Fishery Management Report No. 39

of the

Atlantic States Marine Fisheries Commission

Amendment 4 to the Interstate Fishery Management Plan For Weakfish

November 2002
Revised by Technical Addendum 1
March 2003

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Prepared by

Atlantic States Marine Fisheries Commission
Weakfish Plan Development Team

Plan Development Team Members:

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This Management Plan was prepared under the guidance of the Atlantic States Marine Fisheries Commission's Weakfish Board, chaired by Gordon Colvin of New York. Technical and advisory assistance was provided by the Weakfish Technical Committee, the Weakfish Stock Assessment Subcommittee, and the Weakfish Advisory Panel.

This is a report of the Atlantic States Marine Fisheries Commission pursuant to U.S. Department of Commerce, National Oceanic and Atmospheric Administration Award Nos. NA17FG1050 and NA17FG2205.

EXECUTIVE SUMMARY

1.0 INTRODUCTION

The weakfish program functions under the Commission's Interstate Fisheries Management Program (ISFMP), with immediate oversight provided by the Weakfish Management Board. Amendment 1 to the original *Interstate Fishery Management Plan for Weakfish,* which was adopted in October 1991, was not successful in improving the status of weakfish. Amendment 2 was implemented in April 1995, and resulted in some improvement. However, lower than average commercial and recreational catch rates, a lack of older fish, variable recruitment strength, and below average spawning stock biomass (SSB) mandated further improvements. However, the most recent stock assessment with data through the year 2000 indicates that the stock was not doing as poorly as was thought at the time Amendment 3 was developed.

Amendment 3, adopted in June 1996, was designed to reduce fishing mortality (F) to 0.50 by 2000, restore an expanded age structure, and restore fish to their full geographical extent. Under Amendment 3, weakfish commercial fisheries were regulated by a combination of season and area closures as well as mesh regulations. Bycatch reduction devices (BRD) were required for shrimp fisheries in the South Atlantic to reduce mortality of age 0 and 1 weakfish. The weakfish recreational fishery was regulated by equivalent, state-specific minimum size and possession limits. Each state used management scenarios that are equivalent to or more conservative than 12 inches minimum size and the 4 fish bag limit. Bag limits were not required once minimum size rose to 16 inches.

In 2000, the Weakfish Board heard information offered by the 30th Stock Assessment Review Committee (SARC) and the Weakfish Stock Assessment Subcommittee (SAS) regarding the level of the weakfish stock. The Committee concluded that weakfish were at high levels of biomass and that fishing mortality in 1998 was below the management target of 0.5 for the year 2000. This indicated that the weakfish fishery had met many of the goals it set to achieve in Amendment 3. However, the SAW/SARC indicated that low fishing mortality levels should be maintained to expand size and age structure of weakfish stocks and ensure an appropriate spawning stock biomass.

The Technical Committee and Plan Review Team raised several issues and in order to address them the Weakfish Board decided a new amendment was warranted. Specifically, this Amendment includes revised reference points and reference periods that will lead the states to new fishery management measures. In 2000, the ASMFC Weakfish Management Board approved Addendum I to Amendment 3 in order to extend the current fishery management measures until the Board approved Amendment 4. Amendment 4 was passed in November 2002 and replaces Addendum I to Amendment 3.

Statement of the Problem (1.1.1)

The effect of Amendment 3's management program (bycatch reduction devices in the southern shrimp fishery, commercial management restrictions including mesh size regulations, area closures, seasonal closures, and recreational management measures including bag and size limits) was positive. Fishing mortality decreased, stock biomass increased, and age and size structure expanded.

However, there were several issues that needed to be addressed that led to the development of this Amendment. The target reference point in Amendment 3 was too high to ensure a proper spawning stock biomass. Amendment 4's reference points are more likely to promote expansion of the size/age structure and geographic range. Also, the recreational reference period in Amendment 3 did not reflect age and size structure of the weakfish population fished at a target F over an extended time period. The Technical Committee recommended abandoning the early 1990's reference period for the recreational fishery that

reflected an overfished stock and adopting 1981 – 1985 as a new reference period. The early 1980's better represents a healthy stock with a substantial presence of larger and, presumably, older weakfish.

2.0 GOAL, OBJECTIVES, AND OVERFISHING DEFINITION

The goal of Amendment 4 is to utilize interstate management so that Atlantic coast weakfish recover to healthy levels which will maintain commercial and recreational harvests consistent with a self-sustaining spawning stock and to provide for restoration and maintenance of essential habitat.

OBJECTIVES (2.3)

1) Establish and maintain an overfishing definition that includes target and threshold fishing mortality rates and a threshold spawning stock biomass to prevent overfishing and maintain a sustainable weakfish population.

2) To restore the weakfish age and size structure to that necessary for the restoration of the fishery.

3) To return weakfish to their previous geographic range.

4) To achieve compatible and equitable management measures among jurisdictions throughout the fishery management unit, including states' waters and the federal Exclusive Economic Zone.

5) To promote cooperative interstate research, monitoring and law enforcement necessary to support management of weakfish.

6) To promote identification and conservation of habitat essential for the long term stability in the population of weakfish.

7) To establish standards and procedures for both the implementation of Amendment 4 of the Weakfish FMP and for determination of states' compliance with the provisions of the management plan.

DEFINITION OF OVERFISHING (2.5)

This Amendment uses an overfishing definition with a fishing mortality target of $F_{target} = F_{30\%} = 0.31$, a fishing mortality threshold of $F_{threshold} = F_{20\%} = 0.5$, and a spawning stock biomass threshold of $SSB_{threshold} = SSB_{20\%} = 31.8$ million pounds. An F greater than 0.5 is equal to overfishing and a SSB less than 31.8 million pounds equals overfished.

3.0 DATA MONITORING

In order to collect the necessary information to conduct the annual weakfish stock assessment update, any state that lands at least 150,000 pounds annually (2.5% of the coastwide landings in 2000, NMFS) must sample for biological information. Currently, this would include the states of Rhode Island, New York, New Jersey, Delaware, Maryland, Virginia and North Carolina. All states that land at least 150,000 pounds per year are required to collect at least 100 otolith ages and 300 lengths. All states that land more than 500,000 pounds and less than 1,000,000 pounds per year are required to collect at least 200 otolith ages and 600 lengths. All states that land more than 1,000,000 pounds per year are required to collect at least 300 otolith ages and 900 lengths. The samples should be representative of the state's commercial and recreational landings. The data should be stratified by area fished, calendar quarter, major gears and market category.

Given that state landings vary from year to year, and to avoid states having to change the number of samples they are collecting each year, states should base their sampling programs on their most recent year's landings when they submit their plan for Amendment 4. Then states should revise every other year

based on an average of the past two year's landings. The sampling program should be included in the annual compliance report for Plan Review Team review.

4.0 MANAGEMENT PROGRAM IMPLEMENTATION

RECREATIONAL MANAGEMENT MEASURES (4.1)

In order to achieve annual fishing mortality targets, recreational harvest will be constrained by a combination of size limits and possession limits. States may choose one of several creel limit/minimum size combinations for its recreational fishery. They may allow a: 7 fish creel limit with a minimum size of 12 inches; 8 fish creel limit with a minimum size of 13 inches; 9 fish creel limit with a minimum size of 14 inches; or 10 fish creel limit with a minimum size of 15 inches and greater. States may choose only one creel limit/minimum size combination for their state. There may be no variations by season, area, or angler. States may also submit an alternative management proposal as described in *Section 4.5* of this document.

COMMERCIAL MANAGEMENT MEASURES (4.2)

To achieve fishing mortality targets, commercial fisheries will be constrained by size limits, gear restrictions, and possibly season and/or area closures. To maintain current fishing mortality rates that have led to the strong improvements in the weakfish population, states shall maintain the commercial management measures they have had in place with Amendment 3. If Technical Committee or Plan Review Team review indicates a state is exceeding the mortality goals outlined in Amendment 3, the Management Board may require additional commercial management measures to meet those mortality goals. States may instead submit an alternative management proposal which outlines how the new management proposal is equivalent to their management regime under Amendment 3 in terms of maintaining fishing mortality and spawning stock biomass. Those states that did not develop a commercial fishery management plan under Amendment 3 because they were *de minimis* and are now no longer *de minimis* must develop a management plan that achieves a 33% reduction using the data in the last three years.

The reference period for commercial management measures is 1990 - 1992. Delaware and New Jersey's reference periods are 1989 – 1991. Both Delaware and New Jersey have earlier time periods because they imposed regulations in the 1990 – 1992 time frame. Because the commercial fishery has changed drastically over the years, choosing an earlier time frame would be inappropriate.

Appendix I contains the evaluation manual which outlines the details of the commercial management measures including mesh size regulations, reduction formulas, etc.

Bycatch (4.2.1)

A directed fishery is defined by the ASMFC Interstate Fisheries Management Program Charter as "fishing for a stock using gear or strategies intended to catch a given target species, group of species, or size class." Any fishery landing weakfish over the bycatch allowance outlined below is considered a directed fishery and must abide by all regulations including closed area, closed seasons, and gear restrictions except in any specific exceptions outlined below.

States may allow fishermen targeting species other than weakfish (i.e. non-directed fisheries) to possess no more than 300 pounds in any one day or trip (whichever is the longer period of time) as allowable bycatch during any otherwise closed seasons. Fishermen are permitted this 300 pound allowance provided that there is at least an equal poundage of other species as weakfish on board the vessel. Any state that chooses to implement this allowance must have a reporting system in place that will allow adequate quantification of any such catch. Furthermore, each state that chooses to allow a "bycatch allowance" must account for any harvest of weakfish from non-directed fisheries in their state plans. Any

bycatch of weakfish retained in non-directed fisheries must be at least 12 inches or greater total length except for any exceptions outlined in *Section 4.2.2*.

At no time will the commercial hook and line fishery be permitted any bycatch allowance of weakfish during any otherwise closed season.

The southern penaeid shrimp fishery is permitted 150 pounds of weakfish as bycatch allowance provided that there is at least an equal poundage of other species as weakfish on board the vessel.

Minimum Fish Size (4.2.2)
Each state shall be required to promulgate regulations for its directed commercial fisheries that prohibit landing of weakfish less than 12 inches TL.

Up to 300 undersized weakfish taken in finfish trawl fisheries may be landed. None of the undersized fish can be sold.

Pound net and haul seine fisheries within internal waters are allowed to harvest fish smaller than 12 inches total length. However, catches from these fisheries must be monitored and accounted for in each state's proposal. Harvest of smaller fish requires that states comply with conservation equivalencies as outlined in *Section 4.5*. For example, conservation equivalencies may require states with pound net or haul seine fisheries to shorten seasons. The Weakfish Management Board will consider further exceptions within internal waters (with conservation equivalencies required) on a case by case basis.

Notwithstanding *Section 4.5*, no other gears may harvest and retain weakfish smaller than 12 inches TL.

Minimum Mesh Size for Nets (4.2.3)
Directed weakfish fisheries are required to use mesh sizes that retain 25% or less of weakfish less than 12 inches TL (often called L25 mesh sizes). These mesh sizes for commercial gill nets and fish trawl nets are listed in Table I-1 in the Evaluation Manual. If a state chooses to allow mesh sizes that do not achieve a L25 of 12 inches, it can use conservation equivalency (e.g. longer closed seasons) to satisfy the mesh size requirement (see Appendix I). In the event that calculated mesh sizes do not directly correspond to manufacturers mesh sizes, the next higher commercially available mesh size shall be required.

The L25 mesh sizes as currently listed in Table I-1 are based on the best available science. States are encouraged to conduct studies and present evidence to the Weakfish Technical Committee that would further refine the L25 mesh sizes and amend the table.

Closed Season (4.2.4)
States may determine timing of closed seasons of sufficient length to reach their mortality goals. Any state proposing such a closure would have to show to the satisfaction of the Board that the closure will achieve the desired reduction in mortality.

Closed Area (4.2.5)
States may use area closures to account for required reductions in mortality. Any state proposing such a closure would have to show to the satisfaction of the Board that the closure will achieve the desired reduction in mortality.

Bycatch Reduction Devices (BRDs) And Methods (4.2.8)
Over time, bycatch reduction devices have been developed for many gears to reduce the take of both undersized and legal sized weakfish. As additional bycatch reduction devices are developed, the Management Board may choose to provide incentives or require these devices in order to reduce bycatch.

One or more BRDs shall be required in all food shrimp (penaeid) trawl nets with a headrope length exceeding 16 feet and having mesh less than 2.5 inches stretched inside measurement (middle to middle knot measurement). All BRDs must be certified, properly installed, and demonstrate a 40% reduction by number or 50% reduction of bycatch mortality of weakfish when compared to catch rates in a naked net.

Landings data indicates that most scrap landings come from the pound net fishery. Escape panels in this fishery are workable and can be effective. By the 2004 fishing season, the Weakfish Technical Committee will develop recommendations for the use of bycatch reduction devices (i.e. escape panels) in pound nets. States may choose to implement an incentive-based program for these escape panels.

States are encouraged to continue research on gear technology and methods that will result in further bycatch reductions.

ALTERNATIVE STATE MANAGEMENT REGIMES (4.5)

Once approved by the Weakfish 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 non-compliance 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 Amendment 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.

De minimis Fishery Guidelines (4.5.3)

The ASMFC Interstate Fisheries Management Program Charter defines *de minimis* as "a situation in which, under the 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).

A state may apply for *de minimis* status if, for the last two years, its combined average commercial and recreational landings (by weight) constitute less than 1% of the annual coastwide commercial and recreational landings for the same two year period. States may petition the Weakfish Management Board at any time for *de minimis* status. 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.

ADAPTIVE MANAGEMENT (4.6)

The Weakfish Management Board may vary the requirements specified in this Amendment as a part of adaptive management in order to conserve the weakfish resource. Specifically, the Management Board may change target fishing mortality rates and harvest specifications, other measures designed to prevent overfishing of the stock complex, or any spawning component. Such changes will be instituted to be effective on the first fishing day of the following year, but may be put in place at an alternative time when deemed necessary by the Management Board. These changes should be discussed with the appropriate federal representatives and Councils prior to implementation in order to be complementary to the regulations for the EEZ.

Measures Subject to Change (4.6.2)

The following measures are subject to change under adaptive management upon approval by the

Weakfish Management Board:

(1) Fishing year and/or seasons;
(2) Area closures;
(3) Overfishing definition, MSY and OY;
(4) Rebuilding targets and schedules;
(5) Catch controls, including bag and size limits;
(6) Effort controls;
(7) Bycatch allowance
(8) Reporting requirements;
(9) Gear limitations;
(10) Measures to reduce or monitor bycatch;
(11) Bycatch reduction certification criteria or targets
(12) Observer requirements;
(13) Management areas;
(14) Recommendations to the Secretaries for complementary actions in federal jurisdictions;
(15) Research or monitoring requirements;
(16) Frequency of stock assessments;
(17) Stock enhancement protocols;
(18) *De minimis* specifications;
(19) Management unit;
(20) Catch allocation; and
(21) Any other management measures currently included in Amendment 4.

RECOMMENDATIONS TO THE SECRETARIES FOR COMPLEMENTARY ACTIONS IN FEDERAL JURISDICTIONS (4.9)

As contemplated in 16 USC 5102 (1)(C) and 5103 (b), the Atlantic States Marine Fisheries Commission recommends that in order to maintain consistency, the Secretary of Commerce maintain the following measures which were instituted under Amendment 3 and amended in this Amendment concerning management of weakfish in the exclusive economic zone (EEZ):

- require a minimum weakfish size of 12 inches total length;
- require weakfish recreationally harvested in the EEZ comply with the laws in the state in which they are landed;
- require that weakfish commercially harvested in the EEZ be landed in accordance with the landing laws of the state in which they are landed, with the exception that weakfish caught commercially in the EEZ may not be landed in a *de minimis* state;
- require minimum mesh sizes in the EEZ consistent with a 12-inch minimum fish size. Non-directed fisheries using smaller mesh sized may possess no more than 300 pounds of weakfish during any one day or trip, whichever is longer in duration; and
- require the use of flynets in EEZ waters south of Cape Hatteras to be consistent with adjacent state regulations.

The Weakfish Management Board will annually review their position with regard to EEZ regulations and may provide recommendations for any changes to the National Marine Fisheries Service.

The Atlantic States Marine Fisheries Commission recognizes that the Secretary of Commerce may take this action through the fishery management planning process contained in the Magnuson-Stevens Fishery Conservation and Management Act or the Atlantic Coastal Fisheries Cooperative Management Act.

5.0 COMPLIANCE

Full implementation of the provisions of this Amendment is necessary for the management program to be equitable, efficient and effective. States are expected to implement these measures faithfully under state laws. Although the Atlantic States Marine Fisheries Commission does not have authority to directly compel state implementation of these measures, it will continually monitor the effectiveness of state implementation and determine whether states are in compliance with the provisions of this fishery management plan. This section sets forth the specific elements states must implement in order to be in 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).

Compliance Schedule (5.1.2)

States must implement Amendment 4 according to the following schedule:

January 15, 2003	States must submit programs to implement Amendment 4 for approval by the Weakfish Management Board. Programs must be implemented upon approval by the Management Board.
July 1, 2003	States with approved management programs must implement Amendment 4. States may begin implementing management programs prior to this deadline if approved by the Management Board.

6.0 MANAGEMENT AND RESEARCH NEEDS

Weakfish Amendment 4 contains a list of management and research needs that should be addressed in the future in order to improve the current sate of knowledge of weakfish biology, stock assessment, population dynamics, habitat issues, social and economic issues. By no means are these lists of research needs all-inclusive, and they will be reviewed and updated annually through ASMFC's FMP Review process.

7.0 PROTECTED SPECIES

Weakfish Amendment 4 provides an overview of the protected species known to occur throughout the range of weakfish and potential interactions with weakfish fisheries.

ACKNOWLEDGEMENTS

Amendment 4 to the Interstate Fishery Management Plan for Weakfish was developed under the supervision of the Atlantic States Marine Fisheries Commission's Weakfish Management Board chaired by Gordon Colvin of New York. Members of the Plan Development Team (PDT) include Russ Allen (NJ DFW), Louis Daniel (NC DMF), Jim Kirkly (VIMS), Wilson Laney (USFWS), John McClain (NJ DFW), Stewart Michels (DE DMF), Carrie Selberg (ASMFC, PDT Chair), Brent Stoffle (Rutgers University), Andy Strelcheck (FL FWC), Jim Uphoff (MD DNR), and Alice Weber (NY DEC).

Considerable support was provided by the Weakfish Technical Committee, chaired by Desmond Kahn of Delaware and the Weakfish Stock Assessment Committee, chaired by Jim Uphoff of Maryland. The Plan Development Team would like to thank Desmond Kahn for all his work on updating the Weakfish Stock Assessment.

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1.0 INTRODUCTION

1.1 BACKGROUND INFORMATION

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1.1.1 Statement of the Problem

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1980's better represents a healthy stock with a substantial presence of larger and, presumably, older weakfish.

1.1.2 Benefits to Implementation

Implementation of Amendment 4 is designed to continue the stock recovery seen during the implementation of Amendment 3 to benefit the ecosystem as well as commercial and recreational fisheries. The management measures under Amendment 4 are designed to continue to increase the age and size structure of the population as well as increasing the geographic range.

1.2 DESCRIPTION OF THE RESOURCE

This brief resource description is summarized from several reports referenced in this document and is intended to provide the reader with the basic information necessary to understand weakfish. The reader is referenced to reports for literature that documents life history details.

1.2.1 Weakfish Life History

The weakfish is a moderately-lived (at least up to 17 – 18 years of age but larger fish have not been aged; Mercer 1985, 1989) species that normally spends the majority of its adult life in coastal estuaries and the ocean, migrating north and south and onshore/offshore seasonally. Please see Table 9 for relationships between ages and sizes for weakfish

Mature female weakfish (ages 1 and older) produce large quantities of eggs, that are fertilized by mature males (ages 1 and older) as they are released into waters of nearshore and estuarine spawning areas. Length at maturity is less for southern fish than for northern fish. Southern fish are suggested to produce more eggs at smaller sizes than northern fish do. Work on weakfish fecundity indicated that weakfish, like other sciaenids, are batch rather than total spawners. In other words, females release their eggs over a period of time rather than all at once. Weakfish are indeterminate batch spawners meaning one cannot count all the eggs they will produce in a year in the ovaries at the beginning of spawning season because they continuously produce eggs during spawning season. This may mean that annual fecundity varies for the same fish. However, the relative amount of eggs produced appears proportional to female weight in a given year for both spotted seatrout *Cynoscion nebulosis* (W. Roumillat, SC DNR, personal communication) and weakfish (J. Nye, University of Delaware, personal communication). In the case of weakfish, spawning stock biomass and percent maximum spawning potential based on female weight are assessed. The fertilized eggs hatch into larvae in 36 – 40 hours at temperatures of 20-21º C. Spawning occurs in nearshore and estuarine areas from March through September, with a peak during April to June.

The larvae and post-larvae begin feeding on microscopic animals during their journey from spawning areas to coastal nursery areas and continue to feed on these small animals after their arrival in the nursery areas, located in the deeper portions of coastal rivers, bays, sounds and estuaries. Here they grow into juveniles. Studies in North Carolina sounds indicated that juvenile weakfish were most abundant in shallow bays or navigational channels characterized by moderate depths, slightly higher salinity's, and presence of sand and /or sand-seagrass bottom. Juveniles remain in coastal sounds and estuarine until October through December of their first year, after which they migrate to the coast. Weakfish in the northern end of the range leave the inshore areas earlier than weakfish in the southern end of the range.

In the ocean, weakfish appear to move north and inshore during the summer, and to the south and offshore during the winter. Important wintering grounds for the stock are located on the Continental Shelf from Chesapeake Bay to Cape Lookout, North Carolina. With warmer water temperatures in the spring, the mature adult fish migrate to the spawning areas to complete their life cycle.

Weakfish feed primarily on penaeid and mysid shrimps, anchovies, and clupeid fishes (menhaden, river herring, shad). Juvenile weakfish feed mostly on mysid shrimp and anchovies. Older fish feed on cluepeids, anchovies and other fishes including butterfish, herrings, sand lance silversides, juvenile weakfish, Atlantic croaker, spot, scup and killifishes. Invertebrates in the diet in addition to shrimps include squids, crabs, annelid worms and clams. Weakfish are important top carnivores in Chesapeake Bay where they consume high percentages of blue crabs and spot while along the edges of eelgrass habitats as well as other 'edge habitats' such as along channel edges, rock and oyster reefs. Weakfish are also found in estuaries without eelgrass, such as in the bays and estuaries of South Carolina.

1.2.2 Stock Assessment Summary

A weakfish stock assessment of data through 1998 was conducted in 1999 and reviewed by the Stock Assessment Review Committee for peer review at the 30th Northeast Regional Stock Assessment Workshop (NMFS 2000). This report indicated that weakfish were "at a high level of abundance and subject to low fishing mortality rates." This assessment was updated in 2002 with data through 2000. Much of the language below was taken from this updated assessment (Kahn 2002).

Virtual population analysis was used to estimate fishing mortality and stock size (ADAPT VPA in FACT, Northeast Fishery Science Center; Gavaris 1988; Conser and Powers 1989). This is a type of analysis that uses data on the number of fish caught at various ages or lengths to estimate fishing mortality as well as numbers of spawning individuals in a population.

The most recent stock assessment update indicates that the management measures put in place in Amendment 3 have resulted in positive trends for the weakfish population. The absolute magnitude of impact should be viewed with caution given the uncertainty of the fishing mortality and spawning stock biomass estimates for the most recent year of the assessment, which is often the case with these final year estimates. Once more data is added to the assessment the fishing mortality is expected to rise and the spawning stock biomass is expected to decrease.

This assessment indicates that weakfish are at a high level of abundance and fishing mortality appears to be low. Recent history of the coast-wide stock shows that spawning stock biomass (total weight of fish in a stock that are old enough to spawn) estimates were low from 1982 through 1985. High recruitment of age one weakfish in 1985-1987 produced a brief increase in biomass. By 1989, biomass had again declined and remained low through 1993. Since then, biomass has been building to higher levels. While the exact level of bias in the most recent estimates is unknown, the current level of SSB is well above the proposed threshold level of 31.8 million pounds, or14,400 MT (Figure 1).

Estimates of fishing mortality (the rate fish are being removed by human activity) range from a high in 1994 of 2.52 to a low of in 2000 of 0.12. Since 1995, estimates of F have been below the Amendment 3 target of 0.50. The 2000 estimate of 0.12 could be underestimated. Despite this bias, the corrected value would still be below the fishing mortality target of 0.31 and far below the fishing mortality threshold of 0.50 (Figure 2).

One goal of Amendment 3 was to support an increase in the size and age structure. The model results indicate this is happening. In 1982, the estimate of the proportion of age 6+ fish was 1.0% of the total. By 1990, this had shrunk to only 0.3% of the total number of weakfish. This proportion has been increasing in recent years to the level of 6.8% of the total in 2001.

