implement Amendment 6 through their approved management programs. States may begin implementing management programs prior to this deadline if approved by the Management Board. |

If a jurisdiction cannot implement their striped bass regulations by the January 1st, 2004 deadline, the jurisdiction must suggest an alternative implementation date in their proposal. Subsequently, the Management Board must approve the revised implementation date for the jurisdiction.

Additionally, states may begin to land the increased coastal commercial quota prior to the Management Board's approval of the state's implementation proposal, provided the state has at least a 28" minimum size limit and do not exceed the quota allocation listed in Table 4.

Reports on compliance must be submitted to ASMFC by each jurisdiction annually, no later than May 15th. Allowances for late submissions will be permitted to allow for the inclusion of MRFSS recreational or NMFS commercial landings of striped bass through the previous calendar year.

5.1.3 Compliance Report Content

Each state must submit an annual report concerning its Atlantic striped bass fisheries and management program for the previous fishing year. Reports should follow the standard report for compliance reports (see *Appendix 5*), as was adopted by the ISFMP Policy Board. The report shall cover:

- the previous fishing year's fishery and management program including activity and results of monitoring, regulations that were in effect and harvest, including estimates of non-harvest losses; and
- the planned management program for the current fishing year summarizing regulations that will be in effect and monitoring programs that will be performed, highlighting any changes from the previous year.
- jurisdictions tagging commercially caught striped bass at the time Amendment 6 is implemented must notify the Commission if it plans to discontinue the commercial tagging program (see *Section 4.2.3*).

5.2 PROCEDURES FOR DETERMINING NON-COMPLIANCE

Detailed procedures regarding compliance determinations are contained in the ISFMP Charter, Section 7 (ASMFC 2000). The following summary is not intended to replace the language found in the ISFMP Charter.

The Plan Review Team will continually review the status of state implementation, and advise the Management Board at any time that a question arises concerning state compliance. The PRT will review state reports submitted under *Section 5.1.3* and prepare a report by June 15 for the Management Board summarizing the status of the resource and the fishery and the status of state compliance on a state-by-state basis.

Upon review of a report from the Plan Review Team, or at any time by request from a member of the Management Board, the Management Board will review the status of an individual state's compliance. If the Management Board finds that a state's approved regulatory management program fails to meet the requirements of this section, it may be recommended that the state be found out of compliance. The recommendation must include a specific list of the state's deficiencies in implementing and enforcing this Amendment and the actions that the state must take in order to come back into compliance.

If the Management Board recommends that a state be found out of compliance, as referred to in the preceding paragraph, it shall report that recommendation to the ISFMP Policy Board for further review according to the Commission's Charter for the Interstate Fisheries Management Program.

The state that is out of compliance or subject to a recommendation by the Management Board under the preceding paragraph may request at any time that the Management Board reevaluate its program. The state shall provide a written statement concerning actions which justify a reevaluation. The Management Board shall promptly conduct such reevaluation, and if it agrees with the state, shall recommend to the ISFMP Policy Board that the noncompliance finding be withdrawn. The ISFMP Policy Board and Commission shall deal with the Management Board's recommendation according to the Commission's Charter for the Interstate Fisheries Management Program.

5.3 RECOMMENDED (NON-MANDATORY) MANAGEMENT MEASURES

The following management measures are recommended for states to fully or partially implement. These measures are not part of the compliance criteria for Amendment 6.

5.3.1 Recommended Use of Circle Hooks

The states/jurisdictions are recommended to encourage the use of circle hooks to reduce the mortality

associated with hooking and releasing striped bass. A number of studies have been conducted that have demonstrated that the discard mortality is decreased significantly with the use of circle hooks. In order to promote the use of circle hooks, the states are encouraged to develop public relations/education campaigns on their benefits.

5.3.2 Spawning Area Closures

Consideration should be given to the prohibition of fishing on the spawning grounds during the spawning season.

5.3.3 Survey of Inland Recreational Fishermen

The states/jurisdictions are encouraged to conduct a survey of inland fishermen to evaluate the landings, catch rate, discards, participation, and number of trips.

5.4 ANALYSIS OF ENFORCEABILITY OF MANAGEMENT MEASURES

ASMFC's Law Enforcement Committee reviewed all of the options approved for the final draft of Amendment 6 for the degree of enforceability. The LEC determined that the recreational measures, which employ size limits and bag limits, are enforceable. The commercial size limits are also enforceable. The LEC found that monitoring the allocation of the commercial quota can be labor intensive. Different seasons (various opening and closing dates) can create confusion if the information is not disseminated in a timely fashion.

6.0 MANAGEMENT AND RESEARCH NEEDS

The following list of research needs have been identified in order to enhance the state of knowledge of Atlantic striped bass resource, population dynamics, ecology and the various fisheries for striped bass. The Technical Committee, Advisory Panel, and Management Board will review this list annually and an updated prioritized list will be included in the Annual Striped Bass FMP Review.

6.1 STOCK ASSESSMENT AND POPULATION DYNAMICS

- Develop refined and cost-efficient coastal monitoring regime for striped bass stocks, including spawning stock biomass modeling and virtual population analysis (VPA).
- Conduct sensitivity analysis on current state and federal fishery dependent and independent monitoring programs to determine which, if any, may be eliminated.
- 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 which will provide "quality" fishing. Quality fishing must first be defined.
- Quota calculation methods should be refined which allow better estimates among various components of the fishery.
- Examine reporting rates by commercial and recreational fishermen using high reward tags.
- Review relationship between tag based survival estimates and VPA estimate of mortality in a management framework.
- Improve methods for determining population sex ratio for use in estimates of spawning stock biomass and biological reference points.
- Develop maturity ogive applicable to coastal migratory stock.

6.2 RESEARCH AND DATA NEEDS

6.2.1 Biological

- Develop studies to provide information on the magnitude of hook and release and bycatch mortality, including factors that influence their magnitude and means of reducing or eliminating this source of mortality.
- Further study should be conducted on the discrepancy in ages between scale-based and otolith-based ages. Particular emphasis should be placed on comparisons with known age fish determined from coded wire tags. Comparisons should be made among age readers and areas.
- Increase sea sampling of commercial fisheries to better estimate levels of discards.
- Continue in-depth analysis of migrations, stock compositions, etc. using mark-recapture data.
- Continue to conduct research to determine limiting factors affecting recruitment and possible density implications.
- 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.
- Evaluate the percentage of fishermen using Circle hooks.

