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Atlantic States Marine Fisheries Commission

Amendment #3 to the Interstate Fishery Management Plan for Weakfish

May 1996

AMENDMENT #3 TO THE INTERSTATE FISHERY MANAGEMENT PLAN FOR WEAKFISH

Prepared by

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This Amendment was prepared in cooperation with the Atlantic States Marine Fisheries Commission's Weakfish Management Board, Weakfish Technical Committee, Stock Assessment Subcommittee, and Weakfish Advisory Panel.

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EXECUTIVE SUMMARY

Weakfish (*Cynoscion regalis*) have sustained important coastal commercial and recreational fisheries from New York to North Carolina for over a century. The decline of the recreational catch and increased competition between recreational and commercial sectors during the early 1980s resulted in the development of a cooperative interstate fisheries management plan (Seagraves and Perra 1991) by the Atlantic States Marine Fisheries Commission (ASMFC). Weakfish are managed by the ASMFC Weakfish Management Board (Board).

In 1985, the ASMFC developed and adopted the first Management Plan for Weakfish (FMP or Plan)(Mercer 1985). The FMP was amended two times, initially by Amendment #1 (Seagraves 1991), and most recently by Amendment #2 (see Appendix 1). Under the present FMP, weakfish have not recovered to the levels recommended by the Technical Committee and approved by the Board. Thus, the Weakfish Management Board of the ASMFC has decided to prepare and adopt Amendment #3 which is contained in this document.

Amendment #3 completely replaces all previous amendments. The goal of Amendment #3 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. In order to achieve this goal, the Amendment adopts the following objectives:

1) to restore the weakfish population over a 5-year period by restricting harvest and any other available means;

2) to reach and maintain a target fishing mortality rate of 0.5[1];

3) to restore the expanded age and size structure to that necessary to ultimately restore trophy fisheries and to return weakfish to their previous geographic range. An interim indicator of this level is the average mean size and age structure that existed from 1979 to 1994;

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 #3 of the Weakfish FMP and for determination of states' compliance with the provisions of the management plan.

The management unit for weakfish includes the entire Atlantic population of weakfish in the U.S.

The Amendment is organized into sections. Section One is introductory material, including a background summary on the resource, the fishery and its habitat. Section Two contains the Goals and Objectives of the fishery management program under this Amendment. Section Three contains specific recommendations of the management program for implementation by the states. Section Four specifies the minimum compliance requirements for states for purposes of the Atlantic Coastal Fisheries Cooperative Management Act, and specifies procedures for determining compliance. Section Five deals with needed and recommended research.

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[1] Fishing mortality rate (often abbreviated as "F") is a measurement of the rate of removal of fish from a population by fishing. The value expressed here is the instantaneous rate of removal of fish from the population, which equates to approximately a 34% annual rate of removal of fish from the population by fishing activities. The instantaneous rate of removal is used here because it is more mathematically appropriate for use in the assessment models for weakfish.

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ACKNOWLEDGEMENTS

The Plan Development Team (Team) for Amendment #3 consisted of: Dr. R. Wilson Laney, of the South Atlantic Fisheries Resources Coordination Office, Southeast Region, U.S. Fish and Wildlife Service (USFWS), who served as Plan writer; Mr. Frank Lockhart, Weakfish Coordinator, Atlantic States Marine Fisheries Commission (ASMFC), Team Chairman; Mr. Mark R. Gibson, Rhode Island Division of Fish and Wildlife, Marine Fisheries Office; Mr. David Whitaker, South Carolina Department of Natural Resources (SCDNR), Marine Resources Division; Dr. Louis Daniel, North Carolina Division of Marine Fisheries; and Mr. Jim Casey, Maryland Department of Natural Resources, Tidewater Administration, Fisheries Division. Individuals who either drafted and edited portions of the Plan or who prepared reports from which the Plan writers liberally borrowed text and tables were Dr. Victor Crecco, Connecticut Marine Fisheries Office; Mr. Mark Gibson; Dr. Douglas Vaughan, Beaufort Laboratory, Southeast Fishery Science Center, National Marine Fisheries Service (NMFS); Dr. W.T. Hogarth, Recreational and Interjurisdictional Fisheries Division, Office of Fisheries Conservation and Management, NMFS; Richard J. Seagraves, Mid-Atlantic Fishery Management Council; and Dr. Linda Mercer, Maine Division of Marine Fisheries. The Team thanks Ramona Schreiber, Office of Habitat Protection, NMFS, and Dianne Stephan, ASMFC, who worked together to create the maps in this document. The following individuals assisted in the development of the maps: Tracy Gill, Mark Monaco, and John Christensen, National Ocean Service; Gary Shepard, NMFS; Steve Correia and Arnold Howe, Massachusetts Division of Marine Fisheries; Mark Johnson, Connecticut Marine Fisheries; Don Byrne, New Jersey Fish and Game; Pat Geer, Virginia Institute of Marine Science; Randy Beatty and Jeannie Boylan, SCDNR/SEAMAP. The Team worked under the direction of the ASMFC Weakfish Advisory Panel (Chairman, Ernest Bowden, Virginia), Management Board (Chairman, Phil Coates, Massachusetts Division of Marine Fisheries; immediate past Chairman, Bruce Freeman, North Carolina Division of Marine Fisheries), and Technical Committee (Chairman, Mr. Rob O'Reilly, Virginia Marine Resources Commission). Addresses, telephone and fax numbers for these individuals can be obtained from ASMFC.

Funding for preparation of Amendment #3 was provided to the ASMFC from many sources: by NMFS, the state of Delaware, and by the USFWS. Mr. George Lapointe, Director, ASMFC Interstate Fisheries Management Program, and Mr. Frank Lockhart, Weakfish FMP Coordinator, served as principal contacts at ASMFC. Extensive support and input required for preparation of this document were provided by state and federal agency representatives on the ASMFC Weakfish Technical and Stock Assessment Committees, and by commercial and recreational representatives on the Weakfish Advisory Panel.

The Team expresses profound gratitude to the many individuals who made contributions to the preparation of Amendment #3. These include the professional staff of the state and federal fishery management agencies, primarily those responsible for management of interjurisdictional fishery resources, who have reviewed the Amendment and provided their comments and suggestions for improvements. Included also are the many representatives of conservation groups and interested recreational and commercial weakfish fishermen who have written letters and attended public hearings to express their opinions and ideas.

Finally, Amendment #3 is the second Interstate Fishery Management Plan incorporating the approved habitat outline for ASMFC Fishery Management Plans developed by the Habitat Committee.

Appreciation is extended to the ASMFC support staff for overseeing the final production and distribution of this report.

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1. INTRODUCTION

Weakfish (*Cynoscion regalis*), range from Cape Cod, Massachusetts through Florida and are one of the most important recreational and commercial fishes in waters from New York through North Carolina. Annual commercial landings of weakfish along the East Coast from the mid 1940s through 1994 ranged between 3.1 (1967) and 36 (1980) million pounds (Hogarth et al. 1995b). Recreational harvests were not well documented historically, but between 1979 and 1994 they ranged from 980 thousand (1993) and 42.6 million (1980) pounds (Hogarth et al. 1995b). Even though current landings are below long-term average values, the species remains an important component of east coast fisheries. Ecologically, weakfish are an important predatory species in estuarine and nearshore coastal waters. They are managed in state waters under the jurisdiction of the Atlantic States Marine Fisheries Commission's (ASMFC) Weakfish Management Board (MB), with assistance from the Weakfish Technical Committee (TC) and Weakfish Advisory Panel (AP). In federal waters of the Exclusive Economic Zone (EEZ) from 3 to 200 miles offshore, they are under the jurisdiction of the Fishery Management Councils and/or the U.S. Department of Commerce, National Marine Fisheries Service. In the absence of a Fishery Management Council Plan, states may regulate vessels registered in their own state in the EEZ.

All indications are that the weakfish resource along the Atlantic coast is overfished. Although there have been some recent positive signs, the resource continues to require careful conservation and management by responsible fishery management authorities.

The ASMFC was formed by the fifteen Atlantic coast states in 1942 through a Compact. The following provisions of the Compact establish the basis for the actions taken by the Commission in adopting this fishery management plan:

> ARTICLE I
>
> The purpose of this compact is to promote the better utilization of the fisheries, marine, shell and anadromous, of the Atlantic seaboard by the development of a joint program for the promotion and protection of such fisheries, and by the prevention of the physical waste of the fisheries from any cause. . .
>
> ARTICLE IV
>
> . . . The duty of the said Commission shall be to make inquiry and ascertain from time to time such methods, practices, circumstances and conditions as may be disclosed for bringing about the conservation of, the prevention of the depletion and physical waste of the fisheries, marine, shell and anadromous of the Atlantic seaboard. The Commission shall have power to recommend the coordination of the exercise of the police powers of the several states within their respective jurisdictions to promote the preservation of those fisheries and their protection against overfishing, waste, depletion or any abuse whatsoever and to assure a continuing yield from the fisheries resources of the aforementioned states.
>
> To that end, the Commission shall draft and, after consultation with the Advisory Committee hereinafter authorized, recommend to the governors and legislatures of the various signatory states, legislation dealing with the conservation of the marine, shell and anadromous fisheries of the Atlantic seaboard. . .

The Rules and Regulations of the Commission authorize the Interstate Fishery Management Program to promote the cooperative and coordinated development and implementation of conservation programs for Atlantic coastal fisheries.

Pursuant to the authority contained in the Compact and the Rules and Regulations, the ASMFC finds, and recommends to the governors, legislatures and executive agencies of the respective states that the coordination of the exercise of the police powers of the states within their respective jurisdictions, including appropriate regulations, according to the terms as set forth in this fishery management plan, are essential to promote the preservation of the Atlantic coastal weakfish fisheries, and their protection against overfishing, waste, depletion or any abuse whatsoever and to assure a continuing yield therefrom.

1.1 BACKGROUND INFORMATION

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. Although commercial landings data for weakfish were available from 1880 through the present, effort data were insufficient to determine the relationship between abundance and landings (Mercer 1985). Both commercial and recreational landings peaked in 1980. An assessment of the stock conducted in 1984 (Boreman and Seagraves 1984) suggested that weakfish from Maryland to North Carolina had experienced both growth and recruitment overfishing.[2] The conclusions of that assessment were viewed as uncertain due to weaknesses in the data sets and consequent assumptions required in yield-per-recruit and eggs-per-recruit analyses (Mercer 1985). The initial Plan's management measures were voluntary, rather than mandatory, and improvements in stock status were not evident. The main provisions of 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. The Plan also recommended that stock identification studies be conducted.

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. The Weakfish Management Board and Technical Committee were charged with development of Amendment 1. Several stock identification and other studies conducted along the Atlantic Coast indicated 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 1980s was likely due to the lack of strong year classes since 1978. Gradual disappearance of the 1978 year class from the catches was verified through length frequency distributions of weakfish sampled from recreational catches. Generally the high estimates of fishing mortality on age 2 and older weakfish combined with mediocre recruitment explained the decline. The virtual population analysis (VPA) model used for the stock assessment 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. Also, 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 was adopted by the ASMFC in October, 1991, and incorporated recommendations that: the target fishing mortality rate be lowered to $F = 0.34$ (often called F_{20}, this is the rate of fishing mortality that should maintain a spawning population at 20% of the level for an unfished population; this level was thought to be necessary for long term maintenance of weakfish); that the number of weakfish killed annually by fishermen be reduced by 52 percent; reductions in mortality caused by non-directed fisheries (principally the South Atlantic shrimp trawl fishery) be achieved. Reductions in exploitation were to occur in three steps such that the target mortality rate would be achieved by 1995 (Seagraves 1991).

Little progress was achieved in meeting the reduction targets of Amendment 1. None of the states with directed fisheries adopted management measures that were consistent with the recommended targets in

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[2]Growth overfishing occurs when fishing pressure is too high to allow the fishery to produce its maximum poundage; i.e, small fish are caught before they have a chance to grow. Recruitment overfishing occurs when fishing pressure is too high to allow a fish population to replace itself, i.e., too many fish are caught before they have a chance to reproduce.

Amendment 1 (however, some progress in bycatch reduction in the south Atlantic shrimp trawl fishery was achieved through adoption of Turtle Excluder Devices). Continued concern regarding the status of the stocks 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, 1994 (see Appendix 1). Amendment 2 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 requirements and schedules, and it incorporated modifications in the schedule for compliance with the provisions of 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 percent 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. (See Appendix 1)

The Board and Advisory Panel met on March 13, 1996 to finalize and approve Amendment #3. The Board and Advisory Panel made significant progress but were unable to complete deliberations at this meeting. The Board reconvened on April 16, 1996 and finalized Amendment #3. Amendment #3 was circulated for final technical review during the months of April and May of 1996. Amendment #3 was approved by the Board, ISFMP Policy Board, and the full Commission on May 30 and 31, 1996.