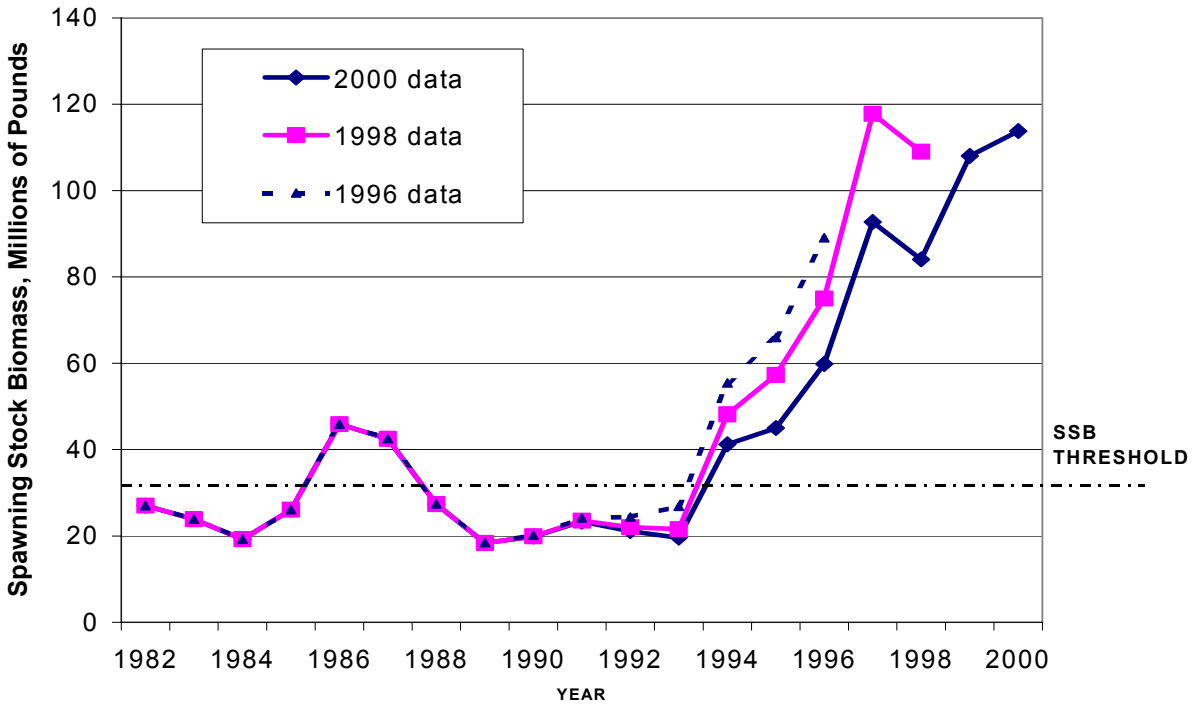

Figure 1: Weakfish Spawning Stock Biomass - This graph depicts how spawning stock biomass estimates have changed over time based on ASMFC stock assessments. As more data is added to the assessment each year, the estimates of SSB for the most recent years' decreases. This graph also indicates the SSB Threshold of 31.8 million pounds.

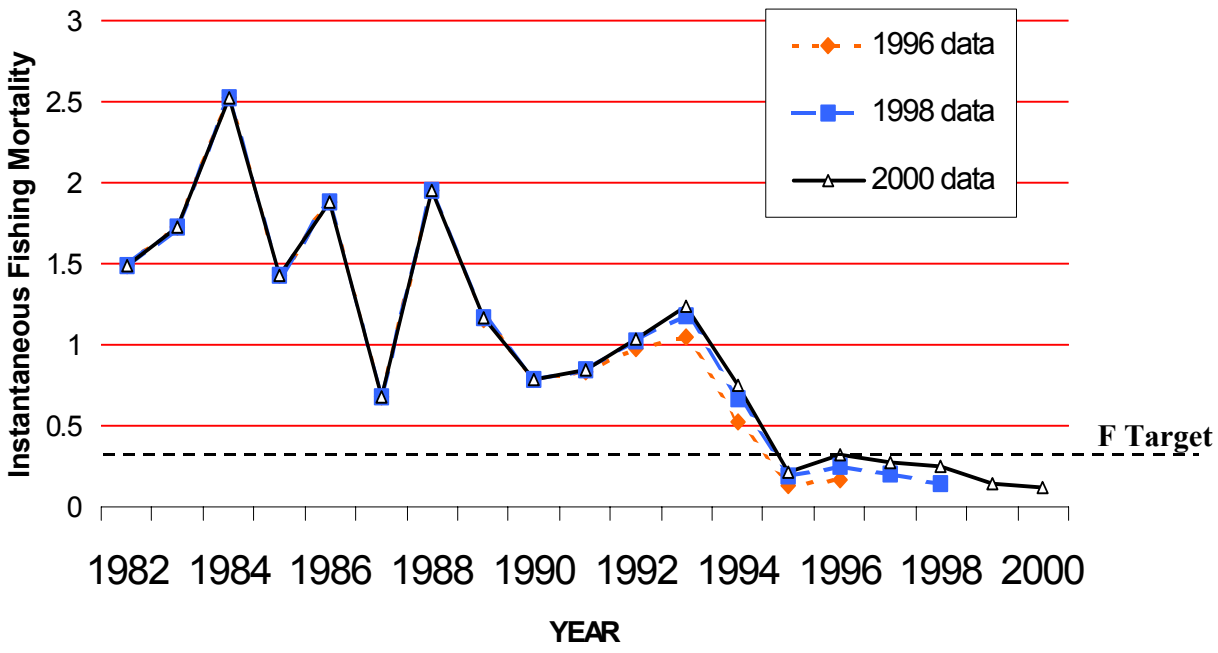

Figure 2: Weakfish Fishing Mortality - This graph depicts how fishing mortality rates have changed over time based on ASMFC stock assessments. As more data is added to the assessment each year, the estimates of fishing mortality for the most recent years increase. This graph also includes the fishing mortality target of 0.31.

1.3 DESCRIPTION OF THE FISHERY

Weakfish have formed one of the most important parts of a mixed-stock fishery on the Atlantic Coast since the 1800's. Fisheries have generally followed the stock on its annual north-south migrations and to the wintering grounds (Seagraves and Perra 1991). The majority of commercially and recreationally caught weakfish are landed from state waters. The dominant commercial gears used include gill nets, pound nets, haul seines, and trawls. The majority of commercial landings occur in the fall and winter months, presumably as the fish congregate to migrate. The recreational fishery catches weakfish using live or cut bait, jigging, trolling and chumming. Recreational harvests typically peak in the warmer months (May through October) when effort tends to be greatest. Typically recreational landings are recorded in numbers and commercial landings are recorded in pounds. However, Figure 4 uses converted recreational landings to pounds in order to compare the landings of the fisheries. In addition, Figure 3 compares the numbers of fish caught by the recreational and commercial fisheries at each age in the year 2000.

1.3.1 Commercial Fishery

The NMFS compiles commercial weakfish landings. The data are cooperatively collected by the NMFS and state fishery agencies from state mandated trip-tickets, landing weighout reports from seafood dealers, federal logbooks, shipboard and portside interviews and biological sampling of catches.

The commercial fishery accounted for about 70 percent of the total (commercial and recreational) coastwide weakfish landings between 1981 and 2001. There is an increasing trend of the recreational fishery accounting for a higher percentage of the fishery. Coastwide commercial weakfish landings from 1950 - 2000 fluctuated from 1,397 mt to 16,312 mt (Figure 5). Average annual weakfish landings for the same period were 5,167 mt.

The commercial weakfish fishery occurs during the fall and winter as the species migrates from estuaries to overwintering grounds in the South Atlantic (Hogarth et al. 1995b). Weakfish are taken primarily by trawls, pound nets, gill nets and haul seines. Weakfish landings were dominated by the trawl fishery from the 1950's through the mid -1980's, when gill net landings began to account for the majority of the landings. Gill net landings in the latter half of the 1990's were about double that of the trawl fishery.

New Jersey, North Carolina and Virginia have dominated commercial weakfish landings since 1950. North Carolina has annually landed the most weakfish since 1972 and Virginia has consistently ranked second since 1993. North Carolina has accounted for about half of all the weakfish commercially landed since 1951.

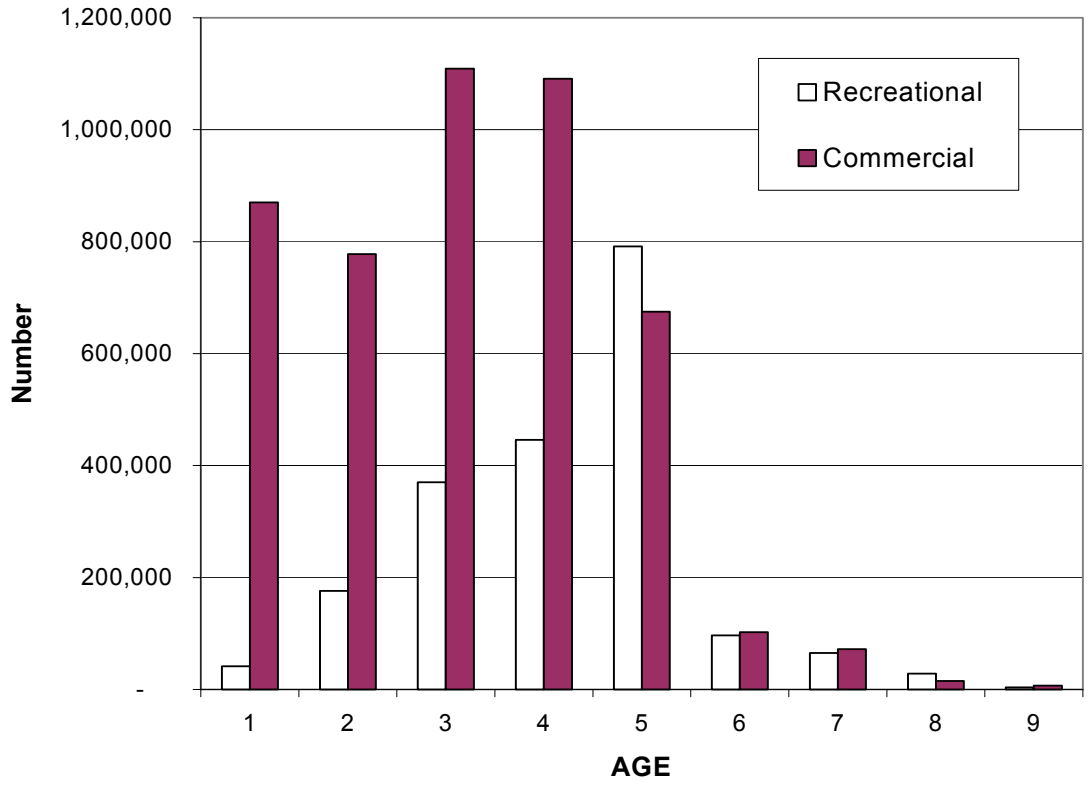

Figure 3: Catch at age estimates of weakfish in 2000.

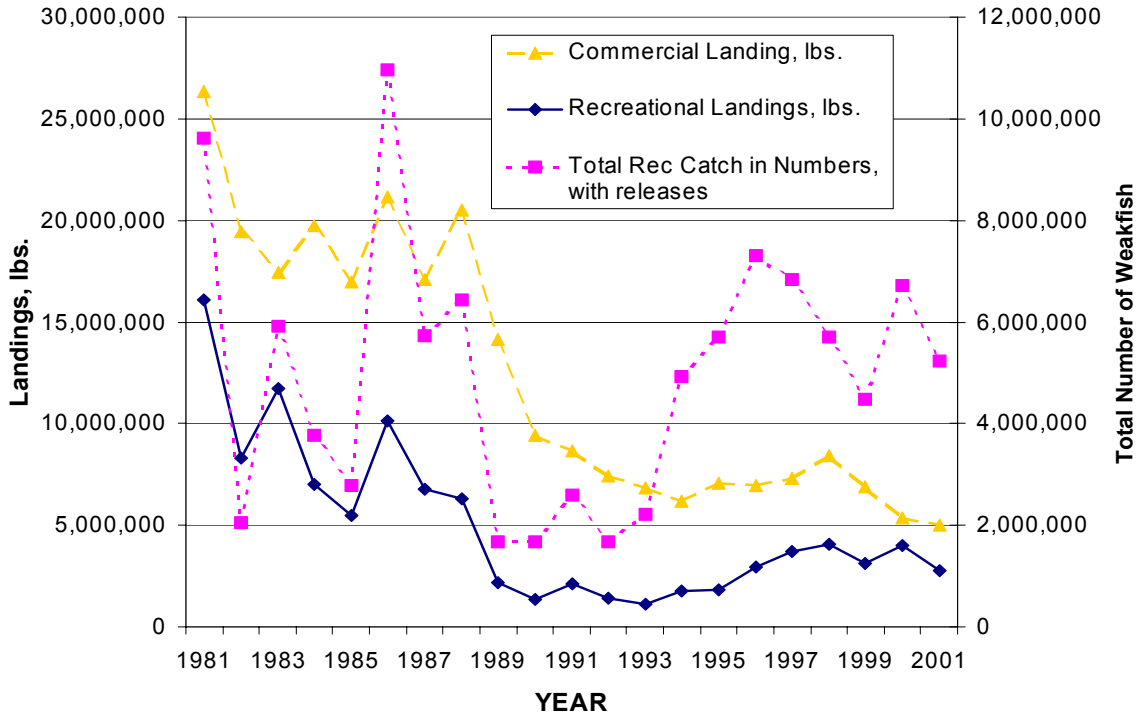

Figure 4: Weakfish landings by fishery. Both the recreational and commercial landings are listed in pounds. However, the total recreational catch with releases is listed in numbers.

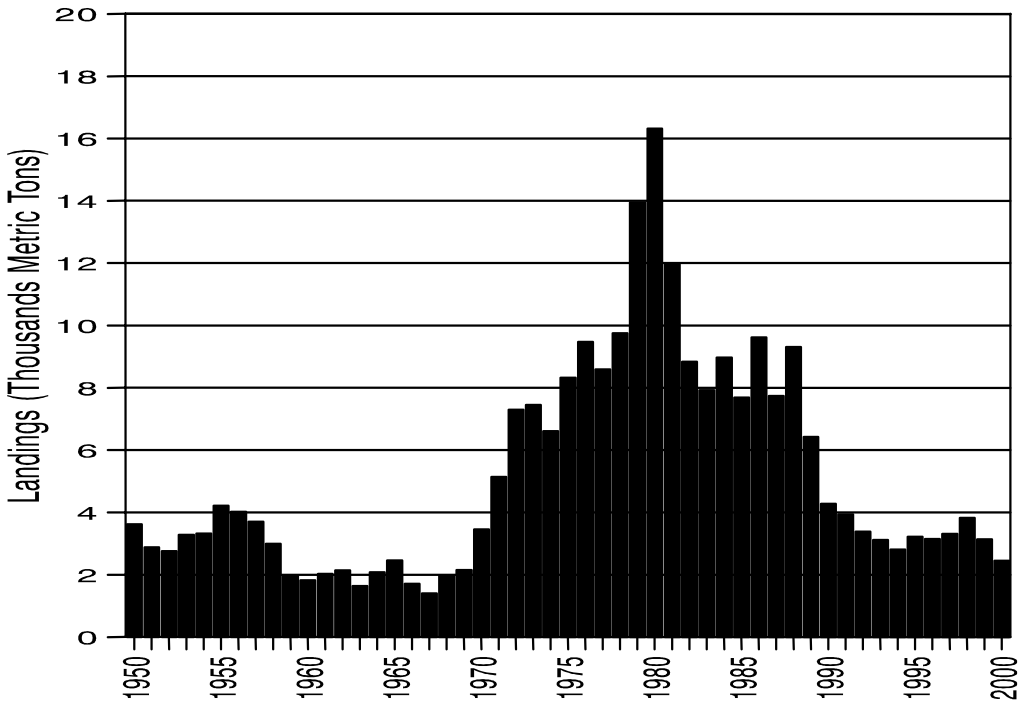

Figure 5: Coastwide commercial weakfish landings expressed as thousands of metric tons for the years 1950 - 2000 (Source: National Marine Fisheries Service).

1.3.1.1 Economic Aspects

The Atlantic commercial weakfish fishery is prosecuted between Massachusetts and Florida. There are, however, limited commercial landings in the states of Maine, South Carolina, and Georgia. Maine reported landings of five pounds in 1995; South Carolina had reported landings in 1982 and 1989; and Georgia reported landings, except for 1988 and 1989, between 1982 and 1990. There are no reported landings for New Hampshire.

Between 1950 and 2000, total Atlantic Coast landings (Maine through east coast of Florida) declined by 51,021 pounds per year or at the annual rate of 0.64% per year. In 1950, total landings equaled 7.99 million pounds; in 2000, landings equaled 5.38 million pounds (Figure 4, Table 6). During the 1970s, however, landings dramatically increased and exceeded 10.0 million pounds in each year until 1990. Between 1990 and 2000 landings decreased from 9.44 to 5.38 million pounds or by nearly 43.0 percent.

The ex-vessel value or first sale value (also referred to as dockside value) followed the same pattern as landings (Figure 4, Table 10). In 1950, the ex-vessel value equaled $5.74 million (in 2001 constant dollar values), but declined to $3.78 million in 2000.[1] The decline represented an annual decrease of $38,486 or an annual rate of 0.67 percent. Between 1978 and 1989, the annual ex-vessel value regularly exceeded $10.0 million per year.

North Carolina has traditionally had the highest level of landings of weakfish (Table 6). On an average annual basis, New Jersey ranks second in terms of landings, and Virginia ranks third. Landings of weakfish in the three states, combined, accounted for 87.9% of the total landings of weakfish between 1980 and 2000 (Table 6). In terms of total ex-vessel or dockside value, North Carolina has traditionally ranked first; Virginia and New Jersey rank second and third, respectively (Table 10). Between 1980 and 2000, all states, except Rhode Island and Connecticut experienced declines in ex-vessel value.

The ex-vessel prices of weakfish have varied substantially over time and among the states (Tables 10 and 11). Between 1980 and 2000, the lowest constant dollar price occurred in 1980. Connecticut, Rhode Island, and New York have generally had the highest ex-vessel prices per pound. North Carolina has typically received the lowest ex-vessel price per pound. The price differences are likely related to product size, market demand, and seasonality of product. Weakfish are generally locally marketed, and prices, therefore, likely reflect local market conditions. In addition, weakfish are highly perishable, and thus, cannot easily be processed and shipped to distant markets.

In describing the economic aspects of a commercial fishery, it is common to describe the size of the fishery, the number of vessels involved, the number of individuals engaged in the fishery, and economic returns. In the case of the weakfish fishery, data necessary for providing a detailed economic description are not available. For the most part, the weakfish fishery is prosecuted in state waters, and few states collect the information required for an extensive economic overview.

1.3.1.2 Social Aspects

Commercial fishermen indicate that there is a varying degree of dependence on weakfish based on the location/port and the gear type used. For some gillnet fishermen in the northern states, weakfish represents one third of the economic value of their total annual catch, while others state that it is one of the three primary species they target during the year. Others suggested that it only represents 10% of

[1] The constant dollar value is the dollar value in terms of a reference or baseline value. It represents the dollar value after adjusted for inflation. Unless otherwise state, all dollar values are present in year 2001 constant dollar values. Prices are deflated by the gross domestic product implicit price index.

their annual catch in terms of value. However, these fish are targeted and caught at a time that helps them "make it through the year."

Some fishermen have suggested that while they currently target weakfish only minimally, historically it was a sought-after species. This follows a reported trend among fishermen who vary their targeted species based on environmental changes or reductions in the number of fish they see when on the water. The fact that 10 years ago some fishermen targeted weakfish only minimally was more a reflection on the condition of the stock and not the desire for the species.

1.3.2 Recreational Fishery

Recreational catch statistics are collected by the NMFS in the Marine Recreational Fisheries Statistics Survey (MRFSS). Effort data is collected through telephone interviews. Catch expansions are based on interviews and biological sampling conducted by trained interviewers stationed at fishing access sites.

Weakfish are highly valued by anglers for their palatability and strong fighting characteristics. Weakfish are commonly caught by anglers using live and cut bait, jigging and trolling with artificial lures, and by chumming in the warmer months of the year. The recreational fishery accounted for approximately 30 percent of the coastwide harvest from 1981-2000.

Recreational landings by number ranged from about 960,000 fish in 1992 to a high of 9,344,000 fish in 1981 (Figure 6, Table 7). Recreational landings were relatively high from 1983-1988. Recreational landings abruptly fell in 1989. Annual recreational landings have fluctuated between 1 million and 2.8 million fish since 1993. The number of fish released alive by anglers has been relatively high since 1993.

Recreational landings from the EEZ accounted for only about 13 percent of the coastwide landings since 1981. Over half of the recreational harvest came from inshore saltwater and brackish water bodies such as bays, estuaries, and sounds. Virginia, New Jersey, Maryland and Delaware have accounted for over 85 percent of the coastwide harvest since 1981. New Jersey has accounted for the majority of the recreational harvest since 1994.

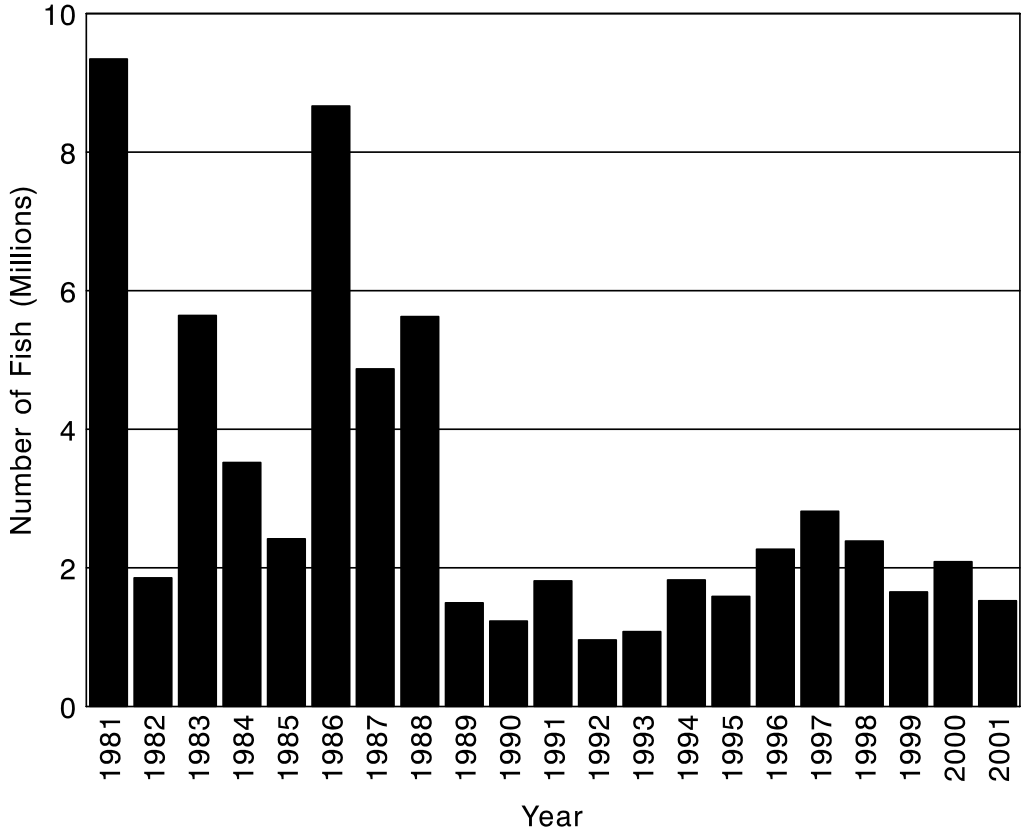

Figure 6: Numbers of recreationally harvested weakfish along the Atlantic Coast from 1981 - 2001 (Source: MRFSS, NMFS)

1.3.2.1 Economic Aspects

Weakfish are caught by recreational anglers in all states between Maine and Florida, with the majority of the catches being taken in Delaware, Maryland, New Jersey, and Virginia (approximately 87% of the total number of weakfish caught along the Atlantic coastal states occurred in the four states) (Table 7). Similarly, the majority of weakfish landed and retained, in terms of weight, came from the four states (90.0% of the total landed weight is estimated by NMFS to have been caught in the four states) (Table 8). Detailed data on number of anglers and directed trips are not readily available. Holiman (Pers. Comm., 2002) provided estimates of the number of trips in which weakfish were caught for the states of Virginia, North Carolina, South Carolina, Georgia, and Florida. The total number of trips over the five states for which weakfish were caught equaled 504 thousand in 1999. The number of trips in 1999 for the five states equaled the following: (1) South Carolina—7,562; (2) North Carolina—120,648; (3) Georgia—1,116; (4) Florida—84,979; and (5) Virginia—289,630.