7.0 PROTECTED SPECIES

7.1 MARINE MAMMAL PROTECTION ACT (MMPA) REQUIREMENTS

Since its passage in 1972, one of the underlying goals of the MMPA has been to reduce the incidental serious injury and mortality of marine mammals permitted in the course of commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate. The 1994 Amendments to the MMPA established section 118 to govern the taking of marine mammals incidental to commercial fishing operations. Under section 118, the National Marine Fisheries Service (NMFS) is required to develop and implement a take reduction plan to assist in the recovery or prevent the depletion of each strategic stock that interacts with a Category I or II fishery. Category I and II fisheries are those that have frequent or occasional incidental mortality and serious injury of marine mammals, respectively. In addition to complying with any applicable take reduction plans, vessels operating in Category I or II fisheries are required to annually register with NMFS and obtain an authorization certificate and carry observers if requested. All commercial fishermen, regardless of Category, are required to report all incidental mortality or serious injury of marine mammals that occurs incidental to commercial fishing to NMFS.

A strategic stock is defined as a stock: (1) for which the level of direct human caused mortality exceeds the potential biological removal (PBR) level; (2) which is declining and is likely to be listed under the Endangered Species Act (ESA) in the foreseeable future; or (3) which is listed as a threatened or endangered species under the ESA or as a depleted species under the MMPA.

Section 101(a)(5)(E) of the MMPA requires the authorization of the incidental taking of individuals from marine mammal stocks listed as threatened or endangered under the ESA in the course of commercial fishing operations if it is determined that: (1) incidental mortality and serious injury will have a negligible impact on the affected species or stock; (2) a recovery plan has been developed or is being developed for such species or stock under the ESA; and (3) where required under section 118 of the MMPA, a

monitoring program has been established, vessels engaged in such fisheries are registered in accordance with section 118 of the MMPA, and a take reduction plan has been developed or is being developed for such species or stock. Currently, there are no permits that authorize takes of threatened or endangered species by any commercial fishery in the Atlantic.

7.2 ENDANGERED SPECIES ACT (ESA) REQUIREMENTS

The taking of endangered sea turtles and marine mammals is prohibited under Section 9 of the ESA. In addition, NMFS may issue Section 4(d) protective regulations necessary and advisable to provide for the conservation of threatened species. There are several mechanisms established in the ESA to avoid the takings prohibition in Section 9. First, a 4(d) regulation may include less stringent requirements intended to reduce incidental take and thus allow for the exemption from the taking prohibition. Section 10(a)(1)(B) of the ESA authorizes NMFS to permit, under prescribed terms and conditions, any taking otherwise prohibited by Section 9 of the ESA, if the taking is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Finally, Section 7(a) requires NMFS to consult with each federal agency to ensure that any action that is authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species. Section 7(b) authorizes incidental take of listed species after full consultation and identification of reasonable and prudent alternatives or measure to monitor and minimize such take.

7.3 PROTECTED SPECIES WITH POTENTIAL FISHERY INTERACTIONS

The marine mammal species found in coastal Northwest Atlantic waters are listed below. Three are classified as endangered or threatened under the ESA; the remainder are protected under provisions of the MMPA. Other marine mammals inhabit Western North Atlantic waters, but because the fishery is primarily coastal, they are not listed here.

Endangered

Right whale
Humpback whale
Fin whale

Threatened

None

Proposed for ESA Listing

None

MMPA

Minke whale
Harbor Porpoise
Bottlenose dolphin
Harbor seal
Grey seal
Harp seal

7.4 PROTECTED SPECIES INTERACTIONS WITH EXISTING FISHERIES

The primary gear types used to catch striped bass in commercial fisheries are gillnets, pound nets, and hook and line. Commercial fishing for striped bass is prohibited in New Jersey, Pennsylvania, Connecticut, New Hampshire, Maine, and the District of Columbia. Massachusetts allows commercial fishing with hook and line gear only, while other areas allow new fisheries. The largest commercial landings are from Maryland, Virginia, Massachusetts, Potomac River Fisheries Commission, and New York.

NMFS observer program out of the Northeast Fishery Science Center has observed striped bass directed gillnet fishing. Table 5 shows the distribution of observed trips in the striped bass gillnet fishery. Striped bass were observed caught in 2 trawl trips (5 hauls) that primarily targeted summer flounder, both in North Carolina in 2000, and no marine mammal takes were observed.

Table 5. Distribution of observed trips in the striped bass gillnet fishery.

Year	Number of Trips by State	Total Trips	Number of Marine Mammal Takes
1996	5 (VA)	5	0
1997	3 (MD), 1 (VA), 3 (NC)	7	0
1998	2 (MD), 26 (VA), 3 (NC)	31	0
1999	5 (NY), 1 (MD), 27 (VA), 7 (NC)	40	1 bottlenose dolphin in VA, released dead
2000	46 (VA), 4 (MD)	50	0

No marine mammals are recorded interacting with striped bass fisheries in the ASMFC's database developed by the Management and Science Committee, although other protected species were observed as bycatch. The ASMFC database showed striped bass caught in Maryland in fixed net, gillnet, and trawl gear and recorded protected species bycatch of sea birds and finfish (Atlantic and Shortnose sturgeon, Atlantic salmon). The ASMFC database also showed striped bass caught in New York in fixed net and trawl gear and recorded protected species bycatch of sea turtles and finfish (Atlantic and Shortnose sturgeon, Atlantic salmon).

The Atlantic commercial fisheries using gillnets, trawl, pound nets and hook and line and the marine mammal species that are reported to have been incidentally injured or killed are listed below by their MMPA Category are listed below (2001 List of Fisheries, 66 FR 42780, August 15, 2001) (Table 6). Striped bass is not a target species of all of the fisheries listed below.

Table 6. Fishery Description and marine mammal species and stock incidentally killed/injured.

FISHERY DESCRIPTION	MARINE MAMMAL SPECIES AND STOCKS INCIDENTALLY KILLED/INJURED
CATEGORY I	
Northeast sink gillnet	North Atlantic right whale, WNA; Humpback whale, WNA; Minke whale, Canadian east coast; Killer whale, WNA; White-sided dolphin, WNA; Bottlenose dolphin, WNA offshore; Harbor porpoise, GME/BF; Harbor seal, WNA; Gray seal, WNA; Common dolphin, WNA; Fin whale, WNA; Spotted dolphin, WNA; False killer whale, WNA; Harp seal, WNA
Atlantic squid, mackerel, butterfish trawl	Common dolphin, WNA; Risso's dolphin, WNA; Long-finned pilot whale, WNA; Short-finned pilot whale, WNA; White-sided dolphin, WNA
CATEGORY II	
North Carolina inshore gillnet	Bottlenose dolphin, WNA coastal
Northeast anchored float gillnet	Humpback whale, WNA; White-sided dolphin, WNA; Harbor seal, WNA
Northeast drift gillnet	None documented
Southeast Atlantic gillnet	Bottlenose dolphin, WNA coastal