1.1.1 Statement Of The Problem

Amendment #1 to the original plan was not successful in improving the status of weakfish to the level recommended by the technical committee and approved by the management board. Amendment #2 to the original FMP was fully implemented in April 1995, and appears to be resulting in positive improvements to the stock. However, lower than average commercial and recreational catch rates, a truncated age structure, variable recruitment strength, and below average SSB mandate further improvements to the FMP.

1.1.2 Benefits Of Implementation

Implementation of Amendment #3 is designed to result in stock recovery, with consequent ecological and economic benefits to coastal ecosystems and fishermen. Restoration of the stock should re-establish weakfish as one of the dominant carnivores in coastal bays and sounds and the nearshore ocean. Management of a restored population of weakfish will establish and maintain fishing mortality targets and a fishery monitoring program that should increase market stability, stabilize commercial and recreational landings (within the limits of environmental variability in recruitment), and reduce the risk of recruitment failure.

1.2 DESCRIPTION OF THE RESOURCE

This brief resource description is summarized from several reports referenced in this document and is intended only to provide the reader with the basic information necessary to understand how weakfish relate to their essential habitats, and the significance of the commercial and recreational weakfish fisheries to the economy and culture of the Atlantic Coast. The reader is referred to the referenced reports for literature which 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, and undoubtedly older, 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 (Fig. 1A & 1B).

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 size than do northern fish. Recent 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. Consequently, fecundity estimates for Atlantic weakfish will need to be revised. The fertilized eggs hatch into larvae in 36-40 hours at temperatures of 20-21° 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 navigation channels characterized by moderate depths, slightly higher salinities, and presence of sand and/or sand-seagrass bottom. Juveniles remain in coastal sounds and estuaries until October through December of their first year, after which they migrate to the Atlantic Ocean (Fig 2 a, b, c, d). 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 warming water temperatures in the spring, the mature adult fish migrate to the spawning areas to complete their life cycle (Fig 3 a, b, c, d).

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 clupeids or 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 cruising around the edges of eelgrass habitats. Weakfish are also found in estuaries without eelgrass, such as in the bays and estuaries of South Carolina.

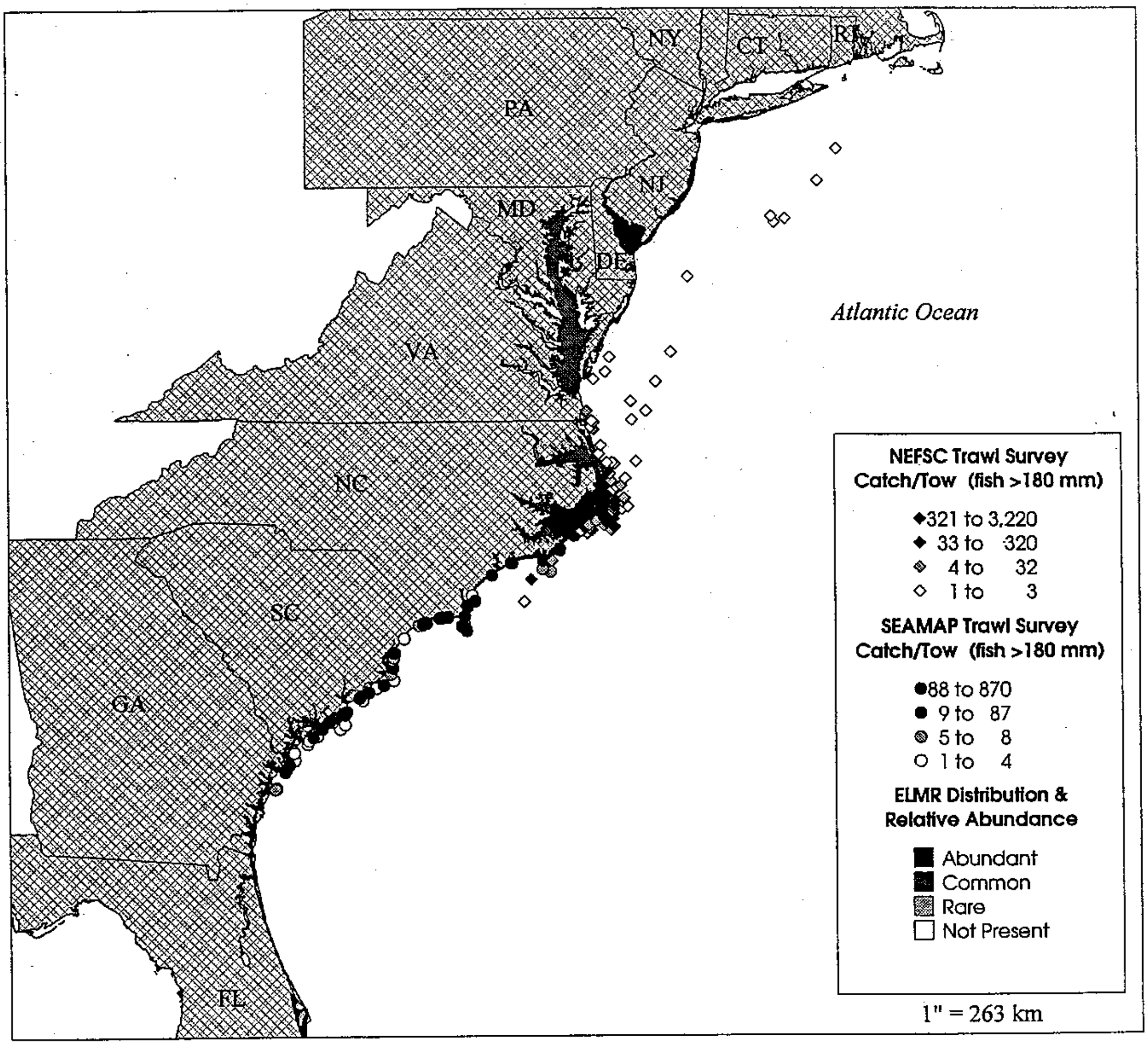
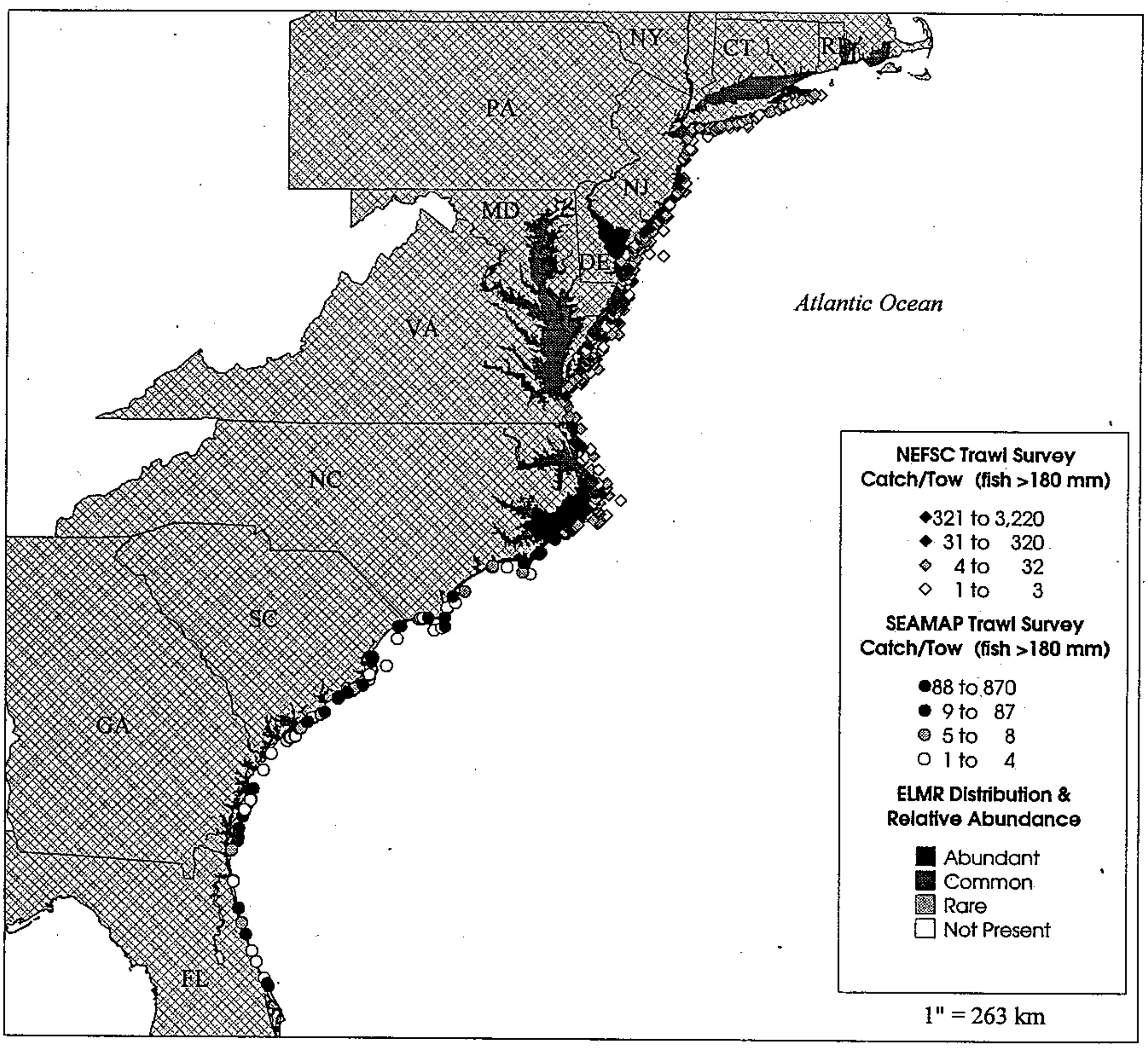


Figure 1A. Adult weakfish distribution and relative abundance from Massachusetts through Florida during March and April. Northeast Fisheries Science Center (NEFSC) and Southeast Area Monitoring and Assessment Program (SEAMAP) trawl survey data are represented by points for the years 1985-1995 and 1989-1995, respectively; Estuarine Living Marine Resources (ELMR) Program data are represented by toned areas, and are mapped in estuarine areas only. Data for greatest relative abundance for each data source during the indicated time periods are depicted. Please refer to the source document (ASMFC in preparation) for a complete description of the data and methodology in map development, which is necessary to understand map application and utility.