Recreational fisheries typically make significant contributions to the economies of the coastal states. Angler expenditures generate sales, wages and sales, and employment throughout the economy. Information necessary for determining the economic contribution of the recreational weakfish fishery, however, is quite limited. Data on expenditures by anglers fishing for weakfish are imprecise (Pers. Communication, NMFS 2002). Data were, however, provided by the Fisheries Economics and Statistics Division of NMFS (Pers. Comm., Gentner, 2002). Unfortunately, the precision of the estimates was quite

low because of low sample size (e.g., the estimated value of equipment rentals for catching weakfish in North Carolina ranged from -$232.3 to $720.4 per trip, with a mean estimated value of $244.1 per trip). NMFS, however, does have relatively precise information on angling expenditures in 1999 for all species and all modes of recreational angling. Using trip expenditure data from NMFS and an input/output model developed for the American Sport Fishing Association of America, the potential economic impacts or contributions of angling in the states of Virginia, North Carolina, South Carolina, Georgia, and the east coast of Florida are estimated.[2]

As might be expected, weakfish angling in Virginia had the largest number of trips and generated the largest economic contributions of the (Table 12). Anglers in Virginia spent $14.0 million catching or attempting to catch weakfish in 1999. North Carolina had the second highest level of expenditures by recreational anglers, and thus, the second highest level of economic contributions to sales, wages and salaries, and jobs. Florida ranked third in terms of economic impacts generated by weakfish angling. Total sales generated by angler expenditures on weakfish in all five states equaled $55.4 million; the total number of full-time jobs generated equaled 778.

1.3.2.2. Social Aspects

Recreational fishermen, including land based anglers, shore and pier anglers, and water based anglers (private boat, charter boat and head/party boats) target weakfish in the ocean, bays, estuaries, and rivers throughout its range. Recreational fishermen report that they target weakfish for a variety of reasons, from enjoyment to food. Many weakfish fishermen prize the species as an "elusive" fish due to the weakness of the fish's jaw and mouth, making it more of a challenge to land. A certain amount of pride is placed in being known as a skilled weakfish fisherman.

There is a varying degree to which people target weakfish for enjoyment, food, or livelihood. It is common to find large groups of people coming to Point Pleasant or Fortescue, New Jersey, solely to fish for weakfish. Fortescue is known as the "Weakfish Capital of the World. It is estimated that more than 250,000 day tourists come to Fortescue primarily to target weakfish in the Delaware Bay. There is a history of more than 50-years of people coming to the area for solely that purpose.

1.3.3 Subsistence Fishing

While there are subsistence anglers throughout the United States whose main goal is to catch fish for consumption, another group of individuals have been noted by charter and party/head boat captains. These anglers, known in the industry as "meat fisherman", hire charter vessels for the purpose of targeting certain fish, in this case weakfish, for consumption. These anglers fish for more than pure enjoyment or recreation, as is seen among other recreational fishermen. They perceive this activity to be an important way of providing a meal for themselves and their families and "putting fish in the freezer" for future consumption. It is not uncommon for these anglers to travel 90 minutes or more from urban areas to places like Point Pleasant, Fortescue, and Cape May, New Jersey as well as to the Outer Banks of North Carolina and Virginia Beach, Virginia. There are cases, as explained by charter fishermen, where a church group from a local urban area pools money to send a couple of members to go and fish. These people are generally considered to be better fishermen. They will hire a boat or purchase a spot on a party/head boat to catch as many fish as allowable and distribute them among church members, family, and friends.

[2] Maharaj and Carpenter (1997) provide a detailed discussion of the input/output model developed to estimate the economic contributions of recreational angling to each of the states' economies. Impacts should also be estimated relative to fixed expenditures such as boat and engine repairs, expenditures on tackle, etc.; the data necessary for estimating the impacts of these other expenditures were not available. The estimates presented in Table 6, therefore, are restricted to only those impacts generated by trip expenditures.

Throughout the Atlantic states the party/head boat industries have historically relied on these "regulars" regardless if they are meat fishermen or not, as a major portion of their clientele. Historically, "regulars" are characterized as people from urban areas, low-income/working classes, and minority groups. Currently, in locations throughout New Jersey, there are a growing number of Asian ethnic groups that report to be increasing their involvement in this type of fishing for weakfish. However, the party/head boat clientele is certainly not limited to these ethnic or class based groups of fishermen. It is documented that in certain areas it is common for corporate groups and other middle class individuals (often tourists visiting port towns on vacation) to hire vessels for company parties or for other recreational purposes. Some of these groups specifically go in search of weakfish, while others coincidentally hire a boat during weakfish season.

In some areas, such as Point Pleasant, New Jersey and Virginia Beach, Virginia, there is a reported shift from the "meat fishermen" and "regulars" to tourists who decide to go head boat fishing while on vacation. This is a common response among charter and party/head boat fishermen, in these areas and other areas as well. In each of the cases, the loss of the regulars and the shift to the tourist fisherman equates to a reported loss in business activity for the industry. This is due to the fact that many of the "regulars" were also classified as "hardcore" fishermen, meaning that regardless of weather conditions, if the boat was going out so were they. The tourist fisherman has the ability to determine whether he will go fishing based on the weather. The loss of these regulars and the shift in clientele is perceived to be directly related to the continued negative impact of regulations often associated with creel and size limits (i.e., fluke). This means that it is no longer economically viable for many of the regulars to travel and pay the cost of hiring a boat, while only being able to come home with a small number of fish. However, they will be the first to tell you that they do not catch their limit every time. The times that they do, especially in New Jersey's head and charter boat industry, they enjoy the day fishing as well as reap the benefit of consuming the day's catch.

One of the most visible ethnic groups that no longer participates in head boat fishing for weakfish are the Amish. Interviews obtained from head boat captains throughout the mid-Atlantic report that the Amish used to be regular customers, but today it is no longer the case.

1.4 HABITAT CONSIDERATIONS

1.4.1 Description of the Habitat

Habitats used by weakfish include: spawning sites in coastal bays, sounds and the nearshore Atlantic ocean and nursery areas including the upper and lower portions of the rivers and their associated bays and estuaries. These types of habitats are distributed along the coast from Maine thorough Florida. Use of these habitats by weakfish may increase or diminish as the size of the populations changes.

1.4.1.1 Spawning Habitat

Weakfish spawn in estuarine and nearshore habitats throughout the species range. The principal spawning area is from North Carolina to Montauk, NY (Hogarth et al. 1995b), although extensive spawning and presence of juveniles has been observed in the bays and inlets of Georgia and South Carolina (pers. Comm, D. Whitaker, SCDNR). Spawning occurs after the spring inshore migration. Timing of spawning is variable, beginning as early as March in North Carolina, and as late as May to the north. Peak spawning occurs from April to June in North Carolina. Peaks in the New York Bight estuarine occur in May and June.

1.4.1.2 Eggs and Larvae Habitat

Nursery habitats are those areas in which larval weakfish reside or migrate after hatching until they reach sexual maturity (90% by age 1, 100% by age 2). These areas include the nearshore waters as well as the bays, estuaries, and sounds to which they are transported by currents or in which they hatch.

1.4.1.3 Juvenile Habitat

Juvenile weakfish inhabit the deeper waters of bays, estuaries, and sounds, including their tributary rivers. They also use the nearshore Atlantic Ocean as a nursery area. In North Carolina and other states, they are associated with sand or sand/seagreass bottom. They feed initially on zooplankton, switching to mysid shrimp and anchovies as they grow. In Chesapeake and Delaware Bays, they migrate to the Atlantic Ocean by December.

1.4.1.4 Adult Habitat

Adult weakfish reside in both estuarine and nearshore Atlantic Ocean habitats. Warming of coastal waters in the spring keys migration inshore and northward from the wintering grounds to bays, estuaries and sounds. Larger fish move inshore first and tend to congregate in the northern part of the range. Catch data from commercial fisheries in Chesapeake and Delaware Bays and Pamlico Sound indicate that the larger fish are followed by smaller weakfish in summer. Shortly after their initial spring appearance, weakfish return to the larger bays and nearshore ocean to spawn. In northern areas, a greater portion of the adults spends the summer in the ocean rather than estuaries.

Weakfish form aggregations and move offshore as temperatures decline in the fall. They move generally offshore and southward. The Continental Shelf from Chesapeake Bay to Cape Lookout, North Carolina, appears to be the major wintering ground. Winter trawl data indicate that most weakfish were caught between Ocracoke Inlet and Bodie Island, NC, at depths of 18 -–55 meters (59 – 180 feet). Some weakfish may remain in inshore waters from North Carolina southward.

1.4.2 Present Condition of Habitats and Habitat Areas of Particular Concern

The quality of weakfish habitats has been compromised largely by impacts resulting from human activities. It is generally assumed that weakfish habitats have undergone some degree of loss and degredation; however, few studies that quantify impacts in terms of the area of habitat lost or degraded.

Loss due to water quality degradation is evident in the northeast Atlantic coast estuaries. The New York Bight is one example of an area that has regularly received deposits of contaminated dredged material, sewage sludge and industrial wastes. These deposits have contributed to oxygen depletion and the creation of large masses of anoxic waters during the summer months.

Some losses have likely occurred due to the intense coastal development that has occurred during the last several decades, although no quantification has been done. Losses have likely resulted from dredging and filling activities that have eliminated shallow water nursery habitat. Further functional losses have likely occurred due to water quality degradation resulting from point and non-point source discharges. Intensive conversion of coastal wetlands to agricultural use also is likely to have contributed to functional loss of weakfish nursery area habitat.

Other functional loss of riverine and estuarine areas may have resulted from changes in water discharge patterns resulting from withdrawals or flow regulation. Estuarine nursery areas for weakfish, as well as adult spawning and pre-spawning staging areas, may be affected by prolonged extreme conditions resulting from inland water management practices.

Power plant cooling facilities continue to impact weakfish populations. The EPA in recent rules regarding these facilities estimates that the number of total weakfish age 1 equivalents lost as a result of entrainment at all transition zone cooling water intake structures in the Delaware Bay is over 2.2 million individuals. Other threats stem from the continued alteration of freshwater flows and discharge patterns to spawning, nursery, and adult habitats in rivers and estuaries. Additional threats in the form of increased mortality resulting from placement of additional municipal water intakes in spawning and nursery areas will occur, although the impacts may be mitigated to some degree with proper screening.

1.5 IMPACTS OF THE FISHERY MANAGEMENT PROGRAM

1.5.1 Potential Economic Impacts

Management and regulation typically generate economic impacts and changes in benefits or economic value to society. Economic impacts are typically assessed in terms of changes in prices, revenues, costs, earnings, sales, income, and employment. Changes in economic value reflect changes in net benefits to society. Items such as sales, income, and employment can be estimated using input/output models, general equilibrium models, or detailed statistical models. Economic value or net benefits is a measure of the sum of benefits to consumers or users and benefits to producers. Consumer benefits may be approximated by consumer surplus, which is the total economic value or benefit derived by consumers or resource users less what they actually expend to acquire the good or service. Producer benefits may be approximated by producer surplus, which equals the difference between total revenues received and total variable or operating costs.

Consumer and producer surplus can both be mathematically calculated using estimated market demand and supply curves. Consumer surplus equals the mathematical area below a demand curve less expenditures by consumers. Producer surplus equals the mathematical difference between revenues received by producers and the mathematical area below a supply curve.[3]

This Amendment has several options for managing and regulating the commercial and recreational weakfish fisheries for states to choose from. Presently, the likely regulatory strategies of each state are unknown, and thus, it is not possible to adequately estimate the potential gains and losses in economic value or benefits and the associated economic impacts of the ASMFC potential regulations.[4] For example, to adequately estimate how ex-vessel prices and revenues would change because of the regulatory strategy, it would be necessary to estimate how commercial landings would change in each state. Similarly, to adequately estimate the potential gains or losses in economic benefits or value to recreational anglers, it would be necessary to estimate how the potential number of trips per angler might change in each state. Information necessary for estimating the potential changes is not available. There is also the unresolved issue of determining the level of aggregation for assessing benefits (e.g., the national level vs. the state level).

In this analysis, changes in ex-vessel prices, revenues, and consumer and angler benefits are examined relative to a potential reduction of 1% in commercial landings, a 1.0 million overall reduction in total commercial landings, which is equally proportioned among the states, and a decrease of one fish per trip per angler. Assessing the possible changes illustrates the potential for economic impacts and changes in

[3] In the case of weakfish, data on variable costs and input (e.g., fuel and labor) usage necessary for estimating a supply curve are not available. It is not possible, therefore, to estimate the potential producer surplus for regulatory options.

[4] In this analysis, economic impacts are assessed in terms of changes in prices and ex-vessel revenues; benefit or economic value is assessed in terms of consumer surplus, which represents the dollar amount an individual is willing to pay for a good or service less what is actually paid by the consumer. Producer surplus, which is a measure of rent, is another measure of benefit; data for estimating producer surplus, however, are not available.

economic benefits. Consumer surplus is assessed at the national level, while changes in revenues and prices are assessed at the state level.

In order to estimate the potential changes in prices, ex-vessel revenues, economic value, very simple inverse or price-dependent ex-vessel regression models were specified and estimated for each of the states. The basic model was as follows:

$$(1) \qquad Price_t = \alpha + \beta_1 \text{ Pricet-1} + \beta_2 \text{ Landings}_t + \beta_3 \text{ Landings}_{t-1} + \beta_4 \text{ Year} + u_t,$$

where Price is the ex-vessel price, in 2001 constant dollar value, during year t; α is an intercept for the regression equation; βs are regression coefficients to be estimated; landings is the quantity of weakfish landed; and u is an error term assumed to be normally distributed with a mean of zero and a constant variance. Equation (1) was specified and estimated for all states having sufficient data on the commercial weakfish fishery: (1) Maryland, (2) New Jersey, (3) New York, (4) North Carolina, (5) Rhode Island, (6) Virginia, (7) East Coast of Florida, (8) Delaware, (9) Connecticut, and (10) Massachusetts (Table 13). Changes in prices and revenues are predicted using the assumed potential changes in landings. Consumer benefits or surplus is estimated by calculated the value of the area below the inverse demand curve and subtracting estimated expenditures or revenues. Producer surplus cannot be calculated because of inadequate information.

1.5.1.1 Commercial Fishery

A one percent reduction in commercial landings of weakfish in each state results in a minimal impact (Table 14). Ex-vessel prices, in year 2001 constant dollar values, minimally increase, and then, only in terms of thousandths of a dollar. Total revenue loss over all states was estimated to equal $37.8 thousand, with North Carolina, Virginia, and New Jersey experiencing the largest losses. The total loss in benefits to consumers was estimated to equal only $3,976.

When total landings were allowed to decrease by one million pounds, and prorated over all ten states at 18.6 percent, the losses were substantially larger. Yet, prices only minimally increased. Rhode Island experienced the largest price increase—from $1.10 per pound in 2000 to $1.13 per pound. Total revenue loss over all states was estimated to equal $633.7 thousand; the reduction in economic value or consumer benefits was estimated to equal $67.3 thousand.

Even though the potential losses from either a one percent reduction in landings or a one million pound overall reduction were estimated to be relatively small, the impacts are quite disproportional. For example, a one million pound reduction, prorated over all states at 18.6%, results in a revenue reduction of 18.5% for the East Coast of Florida, a 18.4% reduction for Massachusetts, and a 16.2% reduction in revenue for Virginia. It will, therefore, be helpful to management if the potential for varying or different impacts among the states is considered in the determination of fishery regulations.

1.5.1.2 Recreational Fishery

Data for estimating even crude levels of changes in benefits for the recreational sector are not available. A separate study would be necessary to obtain information necessary for estimating how anglers would respond to changes in expected catch (i.e., the various creel and size limit restrictions). In general, anglers are hypothesized to realize positive benefits if their expected catch per outing increases, or the size of the fish they catch increases. In a study by Hicks et al. (1999) on the economic value of New England and Mid-Atlantic sportfishing in 1994, it was estimated that anglers would realize a gain of $61.8 million (1994 dollars) by being allowed to catch one more fish per trip relative to the historical catch rate. On a state level basis, it was estimated that anglers would receive benefits between $2.49 and $3.74 per trip by catching one more fish per trip of small gamefish (Table 15).

Similarly, Kirkley et al. (1999) in a study of the economic value or benefits to anglers of saltwater sportfishing in Virginia demonstrated that anglers would increase their demand for trips in response to an increase in the expected catch per trip. The converse, however, may not be true. That is, anglers may not decrease their demand for trips as a response to reduced expected landings per trip. Alternatively, it is problematic how anglers might respond to creel limits that reduce their landings, but not necessarily their catch per trip. For Virginia anglers fishing in 1996 and depending upon their mode of fishing, they would realize between $2.60 and $11.00 in benefits from catching one more fish per outing or per trip.

Estimation of benefits can generally be accomplished by estimating a trip demand model. In this model, the number of trips may be specified as a function of travel and fishing costs, expected catch rates, and other variables believed to influence the demand for trips (e.g., expected size of fish caught, boat ownership, etc.). The demand for trips is a count variable, and thus, is typically estimated by a Poisson regression model (the Poisson explicitly accounts for the fact that the dependent variable or variable of interest represents counts). Using results from the Poisson model, one can derive estimates of benefits per trip by fishing mode and by species targeted or not-targeted. Data for this type of analysis are not available for weakfish.

When data are not available for estimating the potential changes in economic value or benefits that might occur because of regulation, researchers might consider benefit transfer measurements. In this situation, a researcher uses information or estimates from other, but similar analyses, and applies these estimates to their particular case.

In the case of weakfish, there is not sufficient information to even apply a benefits transfer type analysis. In general, the creel limit and minimum size regulations, or other regulations that would affect total catch by recreational anglers, would impose the highest losses in benefits to anglers in Florida, which would then be followed by North Carolina, Georgia, Virginia, and South Carolina.

1.5.2 Social Impacts

Fishermen coastwide have varied opinions about weakfish regulations. Most are satisfied with the efforts to rebuild the stock and are thankful that whether it is regulation or the normal cycle of nature, the weakfish are coming back. However, fishing communities surrounding the Delaware Bay, are reporting low numbers of weakfish, even though the majority of people interviewed along the Atlantic coast are reporting large numbers of weakfish (from Johnson, T. and B. Stoffle, 2002. ASMFC Contract Report #02-0602)[5]. This coincides with the findings of the ASMFC's assessment on stock biomass. People are pleased and encouraged about the possibility of utilizing and sustaining a healthy stock

Fishermen explain that in places such as Fortescue or Bower's Beach, Delaware, livelihoods are tied to Delaware Bay. A community's dependence on such a fishery suggests that regulations must be developed based not only on impact to the stock, but on the social and economic impacts of the regulations on people as well. This should be taken into consideration for those groups of bay and estuary fishermen that in many cases do not have access to areas where there is a greater proportion of larger fish. Those fishermen that cannot meet increasing minimum size limits may engage in taking undersized fish in order to keep something for consumption. As well, their geographic location may preclude them from having

[5] The data collected and analyzed for this and other social sections was based on interviews conducted throughout the Atlantic States. From mid-July until mid-August, 2002, recreational and commercial fishermen were interviewed (N=42) both formally and informally. However, these interviews in no way reflect a complete and scientific representation of all the issues. The interviews were conducted and the findings prepared by Dr. Brent Stoffle and Ms. Teresa Johnson (a current Ph.D graduate student) of Rutgers University.

access to both ocean and inland fishing locations, meaning that they are much more vulnerable than other types of fishermen who have increased access to locations (see Johnson and Stoffle, 2002, for the case of Delaware Bay fishermen).

1.5.2.1 Commercial Fishery

Commercial fishermen generally support increasing by-catch allowances because captured weakfish die due to their fragile nature. Support was also noted for increased funding to study gear modifications that may better address by-catch release mortality (from Johnson, T. and B. Stoffle, 2002. ASMFC Contract Report #02-0602). Some recreational fishermen support this increase because the belief is that they probably catch 300 pounds of by-catch anyway so it is better to let them land it than to discard it. However, other recreational fishermen argue that it is not whether 300 pounds is an appropriate amount for them to land as a by-catch, the problem they have is that when they are asked to be reducing effort due to a reduction in creel limits, commercial fishermen are being given an increase in by-catch. In their opinion this is not a fair and equitable treatment of all fishermen.

1.5.2.2 Recreational Fishery

Some fishermen argue regulations have been important in helping the species to recover, while others are concerned there has been an economic impact on some of the for-hire captains/owners. Some have reported a reduction as high as 25% in clientele and a shift in the clients that they service. They believe clients will not return unless they catch fish, which means that size and/or creel limits may impact them significantly. (Johnson, T. and B. Stoffle, 2002) As well, recreational fishermen fishing off of charter and head boats must also perceive that a sufficient number of fish can be caught. Many fishermen will only catch a few fish on certain trips (often below the established creel limit), however, the perception that when fishing is good they can have a "great day and fill a cooler" keeps them coming back. While most captains agree that it is rare to have everyone on a boat catch their limit of weakfish (for example, in New Jersey the creel limit under Amendment 3 was 14), creel limits could drop to a level that socio-psychologically makes it unworthy of the time and money expenditure and anglers are not likely to come and fish. It is noted that many clients (some estimates as high as 80%) on headboats in Point Pleasant come from more than one hour away (mainly from Philadelphia and New York).

Another concern is that if the creel limit is reduced to numbers so low that it is easily attainable for many fishermen, "high-grading" may occur (fishermen catches his/her own limit, continues fishing, and as larger fish are caught the smaller, dead fish are thrown overboard). While party/head boat captains have reported this type of behavior and disapprove of it, they do not feel responsible for enforcing the size and/or creel limits on their boats. That responsibility lies with the individual fishermen.

There is little controversy or conflict regarding the importance of having an "appropriate" creel and size limit. Many fishermen agree that it is essential to the sustainability of the stock. However, size and creel limits are also critical to sustaining the industry as perceived by recreational fishermen, charter captains, party/head captains, and local business owners (tackle, baits, boating equipment and suppliers). There is a perception that if management is to err, the error must be on the side of the resource. This is understandable because fishermen as well as managers do not want the fishery over-harvested and depleted. However, in cases where management reduces effort in times of apparent growth, it negatively impacts business and changes the complexion of the industry as a whole. As an example, local Virginia Beach fishermen were subject to a creel limit reduction from the catch allowed by Amendment 3, they reported that they have experienced about a 25% loss in the number of clients they serve and changes in the social composition of those fishermen. Captains report that many of their "regulars" do not come back anymore.

1.5.2.3 Subsistence Fishery

Changes in size/creel limits could impact the for-hire sector of the subsistence fishery, as noted in Section 1.3.3.

1.5.2.4 Non Consumptive Factors

A purely social reason for catching weakfish was noted in a public meeting by an individual recreational fisherman speaking for himself and his family. While many argue the business side of things he fishes for weakfish and other species as a way of bringing and keeping his family together. He says that bag limits are not of concern to him and his family. They catch and release fish while keeping a few of the larger ones for home consumption. He fishes because it is an activity that his family enjoys doing together and he does not want the opportunity to be lessened or taken away from him.

1.6 LOCATION OF TECHNICAL DOCUMENTATION FOR FMP

1.6.1 Stock Assessment Document

Detailed information about the weakfish stock assessment and methodology can be found in "Stock Assessment Of Weakfish Through 2000, Including Estimates Of Stock Size On January 1, 2001," a report to the Weakfish Technical Committee (Kahn 2002).

1.6.2 Social Assessment Document

In a report to the ASMFC, Johnson and Stoffle (Johnson and Stoffle 2002) reviewed the perceived impact of weakfish management measures on fishermen.

1.6.3 Economic Assessment Document

In a recent report to the ASMFC, Kirkley reviewed the potential economic impacts of the management alternatives that were considered for this Amendment (Kirkley 2002). In addition to conducting commercial and recreational fishery assessments, he outlined data and research needs.

1.6.4 Law Enforcement Assessment Document

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

2.0 GOALS AND OBJECTIVES

2.1 HISTORY AND PURPOSE OF THIS PLAN

2.1.1 History of Prior Management Actions

Preparation of the initial ASMFC Fishery Management Plan for Weakfish (Plan) in 1985 was motivated by concern over the lack of adequate biological and fisheries data for management of the resource, a decline in landings, concern over bycatch, and a desire to address user conflicts through interstate management. The initial plan's management measures were voluntary, rather than mandatory, and improvements in stock status were not evident. The main provisions on the Plan recommended that northern states (Rhode Island through Virginia) delay harvest of weakfish until they were greater than one

year old, and that the use of turtle excluder/trawl efficiency devices (TEDs) be promoted in the southern shrimp fisheries to maximize escapement of juvenile weakfish from trawl bycatch.

Due to a continued decline of weakfish abundance in part resulting from the failure of the states to implement Plan provisions, the ASMFC Policy Board recommended in 1990 that an amendment to the Plan be developed. Several stock identification, stock assessment and other studies had been completed. It was decided that weakfish should be managed as a unit stock. A new stock assessment (Vaughan et al 1991) indicated that the large decline in landings in the early 1980's was likely due to the lack of strong year classes since 1978. The model used for the stock assessment also indicated that inclusion of the weakfish bycatch captured in the penaeid shrimp trawl fishery along the southeastern United States produced significantly higher estimates of fishing mortality on age 0 and 1 weakfish. It was thought that large gains in yield per recruit and maximum spawning stock potential could be obtained if these age classes could be protected to a significant extent (Vaughan et al 1991). Amendment 1, adopted in 1991, incorporated recommendations including: the target fishing mortality rate be lowered to 0.34 (this was F_{20} which is the fishing mortality that should maintain a spawning population at 20% of the level for an unfished population), the number of weakfish being caught by fishermen be reduced by 52%, and reductions in mortality caused by nondirected fisheries (primarily the southern penaeid shrimp fishery) be achieved. None of the states with directed fisheries adopted management measures that were consistent with the recommended targets but there was some progress in bycatch reduction in the southern shrimp fishery with the adoption of Turtle Excluder Devices. Amendment 1 was not successful in improving the status of weakfish.