FISHERY DESCRIPTION	MARINE MAMMAL SPECIES AND STOCKS INCIDENTALLY KILLED/INJURED
Southeastern U.S. Atlantic shark gillnet	Bottlenose dolphin, WNA coastal; North Atlantic right whale, WNA; Atlantic spotted dolphin, WNA
U.S. Mid-Atlantic coastal gillnet	Humpback whale, WNA; Minke whale, Canadian east coast; Bottlenose dolphin, WNA offshore; Bottlenose dolphin, WNA coastal; Harbor porpoise, GME/BF; Harbor seal, WNA; Harp seal, WNA; Long-finned pilot whale, WNA; Short-finned pilot whale, WNA; White sided dolphin, WNA; Common dolphin, WNA
Atlantic herring midwater trawl (including pair trawl)	Harbor seal, WNA
Virginia pound net	Bottlenose dolphin, WNA coastal
CATEGORY III	
Chesapeake Bay inshore gillnet	Harbor porpoise, GME/BF
Delaware Bay inshore gillnet	Humpback whale, WNA; Bottlenose dolphin, WNA coastal; Harbor porpoise, GME/BF
Long Island Sound inshore gillnet	Humpback whale, WNA; Bottlenose dolphin, WNA coastal; Harbor porpoise, GME/BF
Rhode Island, southern Massachusetts (to Monomoy Island), and New York Bight (Raritan and Lower New York Bays) inshore gillnet	Humpback whale, WNA; Bottlenose dolphin, WNA coastal; Harbor porpoise, GME/BF
Mid-Atlantic mixed species trawl	None documented
North Atlantic bottom trawl	Long-finned pilot whale, WNA; Short-finned pilot whale, WNA; Common dolphin, WNA; White-sided dolphin, WNA; Striped dolphin, WNA; Bottlenose dolphin, WNA offshore
U.S. Atlantic monkfish trawl	Common dolphin, WNA
Gulf of Maine tub trawl groundfish bottom longline/ hook-and-line	Harbor seal, WNA; Gray seal, Northwest North Atlantic; Humpback whale, WNA
Gulf of Maine, U.S. Mid-Atlantic tuna, shark swordfish hook-and-line/harpoon	Humpback whale, WNA
Southeastern U.S. Atlantic, Gulf of Mexico, and Caribbean snapper-grouper and other reef fish bottom longline/hook-and-line	None documented
Southeastern U.S. Atlantic, Gulf of Mexico shark bottom longline/hook-and-line	None documented
Southeastern U.S. Atlantic, Gulf of Mexico, U.S. Mid-Atlantic pelagic hook-and-line/harpoon	None documented

FISHERY DESCRIPTION	MARINE MAMMAL SPECIES AND STOCKS INCIDENTALLY KILLED/INJURED
U.S. Mid-Atlantic mixed species stop seine/weir/pound net (except the North Carolina roe mullet stop net)	None documented

7.5 POPULATION STATUS REVIEW OF RELEVANT PROTECTED SPECIES

The status of marine mammal populations inhabiting the Gulf of Maine has been discussed in great detail in the U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment Reports (Waring, *et al.* 2000). The reports present information on stock definition, geographic range, population size, productivity rates, potential biological removal (PBR) level, fishery specific mortality estimates, and a comparison of the PBR level to estimated human-caused mortality for each stock.

7.6 EXISTING AND PROPOSED FEDERAL REGULATIONS/ACTIONS PERTAINING TO RELEVANT PROTECTED SPECIES

The Northeast sink and Mid-Atlantic coastal gillnet fisheries are the two fisheries regulated by the Harbor Porpoise Take Reduction Plan (63 FR 66464, December 2, 1998). Among other measures, the plan uses time area closures in combination with pingers in Northeast waters, and time area closures along with gear modifications for both small (mesh size greater than 5 inches (12.7 cm) to less than 7 inches (17.78 cm)) and large (mesh size greater than or equal to 7 inches (17.78 cm) to 18 inches (45.72 cm)) mesh gillnet in mid-Atlantic waters. Although the plan predominately impacts the dogfish and monkfish fisheries due to their higher porpoise bycatch rates, other gillnet fisheries are also affected. NMFS has documented observed takes of harbor porpoise in the mesh sizes of 5 inches or less and will be reevaluating observed data for these fisheries and stranding data to reconsider whether management measures are needed to reduce bycatch in these smaller mesh fisheries.

The Atlantic Large Whale Take Reduction Plan (64 FR 7529; February 16, 1999) addresses the incidental bycatch of large baleen whales, primarily the northern right whale and the humpback whale, in several fisheries including the Northeast sink gillnet and Mid-Atlantic coastal gillnet. Among other measures, the plan closes right whale critical habitat areas to specific types of fishing gear during certain seasons and modifies fishing practices. The Atlantic Large Whale Take Reduction Team continues to identify ways to reduce possible interactions between large whales and commercial gear. Upcoming rules will address additional gear marking and modification provisions to further reduce the risk of entanglement, as well as dynamic area and seasonal area management measures

The Bottlenose Dolphin Take Reduction Team is scheduled to convene in November of 2001, and will include representatives from the following Category II commercial fisheries: Mid-Atlantic coastal gillnet; North Carolina inshore gillnet; Southeast Atlantic gillnet; Southeastern U.S. Atlantic shark gillnet; Atlantic blue crab trap/pot; Mid-Atlantic haul/beach seine; North Carolina long haul seine; North Carolina roe mullet stop net; and, Virginia pound net.

7.7 IDENTIFICATION OF CURRENT DATA GAPS AND RESEARCH NEEDS

Additional observer coverage in coastal gillnet and trawl fisheries is needed to understand the degree of interaction that occurs between striped bass fisheries and marine mammals.