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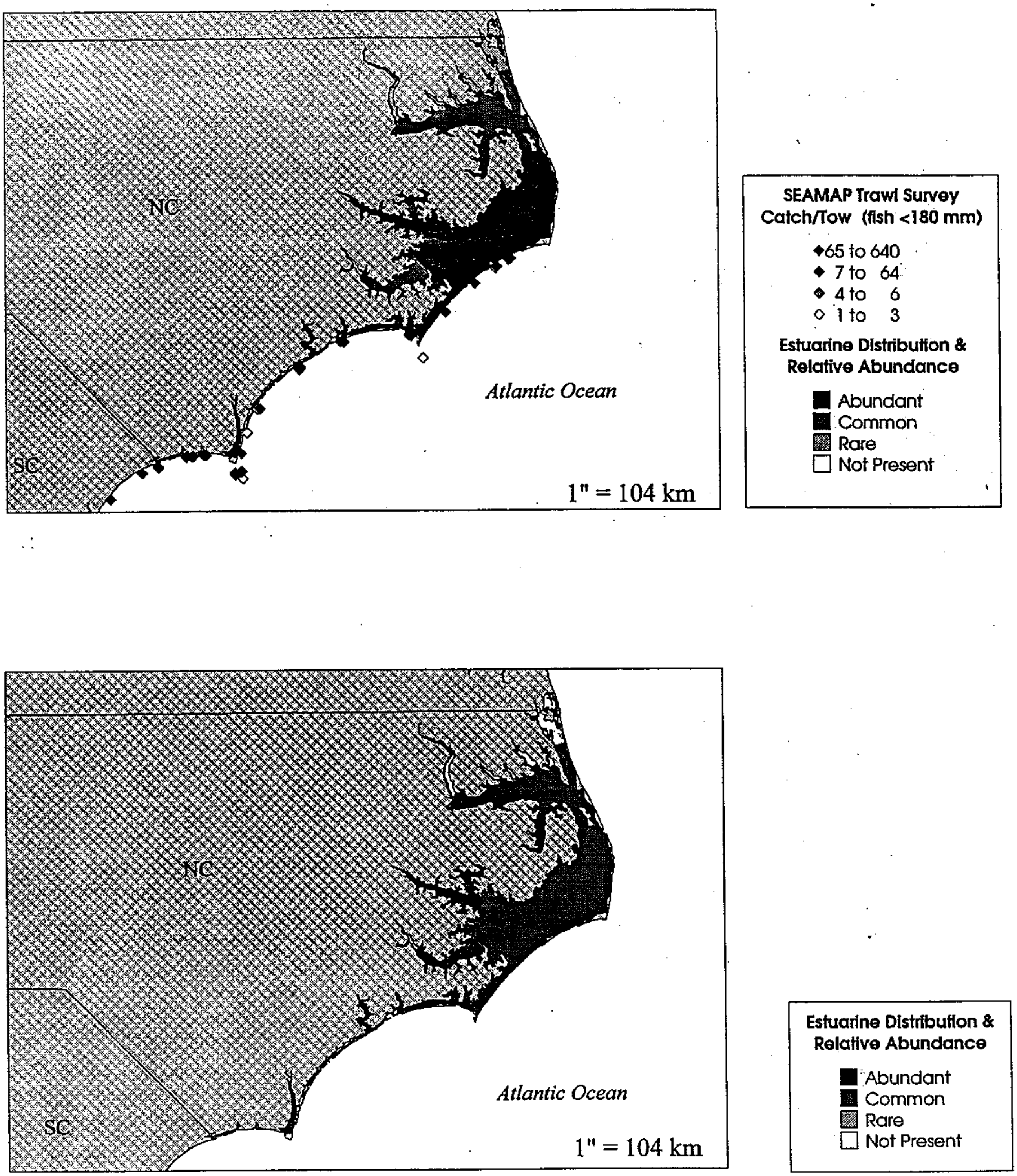


Figure 2A. Juvenile weakfish distribution and relative abundance for North Carolina waters during May-August (top map) and December-March (bottom map). Southeast Area Monitoring and Assessment Program (SEAMAP) trawl survey data are represented by points for the years 1989-1995 (top map only); Estuarine Living Marine Resources (ELMR) Program data are represented by toned areas, and are mapped in estuarine areas only. Please refer to the source document (ASMFC in preparation) for a complete description of the data and methodology employed in map development, which is necessary to understand map application and utility.

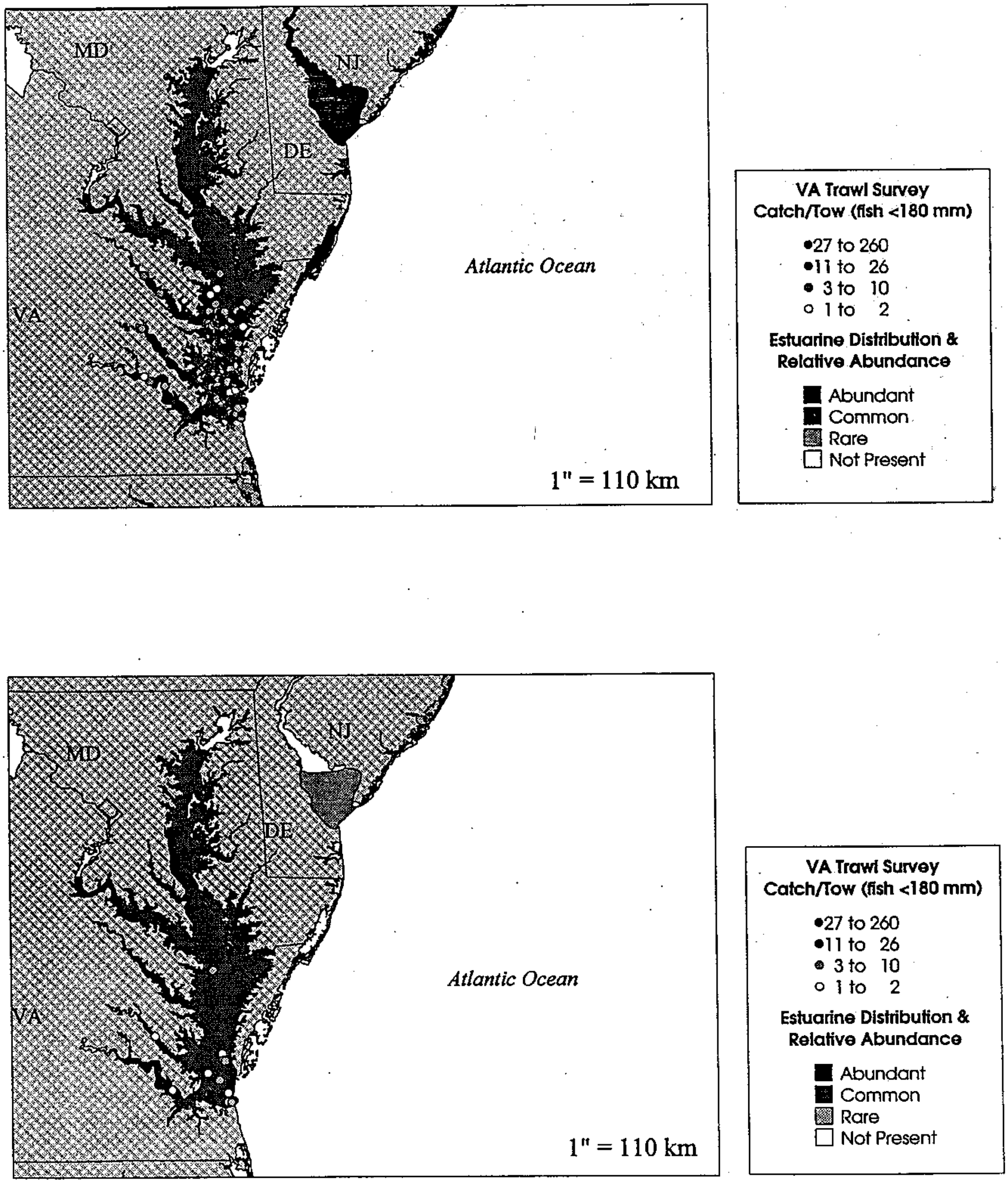


Figure 2B. Juvenile weakfish distribution and relative abundance for Maryland and Virginia waters during May-August (top map) and December-March (bottom map). Virginia trawl survey data are represented by points for the years 1985-1995; Estuarine Living Marine Resources (ELMR) Program data are represented by toned areas, and are mapped in estuarine areas only. Data for greatest relative abundance for the indicated time periods are depicted. Please refer to the source document (ASMFC in preparation) for a complete description of the data and methodology employed in map development, which is necessary to understand map application and utility.

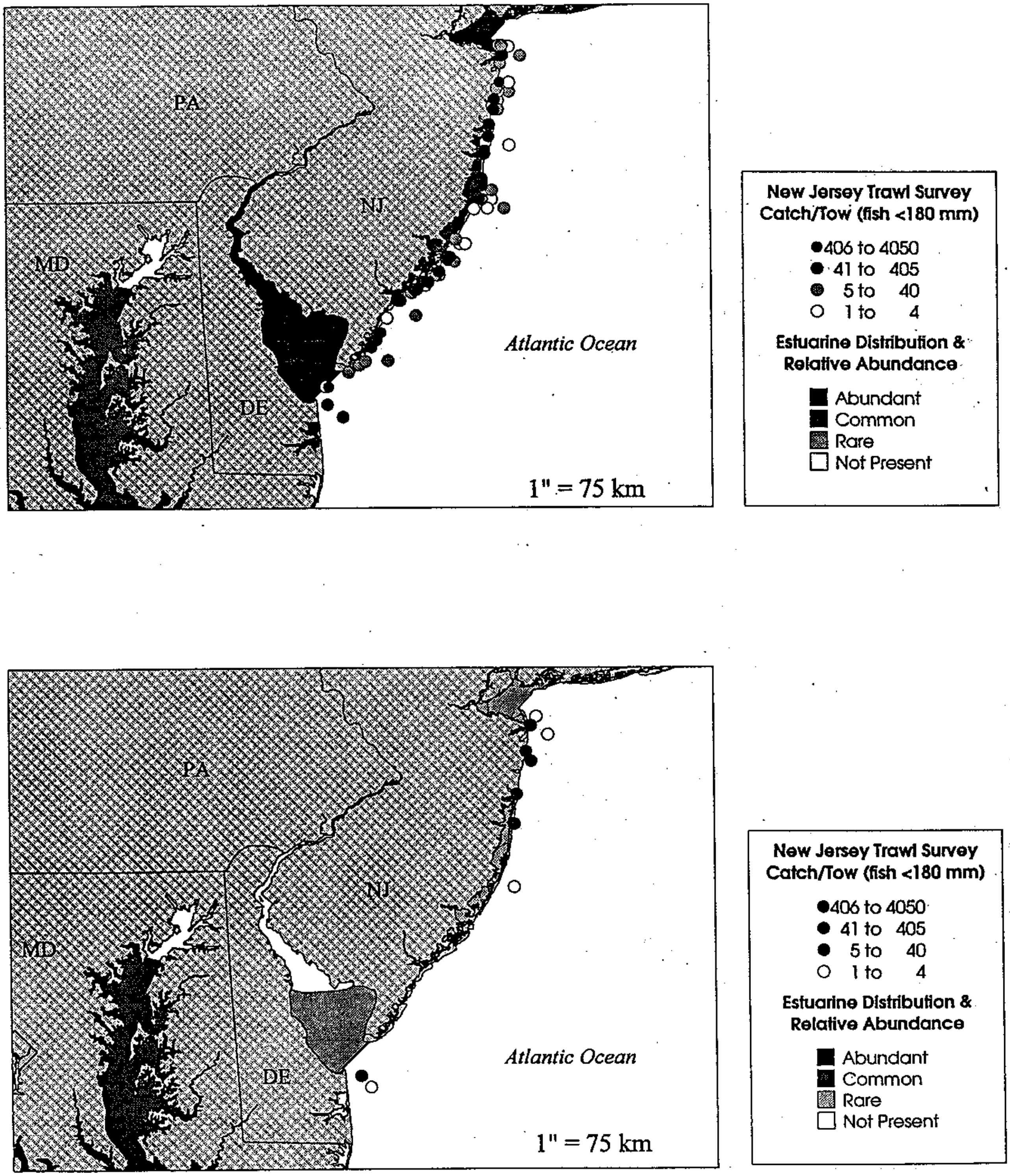
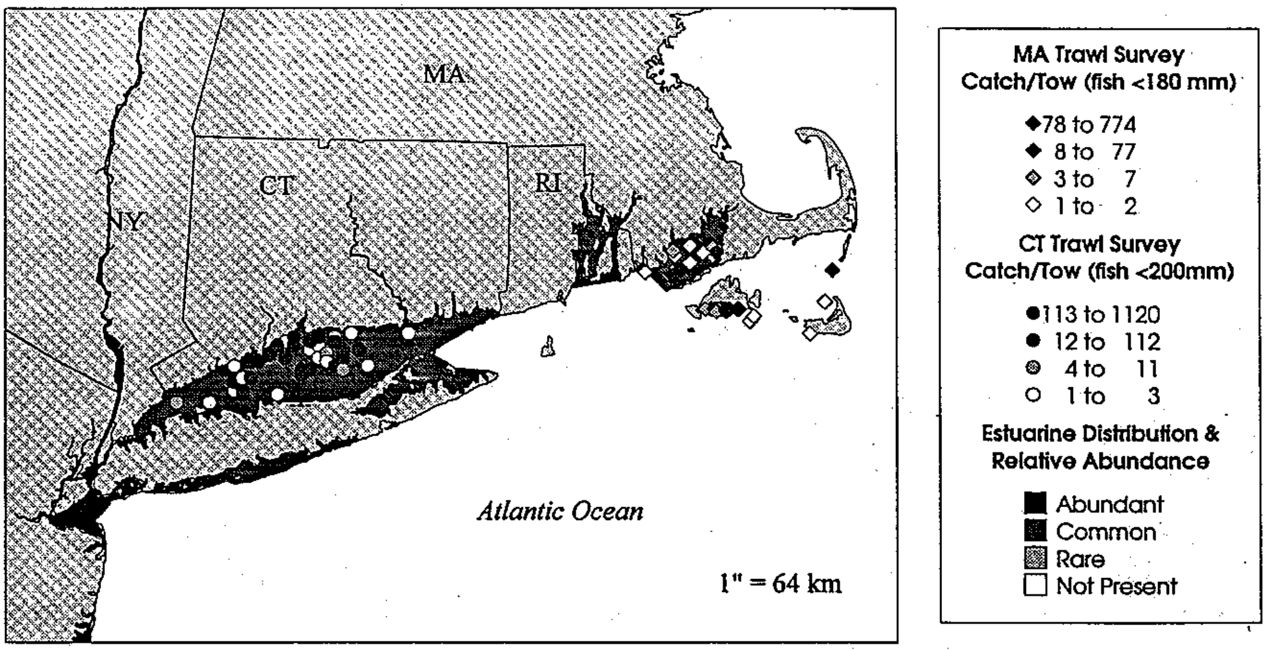


Figure 2C. Juvenile weakfish distribution and relative abundance in New Jersey and Delaware waters during May-August (top map) and December-March (bottom map). New Jersey trawl survey data are represented by points for the years 1984-1995; Estuarine Living Marine Resources (ELMR) Program data are represented by toned areas, and are mapped in estuarine areas only. Data for greatest relative abundance for each data source for the indicated time periods are depicted. Please refer to the source document (ASMFC in preparation) for a complete description of the data and methodology employed in map development, which is necessary to understand map application and utility.