Continued concern regarding the status of the stock led to proposed federal legislation that would have required that weakfish be managed by the ASMFC in a manner equivalent to striped bass. Although this legislation never passed, it inspired the development and ultimate passage of the Atlantic Coastal Fisheries Cooperative Management Act (Act), which provides discretionary authority to the Secretary of Commerce to close fishing in state waters in certain situations if a state is not in compliance with an ASMFC fishery management plan.

As an interim measure, the ASMFC approved Amendment 2 to the Plan in October of 1994 that acknowledged that little progress had been achieved by the states toward implementation of the required reduction in exploitation. It provided for full implementation of the first phase of the reduction strategy (25 percent reduction in the rate of fishing mortality on weakfish followed by 25 percent reduction in exploitation). It clarified the South Atlantic shrimp bycatch requirement and schedules and it incorporated modifications in the schedule for compliance with the provisions in the Act. Specific provisions required: 1) states with directed weakfish fisheries must implement 12-inch minimum size or equivalent measures; 2) states must maintain current minimum mesh sizes; 3) states with directed fisheries must implement harvest control strategies to reduce exploitation by 25% by April 1, 1995; 4) South Atlantic states must implement management measures to achieve the 50 percent reduction in weakfish bycatch in the shrimp trawl fisheries for the 1996 shrimp fishing year; and 5) in the event that the ASMFC did not complete Amendment 3 by March 31, 1996, states with directed weakfish fisheries were to implement harvest control strategies that achieve $F_{20\%}$ for the fishing year beginning April 1, 1996. Amendment 2 was implemented in April 1995, and resulted in some improvements. However, lower than average commercial and recreational catch rates, a lack of older fish, variable recruitment strength, and below average spawning stock biomass (SSB) mandated further improvements. Assessment results at that time (through 1994) indicated the stock was not doing well, but the current assessment depicts the beginning of improvement after Amendment 2 was implemented.

Amendment 3 adopted in June 1996, was designed to reduce fishing mortality (F) to 0.50 by the year 2000, restore an expanded age structure and restore fish to their full geographical extent. Under Amendment 3, weakfish commercial fisheries were regulated by a combination of season and area

closures as well as mesh regulations. Specifically, allowable mesh sizes retain 25% or less of weakfish less than 12 inches. Further, bycatch reduction devices (BRDs) were required for shrimp fisheries in the South Atlantic to reduce mortality of age 0 and 1 weakfish. All BRDs must be certified, properly installed, and demonstrate a 40% reduction by number or 50% reduction of bycatch mortality of weakfish as compared to catch rates in a naked net. The weakfish recreational fishery was regulated by equivalent, state-specific minimum size and possession limits. Each state used management scenarios that were equivalent to or more conservative than 12 inches minimum size and the 4 fish bag limit. Bag limits were not required once minimum size rises to 16 inches.

A weakfish stock assessment, including data through 1998, was completed by the Weakfish Stock Assessment Subcommittee (SAS) in 1999. The Weakfish SAS estimated that the average fishing mortality rate for 1998 was 0.28. The subcommittee noted that estimates for the last year of analysis are the most uncertain and should be considered with caution. However, this fishing mortality rate was a continuation of the trend in continually lower fishing mortality rates that had been below the target of 0.5 established in Amendment 3.

In 2000, the Weakfish Board heard information offered by the 30th Stock Assessment Review Committee (SARC) including that weakfish were at high levels of biomass and that fishing mortality in 1998 was below the management target of 0.5 for the year 2000 indicating that the weakfish fishery had met many of the goals it set to achieve in Amendment 3. However, the SAW/SARC indicated that low fishing mortality levels should be maintained to expand size and age structure to weakfish stocks as well as maintain an appropriate spawning stock biomass. It is important to note that only the "core indices," or surveys taken from states in the center of the species geographic range, were used in the SARC assessment.

The Technical Committee and Plan Review Team raised several issues and in order to address them the Weakfish Board decided a new amendment was warranted. In 2000, the ASMFC Weakfish Management Board approved an Addendum I to Amendment 3 in order to extend the current fishery management measures until the Board approved Amendment 4. Amendment 4 was passed in November 2002 and replaces Addendum I to Amendment 3. Specifically, this Amendment includes revised reference points and reference periods that will lead the states to new fishery management measures.

2.1.2 Purpose and Need for the Plan

The purpose of Amendment 4 to the Weakfish Interstate Fishery Management Plan is to revise the reference points and recreational reference period to ensure an appropriate spawning stock biomass for the weakfish population and to expand the age structure and geographic range of the population. This Amendment is intended to continue the population rebuilding process that began in Amendment 3.

2.2 GOAL

The goal of Amendment 4 is to utilize interstate management so that Atlantic coast weakfish recover to healthy levels which will maintain commercial and recreational harvests consistent with a self-sustaining spawning stock and to provide for restoration and maintenance of essential habitat.

2.3 OBJECTIVES

1) Establish and maintain an overfishing definition that includes target and threshold fishing mortality rates and a threshold spawning stock biomass to prevent overfishing and maintain a sustainable weakfish population.

2) To restore the weakfish age and size structure to that necessary for the restoration of the fishery.

3) To return weakfish to their previous geographic range.

4) To achieve compatible and equitable management measures among jurisdictions throughout the fishery management unit, including states' waters and the federal Exclusive Economic Zone.

5) To promote cooperative interstate research, monitoring and law enforcement necessary to support management of weakfish.

6) To promote identification and conservation of habitat essential for the long-term stability in the population of weakfish.

7) To establish standards and procedures for both the implementation of Amendment 4 of the Weakfish FMP and for determination of states' compliance with the provisions of the management plan.

2.4 SPECIFICATION OF MANAGEMENT UNIT

The entire weakfish population of the East Coast of the United States ranges from Cape Cod, Massachusetts through Florida.

2.5 DEFINITION OF OVERFISHING

A goal of fishery management is to determine how many fish can be safely harvested from a stock. Biological reference points can be identified to indicate what level of harvest is safe. The types of biological reference points used depend on which stock assessment technique best suits the available data.

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. This control rule will be established with targets and thresholds for fishing mortality and a threshold for spawning stock biomass. The management program developed through this Amendment will be designed to achieve the target F.

The use of fishing mortality targets and thresholds and a threshold (spawning stock) biomass will provide managers with a series of factors to use when evaluating the status of the stock. This section 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.

This Amendment uses an overfishing definition with a fishing mortality target of $F_{target} = F_{30\%} = 0.31$, a fishing mortality threshold of $F_{threshold} = F_{20\%} = 0.5$, and a spawning stock biomass threshold of $SSB_{threshold} = SSB_{20\%} = 31.8$ million pounds. An F greater than 0.5 is equal to overfishing and a SSB less than 31.8 million pounds equals overfished. See Figures 1 and 2 that outline current SSB and fishing mortality estimates, respectively, as well as these targets and thresholds.

2.6 STOCK REBUILDING PROGRAM

The stock of weakfish is currently not considered overfished with the recent assessment indicating that fishing mortality is below the target and SSB is above the threshold. 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.

The stock assessment models used at the time Amendment 4 was adopted have shown a retrospective bias. Current information indicates the models overestimate spawning stock biomass and underestimate fishing mortality. The Technical Committee will continue to report to the Management Board both the point estimate that the models indicate as well as a range the technical committee believes to be more accurate given the retrospective bias. The Management Board will take the point estimate as well as this statistical uncertainty into account when determining whether or not to trigger stock rebuilding.

2.6.1 Triggers, Targets, and Schedules for Stock Rebuilding

Fishing Mortality Target:

If the fishing mortality target is exceeded in two consecutive years but neither threshold is exceeded, the Management Board must adjust the weakfish management program to reduce the fishing mortality rate to a level that is at or below the target. The Board must establish a program for this reduction to happen within one year.

Fishing Mortality Threshold:

If the fishing mortality threshold is exceeded in any two consecutive year period, the Management Board must adjust the weakfish management program to that which is required to rebuild to SSB to 30% of an unfished stock within 6 years or less with a fishing mortality not to exceed 0.2.

Spawning Stock Biomass Threshold:

If the SSB falls below the threshold in any given year, the Management Board must adjust the weakfish management program to rebuild SSB to 30% of an unfished stock within 6 years (1 ½ generations) or less.

2.6.2 Age Structure

Objective 2 of this Amendment is 'To restore the weakfish age and size structure to that necessary for the restoration of the fishery.' In order to evaluate where the weakfish population is in relation to this objective, the Technical Committee and Stock Assessment Subcommittee will be monitoring the age structure of the weakfish population through the annual stock assessment update. Various analysis, including one based on deterministic and stochastic cohort extinction analyses have indicated that an expanded age and size structure of the weakfish population could include 8.5% of the weakfish population age 6 and older, 5% of the weakfish population age 7 and older, and 1% of the population age 10 and older. For comparison, in 1982, the estimate of the proportion of age 6+ fish was 1.0% of the total. By 1990, this had shrunk to only 0.3% of the total number of weakfish. This proportion has been increasing in recent years to the level of 6.8% of the total in 2001. The Technical Committee and Stock Assessment Subcommittee will monitor the age and size structure of the weakfish population through the annual stock assessment update and report this information to the Board. Based on the information presented, the Board will take the necessary action.

2.7 RESOURCE COMMUNITY ASPECTS

Weakfish serve not only as an important recreational and commercial species for fishermen, but also as prey for other aquatic and avian predators (various predators at each life stage), and are predators themselves on other species which form the basis of significant fisheries such as those for Atlantic menhaden, and others. Recent studies of the interactions between menhaden abundance and the health of striped bass, bluefish and weakfish (Hartman and Brandt 1995a, 1995b) have been conducted to further understand these relationships.

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 weakfish by providing a broader assessment tool. 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 evaluate the magnitude of predator-prey interactions. Actual data will be evaluated and modeled before any real estimates of how much annual production of menhaden have been utilized by the fishery and predation by bluefish, Atlantic striped bass and weakfish. The model, with additional refinements, will also allow managers to evaluate the effect of changing menhaden and other prey abundance on the weakfish population.

2.8 IMPLEMENTATION SCHEDULE

Amendment 4 to the Interstate Fishery Management Plan for Weakfish was approved and adopted by the Commission in November of 2002. States are required to submit implementation proposals by January 15, 2003. State proposals will be reviewed for approval during the February 2003 ASMFC Meeting Week. States are required to implement the provisions of Amendment 4 no later than July 1, 2003.

3.0 MONITORING PROGRAM SPECIFICATIONS/ELEMENTS

The Weakfish Technical Committee will meet at least once each year to review the stock assessment and all other relevant data pertaining to stock status. The Technical Committee will report on all required monitoring elements outlined in *Section 3* and forward any recommendations to the Weakfish Board. The Technical Committee shall also report to the Management Board the results of any other monitoring efforts or assessment activities not included in *Section 3* that may be relative to the stock status of weakfish or indicative of ecosystem health and interactions.

The Weakfish Advisory Panel will meet at least once each year to review the stock assessment and all other relevant data pertaining to stock status. The Advisory Panel will forward its report and any recommendations to the Management Board.

The Weakfish Plan Review Team will annually review implementation of this Amendment and any subsequent adjustments (addenda), and report to the Management Board on any compliance issues that may arise. The PRT will also prepare the annual Weakfish FMP Review and coordinate the annual update and prioritization of research needs (see *Section 6.0*).

The Weakfish Board encourages all state fishery management agencies to pursue full implementation of the Atlantic Coastal Cooperative Statistics Program (ACCSP). The Weakfish Board recommends a transition or phased-in approach be adopted to allow for full implementation of the ACCSP. Until such time as the ACCSP is implemented, the Weakfish Board encourages state fishery management agencies to initiate implementation of specific ACCSP modules, and/or pursue pilot and evaluation studies to assist in development of reporting programs to meet 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.

In order to collect the necessary information to conduct the annual weakfish stock assessment update, any state that lands at least 150,000 pounds annually (2.5% of the coastwide landings in 2000, NMFS) must sample for biological information. Currently, this would include the states of Rhode Island, New York, New Jersey, Delaware, Maryland, Virginia and North Carolina. All states that land at least 150,000 pounds per year are required to collect at least 100 otolith ages and 300 lengths. All states that land more than 500,000 pounds and less than 1,000,000 pounds per year are required to collect at least 200 otolith ages and 600 lengths. All states that land more than 1,000,000 pounds per year are required to collect at least 300 otolith ages and 900 lengths. The samples should be representative of the state's commercial and recreational landings. The data should be stratified by area fished, calendar quarter, major gears and market category.

Given that state landings vary from year to year, and to avoid states having to change the number of samples they are collecting each year, states should base their sampling programs on their most recent year's landings when they submit their plan for Amendment 4. Then states should revise every other year based on an average of the past two year's landings. The sampling program should be included in the annual compliance report for Plan Review Team review.

3.1 ASSESSMENT OF ANNUAL RECRUITMENT

Annual relative abundance of age 0 weakfish is measured as tuning for age 1 abundance in the ADAPT virtual population analysis (VPA). All states within the "core" area featured in the VPA contribute a juvenile index. All juvenile surveys are conducted with trawls. Two federal trawl surveys (NMFS and SEAMAP fall surveys) sample juveniles between Massachusetts and Florida, although the assessment uses data stratified from the core region of New Jersey to North Carolina. Regional indices are also available for New Jersey, Delaware Bay, Maryland's coastal bays, Chesapeake Bay (Maryland and Virginia each have surveys), and Pamlico Sound in North Carolina.

Requirements for Juvenile Indices

The sampling protocol (stations, sampling intensity, and gear type) shall be consistent from the time this Amendment is adopted. Development of new indices for inclusion in the assessment will require Technical Committee review of the sampling design and results from available data for acceptance.

3.2 ASSESSMENT OF SPAWNING STOCK BIOMASS

Currently, VPA provides estimates of spawning stock biomass (SSB) of weakfish using age structured catch estimates and fishery-independent trawl survey data. Two federal surveys (NMFS and SEAMAP fall trawl surveys) provide age-structured indices for ages 1-4 along the core region (NJ-NC) used in the VPA; Delaware and New Jersey trawl surveys sample ages 1-6; and North Carolina's Pamlico Sound trawl survey provides indices for ages 1-2. These surveys do not provide direct indices of SSB because they are not entirely conducted during the spawning season on spawning weakfish.

1. The Technical Committee shall estimate SSB and the variation of the estimate annually. The Technical committee will use the least biased estimate of SSB and its variation to determine the probability that SSB has fallen below the SSB threshold (14,400 mt). This probability will be provided to the management board.
2. Surveys described in *Section 3.2* shall be continued without major changes to maintain continuity. Should changes be warranted, they should be reviewed and approved by the Technical

Committee. Development of new surveys of age structure for inclusion in the assessment will require Technical Committee review of the sampling design and results from available data for acceptance.

3.3 ASSESSMENT OF FISHING MORTALITY

Fishing mortality is the rate that fish are removed from the population by human harvesting activities. It may include direct losses to harvest and indirect losses as recreational releases or dead bycatch in commercial gears. The estimate of fishing mortality for weakfish includes direct losses and a portion of recreational releases.

Requirements for Fishing Mortality Rate Calculations

1. Catch composition information will be gathered by states with commercial fisheries that are not eligible for *de minimis* status. These data shall be representative of location and season of the catch. Recreational catch estimates will be obtained from the National Marine Fisheries Service's Marine Recreational Fishing Statistical Survey.
2. Each year the Technical Committee shall develop an estimate of directed F and its variation for comparison with the target F and threshold F. The Technical Committee will use the least biased estimate of F and its variation to determine the probability of exceeding the target and limit values of F and will provide these probabilities to the Management Board.

3.4 SUMMARY OF MONITORING PROGRAMS

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 barters 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 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.

3.4.2 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).

3.4.3 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.

3.4.4 Socio-economic Information

No long-term monitoring programs are currently in place for the collection of social information pertaining to persons involved in or affected by the weakfish fishery. The Atlantic Coastal Cooperative Statistics Program (ACCSP) is currently developing standardized, coast-wide protocols for the collection of social and economic fisheries data. This includes fishing communities, recreational fishermen, and commercial harvesters, processors, and dealers. ACCSP partners should continue to support the development and implementation of these protocols to the extent possible.

3.4.4.1 Commercial Fisheries

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

3.4.4.2 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 (refer to the ACCSP Program Design document for details). 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).

3.4.5 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 will be determined by the Discard/Release Prioritization Committee.

3.5 BYCATCH REDUCTION

State and federal agencies shall make every effort to assess the magnitude of by-catch discard mortality occurring in waters under their jurisdiction. (For the purposes of this section by-catch is defined as discard and illegal retention of weakfish which occurs in fisheries directed at other species, preferential selection, hook and release mortality and discard mortality of undersized and/or non-marketable weakfish)

In those cases where by-catch is documented as a serious problem or issue, the involved jurisdiction(s) shall make such documentation available immediately to the Technical Committee, Advisory Panel, and the Management Board. Any documentation shall include, at a minimum, the following information:

1) location, target species, and season of fishery or fisheries involved;

2) gear and gear specifications used in the fishery;

3) an estimate of pounds or numbers of weakfish taken per unit of effort in the fishery (e.g., lb. per trip), as well as an estimate of total weakfish by-catch in the fishery;

4) an estimate of how long (e.g., years, months, weeks) weakfish by-catch has occurred as a serious problem in the fishery.

Where appropriate the National Marine Fisheries Service (NMFS) and/or the U.S. Fish and Wildlife Service (USFWS) shall assist states with preparing the required report. The Technical Committee and Advisory Panel shall review such information, and prepare reports for the Management Board. After reviewing these reports, the Management Board may recommend remedial steps be taken by the involved jurisdictions (e.g., gear restrictions, seasonal/geographic closures, etc.), and may ask the jurisdiction to continue documenting the problem until it is resolved to the Management Board's satisfaction.

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

3.6 TAGGING STUDIES/PROGRAM

Tagging of fish and shellfish 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 and shellfish 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 tagging study be proposed for weakfish, a number of considerations should be addressed. Any proposed study must have stated objectives that 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. Should a species prove tag-able, an appropriate tag should be selected for use. The Weakfish Technical Committee will review tag retention studies and suggest most appropriate tags for this species, if a tagging program is initiated for weakfish. The ideal tag should be one which has a unique alpha-numeric identifier and organization contact information, is easily emplaced, has a high rate of retention, is readily visible to potential recovers 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 or shellfish 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 return reporting. Each study conducted should ideally 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 animals 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., National Marine Fisheries Service, Southeast Fishery Science Center, Miami, FL, 305-361-4248; NMFS Northeast Fishery Science Center, Woods Hole, MA, 02543; or U.S. Fish and Wildlife Service, Fishery Resources Office, Annapolis, MD, 410-263-2604) 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 which is proposing new tagging studies for weakfish 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 weakfish. 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.

4.0 MANAGEMENT PROGRAM IMPLEMENTATION

4.1 RECREATIONAL FISHERIES MANAGEMENT MEASURES

In order to achieve annual fishing mortality targets, recreational harvest will be constrained by a combination of size limits, possession limits. States may choose a minimum size and corresponding creel limit from Table 1. States may also submit an alternative management proposal as described in *Section 4.5* of this document. States may have only one creel limit/minimum size combination in their state. There may be no variations by season, area, or angler within each state.

Table 1: Recreational Creel Limit/Minimum Size Regulations

MINIMUM SIZE	*CREEL LIMIT*
12	*7*
13	*8*
14	*9*
15+	*10*

Amendment 3 used 1992-1994 as a reference period to determine recreational management measures and 1990-1992 for commercial management measures (except Delaware and New Jersey, who use 1989-1991). This period represents a period when the fishery was severely overfished and is not appropriate. The Technical Committee does not believe that this reference period reflects the age and size structure of the weakfish population when it was fished at the target F over an extended time period reflecting a healthy fishery. The Technical Committee recommended abandoning the early 1990's reference period that reflected overfishing and diminished age and size structure and adopting 1981 – 1985 as a new reference period. The early 1980's best represent a less fished stock with an expanded age and size structure, the catch rates of a healthy fishery, and a time of no state regulation.

Under Amendment 4 some states are faced with reductions in their creel limits from what was in place under Amendment 3. These reductions are based on many things including a new reference period, a reduced fishing mortality target, a change in methodology in calculating creel limits to a more appropriate one, and a weakfish population, which has changed since Amendment 3, was adopted. Because the weakfish stock is rebuilding, in order to meet the fishing mortality target and maintain the spawning stock biomass above the threshold, these creel limits had to be reduced. Retaining older creel limits may not have maintained the control on fishing mortality needed to allow the stock to continue rebuilding. In addition, if fishing mortality is controlled and the age and size structure continues to build, recreational anglers will benefit directly. While more weakfish are harvested commercially, recreational anglers currently harvest more older, larger weakfish than commercial fishers (Figure 4). The possession/size limit regime listed for recreational fisheries was projected from the best science available at the time of passage of Amendment 4.

In addition, the status of the weakfish stock will be reviewed annually and the Board has the flexibility to respond to conditions as described under *Section 4.6* of this document. In the case that weakfish recover more quickly or to a greater extent than is projected, restrictions may be reduced; in the case that the

weakfish recover more slowly or to a lesser extent than is projected, restrictions may be increased. The Board will use the annual stock assessments to evaluate the need for any changes to the current regulations.

Reasonable Maximum Creel Limit:
In Amendment 3, a management regime was created where large minimum size limits resulted in high or no creel limits while still achieving the target fishing mortality rate. Amendment 4 sets a maximum creel limit at 10 fish for fish 15 inches or greater.

4.1.1 Minimum Fish Size

Each state shall be required to promulgate regulations for their recreational fisheries that prohibit landing of weakfish less than 12 includes total length (TL). However, conservation equivalencies for minimum fish sizes larger than 12 inches will be allowed. Table 1 displays the options available to the states.

4.2 COMMERCIAL FISHERIES MANAGEMENT MEASURES

To achieve fishing mortality targets, commercial fisheries will be constrained by size limits, gear restrictions, and possibly season and/or area closures. To maintain current fishing mortality rates that have led to the strong improvements in the weakfish population, states shall maintain the commercial management measures they had in place with Amendment 3. If Technical Committee or Plan Review Team review indicates a state is exceeding the mortality goals outlined in Amendment 3, the Management Board may require additional commercial management measures to meet those mortality goals. States may instead submit an alternative management proposal which outlines how the new management proposal is equivalent to their management regime under Amendment 3 in terms of maintaining fishing mortality and spawning stock biomass. Those states who did not develop a commercial fishery management plan under Amendment 3 because they were *de minimis* and are now no longer *de minimis* must develop a management plan that should achieve a 33% reduction using the data in the last three years.

The reference period for commercial management measures is 1990 - 1992. Delaware and New Jersey's reference periods are 1989 – 1991. Both Delaware and New Jersey, have earlier time periods because they imposed regulations in the 1990 – 1992 time frame. Because the commercial fishery has changed drastically over the years, choosing an earlier time frame would be problematic.

Appendix I contains the evaluation manual which outlines the details of the commercial management measures including mesh size regulations, reduction formulas, etc.

4.2.1 Bycatch

A directed fishery is defined by the ASMFC Interstate Fisheries Management Program Charter as "fishing for a stock using gear or strategies intended to catch a given target species, group of species, or size class." Any fishery landing weakfish over the bycatch allowance outlined below is considered a directed fishery and must abide by all regulations including closed area, closed seasons, and gear restrictions except in any specific exceptions outlined below.

States may allow fishermen targeting species other than weakfish (i.e. non-directed fisheries) to possess no more than 300 pounds in any one day or trip (whichever is the longer period of time) as allowable bycatch during any otherwise closed seasons. Fishermen are permitted this 300 pound allowance provided that there is at least an equal poundage of other species as weakfish on board the vessel. Any state that chooses to implement this allowance must have a reporting system in place that will allow adequate quantification of any such catch. Furthermore, each state that chooses to allow a "bycatch

allowance" must account for any harvest of weakfish from non-directed fisheries in their state plans. Any bycatch of weakfish retained in non-directed fisheries must be at least 12 inches or greater total length except for any exceptions outlined in *Section 4.2.2*.

At no time will the commercial hook and line fishery be permitted any bycatch allowance of weakfish during any otherwise closed season.

The southern penaeid shrimp fishery is permitted 150 pounds of weakfish as bycatch allowance provided that there is at least equal poundage of other species as weakfish on board the vessel.

4.2.2 Minimum Fish Size

Each state shall be required to promulgate regulations for their directed commercial fisheries that prohibit landing of weakfish less than 12 inches TL.

Up to 300 undersized weakfish taken in finfish trawl fisheries may be landed. None of the undersized fish can be sold.