8.0 REFERENCES

- Albrecht, A.B. 1964. Some observations on factors associated with survival of striped bass eggs and larvae. *California Fish and Game* 50:100-113.
- Atlantic States Marine Fisheries Commission (ASMFC). 2002. ASMFC LEC Guidelines to Reporting on FMPs. ASMFC's LEC. Washington, D.C. 3 pp.
- ASMFC 2001. 2001 Stock Assessment Report for Atlantic Striped Bass. ASMFC's Atlantic Striped Bass Technical Committee. Washington, D.C. 57 pp.
- ASMFC. 2000a. Interstate Fisheries Management Program Charter. Washington, DC. 23 pp.
- ASMFC. 2000b. Guidelines for Resource Managers on the Enforceability of Fishery Management Measures. The Atlantic State's Marine Fisheries Commission's Law Enforcement Committee (LEC). Washington, D.C. 29 pp.
- ASMFC. 1998. Source document for the supplement to the striped bass FMP – Amendment #5. Atlantic States Marine Fisheries Commission, Washington, D.C. Fisheries Management Report No. 34.
- ASMFC 1995. Amendment #5 to the Interstate Fishery Management Plan for Atlantic Striped Bass. Atlantic States Marine Fisheries Commission. Washington, D.C. Fisheries Management Report No. 24. 50 pp.
- ASMFC 1990. Source document for the supplement to the striped bass FMP – Amendment #4. Atlantic States Marine Fisheries Commission. Washington, D.C. Fisheries Management Report No. 16.
- Austin, H. M. and John Walter. 1998. Food habits of large striped bass in the lower Chesapeake Bay and its tributaries, March 1997-May 1998. Final Rept. Submitted to VRMC, Mar. Rec. Fish. Adv. Bd. and Com. Fish. Adv. Bd. Contract nos. RF-97-08 and CF-97-08. 56 p.
- Bain, M.B., and Jane L. Bain. 1982. Habitat Suitability Index Models: Coastal Stocks of Striped Bass. U.S. Fish and Wildlife Service, Division of Biological Services, FWS/OBS-82/10.1.
- Baker, W.D. 1968. A reconnaissance of anadromous fish runs into the inland fishing waters of North Carolina. Completion report for Project AFS-3. N.C. Wildlife Res. Comm. 33 pp.
- Bason, W.H. 1971. Ecology and early life history of striped bass, *Morone saxatilis*, in the Delaware estuary. *Bill. Ichthyological Associates*. 4: 1-122.
- Bayless, J.D. 1972. Artificial propagation and hybridization of striped bass, *Morone saxatilis* (Walbaum). *S.C. Wildlife Marine Res. Dep.* 135 pp.
- Beal, R. April, 2000. Public Information Document for Amendment 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass. Atlantic States Marine Fisheries Commission.
- Benville, P.E., and S. Korn. 1977. The acute toxicity of six monocyclic aromatic crude oil components to striped bass, *Morone saxatilis*, and bay shrimp, *Crago franciscorum*. *California Fish and Game* 63:204-209.

- Buckel, J.A., D.O. Conover, N.D. Steinberg, and K.A. Mckown. 1999. Impact of age-0 bluefish (*Pomatomus saltatrix*) predation on age-0 fishes in the Hudson River estuary: evidence for density dependent loss of juvenile striped bass (*Morone saxatilis*). *Can. J. Aqu. Sci.* 56: 275-287.
- Brocksen, R.W., and H.T. Bailey. 1973. Respiratory response of juvenile chinook salmon and striped bass exposed to benzene, a water soluble component of crude oil. Pages 783-791 in Proceedings of joint conference of prevention and control of oil spills. Am. Petroleum Inst., Environmental Protection Agency and U.S. Coast Guard, Washington, D.C.
- Buckler, D.R., P.M. Mehrle, L. Cleveland, and F.J. Dwyer. 1987. Influence of pH on the toxicity of aluminum and other inorganic contaminants to east coast striped bass. *Water Air Soil Pollut.* 35:97-106.
- Chittenden, M.E., Jr. 1971. Status of the striped bass, *Morone saxatilis* in the Delaware River. *Chesapeake Sci.* 12(3):131-136.
- Clark, J.R. 1967. Fish and man. Conflict in the Atlantic estuaries. *Am. Litt. Soc., Spec. Publ.* 5. 78pp.
- Doroshev, S.I. 1970. Biological features of the eggs, larvae, and young of the striped bass (*Roccus saxatilis* (Walbaum) in connection with the problem of its acclimation in the U.S.S.R. *J. Ichthyology* 10(2): 235-278.
- Garrison, L.P. and J. S. Link. 2002. A Dynamic Trophic Model to Assess the Atlantic Menhaden Population. Final project report and software submitted to the Atlantic States Marine Fisheries Commission, December 2001.
- Hall, L.W., Jr., D.T. Burton, and L.B. Richardson. 1981. Comparison of ozone and chlorine toxicity to the developmental stages of striped bass, *Morone saxatilis*. *Can. J. Fish Aquatic Sci.* 28: 752-757.
- Hartman, K. and S. Brandt. 1995a. Trophic resource partitioning, diets and growth of sympatric estuarine predators. *Trans. Am. Fish. Soc.* 124:520-537.
- Hartman, K. and S. Brandt. 1995b. Predatory demand and impact of striped bass, bluefish, and weakfish in the Chesapeake Bay: applications of bioenergetics models. *Can. J. Fish. Aquat. Sci.* 52: 1667-1687.
- Holland, B.F., Jr., and G.F. Yelverton. 1973. Distribution and biological studies of anadromous fishes offshore North Carolina. Div. Commer. Sport fish., N.C. Dep. Nat. Econ. Resour. Spec. Sci. Rep. 24. 132pp.
- Hill, J., J.W. Evans and M.J. Van Ben Avyle. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Atlantic) – striped bass. U.S. Fish and Wildlife Service, Division of Biological Services, Washington, D.C. Biological Report 82(11.118). U.S. Army Corps of Engineers, Waterways Experiment Station, Coastal Ecology Group, Vicksburg, MS. TR EL-82-4. 35 pp.
- Kosak – Channing, L., and G.G. Helz. 1979. Ozone reactivity with seawater components. *Ozone Sci. Eng.* 1 39-46.
- Manooch, C.S., III. 1973. Food habits of yearling and adult striped bass, *Morone saxatilis* (Walbaum), from Albemarle Sound, North Carolina. *Ches. Sci.* 14(2): 73-86.

- Mansueti, R.J. 1958. Eggs, larvae and young of the striped bass, *Roccus saxatilis*. Chesapeake Biol. Lab. Contrib. 112, 35 p.
- Marine Research Incorporated. 1976. A report on possible alternatives to chlorination for controlling fouling in power station cooling water systems. Final report. Marine Research Inc. Falmouth, MA. 157pp.
- Markle, D.F. and G.C. Grant. 1970. The summer food habits of young-of-the-year striped bass in three Virginia rivers. Ches. Sci. 11:50-54.
- Merriman, D. 1941. Studies on the striped bass (*Roccus saxatilis*) of the Atlantic Coast. U.S. Fish Wildlife Service Fish Bulletin. 50(35): 1-17.
- Miller, T. J., E. D. Houde and E. J. Watkins. 1996. Perspectives on Chesapeake Bay. Chesapeake Bay fisheries: Prospects for multispecies management and sustainability. Sci. and Tech. Advis. Comm. U. S. EPA Ches.Bay Program. Oct. 1996.
- Musick, J.A., E.O. Murdy, and R.S. Birdsong. 1997. Striped Bass, In Fishes of Chesapeake Bay. Smithsonian Institution, Washington. 218-220.
- North Carolina Division of Marine Fisheries. 1999. Stock status Report, Striped Bass <http://www.ncfisheries.net/stock.stribass.htm> (7/6/00).
- Raney, E.C. 1952. The life history of the striped bass, *Roccus saxatilis* (Walbaum). Bull. Bingham Oceanogr. Collect, Yale University 14(1):5-97.
- Richkus, W.A. 1990. Source document for the supplement to the striped bass fisheries management plan – Amendment #4. Atlantic States Marine Fisheries Commission, Washington, D.C. Fisheries Management Report No. 16.
- Rulifson, R.A., J.E. Cooper, and G.Coloumbo. 1986. Development of fed and starved striped bass (*Morone saxatilis*) larvae from the Roanoke River, North Carolina. N.C. Dep Nat. Resour. Comm. Rep. For ECU Grant/Contract No. 5-21432.
- Rulifson, R.A. 1989. Abundance and Viability of striped Bass Spawnd in the Roanoke River, North Carolina, In 1988. Institute for Coastal and Marine Resources, and Department of Biology, East Carolina University. APES 90-03.
- Rulifson, R.A. 1990. Abundance and Viability of striped Bass Spawnd in the Roanoke River, North Carolina, In 1989. Institute for Coastal and Marine Resources, and Department of Biology, East Carolina University. APES 90-11.
- Rulifson, R.A. 1992. Abundance and Viability of Striped Bass Spawnd in the Roanoke River, North Carolina, In 1990. Institute for Coastal and Marine Resources, and Department of Biology, East Carolina University. APES 90-03.
- Rulifson, R.A. 1993. Abundance and Viability of Striped Bass Spawnd in the Roanoke River, North Carolina, In 1991. Institute for Coastal and Marine Resources, and Department of Biology, East Carolina University. APES 93-04.