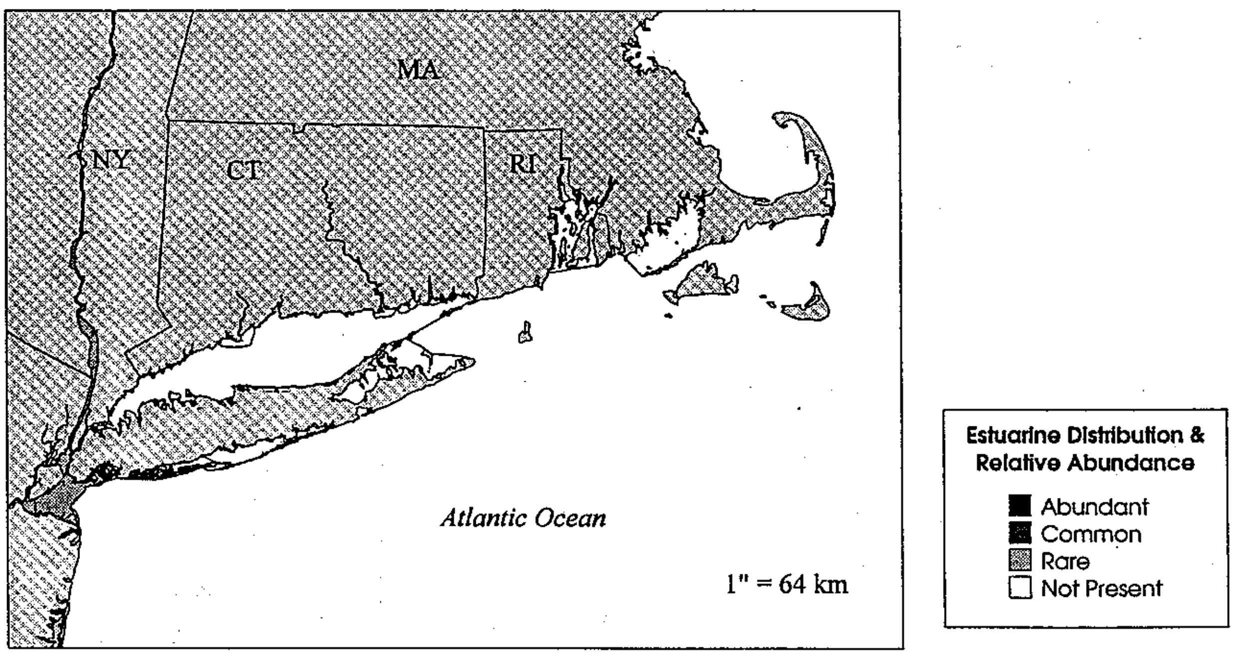


Figure 2D. Juvenile weakfish distribution and relative abundance for waters from Massachusetts through New York during May-August (top map) and December-March (bottom map). Massachusetts and Connecticut trawl survey data are represented by points for the years 1978-1995 and 1984-1995, respectively (top map only); Estuarine Living Marine Resources (ELMR) Program data are represented by toned areas, and are mapped in estuarine areas only. Data for greatest relative abundance for each data source for the indicated time periods are depicted. Please refer to the source document (ASMFC in preparation) for a complete description of the data and methodology employed in map development, which is necessary to understand map application and utility.

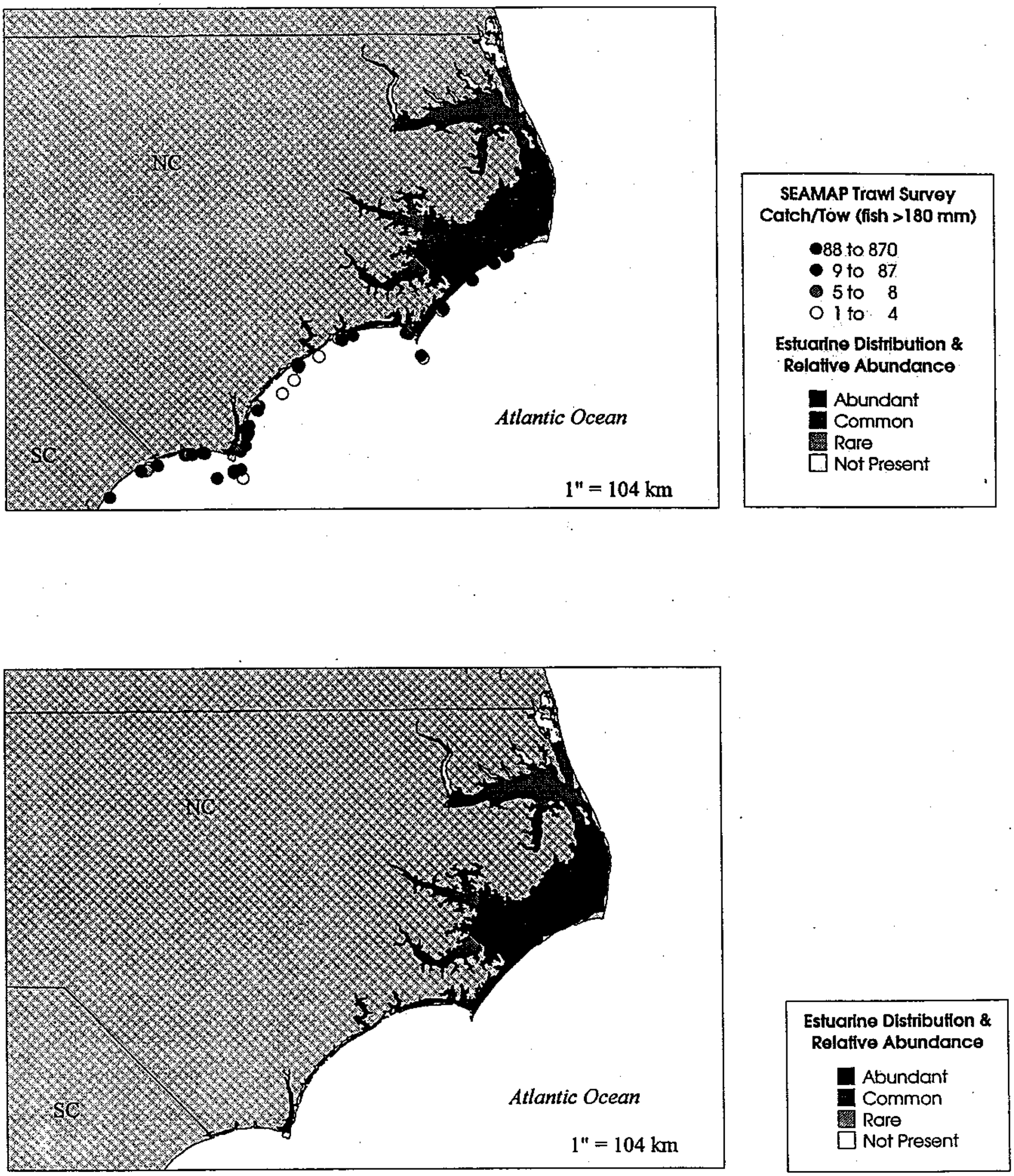
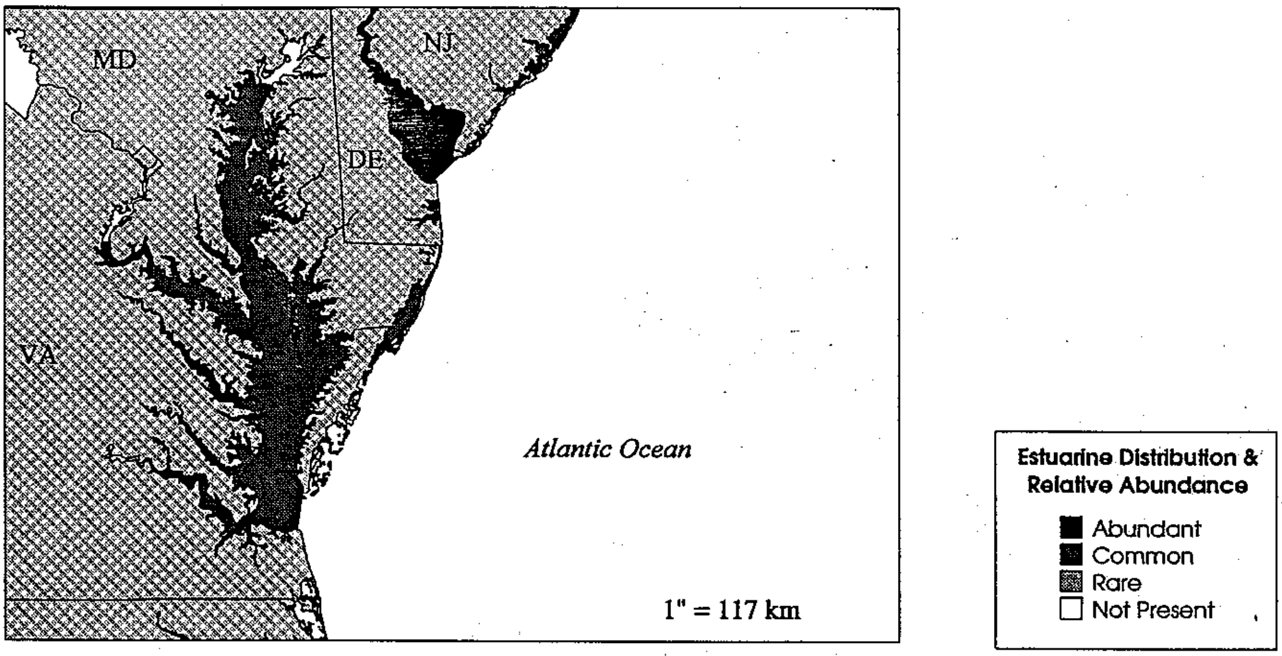


Figure 3A. Adult weakfish distribution and relative abundance for North Carolina waters during May-August (top map) and December-March (bottom map). Southeast Area Monitoring and Assessment Program (SEAMAP) trawl survey data are represented by points for the years 1989-1995 (top map only); Estuarine Living Marine Resources (ELMR) Program data are represented by toned areas, and are mapped in estuarine areas only. Data for greatest relative abundance for each data source for the indicated time periods are depicted. Please refer to the source document (ASMFC in preparation) for a complete description of the data and methodology employed in map development, which is necessary to understand map application and utility.