Pound net and haul seine fisheries within internal waters are allowed to harvest fish smaller than 12 inches total length. However, catches from these fisheries must be monitored and accounted for in each state's proposal. Harvest of smaller fish requires that states comply with conservation equivalencies as outlined in *Section 4.5*. For example, conservation equivalencies may require states with pound net or haul seine fisheries to shorten seasons. The Weakfish Management Board will consider further exceptions within internal waters (with conservation equivalencies required) on a case-by-case basis.

Notwithstanding *Section 4.5*, no other gears may harvest and retain weakfish smaller than 12 inches TL.

4.2.3 Minimum Mesh Size for Nets

Directed weakfish fisheries are required to use mesh sizes that retain 25% or less of weakfish less than 12 inches TL (often called L25 mesh sizes). These mesh sizes for commercial gill nets and fish trawl nets are listed in Table I-1 in the Evaluation Manual. If a state chooses to allow mesh sizes that do not achieve a L25 of 12 inches, it can use conservation equivalency (e.g. longer closed seasons) to satisfy the mesh size requirement (see Appendix I). In the event that calculated mesh sizes do not directly correspond to manufacturers mesh sizes, the next higher commercially available mesh size shall be required.

The L25 mesh sizes as currently listed in Table I-1 are based on the best available science. States are encouraged to conduct studies and present evidence to the Weakfish Technical Committee that would further refine the L25 mesh sizes and amend the table.

4.2.4 Closed Season

States may determine timing of closed seasons of sufficient length to reach their mortality goals. Any state proposing such a closure would have to show to the satisfaction of the Board that the closure will achieve the desired reduction in mortality.

4.2.5 Closed Area

States may use area closures to account for required reductions in mortality. Any state proposing such a closure would have to show to the satisfaction of the Board that the closure will achieve the desired reduction in mortality.

4.2.6 Per Trip Catch Limits

States may use per trip catch limits as an element of their proposals to reduce overall fishing effort.

4.2.7 Permit Limits

States may cap or reduce the number of permits issued to limit additional or reduce present participation in the fishery. In order to claim any mortality reductions, the state would have to demonstrate to the satisfaction of the Weakfish Management Board how such measures meet their target mortality goals.

4.2.8 Bycatch Reduction Devices (BRDs) And Methods

Over time, bycatch reduction devices have been developed for many gears to reduce the take of both undersized and legal sized weakfish. As additional bycatch reduction devices are developed, the Management Board may choose to provide incentives or require these devices in order to reduce bycatch.

One or more BRDs shall be required in all food shrimp (penaeid) trawl nets with a headrope length exceeding 16 feet and having mesh less than 2.5 inches stretched inside measurement (middle to middle knot measurement). All BRDs must be certified, properly installed, and demonstrate a 40% reduction by number or 50% reduction of bycatch mortality of weakfish when compared to catch rates in a naked net.

States are encouraged to continue research on gear technology and method that will result in further bycatch reductions.

Landings data indicates that most scrap landings come from the pound net fishery. Escape panels in this fishery are workable and can be effective. By the 2004 fishing season, the Weakfish Technical Committee will develop recommendations for the use of bycatch reduction devices (i.e. escape panels) in pound nets. States may choose to implement an incentive-based program for these escape panels.

4.3 FOR-HIRE FISHERIES MANAGEMENT MEASURES

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

4.5 ALTERNATIVE STATE MANAGEMENT REGIMES

Once approved by the Weakfish 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 non-compliance 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 Amendment 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.

4.5.1 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 Committee and the Advisory Panel.

The Plan Review Team is responsible for gathering the comments of the Technical Committee, the Stock

Assessment Committee and the Advisory Panel, and presenting these comments as soon as possible to the Management Board for decision.

The Weakfish Management Board will decide whether to approve the state proposal for an alternative management program if it determines that it is consistent with the "target fishing mortality rate applicable", and the goals and objectives of this Amendment.

4.5.2 Management Program Equivalency

The Weakfish Technical Committee, under the direction of the Plan Review Team, will review any alternative state proposals under this section and provide to the Weakfish Management Board its evaluation of the adequacy of such proposals.

4.5.3 *De minimis* Fishery Guidelines

The ASMFC Interstate Fisheries Management Program Charter defines *de minimis* as "a situation in which, under the 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).

A states may apply for *de minimis* status if, for the last two years, its combined average commercial and recreational landings (by weight) constitute less than 1% of the annual coastwide commercial and recreational landings for the same two year period. States may petition the Weakfish Management Board at any time for *de minimis* status. 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.

De minimis states are not required to implement the recreational or commercial fishing provisions of this Amendment, except for bycatch reduction device requirements under *Section 4.2.8* and annual reporting to determine if continued *de minimis* status is warranted.

4.6 ADAPTIVE MANAGEMENT

The Weakfish Management Board may vary the requirements specified in this Amendment as a part of adaptive management in order to conserve the weakfish resource. Specifically, the Management Board may change target fishing mortality rates and harvest specifications, other measures designed to prevent overfishing of the stock complex or any spawning component. Such changes will be instituted to be effective on the first fishing day of the following year, but may be put in place at an alternative time when deemed necessary by the Management Board. These changes should be discussed with the appropriate federal representatives and Councils prior to implementation in order to be complementary to the regulations for the EEZ.

4.6.1 General Procedures

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

The Weakfish Management Board will review the report of the Plan Review Team, and may consult further with Technical Committee, the Stock Assessment Committee 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 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 Committee and the Advisory Panel; and shall then decide whether to adopt or revise and, then, adopt the addendum.

Upon adoption of an 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.

4.6.2 Measures Subject to Change

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

(1) Fishing year and/or seasons;
(2) Area closures;
(3) Overfishing definition, MSY and OY;
(4) Rebuilding targets and schedules;
(5) Catch controls, including bag and size limits;
(6) Effort controls;
(7) Bycatch allowance
(8) Reporting requirements;
(9) Gear limitations;
(10) Measures to reduce or monitor bycatch;
(11) Bycatch reduction certification criteria or targets
(12) Observer requirements;
(13) Management areas;
(14) Recommendations to the Secretaries for complementary actions in federal jurisdictions;
(15) Research or monitoring requirements;
(16) Frequency of stock assessments;
(17) Stock enhancement protocols;
(18) *De minimis* specifications;
(19) Management unit;
(20) Catch allocation; and
(21) Any other management measures currently included in Amendment 4.

4.7 EMERGENCY PROCEDURES

Emergency procedures may be used by the Weakfish Management Board to require any emergency action that is not covered by or is an exception or change to any provision in Amendment 4. Procedures for implementation are addressed in the ASMFC Interstate Fisheries Management Program Charter, Section Six (c)(10) (ASMFC 2000).

4.8 MANAGEMENT INSTITUTIONS

The management institutions for Weakfish 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 ASMFC and the ISFMP Policy Board

The ASMFC (Commission) and the ISFMP 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, including this Amendment 4; and must also make all final determinations concerning state compliance or noncompliance. The ISFMP Policy Board reviews any non-compliance recommendations of the various Management Boards and Sections and, if it concurs, forwards them on to the Commission for action.

4.8.2 Weakfish Management Board

The Weakfish Management Board was established under the provisions of the Commission's ISFMP Charter (Section Four [b]) and is generally responsible for carrying out all activities under this Amendment (ASMFC 2000).

The Weakfish Management Board (Board) establishes and oversees the activities of the Plan Development or Plan Review Team, the Technical Committee and the Stock Assessment Subcommittee; and requests the establishment of the Commission's Weakfish Advisory Panel. Among other things, the Board makes changes to the management program under adaptive management and approves state programs implementing this Amendment and alternative state programs under *Sections 4.5* and *4.6*. The Board reviews the status of state compliance with the FMP or amendment 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 Weakfish Plan Development / Plan Review Team

The Weakfish Plan Development Team (PDT) and the Weakfish 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 Weakfish Management Board. Both are chaired by an ASMFC FMP Coordinator. The Weakfish PDT/PRT is directly responsible to the Board for providing information and documentation concerning the implementation, review, monitoring and enforcement of Amendment 4. The Weakfish PDT/PRT shall be comprised of personnel from state and federal agencies who have scientific and management ability and knowledge of weakfish. The PDT was responsible for preparing all documentation necessary for the development Amendment 4, 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 4. 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 4 once it has been adopted by the Commission.

4.8.4 Weakfish Technical Committee

The Weakfish Technical Committee will consist of representatives from state or federal agencies, Regional Fishery Management Councils, Commission, university or other specialized personnel with scientific and technical expertise and knowledge of the weakfish fishery. The Board will appoint the members of the Technical Committee and may authorize additional seats as it sees fit. Its role is to act as a liaison to the individual state and federal agencies, provide information to the management process, and review and develop options concerning the management program. The Technical Committee will provide scientific and technical advice to the Management Board, PDT, and PRT in the development and monitoring of a fishery management plan or amendment.

4.8.5 Weakfish Stock Assessment Subcommittee

The Weakfish Stock Assessment Subcommittee shall be appointed by the Technical Committee at the request of the Management Board, and will consist of scientists with expertise in the assessment of the weakfish population. Its role is to assess the weakfish population and provide scientific advice concerning the implications of proposed or potential management alternatives, or to respond to other scientific questions from the Board, Technical Committee, PDT or PRT. The Stock Assessment Subcommittee will report to the Technical Committee.

4.8.6 Weakfish Advisory Panel

The Weakfish Advisory Panel was established according to the Commission's Advisory Committee Charter. Members of the Advisory Panel are citizens who represent a cross-section of commercial and recreational fishing interests and others who are concerned about weakfish conservation and management. The Advisory Panel provides the Board with advice directly concerning the Commission's weakfish management program.

4.8.7 Federal Agencies

4.8.7.1 Management in the Exclusive Economic Zone (EEZ)

In the absence of a Council Fishery Management Plan, management is the responsibility of the NMFS as mandated by the Atlantic Coastal Fishery Conservation and Management Act (16 U.S.C. 5105 et seq.)

4.8.7.2 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 Weakfish Board in accordance with the Commission's ISFMP Charter. The NMFS also participates on the Technical Committee and Stock Assessment Subcommittee. The USFWS also participates on the Weakfish Plan Development Team and Technical Committee.

4.8.7.3 Consultation with Fishery Management Councils

In carrying out the provisions of Amendment 4, the states, as members of the Weakfish Management Board, shall closely coordinate with the Fishery Management Councils in order to cooperatively manage the Atlantic coast Weakfish population. In accordance with the Commission's ISFMP Charter, a representative of the Fishery Management Councils shall be invited to participate as a full member of the Weakfish Board.

4.9 RECOMMENDATIONS TO THE SECRETARIES FOR COMPLEMENTARY ACTIONS IN FEDERAL JURISDICTIONS

As contemplated in 16 USC 5102 (1)(C) and 5103 (b), the Atlantic States Marine Fisheries Commission recommends that in order to maintain consistency the Secretary of Commerce maintain the following measures which were instituted under Amendment 3 and amended in this Amendment concerning management of weakfish in the exclusive economic zone (EEZ):

- require a minimum weakfish size of 12 inches total length;
- require weakfish recreationally harvested in the EEZ comply with the laws in the state in which they are landed;
- require that weakfish commercially harvested in the EEZ be landed in accordance with the landing laws of the state in which they are landed, with the exception that weakfish caught commercially in the EEZ may not be landed in a *de minimis* state;

- require minimum mesh sizes in the EEZ consistent with a 12-inch minimum fish size. Non-directed fisheries using smaller mesh sized may possess no more than 300 pounds of weakfish during any one day or trip, whichever is longer in duration; and
- require the use of flynets in EEZ waters south of Cape Hatteras to be consistent with adjacent state regulations.

The Weakfish Management Board will annually review their position with regard to EEZ regulations and may provide recommendations for any changes to the National Marine Fisheries Service.

The Atlantic States Marine Fisheries Commission recognizes that the Secretary of Commerce may take this action through the fishery management planning process contained in the Magnuson-Stevens Fishery Conservation and Management Act or the Atlantic Coastal Fisheries Cooperative Management Act.

4.10 COOPERATION WITH OTHER MANAGEMENT INSTITUTIONS

At this time, no other management institutions have been identified that would be involved with management of weakfish on the Atlantic Coast. Nothing in Amendment 4 precludes the coordination of future management collaboration with other management institutions should the need arise.

5.0 COMPLIANCE

Full implementation of the provisions of this Amendment is necessary for the management program to be equitable, efficient and effective. States are expected to implement these measures faithfully under state laws. Although the Atlantic States Marine Fisheries Commission does not have authority to directly compel state implementation of these measures, it will continually monitor the effectiveness of state implementation and determine whether states are in compliance with the provisions of this fishery management plan. This section sets forth the specific elements states must implement in order to be in 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 STATES

A state will be determined to be out of compliance with the provisions of this fishery management plan, 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 Weakfish 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 Weakfish 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 Weakfish Management Board.

5.1.1 Mandatory Elements of State Programs

To be considered in compliance with this fishery management plan, all state programs must include harvest controls on Weakfish fisheries consistent with the requirements of *Sections 4.1, 4.2* and *4.3*; except that a state may propose an alternative management program under *Section 4.5*, which, if approved

by the Management Board, may be implemented as an alternative regulatory requirement for compliance.

5.1.1.1 Regulatory Requirements

Each state must submit its required Weakfish regulatory program to the Commission through the ASMFC staff for approval by the Weakfish Management Board. During the period from submission, 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 management plan or contained in current state law. States may begin to implement Amendment 4 after final approval by the Commission. The following lists the specific compliance criteria that a state/jurisdiction must implement in order to be in compliance with Amendment 4:

- Recreational Fisheries Management Measures including, but not limited to, creel limit/minimum size, maximum creel limit, and minimum fish size (*refer to Section 4.1*)
- Commercial Fisheries Management Measures including, but not limited to, bycatch, minimum fish size, minimum mesh size for nets, closed seasons and areas, per trip catch limits, permit limits, bycatch reduction devices (*refer to Section 4.2*)

Once approved by the Weakfish 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 Amendment 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

States are required to report on specified monitoring elements. States' responsibilities for monitoring are outlined in Section 3.0 and include age and length data collection.

5.1.1.3 Law Enforcement Requirements

All state programs must include law enforcement capabilities adequate for successfully implementing that state's weakfish regulations. The adequacy of a state's enforcement activity will be monitored annually by reports of the ASMFC Law Enforcement Committee to the Weakfish Plan Review Team.

5.1.2 Compliance Schedule

States must implement Amendment 4 according to the following schedule:

January 15, 2003: States must submit programs to implement Amendment 4 for approval by the Weakfish Management Board. Programs must be implemented upon approval by the Management Board.

July 1, 2003: States with approved management programs must implement Amendment 4. States may begin implementing management programs prior to this deadline if approved by the Management Board.

Reports on compliance must be submitted to the Commission by each jurisdiction annually, no later than ***September 1 beginning in 2003.***

5.1.3 Compliance Report Content

Each state must submit an annual report concerning its weakfish fisheries and management program for the previous calendar year. A standard compliance report format has been prepared and adopted by the ISFMP Policy Board. States should follow this format in completing the annual compliance report.

5.2 PROCEDURES FOR DETERMINING COMPLIANCE

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

In brief, all states are responsible for the full and effective implementation and enforcement of fishery management plans in areas subject to their jurisdiction. Written compliance reports as specified in the Plan or Amendment must be submitted annually by each state with a declared interest. Compliance with Amendment 4 will be reviewed at least annually. The Weakfish Management Board, ISFMP Policy Board or the Commission, may request the Weakfish Plan Review Team to conduct a review of plan implementation and compliance at any time.

The Weakfish Management Board will review the written findings of the PRT within 60 days of receipt of a State's compliance report. Should the Management Board recommend to the Policy Board that a state be determined out of compliance, a rationale for the recommended non-compliance finding will be included. Specifically, the rationale must address the required measures of Amendment 4 that the state has not implemented or enforced, a statement of how failure to implement or enforce the required measures jeopardizes weakfish conservation, and the actions a state must take in order to comply with Amendment 4 requirements.

The ISFMP Policy Board shall, within thirty days of receiving a recommendation of non-compliance from the Weakfish Management Board, review that recommendation of non-compliance. If it concurs in the recommendation, it shall recommend at that time to the Commission that a state be found out of compliance.

The Commission shall consider any Amendment 4 non-compliance recommendation from the Policy Board within 30 days. Any state which is the subject of a recommendation for a non-compliance finding is given an opportunity to present written and/or oral testimony concerning whether it should be found out of compliance. If the Commission agrees with the recommendation of the Policy Board, it may determine that a state is not in compliance with Amendment 4, and specify the actions the state must take to come into compliance.

Any state that has been determined to be out of compliance may request that the Commission rescind its non-compliance findings, provided the state has revised its weakfish conservation measures or shown to the Board and/or Commission's satisfaction that actions taken by the state provide for conservation equivalency.

5.4 ANALYSIS OF ENFORCEABILITY OF PROPOSED MEASURES

The ASMFC Law Enforcement Committee reviewed the proposed management measures for Amendment 4. The Management Board considered each of the Committee's recommendations when choosing management measures. In almost all cases, the Board chose the measure that the Law Enforcement Committee preferred most.

6.0 MANAGEMENT AND RESEARCH NEEDS

The following list of research needs have been identified in order to enhance the state of knowledge of the weakfish resource, population dynamics, ecology and the various fisheries. This list will be reviewed annually by the Plan Review Team, Technical Committee, Advisory Panel, and the Management Board and an updated prioritized list will be included in the Annual Weakfish FMP Review.

6.1 RESEARCH AND DATA NEEDS

6.1.1 Biological

High Priority

Collect catch and effort data including size and age composition of the catch, determine stock mortality throughout the range, and define gear characteristics. In particular, increase length-frequency sampling, particularly in fisheries from Maryland and further north.

Develop latitudinal / seasonal / gear specific age length keys for the Atlantic coast. Increase sample sizes to consider gear specific keys.

Derive estimates of discard mortality rates and the magnitude of discards for all commercial gear types from both directed and non-directed fisheries. In particular, quantify trawl bycatch, refine estimates of mortality for below minimum size fish, and focus on factors such as distance from shore and geographical differences.

Update the scale – otolith comparison for weakfish.

Medium Priority

Define reproductive biology of weakfish, including size at sexual maturity, maturity schedules, fecundity, and spawning periodicity. Continue research on female spawning patterns: what is the seasonal and geographical extent of "batch" spawning; do females exhibit spawning site fidelity?

Conduct hydrophonic studies to delineate weakfish spawning habitat locations and environmental preferences (temperature, depth, substrate, etc.) and enable quantification of spawning habitat.

Compile existing data on larval and juvenile distribution from existing databases in order to obtain preliminary indications of spawning and nursery habitat location and extent.

Continue studies on mesh-size selectivity; up-to-date (1995) information is available only for North Carolina's gill net fishery. Mesh-size selectivity studies for trawl fisheries are particularly sparse.

Low Priority

Identify stocks and determine coastal movements and the extent of stock mixing, including characterization of stocks in overwintering grounds (e.g. tagging).

Biological studies should be conducted to better understand migratory aspects and how this relates to observed trends in weight at age.

Continue studies on recreational hook-and-release mortality rates, including factors such as depth, warmer water temperatures, and fish size in the analysis. Studies are needed in deep and warm water conditions. Further consideration of release mortality in both the recreational and commercial fisheries is needed, and methods investigated to improve survival among released fish.

Document the impact of power plants and other water intakes on larval, post larval and juvenile weakfish mortality in spawning and nursery areas, and calculate the resultant impact to adult sock size.

Define restrictions necessary for implementation of projects in spawning and overwintering areas and develop policies on limiting development projects seasonally or spatially.

Develop a coastwide tagging database.

Develop a spawner recruit relationship and examine the relationships between parental stock size and environmental factors on year-class strength.

6.1.2 Social

A comprehensive social assessment on weakfish fishermen and the industry throughout the range of the species to provide baseline data by which future social impacts could be measured.

6.1.3 Economic

Detailed information on production activities (e.g., fishing effort and labor used by gear, vessel characteristics, areas fished, etc.) and costs and earnings for the harvesting and processing sectors.

Information on retail sales and demand for weakfish in order to estimate the demand and economic benefits of at-home and away-from home consumption of weakfish.

Development of bioeconomic models that link the underlying population dynamics to the economic aspects of the commercial and recreational fisheries.

Distribution of weakfish to the various markets and across states.

Information on the margins of various stages of processing and marketing also need to be obtained; this information is necessary to construct mathematical models that can be used to estimate the economic impacts of management and regulation.

A directed data collection program for weakfish including the same variables presently collected by NMFS in support of MRFSS and by the economic add-on. Data collected includes information on travel distance, mode of angling, expenditures, area fished, catch on previous trips, and other information.

Development of commercial decision-making or behavioral models to explain how fishers might respond to various regulations.

Estimation and assessment of consumer (net economic benefits to consumers) and producer (net economic benefits or profits to producers) surplus; the sum of consumer and producer surplus is a measure of the net economic value to society of a good or service.

Development of input/output models for all states having commercial weakfish activity, or alternatively, full-blown economic impact models, which might consist of input/output models or General Equilibrium models.

Determination of the economic value derived from recreational angling including the economic value of a catch and release fishery.

6.1.4 Habitat

Conduct hydropohonic studies to delineate weakfish spawning habitat locations and environmental preferences (temperature, depth, substrate, etc) and enable quantification of spawning habitat.

Compile existing data on larval and juvenile distribution from existing databases in order to obtain preliminary indications of spawning and nursery habitat location and extent.

Document the impact of power plants and other water intakes on larval, post larval and juvenile weakfish mortality in spawning and nursery areas, and calculate the resulting impacts on adult stock size.

Define restrictions necessary for implementation of projects in spawning and overwintering areas and develop policies on limiting development projects seasonally or spatially.

7.0 PROTECTED SPECIES

In the fall of 1995, Commission member states, the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) began discussing ways to improve implementation of the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) in state waters. Historically, these policies have been only minimally implemented and enforced in state waters (0-3 miles). In November 1995, the Commission, through its Interstate Fisheries Management Program (ISFMP) Policy Board, approved amendment of its ISFMP Charter (Section Six (b)(2)) so that protected species and their interactions with ASMFC managed fisheries are addressed in the Commission's fisheries management planning process. Specifically, the Commission's fishery management plans will describe impacts of state fisheries on certain marine mammals and endangered species (collectively termed protected species), and recommend ways to minimize these impacts. The following section outlines: (1) the federal legislation which guides protection of marine mammals and sea turtles, (2) the protected species with potential fishery interactions; (3) the specific type(s) of fishery interaction; (4) population status of the affected protected species; and (5) potential impacts to Atlantic coastal state and interstate fisheries.

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. Under 1994 Amendments, the Act requires NMFS 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. Specifically, a strategic stock is defined as a stock: (1) for which the level of direct human-caused mortality exceeds the potential

biological removal (PBR)[6] level; (2) which is declining and is likely to be listed under the 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. Category I and II fisheries are those that have frequent or occasional incidental mortality and serious injury of marine mammals, respectively, whereas Category III fisheries have a remote likelihood of incidental mortality and serious injury of marine mammals.

Under 1994 mandates, the MMPA also requires fishermen in Category I and II to register under the Marine Mammal Authorization Program (MMAP), the purpose of which is to provide an exception for commercial fishermen from the general taking prohibitions of the MMPA. All fishermen, regardless of the category of fishery they participate in, must report all incidental injuries and mortalities caused by commercial fishing operations.

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. Permits are not required for Category III fisheries. However, any serious injury or mortality of a marine mammal must be reported.

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

There are numerous species that inhabit the management area of this FMP that are afforded protection under the MMPA and ESA. Eleven are classified as endangered or threatened under the ESA, while the remainder are protected by the provisions of the MMPA.

In addition, over 50 species of marine birds occur within the areas fished for weakfish. These include fulmars, shearwaters, storm petrels, jaegers, skuas, and various species of terns and gulls. Approximately 20 species of marine birds breed along the northern and central Atlantic coast. Another seven species breed in other parts of the Atlantic Ocean and spend their non-breeding season in north and mid-Atlantic

[6] PBR is the number of human-caused deaths per year each stock can withstand and still reach an optimum population level. This is calculated by multiplying "the minimum population estimate" by "½ stock's net productivity rate" by "a recovery factor ranging from 0.1 for endangered species to 1.0 for healthy stocks."

waters from May through September. An additional 15 species winter in the mid-Atlantic region where and when the weakfish fishery may occur. All of these birds are protected under the Migratory Bird Treaty Act.

Listed below are protected species found in coastal Northwest Atlantic waters.