- Secor, D.H., T.M. Trice, and H.T. Hornick. 1995. Validation of otolith-based ageing and a comparison of otolith and scale-based ageing in mark-recaptured striped bass, *Morone saxatilis*. U.S. Fish & Wildlife Fish Bulletin. 93: 186-190.
- Schubel, J.R., T.S.Y. Koo, and C.F. Smith. 1976. Thermal effects of power plant entrainment on survival of fish eggs and larvae: a laboratory assessment. Chesapeake Bay Inst., Ref. 76-5 Spec. rep. 52 Johns Hopkins University. 37 pp.
- Setzler, E., W.R.B., K.V. Wood, Henry H. Zion, Lawrence Lubbers, Nancy K. Mountford; Phyllis Frere, Luther, and Joseph A. Mihursky. 1980. Synopsis of Biological Data on Striped Bass, *Morone saxatilis* (Walbaum). National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S., Department of Commerce, FAO Synopsis No. 121.
- Shepherd, G., 2000. Striped Bass, in Status of Fisheries Resource off Northeastern United States. Northeast fisheries Science Center, National Oceanic and Atmospheric Administration.
<http://www.nefsc.nmfs.gov/sos/spsyn/af/sbass/>
- Stevens, R.E. 1958. The striped bass of the Santee-Cooper reservoir. Proc. 11th Ann. Conf. SE Assn. Of Game and Fish Comm.: 253-264.
- Turner, J.L., and T.C. Farley. 1971. Effects of temperature, salinity, and dissolved oxygen on the survival of striped bass eggs and larvae. California Fish and Game 57:268-273.
- United States Department of Commerce and U.S. Department of Interior. (USDOC/USDOI). 1999. Striped bass research study report for 1999. U.S. Departments of Commerce and Interior, National Marine Fisheries Service and Fish and Wildlife Service, Silver Spring, MD, and Washington, D.C. 34 pp.
- United States Fish and Wildlife Service, Chesapeake Bay Fields Office. Striped Bass (*Morone saxatilis*).
<http://www.fws.gov/r5cbfo/striper.htm>.
- Ware, F.J. 1971. Some early life history of Florida's inland striped bass, *Morone saxatilis*. S.E. Assoc. Game and Fish. Comm. Proc. 24: 439-447.
- Waring, Gordon T., Janeen M. Quintal, Steven L. Swartz, , eds. 2000. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2000. NOAA Technical Memorandum NMFS-NE-162. [Also available on NMFS web site:
http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars.html].
- Westin, D.T., and B.A. Rogers. 1978. Synopsis of the biological data on the striped bass. Univ. R.I. Mar. Tech. Rep. No. 67. 154pp.

9.0 APPENDICES

APPENDIX 1: DETAILS OF STRIPED BASS PDT REFERENCE POINT CALCULATIONS - JANUARY 31, 2002

As directed by the ASMFC executive director and the chairman of the ASMFC Striped Bass Management Board, the striped bass Plan Development Team compiled estimates for a variety of target fishing mortalities. The models used in developing the values are those previously discussed by the Technical Committee and presented as options in the most recent draft of Amendment 6. The procedures used in the analysis are described in the following text and were agreed to by the SBTC during March 26-28, 2002.

Y/R and SSB/R Input

The sexual dimorphic life history parameters of striped bass presents a unique problem. The PDT explored options and settled on the use of the combined sex exploitation pattern. Additionally, the average male:female life history parameters were used (maturity was average of sexes assuming 50:50 overall sex ratio, maximum age of 25 and natural mortality of 0.15)

Weights at Age

Weight at age is a critical component of yield or spawning biomass per recruit calculations. Average weight at age from the VPA for 1995-2000 was applied to ages 1-13. (The period since restoration in 1995 was chosen but it should be noted that the data from 1998-2000 equaled 1997 and therefore were not independent estimates). Mean weights from the VPA time series were also used in calculation of spawning biomass from 1982-2000 used in the stock-recruitment calculations. Weights were applied equally to both sexes.

Weights at age derived from a length-weight equation were compiled from length-weight data available in state reports and applied to ages 14-25 in the yield and spawning biomass per recruit models. Mean length at age from 1982-1997 was applied to a length-weight equation to generate mean weights at age.

Exploitation Patterns

Another critical element was the exploitation pattern of the fishery relative to various size limits. There were three approaches depending on the application. An average PR (the partial recruitment or exploitation pattern by age) was determined from the 1995-2000 VPA results. The fishing mortalities at age were averaged as a geometric mean and the largest value was equivalent to age at full recruitment. Other ages were calculated relative to this maximum F value.

The PR from the 2001 VPA run was used as the current PR. Since the values peaked at age 10 with an $F=0.39$, this was the fishing mortality applied to the exploitation pattern.

An alternative approach was used for estimating patterns under varying size limits. The previously mentioned age-length data was used to calculate the probability that a fish was greater than the minimum size. For instance, if the minimum size were 26", the population would not be fully recruited until all fish at a given age were greater than 26". If 97% were greater at age 8, then the PR would equal 0.97. Comparison of the current PR (given size limits of approximately 20" and 28") was equivalent to the age-length method when the lower sizes were weighted by a factor of 2 in the average. Therefore, estimates with a split size were made averaging the lower size x 2 and the upper size x 1. The slot limit examined was estimated by calculating the probability that a fish was between 20-28" and 36" or greater. The

maximum value of each distribution was chosen which resulted in a bimodal distribution of selectivity. This assumes fish in the slot were equally vulnerable which may be over-estimating the contribution of larger fish.

This approach does not account for discards associated with under-sized fish and does not fully account for differential availability between producer area and coast.