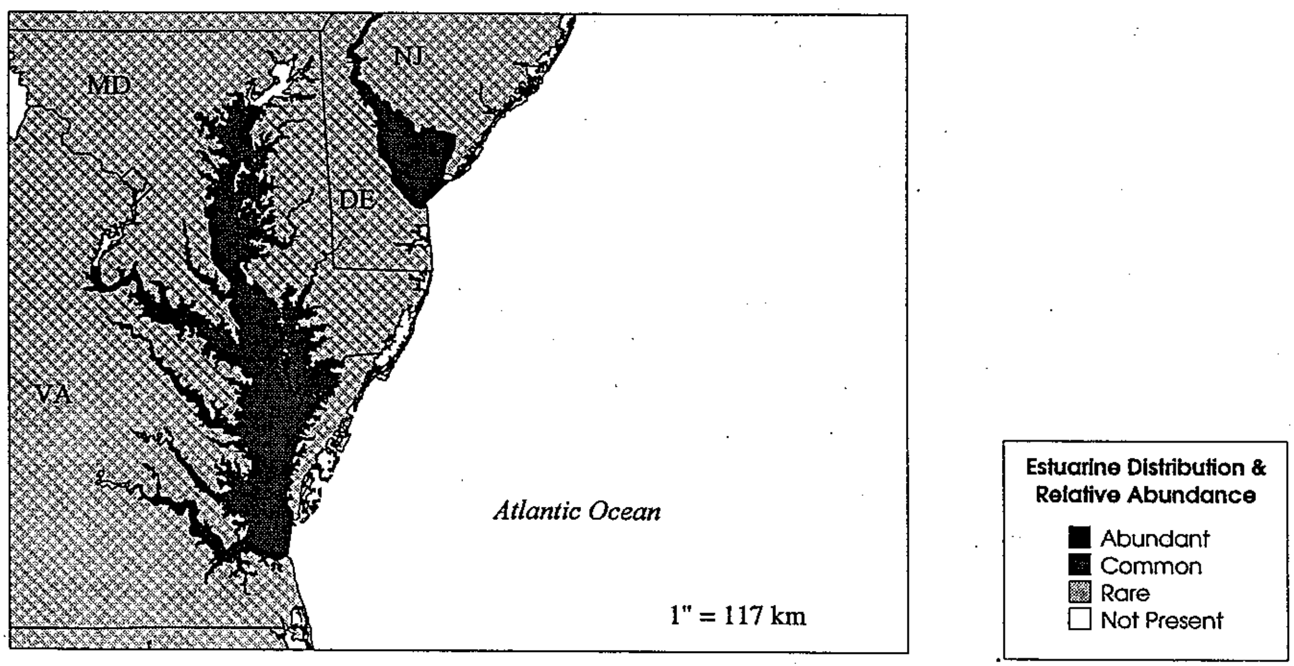
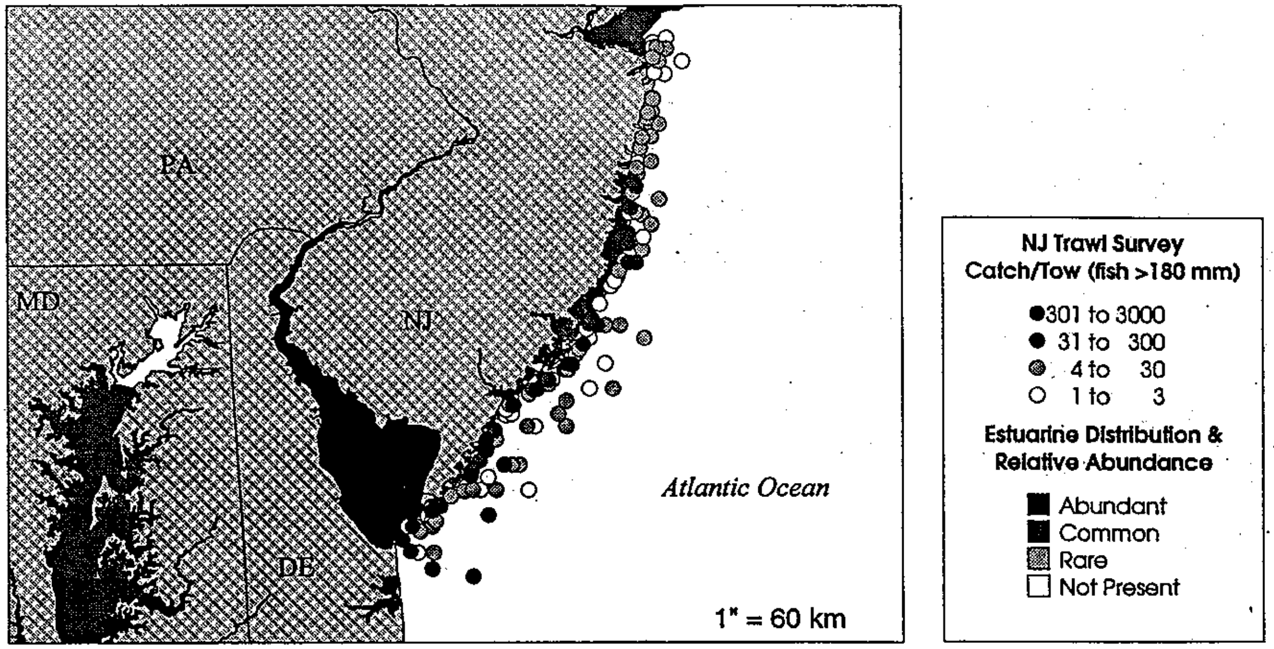


Figure 3B. Adult weakfish distribution and relative abundance for Maryland and Virginia waters during May-August (top map) and December-March (bottom map). Estuarine Living Marine Resources (ELMR) Program data are represented by toned areas, and are the only data presented. Data for greatest relative abundance for the indicated time periods are depicted. Please refer to the source document (ASMFC in preparation) for a complete description of the data and methodology employed in map development, which is necessary to understand map application and utility.



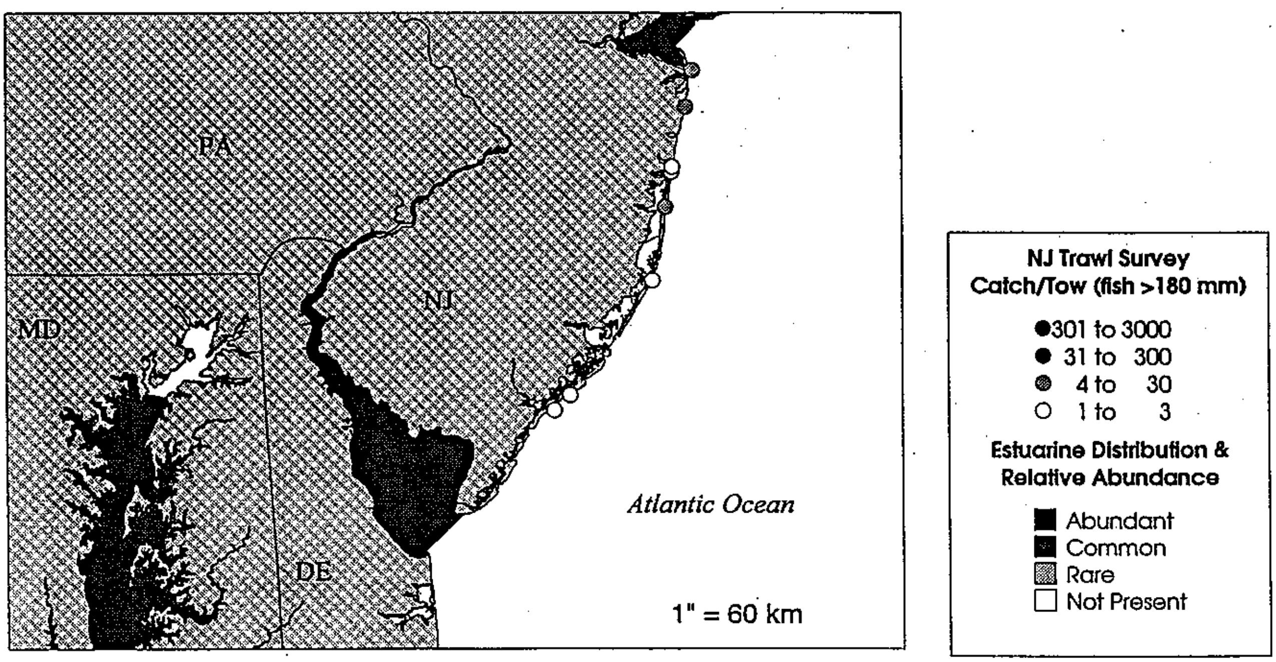
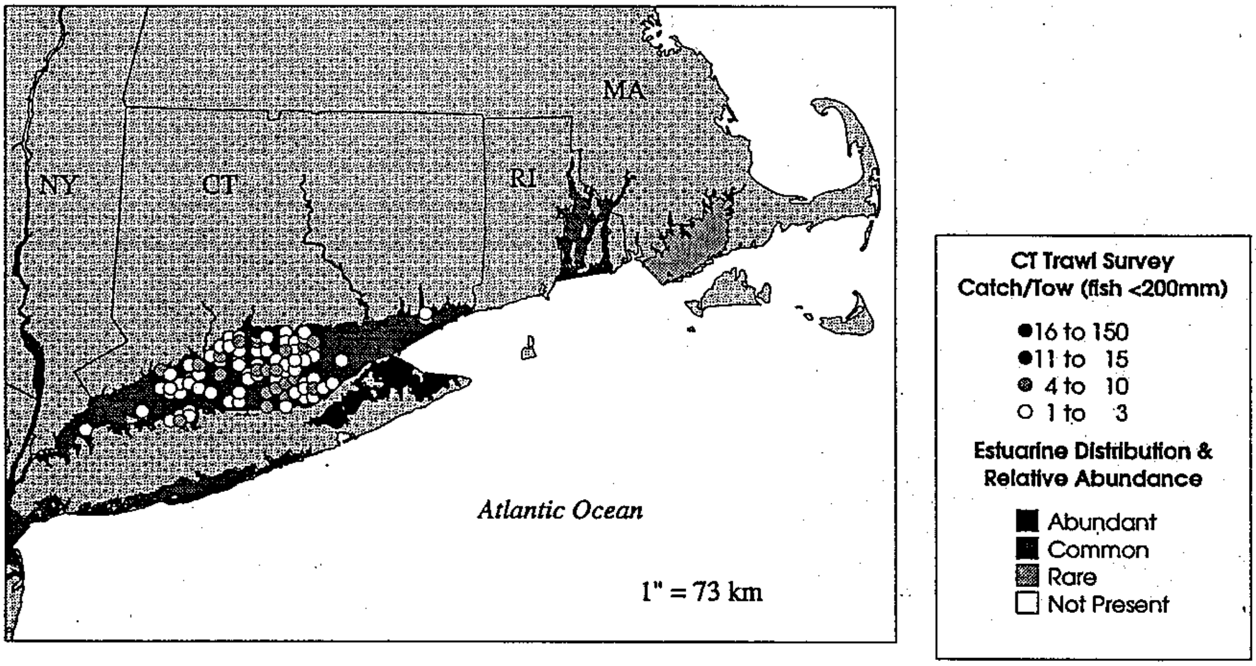


Figure 3C. Adult weakfish distribution and relative abundance in New Jersey and Delaware waters during May-August (top map) and December-March (bottom map). New Jersey trawl survey data are represented by points for the years 1984-1995; Estuarine Living Marine Resources (ELMR) Program data are represented by toned areas, and are mapped in estuarine areas only. Data for greatest relative abundance for each data source for the indicated time periods are depicted. Please refer to the source document (ASMFC in preparation) for a complete description of the data and methodology employed in map development, which is necessary to understand map application and utility.