Endangered

Right whale	(*Eubalaena glacialis*)
Humpback whale	(*Megaptera novaeangliae*)
Fin whale	(*Balaenoptera physalus*)
Sperm whale	*(Physeter macrocephalus)*
Blue whale	*(Balaenoptera musculus)*
Sei whale	*(Balaenoptera borealis)*
Green Turtle[7]	*(Chelonia mydas*)
Leatherback turtle	(*Dermochelys coriacea*)
Kemp's ridley	(*Lepidochelys kempii*)
Hawksbill	*(Eretmochelys imbricata)*
Shortnose sturgeon	(*Acipenser brevirostrum*)
Roseate tern	(*Sterna dougallii)*
Bermuda petrel	*(Pterodroma cahow)*

Threatened

Green sea turtle	(*Chelonia mydas*)
Loggerhead turtle	(*Caretta caretta*)

MMPA

Includes all marine mammals above in addition to:

Minke whale	(*Balaenoptera acutorostrata*)
Bottlenose dolphin	(*Tursiops truncatus*)
Harbor porpoise	(*Phocoena phocoena*)
Harbor seal	(*Phoca vitulina*)
Grey seal	(*Halichoerus grypus*)
Harp seal	(*Phoca groenlandica*)

Species of Concern

Red-throated loon	(*Gavia stellata)*
Black-capped petrel	(*Pterodroma hasitata)*
Common loon	(*Gavia immer)*
Razorbill	(*Alca torda)*

7.4 PROTECTED SPECIES INTERACTIONS WITH EXISTING FISHERIES

The commercial weakfish fishery occurs during the fall and winter as the species migrates from estuaries to overwintering grounds in the South Atlantic (Hogarth et al. 1995b). Weakfish are taken primarily by trawls, pound nets, gill nets and haul seines. Weakfish landings were dominated by the trawl fishery from the 1950's through the mid-1980's, when gill net landings began to account for the majority of the landings. Gill net landings in the latter half of the 1990's were about double that of the trawl fishery.

[7] The breeding populations of green turtles in Florida and on the Pacific coast of Mexico are listed as endangered, the remainder of the population is listed as threatened.

New Jersey, North Carolina and Virginia have dominated commercial weakfish landings since 1950. North Carolina has annually landed the most weakfish since 1972 and Virginia has consistently ranked second since 1993. North Carolina has accounted for about half of all the weakfish commercially landed since 1951.

7.4.1 Marine Mammals

There have been marine mammal interactions in the primary fisheries that target weakfish, including gill net and otter trawl. Based on the stock status, the species of greatest concern are the right whale, bottlenose dolphin, and harbor porpoise.

The Atlantic commercial fisheries using gillnets, trawl, 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) (See Table 2). Weakfish is not a target species in any of the fisheries listed below.

Subsequent sections discuss the number of documented interactions with the primary species of concern, such as the right whale, bottlenose dolphin, and harbor porpoise. These bycatch reports do not represent a complete list, but rather available records. It should be noted that without an observer program for many of these fisheries, actual numbers of interactions are difficult to obtain.

7.4.1.1 Gill net

7.4.1.1.1 Bottlenose Dolphin

From 1996 to 2000, a total of 12 coastal bottlenose dolphin takes were observed in the Mid-Atlantic coastal gill net fishery. This fishery is a combination of small vessel fisheries that target a variety of fish species, including bluefish, croaker, spiny and smooth dogfish, kingfish, Spanish mackerel, spot, striped bass and weakfish (Steve et al. 2001 as cited in Waring et al 2002). It operates in different seasons targeting different species in different states throughout the range of coastal bottlenose dolphins. NMFS has determined that the total estimated average annual fishery-related mortality or serious injury resulting from the 12 observed takes in this fishery is 233 bottlenose dolphins.

7.4.1.1.2 North Atlantic Right Whale

Assessing the level of interactions between right whales and fisheries has been difficult to measure and is derived from two primary sources—observed takes and non-observed fishery entanglement records. There has been only one documented case of an observed take of a right whale and this occurred in a pelagic drift gill net in 1993 (Waring et al., 2002). Subsequent re-examination of the record of this take, combined with information on additional entanglement reports on this whale, concluded that the suspected mortality of this whale was due to entanglement of lobster pot gear.

All other indications of fishery-related interactions have been derived from entanglement records. Entanglement records maintained by the NMFS Northeast Regional Office (NMFS, unpublished data) from 1970 through 2000, included at least 72 right whale entanglements or possible entanglements, including right whales in weirs, entangled in gill nets, and trailing line and buoys (Waring et al., 2002). From 1996 through 2000, five to nine records of mortality or serious injury (including records from both the U.S. and Canadian waters) involved entanglement or fishery interactions. Unfortunately, most of these records do not contain the detail necessary to assign the entanglements to a particular fishery or location.

Table 2: List of Fisheries: Commercial Fisheries in the Atlantic Ocean (DOC 2002).

Fishery Description	Marine Mammal Species Incidentally Killed/Injured
CATEGORY I	
Northeast sink gillnet	North Atlantic right whale, Humpback whale, Minke whale, Killer whaler, White-sided dolphin, Bottlenose dolphin, Harbor porpoise, Harbor seal, Gray seal, Common dolphin, Fin whale, Spotted dolphin, False killer whale, Harp seal.
Longline	Humpback whale, Minke whale, Risso's dolphin, Long-finned pilot whale, Short-finned pilot whale, Common dolphin, Atlantic spotted dolphin, Pantropical spotted dolphin, Striped dolphin, Bottlenose dolphin, Harbor porpoise.
CATEGORY II	
North Carolina inshore gillnet	Bottlenose dolphin.
Northeast anchored float gillnet	Humpback whale, White-sided dolphin, Harbor seal.
Southeast Atlantic gillnet	Bottlenose dolphin.
U.S. Mid-Atlantic coastal gillnet	Humpback whale, Minke whale, Bottlenose dolphin, Harbor porpoise, Harbor seal, Harp seal, Long-finned pilot whale, Short-finned pilot whale, White sided dolphin, Common dolphin.
CATEGORY III	
Chesapeake Bay inshore gillnet	Harbor porpoise
Delaware Bay inshore gillnet	Humpback whale, Bottlenose dolphin, Harbor porpoise
Long Island Sound inshore gillnet	Humpback whale, Bottlenose dolphin, Harbor porpoise
Rhode Island, southern Massachusetts, & New York Bight inshore gillnet	Humpback whale, Bottlenose dolphin, Harbor porpoise
North Atlantic bottom trawl	Long-finned pilot whale, Short-finned pilot whale, Common whale, White-sided dolphin, Striped dolphin, Bottlenose dolphin.
Gulf of Maine tub trawl groundfish bottom longline/hook-and-line	Harbor seal, Gray seal, Humpback whale

Incidents of entanglements in groundfish gill net gear, cod traps, and herring weirs in waters of Atlantic Canada and the U.S. East Coast were summarized by Read (1994). In six records of right whales becoming entangled in groundfish gill net gear in the Bay of Fundy and the Gulf of Maine between 1975 and 1990, the right whales were either released or escaped on their own, although several whales have been observed carrying net or line fragments (Waring et al., 2002). A right whale mother and calf were released alive from a herring weir in the Bay of Fundy in 1976. For all areas, specific details of right whale entanglement in fishing gear are often lacking. When direct or indirect mortality occurs, some carcasses come ashore and are subsequently examined, or are reported as “floaters” at sea; however, the number of unreported and unexamined carcasses is unknown, but may be significant in the case of floaters. More information is needed about fisheries interactions and where they occur.

7.4.1.1.3 Harbor Porpoise

Before 1998 most of the harbor porpoise takes from U.S. fisheries were from the Northeast sink gill net fishery. In the mid-1980s, using rough estimates of fishing effort, NMFS estimated that a maximum of

600 harbor porpoises was killed annually in this fishery. Between 1990 and 2000, NMFS Sea Sampling Program observed 452 harbor porpoise mortalities related to this fishery, with estimates of annual bycatch ranging from 2,900 animals in 1990 to 270 animals in 1999, and 570 animals in 2000 (Waring et al., 2002).

In July 1993, NMFS initiated an observer program in the Mid-Atlantic coastal gill net fishery. This fishery, which extends from North Carolina to New York, is a combination of small vessel fisheries that target a variety of fish species, some of the vessels operate right off the beach, some use drift nets and others use sink nets. From 1995 to 2000, 114 harbor porpoise were observed taken (Waring et al., 2002). During that time, fishing effort was scattered between New York and North Carolina from the beach to 50 miles from shore. After 1995, documented bycatch was observed from December to May. Annual average estimated harbor porpoise mortality and serious injury from the Mid-Atlantic coastal gill net fishery before implementation of the Harbor Porpoise Take Reduction Plan (1995-1998) was 358 animals. Following implementation of the Take Reduction Plan and other fishery management plans for groundfish in 1998/1999 fishing practices changed, resulting in a decrease in estimated annual average harbor porpoise mortality and serious injury to only 37 animals (1999 and 2000).

7.4.1.2 Otter Trawl

There are no documented interactions (either observed or through entanglement records) between coastal bottlenose dolphins and otter trawl fisheries.

No mortalities or serious injuries of right whales have been documented in the pelagic longline, pelagic pair trawl or other fisheries monitored by NMFS. For a discussion of gear entanglements *see Section 7.4.1.1.2*.

There was one observed harbor porpoise mortality that was documented in the North Atlantic bottom trawl fishery from 1989-2000. The take occurred in February 1992 offshore of New Jersey. Since the animal was clearly dead prior to being taken by the trawl, the estimated bycatch for the fishery was zero.

7.4.2 Sea Turtles

Interactions with sea turtles may occur when fishing effort overlaps with sea turtle distribution. Interactions could occur in the summer and fall, as turtles can be found in northeastern waters from June to November. Juvenile and immature Kemp's ridleys and loggerheads utilize nearshore and inshore waters north of Cape Hatteras during the warmer months and can be found as far north as the waters in and around Cape Cod Bay. Sea turtles are likely to be present off the Virginia, Maryland, and New Jersey coasts by April or May, but do not arrive in great concentrations in New York and northwards until mid-June. Although uncommon north of Cape Hatteras, immature green sea turtles also use northern inshore waters during the summer and may be found as far north as Nantucket Sound. Leatherback and hawksbill turtles may also occur in the waters where the weakfish fishery operates. With the decline of water temperatures in late fall, sea turtles migrate south to warmer waters. When water temperatures are greater than approximately 11°C, sea turtles may be present in areas where the weakfish fishery occurs.

The gear types used in the weakfish fisheries include gill nets, pound nets, haul seines, trawls and hook and line. All of these gear types have the potential to interact with sea turtles and result in the take of these species.

7.4.2.1 Gillnets

Sea turtles are vulnerable to capture in gill nets and have been killed through incidental capture in this gear type (Lutcavage et al., 1997). Gill nets of the weakfish fishery are placed in estuaries, inshore, and offshore waters. Loggerhead, Kemp's ridley, leatherback, green, and hawksbill turtles are at risk of capture and death in gill nets of this fishery as these turtles move and feed in coastal waters.

Stranded sea turtles (e.g. loggerhead and Kemp's ridley) have been documented partially or completely entangled in this type of gear. Data on sea turtle strandings and incidental takes along the Atlantic coast by fisheries from 1980 to 1996 compiled by the NMFS Southeast Fisheries Science Center has strongly implicated Atlantic gill net fisheries in incidental capture and strandings of sea turtles. Included in the stranding data were strandings with netting gear still attached to the turtle, or that showed constriction wounds and abrasions indicative of entanglement. Spring and fall gill net operations have been strongly implicated in coincident sea turtle stranding events from North Carolina through New Jersey. In 2000, large-mesh gill nets were determined to be the most likely cause of significant increases in the stranding of sea turtles along the eastern coast of North Carolina, resulting in a closure of gill net fisheries using stretched mesh size of 6 inches or greater in an area along North Carolina and Virginia in order to protect sea turtles.

Of particular concern are the nearshore and inshore gillnet fisheries of the mid-Atlantic that operate in state and federal waters off Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina. Incidental captures in these gillnet fisheries (both lethal and non-lethal) of whales and loggerhead, leatherback, green and Kemp's ridley sea turtles have been reported (NMFS, 2001).

Gill nets are listed as threats to sea turtles in the sea turtle recovery plans (NMFS and USFWS, 1993; NMFS and USFWS, 1992; NMFS and USFWS, 1991a; USFWS and NMFS 1992; NFMS and USFWS, 1991b).

7.4.2.2 Otter Trawl

Numerous trawl fisheries in State waters along the Atlantic coast have adversely affected threatened and endangered sea turtles in the past and can be expected to adversely affect sea turtles in the future.

Reducing sea turtle by catch and mortality in the shrimp trawl fishery has been a very important aspect of sea turtle recovery management efforts. Before the implementation of TEDs (turtle excluder device), large numbers of sea turtles were determined to be dying annually due to this trawl fishery. Other trawl fisheries also pose a potential threat to sea turtles. Non-TED equipped trawl nets fishing in an area where sea turtles occur have the potential to capture, stress (weaken), and drown sea turtles.

Trawl fisheries are listed as marine habitat threats in sea turtle recovery plans (NMFS and USFWS, 1991a; USFWS and NMFS, 1992; NMFS and USFWS, 1991b; NMFS and USFWS, 1992; NMFS and USFWS, 1993).

7.4.2.3 Pound Nets

Pound nets have resulted in sea turtle interactions and are implicated in mortalities. However the effect of pound nets depends on location and mesh size. For example, in some areas pound nets are thought to be benign in terms of interactions with sea turtles. On the other hand, turtle mortalities have occurred in this gear in New York Bight, and the pound net fishery has been implicated as the principal fishery-caused mortality in the Chesapeake Bay during the summer (Magnuson et al., 1990). While turtles can be released from the heart of the pound, injury and death can occur when they become entangled in the

headers or stringers. One hundred and sixty sea turtles were reported dead in Virginia from May 19 to June 11, 2001 in 2001. After research and analysis, NMFS determined that a significant portion of these strandings were related to pound net fishing, and required all Virginia permitted fishermen deploying pound nets with leaders measuring 8 inches (20.3 cm) or greater stretched mesh and leaders with stringers to tie up such leaders in the Virginia waters of the mainstem Chesapeake Bay and tributaries for a period of 30 days.

Pound nets are a potential threat to sea turtles discussed in recovery plans for these species (NMFS and USFWS, 1991a; USFWS and NMFS, 1992; NMFS and USFWS, 1991b)

7.4.2.4 Haul Seines

Seines have been identified as a potential threat to sea turtles (NMFS and USFWS, 1991a; NMFS and USFWS, 1991b; USFWS and NMFS, 1992; NMFS and USFWS, 1993). However, soak times and proper net attendance generally result in the release of live turtles.

7.4.2.5 Recreational Hook and Line

Rod and reel fisheries can impact sea turtles and even result in sea turtle mortality (Magnuson et al., 1990). Data from the STSSN from 1991 through 1995, showed a total of 112 turtles stranded with fishing hooks associated with some part of its body. In a study conducted by the NMFS Galveston Laboratory between 1993 through 1995, 170 ridleys were reported associated with recreational hook-and-line gear; including 18 dead stranded turtles, 51 rehabilitated turtles, five that died during rehabilitation, and 96 that were released by fishermen. Hook and line fishing is mentioned as a potential threat to sea turtles in sea turtle recovery plans (USFWS and NMFS, 1992; NMFS and USFWS, 1991a; NFMS and USFWS, 1991b).

7.5 POPULATION STATUS REVIEW OF RELEVANT PROTECTED SPECIES

7.5.1 Marine Mammals

Three marine mammal species are known to co-occur with or become entangled in gear used by the Atlantic weakfish fishery, namely, coastal bottlenose dolphin, North Atlantic right whale and harbor porpoise. These three species are classified as strategic stocks under the MMPA. Additionally, the right whale is listed as endangered. Above all, the species of greatest concern is the right whale, which is one of the most endangered species in the world, numbering only around 291 animals (Waring et al. 2002).

The status of these and other marine mammal populations inhabiting the Northwest Atlantic has been discussed in great detail in the U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments. Initial assessments were presented in Blaylock (1995) and were updated in Waring et al. (2002). The report presents information on stock definition, geographic range, population size, productivity rates, potential biomass removal (PBR – the number of human-caused deaths the stock can withstand annually and still reach and maintain an optimum population level), fishery specific mortality estimates, and compares the PBR to estimated human-caused mortality for each stock.

7.5.1.1 Bottlenose Dolphin, *Tursiops truncatus*

Under the MMPA, the coastal bottlenose dolphin population is listed as depleted and is classified as a strategic stock. The species ranges on the Atlantic coast from New Jersey south to central Florida (Waring et al. 2002). While there is uncertainty regarding population size and stock structure of Atlantic coastal bottlenose dolphins, the stock is believed to be depleted due to several high mortality events in the past 20 years. There are data suggesting that the population was at an historically high level immediately prior to the 1987-88 mortality event (Keinath and Musick 1988); however, this mortality event was

estimated to have decreased the population by as much as 53%.

Within the western North Atlantic, the stock structure of the coastal bottlenose dolphin is complex (Waring et al. 2002). The standing hypothesis has been that there is a single coastal migratory stock, ranging seasonally from as far north as Long Island, New York to as far south as central Florida. More recent studies, however, suggest that this hypothesis is incorrect and that there is likely a complex mosaic of stocks. Evidence to support this hypothesis includes observed geographic distribution, recent genetic analyses, photo-identification studies, satellite telemetry and stable isotope studies. Most of the available data, however, pertain to stocks in the waters off of North Carolina. Fewer data are available for bottlenose dolphins south of North Carolina and the theory of stock separation in this area is tentative. Stock affiliation for coastal animals in inland waters (estuaries, bays, sounds) also is poorly understood.

As a result of these findings and for the purposes of developing the Bottlenose Dolphin Take Reduction Plan, NMFS subdivided the coastal population into eight different management units, partitioned by region and season. These management units are: (1) Northern migratory summer (NJ/NY border to NC/VA border), (2) Northern North Carolina summer (VA/NC border to Cape Lookout, NC), (3) North Carolina mixed winter (NC coastwide), (4) Southern North Carolina summer (Cape Lookout, NC to Murrell's Inlet, SC), (5) South Carolina annual (Murrell's Inlet, SC to SC/GA border), (6) Georgia annual (coastwide, including estuarine waters), (7) Northern Florida annual (FL/GA border to Indian/Banana River Lagoon), and (8) Central Florida (Indian/Banana River Lagoon south). It is important to note that while there are eight management units, these units correspond to seven distinct bottlenose dolphin stocks -- Northern migratory, Northern North Carolina, Southern North Carolina, South Carolina, Georgia, Northern Florida and Central Florida. The North Carolina winter mixed management represents the winter abundance estimate for the Northern migratory, Northern North Carolina and Southern North Carolina populations combined

Abundance estimates for each management are outlined in Table 3. They are derived from 1995 estimates, which incorporate counts conducted by aerial or shipboard surveys, and from photo-identification data combined with mark recapture technology.

Table 3: Estimates of abundance and PBR for each management unit of the Western North Atlantic Coastal Bottlenose Dolphins (taken from Palka and Rossman 2001)

Management Unit	**Abundance Estimate**	*PBR*
Northern Migratory summer (May – October)	5,681	**23**
Northern North Carolina summer (May – October)	4,302	**16**
Southern North Carolina summer (May – October)	1,298	4.5
*North Carolina mixed winter (November – April)	6,474	**23**
South Carolina annual	3,513	24
Georgia annual	7,67	4.3
Northern Florida annual	354	2.3
Central Florida	10,652	74

* North Carolina mixed winter represents the winter abundance estimate for the Northern migratory, Northern North Carolina and Southern North Carolina populations combined.

Table 3 also provides PBR values for the various coastal bottlenose dolphin management units. PBR is defined as the number of human-caused deaths per year each stock can withstand and still reach an optimum population level. This is calculated by multiplying "the minimum population estimate" by "½ stock's net productivity rate" by "a recovery factor ranging from 0.1 for endangered species to 1.0 for healthy stocks." These numbers are gauged against annual bycatch estimates for the management units to

determine whether management actions are effective in reducing bycatch below PBR, with the ultimate goal of attaining a zero mortality rate.

In 2002, NMFS conducted surveys to update abundance estimates. Preliminary data from these surveys suggest that its initial abundance estimate of 21,1771 animals for the North Carolina winter mixed management unit far exceeds the 1995 estimate of 6,474 bottlenose dolphins. However, this preliminary estimate has not been peer reviewed and is confounded by an overlap in distribution between the coastal and offshore morphotypes of he bottlenose dolphin population. It is anticipated the new data and analyses will be peer reviewed in 2003.

7.5.1.2 North Atlantic Right Whale, Eubalaena glacialis

Northern right whales are listed as endangered under the ESA. They are also protected under the MMPA. Hunting is the major reason the western North Atlantic right whale population has declined to less than 300 individuals. Presently, the North Atlantic right whale is considered one of the most critically endangered populations of large whales in the world (Clapham et al. 1999, as cited in Waring et al. 2000). The species was continually hunted off the U.S. East Coast for three centuries possibly reducing its numbers to less than 100 individuals by the time international protection from the League of Nations came into effect in 1935 (see Waring et al. 2000 and reference therein). Right whales have been protected from commercial whaling under legislation of the International Whaling Commission since 1949 (NMFS 1991b).

Western North Atlantic right whales occur in the waters off New England and northward to the Bay of Fundy and the Scotian Shelf during the summer (NMFS 2000b). During the winter, a segment of the population, consisting mainly of pregnant females, migrates southward to calving grounds off the coastal waters of the southeastern U.S. Right whales use Mid-Atlantic waters as a migratory pathway between their summer feeding grounds and winter calving grounds. During the winters of 1999/2000 and 2000/2001, considerable numbers of right whales were recorded in the Charleston, South Carolina area (Waring et al. 2000). Currently, it remains unclear whether this is typical or reflects a northern expansion of the normal winter range.

Based on photo-identification techniques, the western North Atlantic population size was estimated to be 291 individuals in 1998 (Kraus et al. 2000, as cited in NMFS 2000b). This estimate may be low if animals were not photographed and identified or if animals were incorrectly presumed dead due to not being seen for an extended period of time. The population growth rate estimated for the western North Atlantic population during the late 1980's through early 1990's suggested that the stock was slowly recovering (Knowlton et al. 1994). However, a review of work conducted in 1999 indicated that the survival rate of the northern right whale had declined during the 1990's (Waring et al. 2000). One factor currently under review for this decline is the apparent increase in the calving interval. The mean calving interval pre-1992 was estimated at 3.67 years. An updated analysis considering data through the 1997/98 season indicated that the mean calving interval had increased to more than 5 years (Kraus et al. 2000 as cited in Waring et al. 2000). Reasons under consideration for this shift include contaminants, biotoxins, nutrition/food limitation, disease and inbreeding problems.

The primary sources of human-caused mortality and injury of right whales include ship strikes and entanglement in fishing gear. A recent study estimated that 61.6% of right whales show injuries consistent with entanglement in gear while 6.4% exhibited signs of injury from vessel strikes (Hamilton et al. 1998). With the small population size and low annual reproductive rate, human-caused mortalities have a greater impact on this species relative to other species. As such, due to the overall decline in the western North Atlantic right whale population, the PBR is set at zero (Waring et al. 2000).

7.5.1.3 Harbor Porpoise, *Phocoena phocoena*

The Gulf of Maine harbor porpoise was proposed to be listed as threatened under the ESA on January 7, 1993 (NMFS 1993), but in 1999 NMFS determined this listing was not warranted (NMFS 1999). NMFS removed this stock from the ESA candidate species list in 2001. The harbor porpoise is considered a strategic stock under the MMPA. The PBR for the harbor porpoise is 483 animals (NMFS 1998b). The total fishery-related mortality and serious injury for this stock is not be less than 10% of the calculated PBR, which means the human induced mortality is not approaching zero mortality and serious injury rate. For many years before 1999, the total fishery-related mortality and serious injury exceeded the PBR, therefore it remains listed as a strategic stock.

The harbor porpoise can range from the Labrador to North Carolina to North Carolina. The southern-most stock of harbor porpoise is referred to as the Gulf of Maine/Bay of Fundy stock and generally spends its winters in the Mid-Atlantic region. Harbor porpoise are generally found in coastal and inshore waters, but will also travel to deeper, offshore waters. The status of the harbor porpoise stock in US waters is unknown. There is insufficient data to determine the population trends for this species because they are widely dispersed in small groups, spend little time at the surface, and their distribution varies unpredictably from year to year depending on environmental conditions (NMFS 1998b). The best estimate of abundance for the Gulf of Maine/Bay of Fundy harbor porpoise is 89,700. The minimum population estimate is 74,695 (Waring et al. 2002).

7.5.2 Sea Turtles

All sea turtles that occur in U.S. waters are listed as either endangered or threatened under the ESA. The Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricata*) are listed as endangered. The loggerhead (*Caretta caretta*) and green turtle (*Chelonia mydas*) are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific coast of Mexico, which are listed as endangered. All five of these species inhabit the waters of the U.S. Atlantic and Gulf of Mexico.

Atlantic coastal waters provide important developmental, migration, and feeding habitat for sea turtles. The distribution and abundance of sea turtles along the Atlantic coast is related to geographic location, reproductive cycles, food availability, and seasonal variations in water temperatures. Water temperatures dictate how early northward migration begins each year and is a useful factor for assessing when turtles will be found in certain areas. Sea turtles can occur in offshore as well as inshore waters, including sounds and embayments.