Stock-Recruitment

Stock recruitment data consisted of age one recruits from the VPA and spawning biomass calculated external to the VPA. Stock numbers at age were split into male/female assuming a 50:50 sex ratio at age. The stock size matrix by sex was multiplied by a sex specific maturity at age vector then by a weight at age vector. Weight at age data was the 1982-2000 time series from the 2001 VPA. In order to maximize the information used to fit the s/r curve, the 2001 recruitment was estimated using the 2001 Maryland juvenile abundance index (JAI) and the relationship between previous JAIs and recruitment estimates. The 2001 estimated recruitment was 12,071,000. The data was fit to a Shepherd stock-recruitment curve and the parameters used to estimate F_{msy} , with the results from the yield per recruit and spawning stock biomass per recruit models in the manner described by Sissenwine and Shepherd (1987).

Targets and Thresholds

The PDT evaluated population size, spawning biomass and yield for a series of F target options. Target options of $F=0.2, 0.25, 0.30$ and $F_{msy} (0.41)$ and were compared to population estimates for 2000. Equilibrium recruitment, estimated from the stock-recruitment relationship, was multiplied by yield per recruit, spawning biomass per recruit and biomass per recruit to calculate potential yield, spawning biomass and total biomass at equilibrium.

Projections

Projections were made for the various exploitation patterns assuming annual recruitment equal to the 1995-2000 average of 10.1 million fish. Projections represented total striped bass abundance, abundance of fish age 15 and greater, total yield in number, yield in number of fish age 15 and greater and total yield in weight (mt). Stock abundance in the terminal year of the VPA was projected using the exploitation pattern associated with various size limits, the target F_s ($F=0.2, 0.25$ or 0.3) associated with those size limits and a natural mortality of 0.15. Since 13 was the maximum age in the VPA, the abundance values for age 15 and older were calculated beginning in 1995. The maximum F and the related selectivity estimate were applied across cohorts to create new 15+ values. Yield in weight was estimated using the 1995-2000 average weight at age from the VPA. The projections were for a ten year period beginning in 2002.

Changes in size limits or exploitation patterns result in changes in the associated biological reference points. To make comparisons under varying size limits, the % maximum spawning potential (%MSP) associated with the base F values was used as a standard for estimating comparable F values. For instance, if at $F=0.20$ with the 2000 size limits the %MSP equaled 26%, then the F associated with %MSP of 26% under a different size limit would be the equivalent fishing mortality.

APPENDIX 2: SUMMARY OF FISHERY DEPENDENT AND INDEPENDENT MONITORING PROGRAMS

Table 7. Summary of juvenile abundance index surveys including the state/agency responsible for conducting each survey.

RESPONSIBLE STATE AND AGENCY	SAMPLING AREAS
Maine: <i>Department of Natural Resources</i>	Kennebec River
New York: <i>Department of Environmental Conservation</i>	Hudson River
New Jersey: <i>Department of Environmental Protection</i>	Delaware River
Maryland: <i>Department of Natural Resources</i>	Chesapeake Bay Tributaries
Virginia: <i>Marine Resources Commission</i>	Chesapeake Bay Tributaries
North Carolina: <i>Division of Marine Fisheries</i>	Albemarle Sound

Table 8. Summary of spawning stock biomass surveys including the state/agency responsible for conducting each survey.

RESPONSIBLE STATE AND AGENCY	SAMPLING AREAS
New York: <i>Department of Environmental Conservation</i>	Hudson River ¹
Pennsylvania: <i>Fish and Boat Commission</i>	Delaware River ²
Delaware: <i>Division of Fish and Wildlife</i>	Delaware River ³
Maryland: <i>Department of Natural Resources</i>	Upper Chesapeake Bay ⁴ Potomac River ⁵
Virginia: <i>Marine Resources Commission</i>	Rappahannock River ⁶ James River ⁷
North Carolina: <i>Division of Marine Fisheries</i>	Roanoke River ⁸ Albemarle Sound ⁹

- ¹ Hudson River, West Point to Catskill
- ² Delaware River, State line to the Tacony-Palmyra Bridge
- ³ Delaware River, Delaware Memorial Bridge to state line
- ⁴ Upper Chesapeake Bay, Worton Point to Elkton
- ⁵ Potomac River, Maryland Point to White Stone Point
- ⁶ Rappahannock River, Tappahannock to Federicksburg
- ⁷ James River, Dancing Point to Tax Point
- ⁸ Roanoke River, upriver to spawning grounds
- ⁹ Albemarle Sound, Western sound approaches to river

Table 9. Required Fishery-Dependent Monitoring Programs Under Amendment 6

STUDY CATEGORY	NEEDS & GENERAL GUIDELINES	RESPONSIBLE STATE/ AGENCIES
Commercial catch composition	NEED: Define structure of exploitation, calculation of mortality rates, VPA GUIDELINES: Samples should be representative of location and seasonal distribution of catch, and should include size and sex composition. Collection of scales is conditional; if scale:age relationships from previous years are validated, indirect methods may be used	States with commercial fisheries (MA, NY, RI, DE, MD, VA, PRFC, NC)
Commercial catch and effort	NEED: Track mortality in a general way, VPA GUIDELINES: Surveys should produce reliable measures of catch (numbers and weight) and effort in gear days fished.	States with significant commercial fisheries (MA, NY, MD, VA, PRFC)
Recreational catch composition	NEED: Define structure of exploitation, calculation of mortality rates, VPA GUIDELINES: Samples should be representative of location, seasonal distribution, and age and size frequency (including sublegals).	MA, RI, CT, NY, NJ, MD, VA, PRFC
Recreational catch and effort	NEED: Track mortality in a general way, VPA. GUIDELINES: States should supplement NMFS MRFSS to achieve a 20% CV, or may propose specialized striped bass surveys to better assess harvest. MRFSS without supplementation may be used by other states with a recreational fishery.	NMFS, MA, RI, CT, NY, NJ, MD, VA, PRFC

APPENDIX 3. THE DERIVATION OF THE COASTAL COMMERCIAL QUOTA ALLOCATION

The Striped Bass Management Board approved an increase to the coastal commercial quota to 100% of the average commercial landings during 1972-1979 for all coastal commercial fisheries except Delaware's coastal commercial fishery. The Management Board decided to maintain Delaware's commercial quota at the level allocation during the 2002 fishery (193,447 pounds). The decision to hold Delaware's commercial quota at the 2002 level is based on tagging information that indicates the fishing mortality rate on the Delaware River/Bay stock is too high. There is also some uncertainty regarding the status of the spawning stock for the Delaware River/Bay. Due to both of these concerns, the Management Board held Delaware's commercial quota constant.