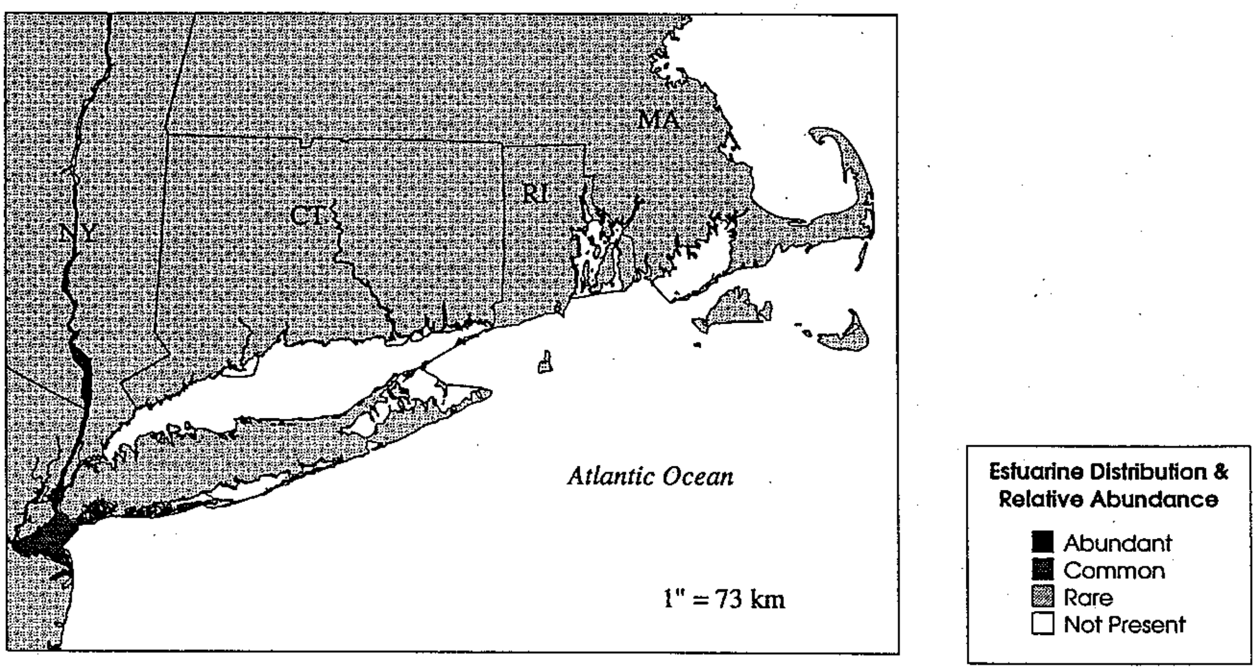


Figure 3D. Adult weakfish distribution and relative abundance for waters from Massachusetts through New York during May-August (top map) and December-March (bottom map). Connecticut trawl survey data are represented by points for the years 1984-1995 (top map only); Estuarine Living Marine Resources (ELMR) Program data are represented by toned areas, and are mapped in estuarine areas only. Data for greatest relative abundance for each data source for the indicated time periods are depicted. Please refer to the source document (ASMFC in preparation) for a complete description of the data and methodology employed in map development, which is necessary to understand map application and utility.

1.2.2 Stock Assessment Summary

Weakfish were assessed through 1994 using updated fishery landings data and survey indices. Revised estimates of shrimp discards and new life history findings on maturation and longevity were also incorporated. The mortality rate of recreational discards was reduced from 35% to 20%. A new Virtual Population Assessment (VPA)[3] model that can utilize more fishery independent indices and that does not require an assumption of constant regulations was used for the first time.

In 1994, commercial landings were 2767 metric tons (MT). Average coastwide landings of the last 5 years ('90 - '94) have declined by over 41% from average coastwide landings of the previous 44 year period ('46 - '89). From New York to North Carolina, the major fishing region for weakfish, the average landings of the last 5 years ('90 - '94) have declined by over 43% from average coastwide landings of the previous 44 year period ('46 - '89). Since 1980, when the highest commercial landings occurred, commercial landings have declined by 83% (fig. 4).

In 1994, recreational landings were 810 MT representing a decline of over 90% from the all-time peak landings (fig. 5). Mean weight of fish caught in the recreational catch has also declined. Landings at age data indicate that most of the declines have occurred in weakfish age 4 and older.

Shrimp discards have ranged from 24 million to 51 million age 0 weakfish. Recent estimates are the lowest, which is possibly because of reduced abundance of age 0 weakfish and the usage of Bycatch Reductions Devices (BRDs; see section 3.3.9) in North Carolina. Recreational discards (which are often referred to as "B2" losses in the Marine Recreational Fisheries Statistics Survey (MRFSS)) have increased from less than 10% of the recreational catch to over 40%; however, these losses still make up a small amount of total fishery losses.

Catch Per Unit Effort (CPUE) in the commercial and recreational fisheries has declined significantly over time. Reductions of 50% and 80%, respectively, are evident. Age specific CPUE indices indicate a loss of older, larger fish from the stock. These declines are supported by sportfishing citation data which show a complete collapse of trophy size weakfish from Delaware through North Carolina.

The primary fishery independent[4] abundance index is the National Marine Fisheries Service/Northeast Fishery Science Center (NMFS/NEFSC) fall inshore trawl survey. Results indicate that abundance of age 2+ weakfish has declined sharply since 1985 to only about 15% of historical levels. Abundance of age 0 and 1 weakfish has not declined as much although 7 of the last 9 years have been below average. A number of other surveys conducted by state agencies, universities, and power companies are also available. Direct comparisons are difficult due to differences in length of time series. Collectively, they indicate low or average recruitment in recent years with greater reductions in the northern portion of the range of weakfish. Limited indices available for 1995 indicate average recruitment in North Carolina and Virginia, above average in Delaware, below average in New York, and a record low in Rhode Island.

Virtual Population Assessment (VPA) analyses indicate that spawning stock biomass[5] (SSB) declined over 90% from 1979 to 1991. A modest increase is evident through 1994. The 1994 estimate of SSB of

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[3]Virtual Population Analysis 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.

[4]Fishery independent data is data that is gathered directly by scientists rather than through fishermen or seafood dealers.

[5]Spawning Stock Biomass (SSB) is the total weight of fish in a stock that are old enough to spawn.

Figure 4: Commercial landings of weakfish from 1946 - 1994 (in metric tons) (Source: National Marine Fisheries Service)

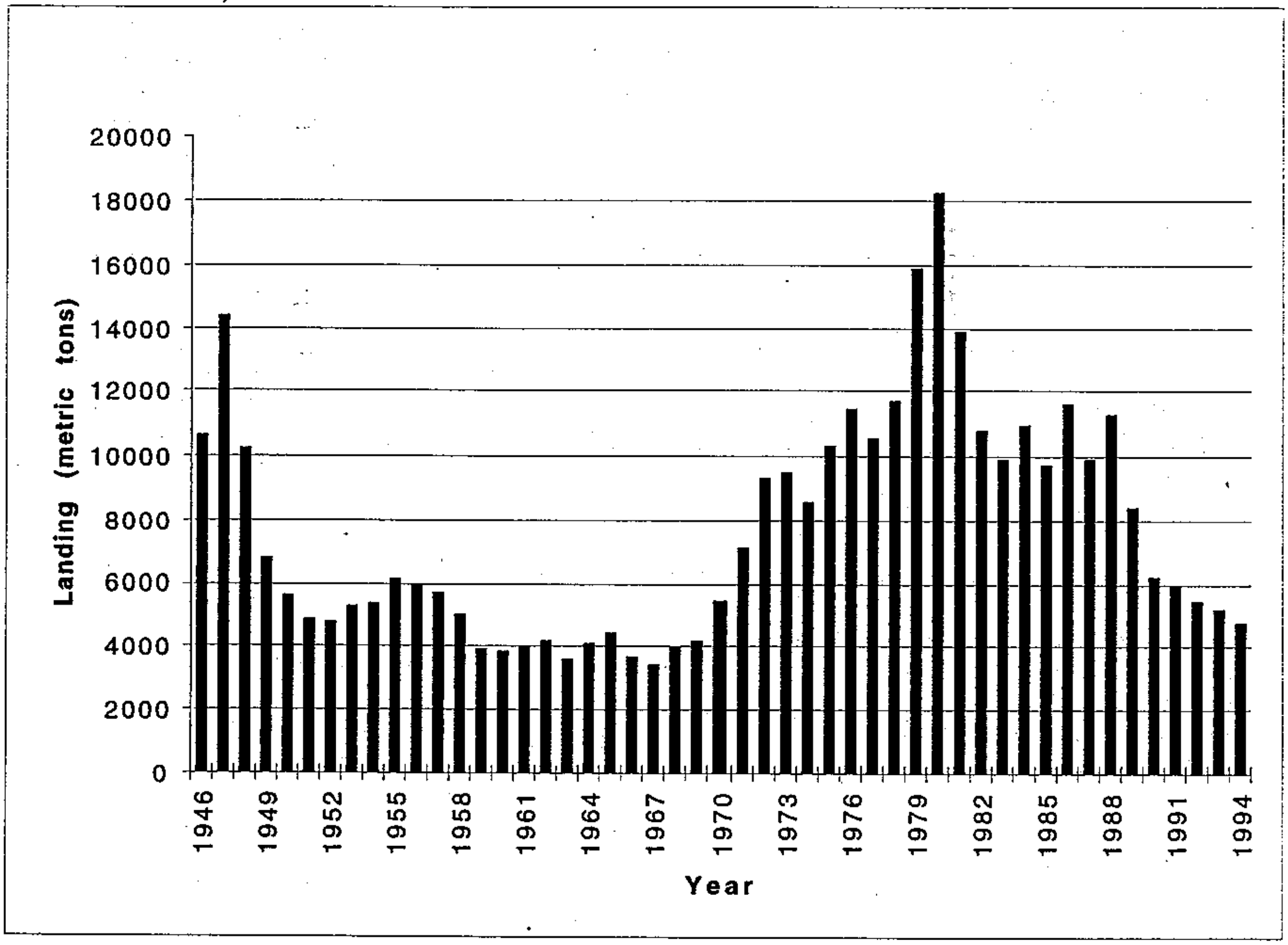
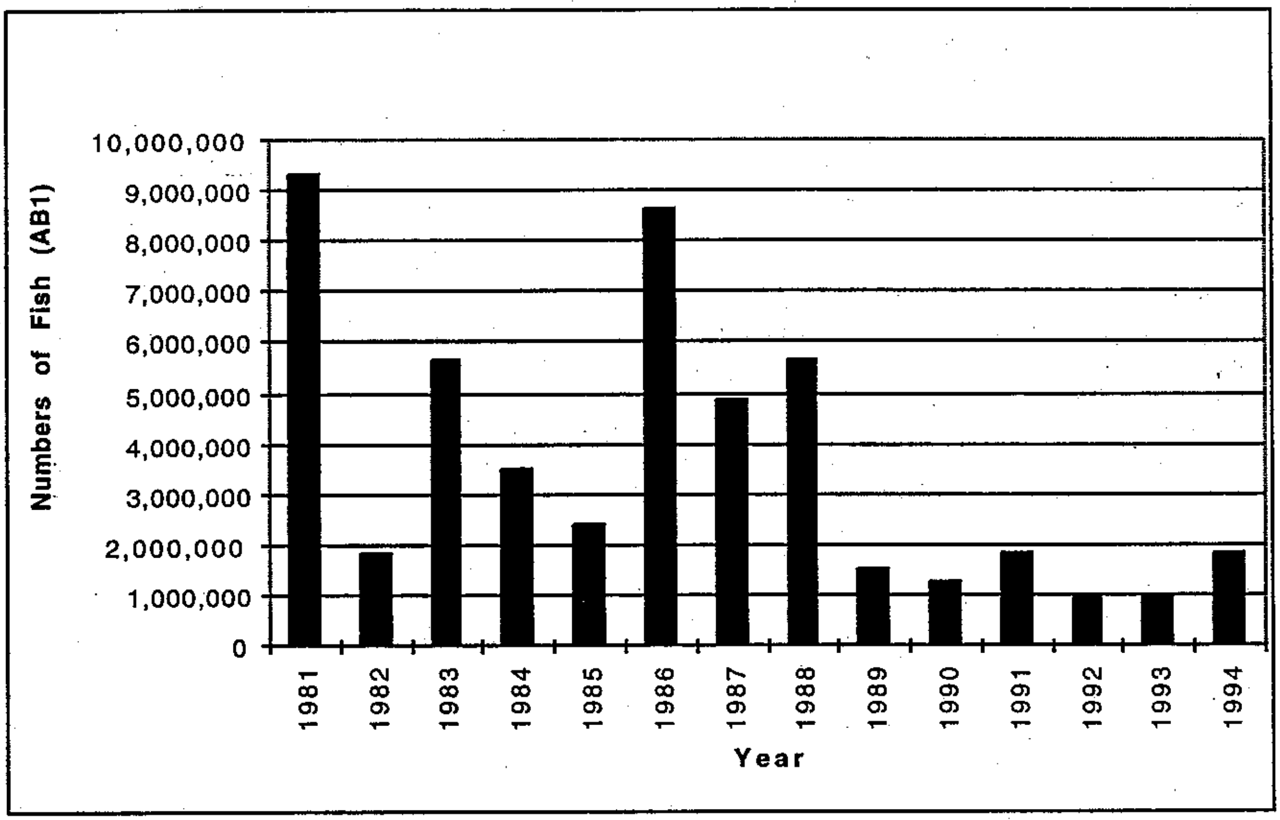


Figure 5: Numbers of recreationally landed weakfish along the Atlantic Coast from 1981 - 1994. (Source: MRFFS, National Marine Fisheries Service)



9608 MT is about one half of that needed to produce stable recruitment. The decline of SSB occurred while fishing mortality rates[6] on age 2-7+ weakfish rose from 0.42 in 1979 to over 2.0 in 1989. The 1994 estimate of F=1.88 is well over the FMP target reference point of 0.50.