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

7.6.1 Marine Mammals

7.6.1.1 Bottlenose Dolphin

From November 2001 through May 2002, NMFS convened the Bottlenose Dolphin Take Reduction Team in order to develop consensus recommendations to reduce the incidental take and mortality of Atlantic coastal bottlenose dolphin in all Category I and II fisheries. For the purposes of the Team's deliberations, NMFS subdivided the coastal population into eight different management units, partitioned by region and season. These management units are: (1) Northern migratory summer (NJ/NY border to NC/VA border), (2) Northern North Carolina summer (VA/NC border to Cape Lookout, NC), (3) North Carolina mixed winter (NC coastwide), (4) Southern North Carolina summer (Cape Lookout, NC to Murrell's Inlet, SC), (5) South Carolina annual (Murrell's Inlet, SC to SC/GA border), (6) Georgia annual

(coastwide, including estuarine waters), (7) Northern Florida annual (FL/GA border to Indian/Banana River Lagoon), and (8) Central Florida (Indian/Banana River Lagoon south). Each management was further assigned numbers for estimated stock abundance, potential biological removals (PBR) and bycatch estimates, as shown in Table 4.

Table 4: Estimates of abundance, PBR and bycatch for each management unit of the Western North Atlantic Coastal Bottlenose Dolphins (taken from Palka and Rossman 2001)

Management Unit	Abundance Estimate	PBR	Bycatch Estimate
Northern Migratory summer (May – October)	5,681	23	30
Northern North Carolina summer (May – October)	4,302	16	23
Southern North Carolina summer (May – October)	1,298	4.5	0
*North Carolina mixed winter (November – April)	6,474	23	180
South Carolina annual	3,513	24	0
Georgia annual	7,67	4.3	0
Northern Florida annual	354	2.3	0
Central Florida	10,652	74	54

* North Carolina mixed winter represents the winter abundance estimate for the Northern migratory, Northern North Carolina and Southern North Carolina populations combined.

The highlighted management units above represent the areas that the Team focused its greatest amount of effort on, since in each area the estimated amount of bycatch exceeded the allocated PBR for that area and fishery. Total bycatch is defined as the product of the bycatch rate, takes per unit effort (estimated from a sample of the fishery, and the total effort of the fishery. The Team's consensus recommendations for these areas included gear tending requirements (i.e., proximity rule), limits and prohibitions to overnight sets, and gear marking requirements.

Since submission of the Team's consensus recommendations in May 2002, NMFS has released notice of its intent to develop an Environmental Impact Statement, as well as reconvene the Team to develop additional measures that will reduce the mortality and serious injury of coastal bottlenose dolphins to less than PBR. The Team is scheduled to reconvene in early 2003, with the focus of its deliberations on achieving further reductions in bycatch in the North Carolina winter mixed management unit, the summer Northern migratory management unit and the summer North Carolina management unit.

For additional information, contact the National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division F/SER3, 9721 Executive Center Drive North, St. Petersburg, FL 33702.

7.6.1.2 Atlantic Right Whale

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 gill net and Mid-Atlantic coastal gill net. The PBR has been set at zero. Amongst other measures, the plan closes right whale critical habitat areas to specific types of fishing gear during certain seasons and modifies fishing practices. Areas identified as right whale critical habitats include two off of the New England coast (Cape Cod/Massachusetts Bay and Great South Channel) and one off the Southeast coast (Altamaha River, Georgia to approximately Jacksonville Beach, Florida).

The most recent changes to the regulations implemented under the Plan include the implementation of Dynamic and Seasonal Area Management Programs, which close certain areas to fishing relative to the presence of right whales in order to provide further protection to large whales, particularly right whales.

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.

Copies of the various rules governing large whale protection are available from the Protected Resources Division, National Marine Fisheries Service, Northeast Region, 1 Blackburn Drive, Gloucester, MA 01930. Additional information regarding the rule and changes to it is on the Internet at http://www.nero.nmfs.gov/whaletrp/

7.6.1.3 Harbor Porpoise

On December 1, 1998, NMFS published the final rule to implement the Harbor Porpoise Take Reduction Plan for both Gulf of Maine and the Mid-Atlantic coastal waters. The short-term goal of the Plan is to reduce, within six months of the plan's implementation, the mortality and serious injury of harbor porpoises to less than the PBR level. The PBR for harbor porpoises is 483 animals.

The Northeast sink and Mid-Atlantic coastal gill net fisheries are the two fisheries regulated by the Plan (63 FR 66464, December 2, 1998; also refer to for defined fishery boundaries). Amongst 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 gill net in mid-Atlantic waters. Although the Plan predominately impacts the dogfish and monkfish fisheries due to their higher porpoise bycatch rates, other gill net 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 (63 FR 66464, December 2, 1998).

Copies of the final rule are available from the Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910-3226. Additional information regarding the rule and changes to it is on the Internet at: www.nero.nmfs.gov/porptrp/.

7.6.2 Sea Turtles

Under the ESA, and its implementing regulations, taking sea turtles – even incidentally – is prohibited, with exceptions identified in 50 CFR 223.206. The incidental take of endangered species may only legally be authorised by an incidental take statement or an incidental take permit issued pursuant to section 7 or 10 of the ESA. No incidental take of sea turtles is currently authorised for any of the gear (i.e., gill net, otter trawl, haul seines, pound nets) that targets weakfish.

Existing NMFS regulations specify procedures that NMFS may use to determine that unauthorised takings of sea turtles are occurring during fishing activities, and to impose additional restrictions to conserve sea turtles and to prevent unauthorised takings (50 CFR 223.206(d)(4)). Restrictions may be effective for a period of up to 30 days and may be renewed for additional periods of up to 30 days each.

Currently, no sea turtle-related regulations have been implemented which would impact gears targeting weakfish. There are regulations, however, which were implemented in March 2002 that impact the use of large mesh gill nets (>8 inches) throughout Virginia and North Carolina. These regulations include one permanent area closure and three seasonal area closures. Copies of the regulations are available from the

Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910-3226.

7.7 POTENTIAL IMPACTS TO ATLANTIC COASTAL STATE AND INTERSTATE FISHERIES

Regulations under all three take reduction plans for Atlantic large whale, harbor porpoise and bottlenose dolphin have the potential to impact gill net fisheries that harvest weakfish.

7.8 IDENTIFICATION OF CURRENT DATA GAPS AND RESEARCH NEEDS

7.8.1 Bottlenose Dolphin Research Needs

Stock Identification and Status

- Continued research on stock structure to confirm existing stock delineations and incorporate dolphins in inland waters for improved stock identification.
- Precise abundance estimates over entire range of the coastal morphotype from southern Florida to the New York/New Jersey border, winter and summer, including estuaries.

Improving Assessment of Bycatch Levels

- Increase observer coverage to provide more accurate estimates of fishing related mortality, including the development and use of alternative platforms. Observer coverage should be expanded into state waters.
- Explore and expand stranding networks for collection of data pertinent to bottlenose dolphin/fishery interactions. Include training, equipment, support, and better communication among participants (stranding network members, managers, local authorities, scientists, and fishers).

Gear Modification Research

- Research on the effectiveness of reflective nets for catching fish, as well as for reducing takes of *Tursiops truncatus*.
- Research on comparing the behavior of captive and wild dolphins around gill nets with and without acoustically reflective webbing.
- Investigate the effects of twine stiffness and acoustically reflective webbing on dolphin bycatch.
- Investigate bridle alterations to prevent collapsing of the net and elimination of bridles on anchored gillnet gear with respect to their potential effects on the likelihood of bottlenose dolphin interactions.
- Investigate the behavior of anchored gill net gear with regard to likelihood of entanglement a) when net panels are laced together and b) when they are not laced together, leaving gaps between nets.
- Investigate the effects of different string designs (i.e., shallower net depth, hung in different parts of the water column) to determine if the amount of webbing can be reduced without affecting catch for different fisheries (especially small mesh in coastal waters).
- Determine if dolphins that appear to be attracted to boats or nets in North Carolina waters are interacting with gill net gear, attempt to identify such dolphins, and investigate their behavior and mortality rate.
- Investigate the importance of time of day and time from set with respect to when dolphins are caught in gear, based on carcass temperature and soak times.

7.8.2 Sea Turtle Research Needs

- Research into gear development/deployment for gill nets and trawls of this fishery should be conducted to ensure minimal impact on sea turtles.
- Pound net leaders should be less than 8 inch stretched mesh.

- Fishermen should be instructed on handling and resuscitation procedures for turtles encountered in the course of fishing.
- Public outreach material should be developed to improve recreational fishing knowledge of sea turtle entanglement with hooks and monofilament line.

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Table 5: Weakfish regulations under Amendment 3 on the Atlantic Coast as of 1/2002*

State	Recreational Regulations	Commercial Regulations
MA	16" minimum size; 12 fish bag limit	16" minimum size
RI	16" minimum size	16" minimum size
CT	16" minimum size	16" minimum size
NY	16" minimum size; 6 fish bag limit	16" minimum size; closed seasons; gear restrictions
NJ	14" minimum size; 14 fish bag limit	13" minimum size; 12" minimum size for trawl fishery during limited season; closed seasons; gear restrictions
DE	14" minimum size; 14 fish bag limit	Gill net: 12" minimum size; gear restrictions; closed seasons Hook and Line: 14" minimum size; bag limits during part of season and no bag limit during other parts
MD	14" minimum size; 10 fish bag limit	12" minimum size; closed seasons; gear restrictions
PRFC	14" minimum size; 10 fish bag limit	12" minimum size; closed season; gear restrictions; incentives for by-catch reduction devices
VA	12" minimum size and 4 fish bag limit for summer season; 14" minimum size and 14 fish bag limit for winter season	Pound Net: no minimum size; limited entry; closed season Gill Net: 12" minimum size; closed season; gear restrictions Haul Seine: no minimum size; closed season Trawl Fishery: 12" minimum size; closed season
NC	12" minimum size; 4 fish bag limit Or 14" minimum size; 10 fish bag limit	Long Haul Seine and Pound Net fishery: Seasonal 10" minimum size Other commercial fisheries: 12" minimum size Gear restrictions; Flynet area closure
SC	*De minimis* status	*De minimis* status
GA	*De minimis* status 13" minimum size; 6 fish bag limit	*De minimis* status 13" minimum size; 6 fish bag limit
FL	*De minimis* status 12" minimum size; 4 fish bag limit	*De minimis* status 12" minimum size; area closures; gear restrictions

*Please note: This table is meant to be a summary of the general regulations from each state and does not include the details of every regulation from every state.

Table 6: Atlantic coast commercial fisheries landings (in pounds), by state and year (1982 - 2001).

YEAR	MA	RI	CT	NY	NJ	DE	MD	VA	NC	SC	GA	FL	**Total**
1982	22,900	176,800	25,600	1,257,100	2,073,500	1,294,500	249,200	2,149,200	12,052,232	443	596	176,203	**19,478,274**
1983	6,900	163,700	42,800	850,000	2,172,700	901,800	390,000	2,592,900	10,233,734		2,749	117,720	**17,475,003**
1984	4,800	167,600	31,300	484,500	2,751,600	782,400	325,000	2,109,000	12,990,726		862	125,799	**19,773,587**
1985	3,100	163,100	28,200	386,200	3,030,100	990,800	316,110	2,082,186	9,821,188		82	132,291	**16,953,357**
1986	5,700	127,600	13,700	359,900	3,208,600	723,500	336,700	1,994,100	14,309,372		75	108,726	**21,187,973**
1987	1,700	78,600	29,500	329,100	2,094,100	577,800	366,900	1,962,800	11,508,389		189	123,081	**17,072,159**
1988	3,800	19,400	2,400	124,500	2,332,800	530,700	832,600	1,473,200	15,091,878			115,124	**20,526,402**
1989	1,900	9,600	2,300	103,500	1,458,500	530,200	743,800	1,025,200	10,115,747	113		171,318	**14,162,178**
1990	1,720	24,646	1,281	19,924	968,318	613,000	662,361	1,207,560	5,802,159		33	137,188	**9,438,190**
1991	1,912	25,009	21,300	111,629	1,174,181	497,300	328,251	1,059,679	5,308,574			164,925	**8,692,760**
1992	3,033	30,277	3,500	168,087	940,695	362,400	385,426	549,961	4,862,551			147,858	**7,453,788**
1993	1,080	9,991	1,477	88,379	834,446	194,700	181,863	1,088,047	4,309,249			144,347	**6,853,579**
1994		18,155	11,000	99,470	695,280	261,900	140,907	1,294,224	3,490,002			179,582	**6,190,520**
1995	535	52,728	6,431	172,567	867,263	281,200	69,417	1,485,065	4,113,310			50,310	**7,098,831**
1996	86	43,723	6,937	365,646	822,041	310,849	132,795	1,587,186	3,977,671			4,493	**7,251,427**
1997	55	31,211	10,958	336,795	1,036,488	558,919	192,634	1,557,980	3,561,099			11,720	**7,297,859**
1998	410	77,095	14,482	500,183	1,805,938	552,644	244,467	1,863,928	3,354,060			11,518	**8,424,725**
1999	2,550	126,793	22,172	490,596	1,292,749	440,295	223,455	1,674,117	2,613,727			17,486	**6,903,940**
2000	527	189,362	7,920	335,943	1,071,428	320,067	208,315	1,362,829	1,869,073			7,208	**5,372,672**
2001	231	109568	7167	588914	837550	187642	185815	1121961	1960380			10821	**5,010,049**

Note: Maine reported 5 lbs of weakfish in 1995.
SOURCE: National Marine Fisheries Service

Table 7: Atlantic Coast recreational fisheries landings of weakfish (in numbers), by State and Year (1982 - 2001).

Year	MA	RI	CT	NY	NJ	DE	MD	VA	NC	SC	GA	FL	**Total Numbers**
1981	5,946	18,371	18,707	275,120	1,028,787	122,744	177,761	7,484,780	204,230	2,580	2,433		**9,341,459**
1982		18,614	11,769	88,234	104,066	217,821	440,146	715,892	200,045	17,342		40,161	**1,854,090**
1983	2,732	74,608	6,363	36,934	2,857,093	1,009,899	595,286	354,846	387,871	6,807	17,209	293,303	**5,642,951**
1984	2,237	0	1,561	20,133	1,026,043	593,107	104,057	782,848	489,468	7,836		493,521	**3,520,811**
1985		17,092	2,874	89,538	812,839	365,693	305,799	505,223	217,671	61,788	4,811	36,340	**2,419,668**
1986		4,595	7,315	34,582	2,500,622	914,489	1,947,394	2,418,046	611,363	78,315	18,130	129,270	**8,664,121**
1987			777	7,447	1,666,619	638,342	824,883	1,015,413	624,160	18,841	10,802	64,248	**4,871,532**
1988			0	13,215	642,032	974,712	1,163,766	2,297,053	438,148	1,834	0	95,509	**5,626,269**
1989				6,436	303,289	254,170	226,505	357,864	190,193	6,810	8,245	141,880	**1,495,392**
1990		407		3,057	216,385	179,837	370,528	286,458	91,300	8,027	2,273	73,983	**1,232,255**
1991			18,695	28,072	545,665	366,464	221,242	351,947	140,826	19,616	4,954	115,210	**1,812,691**
1992		9,624	434	5,282	311,659	100,561	137,260	265,645	35,490	23,501	1,751	68,943	**960,150**
1993			2,460	12,610	203,915	235,312	238,768	108,392	106,737	7,360	14,752	148,968	**1,079,274**
1994			0	1,872	591,571	300,211	332,846	169,740	177,965	46,858	718	204,714	**1,826,495**
1995		1,568		22,310	671,850	406,730	88,695	226,682	62,475	29,897	22,437	55,435	**1,588,079**
1996		0		16,320	1,104,251	633,920	183,408	193,861	90,704	5,695	5,413	35,757	**2,269,329**
1997		1,415	517	112,986	1,028,334	647,529	162,900	557,809	184,954	2,039	44,202	72,970	**2,815,655**
1998	618	0	2,183	21,392	920,558	455,603	290,051	463,525	191,181	15,838	718	24,678	**2,386,345**
1999		2,296	1,606	18,347	583,883	224,307	340,096	229,209	127,163	3,941	1,679	119,027	**1,651,554**
2000		664	6,960	40,428	737,119	296,728	461,127	278,857	67,376	5,409	4,017	120,376	**2,019,061**
2001		2270	715	27,707	734,691	97,992	302,596	173,394	158,345		3,314	44,966	**1,545,990**

Source: National Marine Fisheries Service

Table 8: Atlantic Coast recreational fisheries landings of weakfish (pounds), by state and year (1982-2001).

Year	MA	RI	CT	NY	NJ	DE	MD	VA	NC	SC	GA	E. FL	**Total Pounds**
1982		154,609		725,194	613,223	1,330,769	2,127,679	2,994,879	276,047	14,786		48,137	**8,285,323**
1983	22,452	588,805	12,976	164,227	6,080,018	2,205,140	1,215,376	738,671	338,100	4,515	12,165	348,175	**11,730,620**
1984	16,272		11,358	51,464	3,987,542	1,279,594	254,962	850,169	189,031	5,150		368,237	**7,013,779**
1985		131,884	17,269	638,913	1,876,608	1,102,095	898,313	508,980	184,485	105,151	3,422	21,907	**5,489,027**
1986		41,142	61,281	242,217	3,184,095	1,598,932	2,406,643	2,032,394	417,470	44,185	12,621	100,805	**10,141,785**
1987			4,286	51,830	3,353,362	1,072,198	831,615	647,692	710,002	23,781	9,491	45,637	**6,749,894**
1988				26,127	833,198	1,664,477	1,679,702	1,677,694	359,606	1,841		89,004	**6,331,649**
1989				46,133	575,110	521,648	344,658	424,463	139,979	5,963	8,175	111,105	**2,177,234**
1990		897		4,317	358,457	207,131	388,662	256,690	63,420	11,186	961	55,538	**1,347,259**
1991				35,931	896,800	427,778	278,176	280,075	99,824	25,210	5,597	81,173	**2,130,564**
1992		20,154	908	19,824	677,811	232,204	121,403	206,710	27,363	40,459	1,014	51,127	**1,398,977**
1993			6,510	18,889	312,839	291,627	173,952	89,992	78,982	6,929	12,791	109,827	**1,102,338**
1994				2,579	706,206	319,491	300,831	142,265	149,159	25,163	783	149,038	**1,795,515**
1995				24,467	898,564	419,527	141,511	211,494	72,412	22,875	21,283	43,413	**1,855,546**
1996				19,081	1,730,055	690,121	185,074	194,485	79,317	4,980	5,060	17,218	**2,925,391**
1997			1,367	220,718	1,817,034	734,800	188,339	463,652	165,032	1,728	34,356	65,690	**3,692,716**
1998	4,087		9,808	63,298	1,910,868	616,422	377,820	839,245	192,210	11,288	690	19,237	**4,044,973**
1999		5,866	6,371	63,058	1,374,169	484,157	544,474	399,588	161,291	4,383	1,614	98,457	**3,143,428**
2000		1,922	35,095	164,525	1,916,093	635,339	696,662	496,205	87,926	6,312	3,503	111,211	**4,154,793**
2001			4,883	151,584	1,251,150	172,969	567,625	373,206	158,423		2,983	39,806	**2,722,629**

SOURCE: National Marine Fisheries Service

Table 9: Length at age data for weakfish from the year 2000
(Samples provided from Delaware through North Carolina.)

Age	Mean Length	Sample Size*	Size Range
0	6"	64	3" - 8"
1	9"	755	5" - 15"
2	11"	568	8" - 17"
3	13"	564	9" - 24"
4	15"	432	10" - 27"
5	18"	451	11" - 28"
6	21"	69	12" - 29"
7	21"	49	13" - 29"
8	25"	18	15" - 30"
9	23"	3	20" - 27"

* number of fish in the samples

Table 10: Annual Ex-vessel (Dockside) Value of Commercial Weakfish (Year 2001 Constant Dollar Value), 1980-2000

Year	Massachusetts	Rhode Island	Connecticut	New York	New Jersey	Delaware	Maryland	Virginia	North Carolina	South Carolina	East Coast Florida	Atlantic Coast States
1980	$15,399	$160,579	$2,726	$1,181,095	$1,656,343	$493,526	$256,440	$2,895,893	$7,258,095	$7,072	$148,485	$14,075,652
1981	22,006	261,187	32,161	1,291,529	1,837,830	811,876	238,116	1,933,468	9,307,508		131,574	15,867,256
1982	16,014	205,919	29,086	1,206,676	1,164,220	1,250,562	186,721	1,958,155	8,784,193	243	123,960	14,925,749
1983	4,369	192,915	49,634	793,258	1,130,994	764,490	278,372	2,142,314	6,844,230		83,490	12,284,065
1984	2,939	184,179	33,559	637,831	1,888,960	539,266	229,654	1,688,500	6,275,148		85,221	11,565,257
1985	3,023	219,241	29,310	545,608	2,003,778	735,563	270,258	1,635,140	5,773,633		94,535	11,310,088
1986	5,138	197,087	19,903	537,908	1,559,866	346,650	256,704	1,338,053	6,095,967		85,522	10,442,799
1987	1,767	130,562	49,929	489,173	1,303,968	540,073	330,407	1,500,029	6,001,877		82,849	10,430,635
1988	4,203	36,891	3,928	217,986	1,203,183	292,355	447,545	1,244,912	7,121,041		77,191	10,649,235
1989	2,500	11,516	3,613	159,772	1,389,987	366,641	684,455	1,136,165	5,717,568	104	82,807	9,555,128
1990	1,697	29,683	1,944	29,219	677,310	404,512	563,506	1,388,701	4,081,298		71,278	7,249,149
1991	1,264	23,437	31,191	143,732	886,653	745,425	281,610	925,696	2,809,226		93,571	5,941,806
1992	1,611	30,921	5,004	224,596	759,191	335,855	250,815	501,087	2,958,462		69,513	5,137,055
1993	610	10,537	2,062	139,015	804,652	192,535	171,062	852,977	2,607,329		80,687	4,861,465
1994		19,404	14,816	201,739	596,837	417,156	148,963	832,871	2,185,867		86,470	4,504,123
1995	455	40,826	6,960	173,517	480,262	452,297	67,367	805,472	2,415,138		42,006	4,484,301
1996	75	29,599	5,240	252,534	494,035	507,856	112,454	1,630,844	2,521,420		4,707	5,558,764
1997	8	24,717	7,212	263,624	589,606	561,080	89,843	734,021	2,006,660		12,830	4,289,601
1998	311	52,888	10,256	393,319	874,756	357,721	120,247	587,643	1,800,630		9,392	4,207,164
1999	2,081	91,570	21,860	456,634	853,719	367,776	135,898	1,045,102	1,453,870		16,966	4,445,477
2000	407	207,802	8,698	345,377	739,652	325,178	115,626	911,962	1,115,793		9,494	3,779,989
Annual Average	$4,294	$102,927	$17,576	$461,150	$1,090,276	$514,685	$249,336	$1,318,524	$4,530,236	$2,476	$71,074	$8,360,226

Source: Kirkley 2002

Table 11: Annual Ex-vessel Prices ($/lb.) of Commercial Weakfish by State, 1980-2000 (2001 Constant Dollar Value)

	State											
Year	Massachusetts	Rhode Island	Connecticut	New York	New Jersey	Delaware	Maryland	Virginia	North Carolina	South Carolina	East Coast Florida	Atlantic Coast States
1980	$0.49	$0.69	$0.29	$0.74	$0.34	$0.27	$0.45	$0.46	$0.36	$0.55	$0.67	$0.39
1981	0.55	1.08	1.17	0.95	0.49	0.77	0.70	0.78	0.55		0.69	0.60
1982	0.70	1.16	1.14	0.96	0.56	0.97	0.75	0.91	0.73	0.55	0.70	0.77
1983	0.63	1.18	1.16	0.93	0.52	0.85	0.71	0.83	0.67		0.71	0.70
1984	0.61	1.10	1.07	1.32	0.69	0.69	0.71	0.80	0.48		0.68	0.58
1985	0.98	1.34	1.04	1.41	0.66	0.74	0.85	0.79	0.59		0.71	0.67
1986	0.90	1.54	1.45	1.49	0.49	0.48	0.76	0.67	0.43		0.79	0.49
1987	1.04	1.66	1.69	1.49	0.62	0.93	0.90	0.76	0.52		0.67	0.61
1988	1.11	1.90	1.64	1.75	0.52	0.55	0.54	0.85	0.47		0.67	0.52
1989	1.32	1.20	1.57	1.54	0.95	0.69	0.92	1.11	0.57	0.92	0.48	0.67
1990	0.99	1.20	1.52	1.47	0.70	0.66	0.85	1.15	0.70		0.52	0.77
1991	0.66	0.94	1.46	1.29	0.76	1.50	0.86	0.87	0.53		0.57	0.68
1992	0.53	1.02	1.43	1.34	0.81	0.93	0.65	0.91	0.61		0.47	0.69
1993	0.56	1.05	1.40	1.57	0.96	0.99	0.94	0.78	0.61		0.56	0.71
1994		1.07	1.35	2.03	0.86	1.59	1.06	0.64	0.63		0.48	0.73
1995	0.85	0.77	1.08	1.01	0.55	1.61	0.97	0.54	0.59		0.83	0.63
1996	0.88	0.68	0.76	0.69	0.60	1.63	0.85	1.03	0.63		1.05	0.77
1997	0.14	0.79	0.66	0.78	0.57	1.00	0.47	0.47	0.56		1.09	0.59
1998	0.76	0.69	0.71	0.79	0.48	0.65	0.49	0.32	0.54		0.82	0.50
1999	0.82	0.72	0.99	0.93	0.66	0.84	0.61	0.62	0.56		0.97	0.64
2000	0.77	1.10	1.10	1.03	0.69	0.99	0.56	0.67	0.60		1.02	0.70
Annual Average	$0.76	$1.09	$1.17	$1.21	$0.64	$0.92	$0.74	$0.76	$0.57	$0.67	$0.72	$0.64

Source: Kirkley 2002Table 12: Expenditures and Economic Contributions of Weakfish Recreational Fisheries (VA – FL), 1999[a]

Expenditure and Impact Category	South Carolina	North Carolina	Georgia	Florida	Virginia	Total
Trip Expenditures	$479,916	$9,182,136	$124,957	$4,773,517	$14,029,827	$28,590,352
Number Directed Trips	7,562	120,648	1,116	84,979	289,630	503,935
Expenditures per Trip	$63.46	$76.11	$111.97	$56.17	$48.44	$59.81
Sales/Output	$880,940	$17,528,196	$255,305	$8,854,447	$27,836,337	$55,355,226
Wages and Salaries	$242,010	$4,863,065	$70,030	$2,524,854	$7,743,656	$15,443,615
Jobs	14	264	3	121	375	778

Source of Data: Data for trips provided by Holiman (Pers. Comm., 2002) of the National Marine Fisheries Service. Data on angling expenditures were provided by the Fisheries Economics and Statistics Division, National Marine Fisheries Service.