Table 10 provides the Amendment 6 coastal commercial quotas in pounds for each jurisdiction. Table 11 shows each jurisdiction's commercial landings from 1972 to 1979, as well as the average commercial landings for this period. The landings in Table 11 come from Table 4.4.1 in the *Source Document for the Supplement to the Striped Bass FMP – Amendment 4* (ASMFC 1990), except for Virginia. The landings in the source document include landings from inland rivers and bays, so the Commonwealth of Virginia provided the coastal commercial landings from its records for the base period.

New York, Maryland, and North Carolina also have significant commercial striped bass fisheries in the inland rivers, as a result Table 11 represents the total commercial landings for these three states. Table 7 of *Amendment 5 to the Striped Bass Management Plan* provides the striped bass commercial quotas for the coastal area jurisdictions under a variety of size limits (ASMFC 1995). The quota listed in Table 7 of Amendment 5, under a size limit of 28 inches, is 70% of the state's average coastal commercial landings during the 1972-1979 base period. To derive the Amendment 6 coastal commercial quota for New York, Maryland, and North Carolina, the 1996 quota, under a 28-inch size limit, was increased by 43% to bring it back up to 100% of the average coastal commercial landings during 1972-1979. Table 12 shows the Amendment 5 coastal commercial quota for New York, Maryland, Virginia, and North Carolina and the 2002 commercial quota for Delaware.

Table 10. Amendment 6 Allocation of the Coastal Commercial Quota (in pounds).

State	Allocation (lbs.)
Maine	250
New Hampshire	5,750
Massachusetts	1,159,750
Rhode Island	243,625
Connecticut	23,750
New York	1,061,060
New Jersey	321,750
Delaware	193,447
Maryland	131,560
Virginia	184,853
North Carolina	480,480

Table 11. Commercial Striped Bass Landings (in pounds) from 1972-1979 (ASMFC 1990).

YEAR	STATE										
	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC
1972	-	16,000	1,174,000	309,000	-	836,000	373,000	248,000	3,229,000	477,800	1,261,000
1973	-	15,000	1,386,000	623,000	-	1,741,000	766,000	586,000	4,976,000	289,580	1,752,000
1974	-	5,000	1,258,000	336,000	-	1,409,000	714,000	212,000	3,503,000	431,439	1,016,000
1975	1,000	4,000	1,360,000	306,000	-	1,184,000	342,000	106,000	2,897,000	153,617	1,303,000
1976	-	2,000	1,360,000	154,000	63,000	851,000	137,000	80,000	1,897,000	72,285	1,038,000
1977	-	2,000	1,185,000	110,000	56,000	766,000	125,000	57,000	1,815,000	10,803	571,000
1978	1,000	2,000	860,000	57,000	26,000	1,122,000	77,000	38,000	1,265,000	11,454	698,000
1979	-	-	695,000	54,000	45,000	570,000	40,000	26,000	947,000	31,843	614,000
Total	2,000	46,000	9,278,000	1,949,000	190,000	8,479,000	2,574,000	1,353,000	20,529,000	1,478,821	8,253,000
Average	250	5,750	1,159,750	243,625	23,750	1,059,875	321,750	169,125	2,566,125	184,853	1,031,625

Table 12. The Derivation of the Amendment 6 coastal commercial quotas (in pounds) for New York, Maryland, Delaware and North Carolina.

STATE	DE	STATE	NY	MD	NC
2002 Quota	193,447	Amendment 5 Allocation (28")	742,000	92,000	336,000
43% increase	<i>no increase</i>	43% increase	319,060	39,560	144,480
Amendment 6 Quota	193,447	Amendment 6 Quota	1,061,060	131,560	480,480

APPENDIX 4: ATLANTIC STRIPED BASS COMMERCIAL AND RECREATIONAL REGULATIONS BY STATE

Table 13. State Commercial Fishery Regulations for Atlantic Striped Bass*

* All regulations are subject to change. The following table summarizes the state regulations for the Atlantic striped bass fishery prior to the implementation of Amendment 6 (in 2001). Readers should contact their state fisheries offices for detailed and current regulations.

STATE	SIZE LIMITS	SEASONAL QUOTA (LB)	OPEN SEASON
Maine	No Fishery		
New Hampshire	No Fishery	4,000	
Massachusetts	34" minimum	802,000	July 3 until quota is reached
Rhode Island	28" min. (trap fishery) 34" min. (hook & line)	52,502 (trap) 81,390 (H & L)	1 June – July (4 fish, H&L) Aug. 1 until quota reached (4 fish, H&L)
Connecticut	No Fishery		
New York	24" –36"	590,155	July 1 - Dec. 15
New Jersey	No Fishery	Bonus fishery of 225,000 lbs. from Comm. cap	
Pennsylvania	No Fishery		
Delaware	20" Minimum	193,447 lb.	GILLNET 1 March – 30 April, 15 Nov. – 30 Dec. HOOK AND LINE 1 Sep. – 31 Dec. SPAWNING GROUNDS 1 Jan. – 31 March 1 June – 31 December
Maryland	BAY AND RIVERS 18" – 36" OCEAN 24"	BAY AND RIVERS 1,761,000 lb. (portion of 10,500,000 lb. baywide quota OCEAN 91,000 lb.	BAY POUND NET 1 June – 30 Nov. BAY HAUL SEINE 7 June – 29 Nov. BAY HOOK AND LINE 18 June – 28 Nov. BAY DRIFT GILL NET 1 Jan. – 28 Feb., 2 Dec. – 31 Dec. OCEAN 1 Jan. – 30 April, Nov. 1 – 31 Dec.
PRFC	18 – 35"	883,850 lb. (part of 10,500,000 lb. baywide quota)	Seasons for fyke nets, haul seines, gillnets, poundnets, and hook and line fisheries.
District of Columbia	No Fishery		
Virginia	BAY AND RIVERS 18" min & 28" max from March 26 - June 15 OCEAN 28" minimum	1,701,748 lb. (portion of 10,500,000 lb. baywide quota)	BAY AND RIVERS 1 Feb – 31 Dec. OCEAN 1 Feb – 31 Dec.
North Carolina	ALBEMARLE SOUND 18" ATLANTIC OCEAN 28"	ALBEMARLE SD. 225,000 ATLANTIC OCEAN 336,000	ALBEMARLE SOUND Spring and Fall Seasons ATLANTIC OCEAN Seasons Based on Gear Type

Table 14. State Recreational Fishery Regulations for Atlantic Striped Bass.*

* All regulations are subject to change. The following table summarizes the state regulations for the Atlantic striped bass fishery prior to the implementation of Amendment 6 (in 2001). Readers should contact their state fisheries offices for detailed and current regulations.