Recruitment peaked at 161 million age 0 fish in 1986 but was below average from 1990 - 1994. Recruitment estimates were sensitive to the inclusion of shrimp discards in the VPA but SSB and F rate were not. Stock and recruitment analyses indicated that an SSB of 20,000 MT is needed to produce stable recruitment with the possibility of strong year classes. Diagnostic evaluations of the VPA indicate that the final year of the VPA (1994 for this model) tends to overestimate SSB and recruitment and underestimate fishing mortality. This may result from increasing catchability in the fishery, landings under-reporting, and changes in age-key methods.

Biological reference points were estimated including the effect of shrimp discard losses. The fishing mortality rate corresponding to Maximum Sustainable Yield (MSY) was estimated at 0.70 which is associated with a long term sustainable yield of 16210 MT (including discards). Short term projections indicated that continued high F rates would result in declines in SSB from the 1994 level. Longer term recovery projections indicate that the stock can be rebuilt to 20,000 MT SSB in 5 years if F is reduced to 0.50. The projections also indicate that fishing mortality rates of F= 0.5 or less are needed to rebuild weakfish age structure to historical levels.

In conclusion, the most recent weakfish stock assessment continues to show reasons for concern. Landings in recent years remain below average, particularly in the northern range for weakfish. The average age/size structure has been truncated such that large fish are extremely rare, particularly in the northern range for weakfish. Recruitment has been below average for 7 of the last 9 years. Fishery independent surveys show that abundance of age 2+ weakfish is about 15% of historical levels. Spawning stock biomass is only about one-half of what is believed to be necessary for stable recruitment. Finally, fishing mortality rate remains high; in 1994, mortality due to fishing was estimated to remove over 80% of the weakfish population.

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 1800s. Fisheries have generally followed the stock on its annual north-south migrations and to the wintering grounds (Seagraves and Perra 1991). Weakfish are harvested commercially using pound nets, haul seines, gill nets and trawls and hook & line during spring, summer and fall. During the winter they are taken in trawls, gill nets and fly nets, primarily off the North Carolina coast. Recreationally, weakfish are viewed as strong fighters and as a desirable fish for consumption that are available inshore during much of the year (Seagraves and Perra 1991). The recreational catch occurs primarily from private and rental boats, and also party and charter boats and shore-based angling. For management purposes, the fishing year for weakfish is defined to be from April 1 through March 31.

1.3.1 Coastwide

Catch statistics for the weakfish fisheries on the Atlantic coast are compiled by the NMFS for both commercial and recreational fisheries. These data are further supplemented by individual state programs. The information provided below is derived from summary reports prepared on an annual basis by NMFS.

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[6] Fishing mortality rate (often abbreviated as "F") is a measurement of the rate of removal of fish from a population by fishing. The value expressed here is the instantaneous rate of removal of fish from the population. The instantaneous rate of removal is used because it is more mathematically appropriate for use in the assessment models for weakfish. Instantaneous rates of F=0.42 and F=1.88 are equal to annual rates of removal of about 34% and 84%, respectively.

1.3.1.1 Commercial

The commercial fishery for weakfish occurs primarily during the fall and winter as they migrate from estuaries to overwintering grounds in the South Atlantic (Hogarth et al. 1995b). Otter trawl and sink gill net harvests currently dominate the commercial landings. The otter trawl was the dominant gear during the 1980s, but gill nets now predominate.

Between 1946 and 1994, commercial landings of weakfish fluctuated between 1,397 and 16,312 mt (3.1 and 36 million pounds) (Fig. 4). Landings peaks occurred in 1945 and 1980, with the minimum occurring in 1967. Average annual commercial landings (1946 through 1993) were 5,733 mt (12.6 million pounds); however, since 1989 the landings have been below this average value. Landings in the EEZ were 34 percent of the total during 1972-1994, with a low of 14 percent in 1973 and high of 55 percent in 1992 (Hogarth et al. 1995b).

Historically, the greatest landings were in the Mid-Atlantic and Chesapeake Bay. Before 1957, Virginia and New Jersey accounted for most landings of weakfish. Between 1957 and 1975, North Carolina consistently landed the most weakfish on the Atlantic coast, but Virginia and New Jersey also landed a significant portion of the coastwide total. After 1976, North Carolina has dominated coastwide landings, landing between one-third and two-thirds of the coastwide total. The shift in catch was thought to reflect the increased mobility of the North Carolina fishing fleet, ranging into the EEZ, rather than an actual shift in the distribution of weakfish (Mercer 1989). However, declines in weakfish population size are thought to have caused weakfish to have constricted to the center of its distribution which occurs off the coast of North Carolina and Virginia.

1.3.1.2 Recreational

Weakfish are taken by anglers using live and cut bait, by jigging and trolling with artificial lures, and by chumming during the warmer months of the year. Most recreationally caught weakfish were taken from boats during 1988-1993, but shore-based catches can be substantial during the fall migration.

Recreational landings have ranged from an estimated 960,000 fish in 1992 to a high of 9,344,000 fish in 1981 (fig. 5). Recreational catch accounted for 54.3 percent of the total catch in 1980 but steadily declined to 12 percent in 1993.

Most recreational harvests during 1988-1993 occurred in the Mid-Atlantic region, with lesser portions of the harvest from the North and South Atlantic regions. Since 1979, the Mid-Atlantic region has taken 94.4 percent of the recreational harvest, by weight, compared to 4.4 percent in the South Atlantic and 1.2 percent in New England. Most of the recreational harvest (91.7 percent) occurred in state waters in 1994. Only 8.3 percent of the recreational catch has occurred in the EEZ.

A notable change in the recreational fishery has been the decline in the catch of large size fish. Numbers of sportfishing citation awards for large weakfish have declined in recent years in all states that have maintained records.

1.3.1.3 Bycatch in Other Fisheries

Catch of weakfish that occurs in fisheries directed at other species is referred to as bycatch. Bycatch results in mortality in addition to that which results from fishing and is one component of what is collectively referred to as "nonharvest" mortality. Bycatch of weakfish has been documented in the South Atlantic shrimp fishery and in the pound net, long haul seine and the trawl (particularly fly net) fisheries.

Estimates of bycatch are difficult to obtain for many fisheries, since few studies have focused specifically on that aspect. The exception is the South Atlantic shrimp fishery. Current estimates of weakfish bycatch from this fishery are included below. Bycatch losses contribute to the overall mortality of weakfish and are important to consider in the current and future management of most fisheries.

In general, in southeastern shrimp fisheries, Atlantic croaker and spot were found to be the most dominant bycatch species during most combinations of area/season/year. However, weakfish were quite abundant by weight for the North Carolina boat fishery during summer and fall of 1993 and weakfish was second in dominance for the Florida offshore area during the winter of 1994. Mean number of weakfish captured per trip ranged from 14 - 905 fish from Florida through South Carolina and between 4 and 109 fish in North Carolina.

1.3.1.4 *Value of the Fishery*

Value of the weakfish commercial harvest from 1972-1994 is documented in Hogarth et al. (1995B; Table 5). Dockside value from 1972-1994 ranged from 1.4 million dollars in 1972 to 9.04 million dollars in 1981. The average value was 5.4 million dollars during this period. Percent of the commercial harvest taken from the EEZ ranged from 14 in 1972 to 55 in 1992. Value of the total coastwide recreational catch has not been estimated.

1.3.2 By State

Each state annually compiles the results of both commercial and recreational fisheries and provides a report to the ASMFC. Information provided below is based on the state reports that are on file with the ASFMC, and on NMFS statistics summarized in Hogarth et al. (1995b).

1.3.2.1 *Commercial*

Commercial landings of weakfish by state are reported in Table 7 of Hogarth et al. (1995b). Percentage of North Carolina landings are reported in Table 6 of the same report. From 1984 through 1994, a majority of the total commercial harvest, ranging from 58 (1985) to as much as 74 (1988) percent was landed in North Carolina. Landings from the EEZ off North Carolina ranged from 18.9 (1984) to as much as 68.2 (1993) of the coastwide total commercial harvest, during the same period. Longer term (1946 to 1994) harvest data indicate that most of the annual commercial landings occur in New Jersey (16.68 percent), Virginia (25.12 percent) and North Carolina (44.24 percent), with lesser amounts in New York, Delaware and Maryland and very small percentages in the remaining East Coast states.

1.3.2.2 *Recreational*

Economic impacts to recreational fisheries are not as well studied on a state by state basis. North Carolina, in an internal study, estimated the following values (in 1990 dollars) associated with recreational fishing for weakfish: Sales of $12,907,533, value added of $6,144,400, and capital expenditures of $699,100. In addition, it was estimated that 75 jobs were associated with weakfish with a combined total income of $2,630,800.

1.3.2.3 *Bycatch*

Data on the magnitude of bycatch in finfish fisheries by state have not been compiled; however bycatch will be greater in those states where weakfish are the most abundant and where fishing activity, both commercial and recreational, is most intense. Based on the percentage of the average catch by state from 1946 through 1994, bycatch of legal size weakfish during closed seasons may be greatest in North Carolina, Virginia and New Jersey. Bycatch of sub-legal size fish is likely greatest in weakfish nursery areas that experience fishing activity and where net mesh sizes used are small (e.g. 2.5 inches or less) such as the shrimping areas in south Atlantic waters.

1.3.2.4 *Value of the Fishery*

Value of commercial weakfish fisheries has ranged from a high of $9.0 million in 1981 to a low of $1.4 million in 1972 (NMFS). The average value of the harvest in state waters was estimated at $3.8

million, compared to an average of $1.7 million for the EEZ catch (1972-1994 data; Hogarth et al. 1995b).

1.4 HABITAT CONSIDERATIONS

1.4.1 Description Of Habitat

Habitats used by weakfish include: spawning sites in coastal bays, sounds and the nearshore Atlantic ocean and nursery areas that include the lower portions of the rivers and their associated bays and estuaries (see Figs. 1 - 3). These types of habitats are distributed along the coast from Maine through Florida. Use of these habitats by weakfish may increase or diminish as the size of the population 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 estuaries occur in May and June.

Eggs and larvae are planktonic and are primarily found nearshore. They are carried by currents inshore to estuarine and nearshore nursery areas.

1.4.1.2 Nursery Habitat

Nursery habitats are those areas in which larval and juvenile weakfish reside or migrate after hatching until they reach sexual maturity (90% by age 1, 100% by age 2). These include the nearshore waters as well as the bays, estuaries and sounds to which they are transported by currents or in which they hatch. Juvenile weakfish inhabit the deeper waters of bays, estuaries and sounds, including their tributary rivers. In North Carolina, they are associated with sand or sand/seagrass 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.

1.4.1.3 Adult Resident Habitat and Migratory Routes

Adult weakfish reside in both estuarine and nearshore Atlantic Ocean habitats. Warming of coastal waters in 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 spend the summer in the ocean rather than estuaries (see Figs. 1 and 3).

Weakfish form aggregations and move offshore as temperatures decline in 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 Status Of Habitats And Impacts On Fisheries

Fisheries management measures cannot successfully sustain weakfish stocks if the quantity and quality of habitat required by the species are not available. Harvest of fish is a major factor impacting population status and dynamics and is subject to control and manipulation; however, without adequate habitat quantity and quality, the population cannot thrive.

Status of Atlantic Coast weakfish habitats was most recently reviewed in Hogarth (1995b) and Mercer (1985, 1989). The information presented here is summarized from the referenced reports.

1.4.2.1 Quantity

The National Oceanic and Atmospheric Administration (NOAA), working with ASMFC staff, have integrated survey data from all east coast estuaries into a common database and produced maps of areas used by weakfish (Figs. 1,2,3).

Nursery areas for weakfish consist of the areas in which the larvae, post-larvae and juveniles grow and mature. These areas include the spawning grounds and areas through which the larvae and post-larvae drift after hatching, as well as the portions of rivers and adjacent estuaries in which they feed, grow and mature. Juvenile weakfish that depart from coastal bays and estuaries prior to reaching adulthood also use the nearshore Atlantic Ocean as a nursery area. These areas are depicted in Fig. 2.

The area used by adult weakfish consists of the nearshore Atlantic Ocean from Maine to Florida; inlets that provide ingress to coastal bays and estuaries; and bay, estuarine, sound and riverine habitats that serve as spawning grounds. Atlantic Coast weakfish generally tend to move inshore and north during the summer, and southward and offshore in the winter. Adult habitats are depicted in Figs. 1 and 3.