[a]Economic activity generated by angler expenditures calculated using multipliers provided in Maharaj and Carpenter (1997).
Expenditure per trip is the average expenditure per trip for all types of recreational angling.

Table 13: Estimated Coefficients and Statistics for Inverse Demand (Price-Dependent) Models

State	α	β_1 $Price_{t-1}$	β_2 $Landings_t$	β_3 $Landings_{t-1}$	β_4 Year	R-squared[a]
Maryland	-3.65 (1.36)[b]	0.75 (9.13)	-0.0000004 (-2.91)	0.0000004 (3.45)	0.002 (1.40)	0.63
Massachusetts	1.34 (0.14)	0.35 (1.82)	-0.000002 (0.41)	-0.000003 (0.64)	-0.0004 (0.09)	0.11
New Jersey	-4.46 (1.69)	0.59 (5.07)	-0.00000007 (3.00)	0.00000005 (2.43)	0.002 (1.76)	0.54
New York	-7.18 (1.58)	0.64 (5.60)	-0.0000003 (2.54)	0.0000003 (2.07)	0.004 (1.64)	0.64
North Carolina	-1.24 (1.01)	0.77 (14.28)	-0.00000002 (6.25)	0.00000003 (7.25)	0.0007 (1.06)	0.88
Rhode Island	-7.12 (1.50)	0.61 (5.60)	-0.000001 (2.52)	0.000001 (2.64)	0.004 (1.56)	0.53
Virginia	-4.52 (1.47	0.59 (4.99)	-0.00000007 (2.79)	0.00000006 (2.54)	0.002 (1.53)	0.51
Florida	-3.60 (1.50)	0.54 (4.31)	-0.000001 (4.02)	0.0000004 (1.20)	0.002 (1.64)	0.57
Delaware	-15.28 (2.78)	0.35 (2.45)	-0.0000002 (2.13)	0.0000001 (1.21)	0.008 (2.84)	0.40
Connecticut	-9.92 (1.79)	0.69 (6.79)	0.000001 (0.38)	0.0000006 (0.17)	0.005 (1.81)	0.66

[a]R-squared is the adjusted R-squared.
[b]Numbers in parentheses are t-statistics.
Source: Kirkley 2002

Table 14: Estimated Changes in Landings, Ex-vessel Prices, Revenues, and Consumer Benefits Associated With a 1% Change Landings in Each State and A 1,000,000 Pound Reduction Proportionately Reduced in Each State by 18.6 Percent

State	Observed			1 Percent Reduction in Landings			1,000,000 Pound Reduction			Reduction in Ex-vessel Revenues		Reduction in Consumer Benefits or Economic Value	
	Landings	Price ($)	Revenue ($)	Landings	Price ($)	Revenue ($)	Landings	Price ($)	Revenue ($)	1%	1,000,000	1 Percent	1,000,000 Pounds
Massachusetts	527	0.77	407	522	0.77	403	429	0.77	332	-4	-75	0	0
Rhode Island	189,362	1.10	207,802	187,468	1.10	205,724	154,188	1.13	173,789	-2,078	-34,013	-193	-3,260
Connecticut	7,920	1.10	8,698	7,841	1.10	8,611	6,449	1.10	7,099	-87	-1,599	-1	-16
New York	335,953	1.03	345,377	332,593	1.03	341,923	273,549	1.05	287,296	-3,454	-58,080	-376	-6,371
New Jersey	1,071,428	0.69	739,652	1,060,714	0.69	732,256	872,409	0.71	616,686	-7,397	-122,966	-869	-14,718
Delaware	328,813	0.99	325,178	325,525	0.99	321,926	267,736	1.01	269,702	-3,252	-55,476	-255	-4,320
Maryland	208,315	0.56	115,626	206,232	0.56	114,469	169,620	0.57	96,295	-1,156	-19,331	-149	-2,518
Virginia	1,362,829	0.67	911,962	1,349,201	0.67	902,842	1,109,682	0.69	764,009	-9,120	-147,953	-1,315	-22,269
North Carolina	1,869,073	0.60	1,115,793	1,850,382	0.60	1,104,635	1,521,890	0.61	923,313	-11,158	-192,480	-818	-13,846
East Coast Florida	9,319	1.02	9,494	9,226	1.02	9,399	7,588	1.02	7,741	-95	-1,753	-1	-10
Total	5,383,539		3,779,989	5,329,704		3,742,189	4,383,539		3,146,263	-37,800	-633,726	-3,976	-67,329

Source: Kirkley 2002

Table 15: Gains Per Trip by State and Species Group of Catching One more Fish per Trip Relative to Historic Catch Rates

State	Small Game (1994 Constant Dollar Value)	Small Game (2001 Constant Dollar Value)
Virginia	$2.46	$2.86
Maryland	3.44	4.00
Delaware	3.00	3.49
New Jersey	2.69	3.13
New York	2.43	2.83
Connecticut	3.29	3.83
Rhode Island	3.13	3.64
Massachusetts	3.09	3.60
New Hampshire	3.25	3.78
Maine	3.74	4.35
All States	2.89	3.36

Source: Hicks, R., S. Steinback, A. Gautam, and E. Thunberg (1999).

APPENDIX I: EVALUATION MANUAL

ASSESSING STATES' COMPLIANCE

to the

ASMFC FISHERY MANAGEMENT PLAN FOR WEAKFISH

Prepared by

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Developed in September 1996 for Weakfish Amendment 3
Updated in 2002 for use in Weakfish Amendment 4

Reduction in Weakfish Exploitation

Reduction in mortality strategies

Findings by the ASMFC Weakfish Stock Assessment Subcommittee indicated that modest minimum size limits contribute much less towards mortality reductions in either the commercial or recreational fishery, or progress towards the biological reference point, than previously determined (Crecco 1993a). Additionally, the subcommittee determined that a high gear-averaged discard mortality rate of 77% and a low level of directed fishing mortality (17%) characterized this fishery during the 1990-92 period.

The current reference, or baseline, period is 1990-92 for the commercial fishery. Please note that Delaware and New Jersey utilize a 1989-91 reference period. Compared to these reference periods, most states are required to achieve a 32% reduction in the weakfish exploitation rate during the ASMFC-designated fishing season, April 1 through March 31. This level of reduction under Amendment 3 will continue for Amendment 4.

The 1994 exploitation rate has been estimated as 76%, with the fishing mortality rate (F) equal to 1.88. Amendment 3 required that Atlantic coastal states implement management measures which theoretically reduce the exploitation rate by 17%/fishing season, until March 31, 1988. The target exploitation rate of 34% was necessary to achieve the reference point, F = 0.5, and Amendment 3 established fishing year 2000 for meeting this target. Evaluation guidelines (Crecco 1994, 1993a, 1993b; Gibson 1993; Vaughan 1993a, 1993b) are provided below and are intended as a reference for states to use in establishing their reduction plans. These guidelines will also allow the ASMFC Weakfish Management Board to better evaluate any state's compliance with Amendment 4.

Evaluation guidelines

Commercial fishery

Minimum size and mesh size limits

Minimum size limits are 12 inches (except for pound net and haul seine fisheries within internal waters), unless the Management Board approves a state's use of a conservational equivalent. Table I-2 and Attachment II are the reference tables for states to use in calculating reductions in the fishing mortality rate. Table I-2 also provides L_{25} values for associated minimum mesh and size limit combination. Required minimum mesh sizes are provided in Table I-1. A state may choose a conservational equivalent to any of the required minimum mesh sizes. For example, any state may extend the length of a gill net or otter trawl closed season, rather than establish the required minimum mesh size in those fisheries (see Table I-2).

Reductions in F mainly result from using minimum gear mesh sizes that correspond to the L_{25} value (fraction of weakfish subject to discard mortality in the commercial net), rather than from an increase in size limits. Crecco (1993b) found that the effect of size limits, especially modest ones, on estimated seasonal reductions was minimized by the high discard mortality rate of 77% (see Table I-2).

Shrimp by-catch level

Amendment 4 specifies by-catch reduction requirements for shrimp trawl fisheries. As background, the average (1985-88) annual number of age-0 weakfish killed by the South Atlantic trawl

fishery was about 18.9 million, equivalent to 2.7 million pounds (Crecco 1993a). This estimate was based on the assumed relationship between shrimp landings and weakfish by-catch in the South Atlantic shrimp trawl fishery, where it was estimated from empirical data that 0.25 pounds of weakfish were taken as by-catch for every pound of shrimp harvested (Vaughan 1992). Now, by-catch of weakfish from the shrimp fisheries are estimated according to the relationship between shrimp effort and relative weakfish abundance, mediated by the catchability coefficient (q) of weakfish in shrimp trawls (Gibson 1994). Using this formulation, Gibson (1995) estimated that 33.7 million age-0 and 6.4 million age-1 weakfish were taken as by-catch in the 1994 shrimp trawl fisheries. This combined by-catch estimate of 40.1 million weakfish ranks as fifth highest among by-catch estimates for the 1985-94 period.

Geographic composition of landings

Commercial landings from Atlantic coastal states' waters accounted for 70% of the total commercial landings during the 1987-89 period, and EEZ waters comprised the remainder. For the assessment year (1994) weakfish harvests from state waters accounted for 75% of total coast-wide commercial landings (Hogarth et. al. 1995). Significantly, each state must account for un-regulated EEZ harvests. For example, if a state cannot regulate commercial landings from the EEZ, and the EEZ accounted for 20% of total 1990- 92 landings, that state would need to achieve at least a 40% reduction in F. The average (1990-92) geographical distribution of a state's commercial landings from harvests in federal and state waters should be presented in the compliance proposal. These landings should be partitioned according to month and gear type (see Attachment I).

Temporal closures

For Amendment 3, most states submitted reduction in weakfish mortality proposals that contained some form of a temporal closure, whereby no weakfish harvest would occur during a specified amount of time during the fishing season. Crecco (1996) derived various schedules of estimated seasonal harvest reductions that would enable states to achieve required annual reductions in the weakfish exploitation rate in commercial fisheries, given specific minimum size limits and corresponding L_{25} retention lengths (see Table I-2). In the analysis, he accounted for various sources of non-harvest mortality such as discard mortality and non-directed F. Both of these sources of mortality have been estimated as extensive losses to the weakfish stock and directly affect the length of closed seasons necessary to achieve measurable harvest reductions. Additionally, the magnitude of any reduction in exploitation realized from establishment of a seasonal closure will likely be diminished because few fisheries operate at maximum efficiency. Consequently, recoupment would occur during any open portion of the fishing season. For this reason, reductions in exploitation based on seasonal closures would need to account for this event (Attachments II and III).

An illustration of the calculation of the reduction associated with a gear-based, time closure which accounts for recoupment is shown in Attachment II. In this example, closure of a state's gill net fishery for 143 days of a 273 day season hypothetically represents 33% of this fishery's landings and results in an 23.5% reduction in F. This reduction only accounts for 73% of the required 32% reduction in F, and days must be added by increment to the closed period to raise the reduction in F to 32%. Importantly, the 23.5% reduction in F achieved by the 143-day closure may be lessened if other gear types or the EEG account for landings in that state.

Each state should provide the data necessary for verification of reductions in F associated with temporal closures (see Attachments I and II).

Area closures

The process for calculating reductions realized from area closures generally follows the format outlined above for temporal closures. To date, reduction-in-mortality proposals that specified an area closure have substituted fishing trips for the days fished element of the closed season option. Attachment I and III detail the data needs for evaluating area closures, relative to reductions in weakfish exploitation.

Per trip catch limits

Amendment 4 allows states to establish per trip catch limits, as a means to reduce overall fishing effort.

By-catch Allowance

States may allow fishermen targeting species other than weakfish (i.e. non-directed fisheries) to possess no more than 300 pounds in any one day or trip (whichever is the longer period of time) as allowable bycatch during any otherwise closed seasons. Fishermen are permitted a 300 pound allowance provided that there is at least an equal poundage of other species as weakfish on board the vessel. Any state that chooses to implement this allowance must have a reporting system in place that will allow adequate quantification of any such catch. Furthermore, each state that chooses to allow a "bycatch allowance" must account for any harvest of weakfish from non-directed fisheries in their state plans. Any bycatch of weakfish retained in non-directed fisheries must be at least 12 inches or greater total length except for any exceptions outlined in *Section 4.2.2*.

At no time will the commercial hook and line fishery be permitted any bycatch allowance of weakfish during any otherwise closed season.

The southern penaeid shrimp fishery is permitted 150 pounds of weakfish as bycatch allowance provided that there is at least an equal poundage of other species as weakfish on board the vessel.

Recreational fishery

Minimum size and possession limits

Table I-3 is the reference table for states to use in constructing a reduction-in-exploitation plan for recreational fisheries. Attachment I lists the evaluation data needs. As discussed above, minimum size limits contribute much less to mortality reductions in the recreational fishery than previously determined. In consequence, possession limits are the primary means for states to achieve harvest reductions in their recreational fisheries. Table I-3 shows the combinations of minimum possession size and possession limits that meet compliance with Amendment 4.

Literature Cited

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Vaughan, D. S. 1996. Catch-at-age-matrix for the Atlantic weakfish stock, 1982 - 1995. Report to weakfish technical committee, Atlantic States Marine Fisheries Commission.

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Vaughan, D. S. 1993b. Report to the weakfish scientific and statistical committee Atlantic States Marine Fisheries Commission. Assessment of Atlantic weakfish stock, 1982 - 1992. 29 p.

Table I-1: Weakfish retention lengths (L_{25} = 25%) for various mesh sizes by gear. For example, a 3-inch gill net mesh size will theoretically retain 25% of the catch which measures 12.5 inches or less in total length.

MESH SIZE (INCHES)	GILL NET[1] L_{25}	OTTER TRAWL[2] SQUARE MESH L_{25}	OTTER TRAWL[3] DIAMOND MESH L_{25}
2 1/2	9.9	9.0	8.1
2 5/8	10.4		
2 3/4	11.7	9.9	8.9
2 7/8	12.1		
3	12.5	10.8	9.7
3 1/8	12.9	-	-
3 1/4	-	11.7	10.5
3 3/8	13.8	-	-
3 1/2	14.1	12.6	11.3
3 5/8	14.6	-	-
3 3/4	15.1	13.5	12.1

Note: Retention length for otter trawl cod ends corresponds to an inside-knot-to-inside knot measurement and is not based on a fork-to-total length conversion.

1 Stagg (1995).

2 Monaghan (1992).

3 Monaghan (1995 pers. comm.), as modified after Cooper and Hickey (1988).

Table I-2: Percentage reductions in F (fishing mortality rate) for the weakfish commercial fishery. These reductions are required to achieve the scheduled reductions in F, as specified by Amendment 3. These percentage reductions in F apply until March 31, 1997 and reflect conservation equivalents, according to changes in mesh selection (L_{25}) and minimum size limits. (Crecco 1996).

Minimum Size	L_{25} At Each Size				
(inches TL)	8.0	9.0	10.0	11.0	12.0
6.0	66	54	48	44	39
7.0	64	52	46	42	37
8.0	61	49	44	40	36
9.0	59	48	43	39	35
10.0	57	47	42	38	34
11.0	56	45	41	36	33
12.0	54	44	39	35	32
13.0	52	43	38	34	31
14.0	49	42	37	33	30
15.0	49	40	36	32	29
16.0	48	39	34	31	28
17.0	43	37	31	28	25
18.0	40	37	28	25	23
19.0	37	30	25	22	20
20.0	31	27	23	21	19

Note: reductions are required, after accounting for recoupment.

Table I-3: Recreational Creel Limit/Minimum Size Regulations. One of these combinations of minimum size and possession limits is required by Amendment 4 (Crecco 1994).

MINIMUM SIZE	*CREEL LIMIT*
12	*7*
13	*8*
14	*9*
15+	*10*

ATTACHMENT I of Appendix I
EVALUATION DATA NEEDS

Effective evaluation of a coastal state's proposals for reducing the weakfish exploitation rate requires that these data and information are supplied, in advance of any ASMFC review process.

Commercial fishery

- **Provide minimum size data and define each gear type's fishing season.**
- **Provide average (1990-92) monthly landings in numbers of fish by gear type or area.**
- **Provide average (1990-92) proportion of landings from state and EEZ waters, by month and gear type.**
- **Detail mesh size, by gear type used during open and closed seasons. Provide an accurate description of mesh size; for example, 3 1/8" inside-knot-to-inside-knot stretch measurement.**
- **Detail the extent of area or time closures, with corresponding average (1990-92) area harvest detailed. A reduction in F must account for recoupment.**
- **A detailed report on any by-catch allowance established by a state must be provided.**

Recreational Fishery

- **Detail minimum size limits and corresponding possession limits of recreational fisheries.**
- **Quantify savings and resultant change in possession limits, following establishment of a closed season.**

For both fisheries, provide a comprehensive accounting of how the proposals result in meeting the overall reduction in F .This should be a one-page summary.

Note: For commercial fishery reduction-in-F calculations, the reference period for Delaware and New Jersey is 1989-91.

Attachment II of Appendix I
Reduction in the Fishing Mortality Rate

- Reduction in $F = \{ 1 - \left[\frac{\mathbf{FQ * FS}}{CP} \right] \} * Pct_{LCP}$

- **FQ =** fishing quotient = 0.15, as it was initially assumed that no fishery (except the pound net) operates at a rate > 0.85
- **FS** = fishing season = the time span (in days) when 90% of average (1990 – 1992) annual weakfish landings (number of fish) occurred.
- **CP =** closed period = number of days of the fishing season that is closed to landings
- **Pct_{LCP}** = percentage of fishing season landings represented by the closed period

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Illustrative example for a gill net fishery (1996/98)

1) Fishing season **(FS)** = 273 days, 12-inch size limit
2) Closed period **(CP)** = 143 days = a Pct_{LCP} of 33%, and 52% of the fishing season, in days.
3) Fishing quotient **(FQ)** = 0.15
4) Reduction in F = 23.5% = 73.4% of required 32%
5) Now, you must add days or **Pct_{LCP}** incrementally, to raise the reduction in F to 32%
6) The 32% reduction in "5)" may be lessened, if other gear types or the EEZ account for landings

ATTACHMENT III of Appendix I

Recoupment effects on reduction in the fishing mortality rate

Background

The extent of recoupment, the ability of fishermen to make up for lost fishing opportunities through an increase in fishing effort, can be difficult to quantify. Recoupment should certainly change catchability (and by extension, fishing mortality rates), so there should be some estimate of the effect of this process on fishing mortality and exploitation rates. For example, following a closure of the weakfish fishery, the gill net fishery could increase its fishing power simply by increasing the total number or length of nets. The trawl fishery could increase its number of days at sea (or tow times), and the haul seine fishery could fish more days of a week than this time- consuming operation traditionally allows. All three actions would result in mitigating the effects of a seasonal closure. Of major gear types used in the weakfish fishery, only the pound net can be considered independent of the recoupment process. This fixed fishing device traps fish seven days per week throughout the season, with only a few days of inactivity.

Previously, the weakfish technical committee included a discretionary term in a recoupment model to represent a fishery's activity level. This discretionary time was assigned a value of 0.15 and it became convenient to define discretionary time as 1 in 7 days of weather-independent inactivity. At its early February 1994 meeting, the committee agreed by consensus that discretionary time, expressed in days, was an incomplete measure of a fisheries ability to recoup harvest losses following a seasonal closure. It was decided that a fishing quotient (FQ) term, with a rate of 0.15, better relates to the recoupment potential of most fisheries because it bases efficiency on fishing power potential (see Attachment III). Most fisheries do not operate at 100% efficiency; an efficiency of 85% is more realistic. However, following a closed period, a fishery may approach 100% efficiency by increasing its fishing power. The fishing quotient accounts for this ability of a fishery to increase its harvest efficiency through recoupment.

On an annual basis, a fishery's achieved reduction in its weakfish exploitation rate can be assessed. The assessment may indicate the need for an adjustment of the FQ, prior to the next seasonal closure. For example, if a fishery achieves little reduction in exploitation, this indicates that the fishery may have operated at less than an 85% efficiency, and the FQ would need to be adjusted upward from 0.15 to account for this unanticipated recoupment rate.

The ASMFC striped bass technical committee members have addressed the effects of recoupment on fishing mortality rates in the striped bass fishery. Weakfish technical committee members also recognized that recoupment would be associated with temporal closures, even if those closures were as long as thirty days in succession. In April 1991 the weakfish technical committee explained to the weakfish management board that a coast-wide fishery closure (no gear in the water) during the months of January, May and October would statistically reduce the coastal catch by 33%, but the recoupment process would lower that reduction to 25%.

During the latter months of 1991 a number of states proposed short-term (e. g., one day per week; each weekend during a 3-month period) closures. It was then evident that recoupment rates had to be evaluated as a component of any state's plan to reduce the rate in weakfish exploitation by 25%, equivalent to a 33% reduction in F at a size limit of 12 inches. The weakfish stock assessment subcommittee constructed a practicable formula or model to account for recoupment. The recoupment formula was presented to the weakfish technical committee in late April 1992, and most representatives

agreed with the formula's components. The formula was presented to the weakfish management board in early September 1992. Several board members voiced concern that the formula was too conservative because the amount of discretionary time represented an overestimate. In mid-November 1992 the stock assessment subcommittee reviewed the recoupment formula. The group consensus favored maintaining the minimum amount of discretionary time as 15% but allowed for any state to show proof that any of its fisheries operated at a lower level.

Components of the reduction in F formula

Most of the elements of this formula are summarized by Attachment III. The fishing quotient (FQ) is treated as a rate of 0.15, initially. However any state may provide documentation to support a lower FQ. The fishing quotient term is the controlling element of the reduction-in-F formula.

The fishing season represents the time when 90% of average (1990-92) annual weakfish landings, by number, occurred. If the fishing season were based on all (100%) fishing days, states would need longer closed periods. A portion of this extra closure would occur during times when weakfish were highly abundant, a further penalty for states.

Significantly, the reduction realized from a closed period is partly based on the portion (%) of fishing season landings represented by the closed period (Pct_{LCP}, see Attachment III). If the reduction in F is computed on a gear-by-gear basis, it will be lowered by the amount (%) correspondent to that gear type's contribution to the total landings. Also, if landings from a gear type are from state and federal waters, the realized reduction will be lowered by an amount (%) equivalent to the fraction of the total landings that EEZ landings represent. Based on 1990-92 data, the EEZ accounted for 36% of the total, coast-wide commercial landings. However, proportions of EEZ to total state landings vary from state to state, and each state will account for its own proportion of landings between these two fishing areas.

Atlantic States Marine Fisheries Commission

TECHNICAL ADDENDUM I

to

Amendment 4 to the Interstate Fishery Management Plan for Weakfish

Final Approval: March 21, 2003

Prepared by: Weakfish Plan Review Team
Braddock Spear, Chair

Purpose

To correct a typographical error in the text of Amendment 4 with regard to fishing mortality reduction.

Statement of the Problem

A typographical error has been carried over from Amendment 3 to Amendment 4. Within the text of Amendments 3 and 4, it was stated that states are required to achieve a 33% reduction in fishing mortality (F). However, in the Evaluation Guides, as attachments of Amendments 3 and 4, the equation is set up for states to calculate a 32% reduction in fishing mortality.

Solution

The intent of Amendment 3 and 4 was to require states to achieve a 32% reduction in fishing mortality as stated in the Evaluation Guides. Most states' reduction falls within the range of 32% and 33%. Many states have been using a 32% reduction in their calculations of fishing mortality.

Thirty-two percent reduction in fishing mortality shall replace 33% reduction in fishing mortality in the following sections of Amendment 4 to the Interstate Fishery Management Plan for Weakfish:

Executive Summary; Commercial Management Measures (Section 4.2); page vi

Section 4.2 Commercial Fishery Management Measures; page 30