STATE	SIZE LIMITS	DAILY BAG LIMIT	SEASONAL QUOTA (LB)	OPEN SEASON
Maine	20 – 26” 40” minimum	1 fish between 20” and 26” <u>OR</u> 1 fish above 40”	None	Catch & Release only spawning areas after May 1
New Hampshire	28” minimum	1 fish	None	All year
Massachusetts	28” minimum	1 fish	None	All year
Rhode Island	28” minimum	2 fish	None	All year
Connecticut	Shore/Private Boats 24 – 32” 41” minimum Party/Charter Boats 28” minimum	1 fish between 24” and 32” <u>AND</u> 1 fish above 41” 2 fish	None	All year
New York	Hudson River 18” minimum Ocean and Delaware River 28” minimum	Hudson River 1fish Ocean 1 fish Charter and Delaware River 2 fish	None	Hudson River 15 Mar. - 30 Nov. Ocean 8 May – 15 Dec. Delaware River All year
New Jersey	24 – 28” 28” minimum Bonus Program 28” minimum	1 fish between 24” and 28” <u>AND</u> 1 fish above 28” Bonus Program 1/day in addition to regular fishery	Bonus program of 225,000 lbs. from commercial cap	All year, except <u>Delaware River</u> <u>spawning grounds:</u> 1 Jan – Mar 31 1 June - 31 Dec <u>Other Rivers:</u> 1 Mar – 31 Dec.
Pennsylvania	28” minimum	2	None	Non-Tidal All year Tidal Delaware River March, 1 June – 31 Dec
Delaware	24 – 28” 28” minimum	1 fish between 24” and 28” <u>AND</u> 1 fish above 28”	None	All year, except <u>Delaware River</u> <u>spawning grounds:</u> 1 Jan – Mar 31 1 June - Dec 31

Table 14 (continued). State Recreational Fishery Regulations for Atlantic Striped Bass.*

* All regulations are subject to change. The following table summarizes the state regulations for the Atlantic striped bass fishery prior to the implementation of Amendment 6 (in 2001). Readers should contact their state fisheries offices for detailed and current regulations.

STATE	SIZE LIMITS	DAILY BAG LIMIT	SEASONAL QUOTA (LB)	OPEN SEASON
Maryland	Spring 28" minimum Summer/Fall 18 – 28" 28" minimum Ocean 28" minimum	Spring 1 fish Summer/Fall 2 fish between 18" and 28" OR 1 fish between 18" and 28" AND 1 fish above 28" Ocean 2	Spring Part of 30,000 fish cap Summer/Fall 3,764,450 lb. (portion of 10,500,000 lb baywide quota) Ocean None	Spring Bay: 20 Apr. – May15 Potomac tribs: 20 Apr. – 15 May Summer/Fall Bay: 16 May – 15 Dec. Potomac tribs: 16 May – 31 Dec. Ocean All year
PRFC	Spring 28" minimum Summer/Fall 18" (28")	Spring 1 Summer/Fall 2 fish, only one of which may be larger than 28"	Spring Portion of 30,000 fish cap Summer/Fall 723,150 lb. (portion of 10,500,000 lb baywide quota)	Spring 15 April – 15 May Summer/Fall 16 May – 31 December
District of Columbia	18" Minimum 36" Maximum	1	None	4 May – 31 July 1 Sept. – 17 Nov.
Virginia	Spring 18 – 28" Trophy 32" minimum Fall 18" Ocean 28"	Spring 2 fish Trophy 1 fish Fall 2 fish Ocean 2 fish	Trophy Portion of 30,000 fish cap Spring/Fall 1,701,748 lb. (portion of 10,500,000 lb baywide quota) Ocean None	Spring 16 May – 15 June Trophy 1 May – 15 May Fall 4 Oct. – 31 Dec. Ocean 1 Jan – 31 Mar 16 May – 31 Dec
North Carolina	Roanoke River 18" Minimum, but no fish between 22 - 27" in April & May Sounds and Rivers 18" minimum Atlantic Ocean 28" minimum	Rivers 3 fish Albemarle Sound 2 fish Atlantic Ocean 2 fish	Roanoke Riv. 112,500 Albemarle Sd 56,250 spring 56,250 fall Other Areas None Atlantic Ocean None	Roanoke River Tues., Wed., Sat., Sun. from 15 Mar Albemarle Sd. Wed., Fri., Sat., Sun. from 1 Jan Other Areas All year Atlantic Ocean All year

APPENDIX 5: COMPLIANCE REPORT OUTLINE

ATLANTIC STATES MARINE FISHERIES COMMISSION

State Reporting Requirements for FMPs

The ISFMP will send out a notice 90 days prior to the report submission deadline requesting submission of the standard report, including any specific compliance requirements as mandated by the FMP.

All compliance reports should follow the general format below (Sections I-IV), and include any additional details as specified in Sections V-VI of this document:

I. Introduction

- A. Summary of the year: highlight any significant changes in monitoring, regulations, or harvest.

II. Request for *de minimis*, where applicable.

III. Previous calendar year's fishery and management program

- A. Harvest and losses (refer to Table 9 in Amendment 6 to the Atlantic Striped Bass FMP)

- i. Commercial fishery

- (1) Characterization of fishery (seasons, cap, gears, regulations)
 - (2) Characterization of directed harvest
 - (a) Landings and method of estimation
 - (b) Catch composition
 - (i) Age frequency
 - (ii) Length frequency
 - (iii) Sex
 - (c) Estimation of effort
 - (3) Characterization of other losses (poaching, bycatch, etc.)
 - (d) Estimate and method of estimation
 - (e) Estimate of composition (length and/or age)

- ii. Recreational fishery

- (1) Characterization of fishery (seasons, cap, gears, regulations)
 - (2) Characterization of directed harvest
 - (a) Landings and method of estimation
 - (b) Catch composition
 - (i) Age frequency
 - (ii) Length frequency (legal and sub-legal catch)
 - (c) Estimation of effort
 - (3) Characterization of other losses (poaching, hook and release mortality, etc.)
 - (d) Estimate and method of estimation
 - (e) Estimate of catch composition

- iii. Other losses

- iv. Harvest and losses - including all above estimates in numbers and weight (pounds) of fish, and mean weight per fish for each gear type.

- B. Required fishery independent monitoring programs (refer to Table 7 and 8 in Amendment 6 to the Atlantic Striped Bass FMP)

- i. Description of requirement as outlined in Atlantic Striped Bass Amendment 6
- ii. Brief description of work performed
- iii. Results (as applicable to program)
 - (1) Juvenile indices
 - (a) Index of abundance
 - (b) Variance
 - (2) Spawning stock assessment
 - (a) Length frequency
 - (b) Age frequency
 - (c) Sex
 - (3) Stock characterization
 - (a) Length frequency
 - (b) Age frequency
 - (c) Sex
 - (d) Catch per unit effort
 - (4) Tagging
 - (a) Number of fish tagged

IV. Planned management programs for the current calendar year

- A. Summarize regulations that will be in effect.
(Copy of current regulations if different from III c.)
- B. Summarize monitoring programs that will be performed.
- C. Highlight any changes from the previous year.