1.4.2.2 Quality

The quality of weakfish habitats has been compromised largely by impacts resulting from human activities. Polluted waters were suspected to contribute to "fin rot" disease of weakfish observed in the NY Bight, Delaware Bay and GA. Weakfish have been observed with ulcerative mycosis in FL, North Carolina and VA. Cases of ulcers and blindness have been documented in VA rivers. Decline of weakfish stocks in the 1950s and 1960s was thought related to DDT, although concentration of this pesticide by weakfish has not been documented.

While weakfish has been recommended as a target species for contaminant studies for northeast Atlantic estuarine and marine waters (Maine through Connecticut, see U.S. Environmental Protection Agency 1995), few data on contaminant concentrations in weakfish have apparently been collected. Work reported in 1978 by personnel of the National Marine Fisheries Service (Hall et al. 1978) examined concentrations of 15 metals (mercury, lead, cadmium, arsenic, selenium, silver, chromium, copper, zinc, nickel, molybdenum, vanadium, manganese, antimony and tin) in many species, including weakfish. Tissues sampled included liver, muscle and some whole fish. Concentrations detected in weakfish were generally less than 1 part per million for most elements sampled, with the exception of arsenic and zinc, and occasionally selenium, manganese, antimony, lead, copper and tin. The study was designed to produce baseline data, and the authors gave no indication of whether the levels detected exceeded federal or state action levels in effect at the time. More recent studies in North Carolina (North Carolina Department of Environment, Health and Natural Resources 1991) also sampled weakfish. Fillets from weakfish taken from a number of sites in Pamlico Sound were analyzed for metals (mercury, arsenic, cadmium, chromium, copper, nickel, lead and selenium). Only one sample was above 1 part per million (for zinc). The most recent study located (U.S. Environmental Protection Agency 1992) detected no dioxin in the weakfish sampled from three sites. No information has to date been located on the effects of the levels of metals detected upon weakfish physiology.

1.4.2.3 Loss and Degradation

It is generally assumed that weakfish habitats have undergone some degree of loss and degradation; however, few studies exist 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 result 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.

1.4.2.4 Current Threats

Current threats to weakfish include impacts that have resulted from the human activities discussed above, as well as from presently proposed and future activities. Potentially serious 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/industrial water intakes in spawning and nursery areas will occur, although the impacts may be mitigated to some degree with proper screening.

1.4.2.5 Effect on the Ability to Harvest and Market

Impacts to weakfish habitat may have two different effects on the ability to harvest and market weakfish. Impacts that result in mortality over and above that which would occur naturally at any life stage will reduce the size of the population and thereby ultimately reduce the size of the allowable harvest. Such impacts include impingement and entrainment of larvae and juveniles, lethal levels of contamination, and changes in spawning grounds that could reduce or eliminate reproductive success. Impacts that may not increase mortality, but reduce or eliminate marketability, include non-lethal levels of contaminants that may render fish unfit for human consumption, or changes in water quality that may reduce fish condition or appearance to a point where they are unmarketable.

At present, there is only one consumption advisory in effect for mercury and poly-chlorinated biphenyls, which covers Purvis Creek, Gibson Creek and the Turtle , South Brunswick and Buffalo Rivers in Georgia (Susan Shipman, Coastal Resources Division, Georgia Department of Natural Resources, personal communication to RWL April 23, 1996). However, since weakfish present in the affected area are largely juveniles, and since commercial and recreational catches of weakfish in Georgia are very small, it is unlikely that the advisory significantly effects weakfish harvest or marketing this area.

1.4.3 Identification And Distribution Of Essential Habitats

All habitats described above are potentially essential to the continued sustainability of the Atlantic Coast weakfish stock as it presently exists. The maps of weakfish distribution and abundance (Figures 1 — 3) can be used as a surrogate to define essential habitat until more detailed analyses of weakfish habitat use become available. Additional distribution and abundance maps of habitats used by weakfish are included in the Source Document (ASMFC in preparation).

It is difficult at present to assess how much additional habitat may be "essential" in the absence of a specific goal for recovery of additional areas that were historically but are not presently used by weakfish. States may wish to identify areas targeted for recovery as essential habitat. These areas may be necessary for achieving historic weakfish production levels in their jurisdiction.

1.5 EXPLANATION OF ADAPTIVE MANAGEMENT APPROACH

The term "adaptive management" means that fishery managers evaluate the response of the population to the measures employed and react to changes on a more timely basis than a formal plan amendment allows. This ensures that managers are able to change a fishery management plan as necessary to ensure that the goal and objectives of the plan are met. Adaptive management requires that the fishery and population are monitored to an extent sufficient to allow managers to assess how well the plan is performing. Necessary corrections must be made to the management regime if indications are that the population is declining, or that landings exceed desired levels. In the case that weakfish recover more quickly or to a greater extent than is projected, restrictions may be reduced; in the case that 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. (See section 3.6)

1.5.1 Emergency Management Provisions

Provisions for the implementation of emergency management provisions are addressed in Section 3.6.2. No emergency management provisions are proposed at this time.

1.6 IMPACTS OF THE FISHERY MANAGEMENT PROGRAM

Actions are designed to protect the stock from overharvest, both in state waters and the EEZ, and should have a positive net effect on the resource, aid in stock recovery, and stimulate the economy through providing a stable resource base for both commercial and recreational harvest. Measures required to reduce bycatch in the South Atlantic shrimp trawl fishery will benefit other finfish species and improve overall ecosystem health.

1.6.1 Biological And Environmental Impacts

Major biological concerns for the weakfish population include providing an opportunity for the fish to spawn <u>at least</u> once prior to harvest, and increasing the survival of juveniles and small adults. In addition, it is believed that an expanded age structure lessens the chance of a few recruitment failures causing the collapse of the fishery. Furthermore, extended age-structure should result in the return of large weakfish to the northern end of their range (i.e. Southern New England). Under the plan, increase in the minimum size limit will ensure that weakfish spawn at least once and possibly two or three times before they become vulnerable to capture by the fishery. Lower fishing mortality rates on all age classes should result in expansion of the age structure. The plan also provides for reduction in bycatch and discard mortality of small weakfish in non-directed fisheries, specifically the South Atlantic penaid shrimp trawl fishery (North Carolina through Florida). Implementation of requirements for bycatch reduction devices will increase survival and facilitate recovery and long term sustainability of the fishery.

1.6.1.1 Protected Species Considerations

Many protected species of marine mammal could interact with commercial fishing gear used for the harvest of weakfish (Hogarth et al. 1995a). The National Marine Fisheries Service considers all marine mammal stocks that occur in Atlantic Coast U.S. waters as potentially interacting with the fishery. This is likely because at least one component of the fishery is active from Massachusetts through North Carolina in both inshore and offshore waters throughout the year. No specific data are available on the bycatch or entanglement of marine mammals in gear used for directed weakfish harvest.

Five species of federally-listed marine sea turtles occur in Atlantic Ocean EEZ and inshore waters (Hogarth et al. 1995b). These species could be affected by commercial fishing for weakfish. All of these species are under the joint jurisdiction of the NMFS and the U.S. Fish and Wildlife Service and are the subject of recovery plans prepared by those agencies (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991a, 1991b, 1992a, 1992b, 1993)

1.6.2 Social Impacts

Weakfish have been sought, as noted above, by both commercial and recreational fishermen along the Atlantic Coast since the 1800s. The stock likely has great social significance to both groups. There is no comprehensive study of the socio-economics of the weakfish fisheries (Hogarth et al. 1995b). Socioeconomic data on fishing communities dependent on weakfish are not available, although it is thought that no community is totally dependent on weakfish.

1.6.2.1 Commercial

There are no coastwide data on the number of fishermen or vessels participating in the weakfish fisheries (Mercer, 1985; Hogarth et al. 1995b). Recent declines in weakfish harvests suggest that the number of participants in the fisheries may have declined as effort was transferred to other species. Implementation of the amendment should encourage more fishermen to participate in the fisheries after recovery of weakfish has occurred.

1.6.2.2 Recreational

Implementation of the amendment should positively affect recreational fishermen. The number of recreational anglers involved in the weakfish fishery doubled between 1960 and 1970 when the weakfish population level was increasing (Mercer 1985). Since 1988, the estimated number of recreational trips that targeted weakfish has declined from 1.1 million (1988) to 0.6 million (1993) as the weakfish population declined. Rebuilding of the stock under the provisions of this amendment is expected to increase recreational angling for weakfish.

1.6.3 Economic Impacts

In view of the depressed/overfished condition of the weakfish stock, the economic status of both the commercial and recreational sectors will be improved by implementation of the amendment, regardless of the option selected.

1.6.3.1 Commercial Impacts

The present (1994) value of the commercial harvest is only 66 percent of the average value of the harvest from 1972-1994. Value of the harvest is expected to increase, up to a point, as the stock increases, since demand for seafood products continues to increase. The decline of the stock has already had a major negative impact on the economy, since commercial harvest value has declined from $9 million in 1982 to $3.6 million in 1994. However, closure of the New York market to untagged weakfish during New York's closed season may have also contributed to the decline of the commercial harvest value. Implementation of the amendment may improve and stabilize harvest in the long term.

The bycatch reduction device (BRD) requirement of section 3.3.9 will have economic impacts on the southern penaeid shrimp trawl fishery. There will be additional costs to purchase and install BRDs as well as costs associated with shrimp loss (currently estimated to be from 3 - 5%). However, some of these costs may be offset by increased efficiency due to shorter culling times with less finfish bycatch.

1.6.3.2 Recreational Impacts

The decline of the fishery has resulted in a significant decline of the number of recreational trips targeting weakfish. Restoration of the stock under the provisions of this amendment will result in an increase in the number of trips, greater participation, and greater return to the economy as a result of more recreational trips and related expenditures for travel and lodging.

1.7 LOCATION OF TECHNICAL DOCUMENTATION

In order to reduce the length of Amendment #3 and restrict its content to major provisions and a minimum of explanatory text, supporting documentation will be placed in the Amendment #3 Source Document (ASMFC, in preparation). The Source Document will be available from the ASMFC in late 1996 and will contain extensive materials that explain the science that supports weakfish management, including: the complete stock assessment, a state - by - state description of weakfish fisheries, additional maps and descriptions of data used to construct them.

2. AMENDMENT #3 GOAL AND OBJECTIVES

Goal

The goal of Amendment #3 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

1) To restore the weakfish population over a 5-year period.

2) To reach and maintain a target fishing mortality rate of 0.5[7].

3) To restore the expanded age and size structure to that necessary ultimately to restore trophy fisheries and to return weakfish to their previous geographic range. An interim indicator of this level is the average mean size and age structure that existed from 1979 to 1994 (Table 2).

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 #3 of the Weakfish FMP and for determination of states' compliance with the provisions of the management plan.

2.1 SPECIFICATION OF MANAGEMENT UNIT

The entire population of weakfish of the east coast of the United States from Cape Cod, Massachusetts through Florida.

2.2 DEFINITION OF OVERFISHING

The current overfishing definition is any level over the target fishing mortality rate of F=0.5 on fully recruited weakfish, age 2 and older[8].

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7 Fishing mortality rate (often abbreviated as "F") is a measurement of the rate of removal of fish from a population by fishing. The value expressed here is the instantaneous rate of removal of fish from the population, which equates to approximately a 40% annual rate of removal of fish from the population. The instantaneous rate of removal is used because it is more mathematically appropriate for use in the assessment models for weakfish.

8 The term "fully recruited" means the age at which 100% of the fish are vulnerable to legal harvest by the fishery. For weakfish, this occurs at age 2 and older.

2.3 STOCK REBUILDING PROGRAM

Each state is required to implement harvest reduction strategies designed to recover weakfish over a 5 year period. Table 1 describes the necessary reductions under Amendment #3 for fishing years 1996-2000. The fishing year is currently defined as April 1 through March 31.

Table 1: Required reduction schedules for fishing mortality rates (F) for Atlantic Coast weakfish during the April 1, 1996 through March 31, 1998 period. All reductions in F are based on a 12-inch minimum size limit.

	Fishing Year				
	1996	**1997**	**1998***	**1999**	**2000*** **
Projected F	1.27	1.27	1.01*	0.76*	0.50
% Reduction in F rate**	33	33	47*	60*	74
Projected harvest rate	64%	64%	54%*	44%*	34%
% Reduction in harvest rate**	17	17	29*	41*	53

*Required reductions during the 1998 and 1999 fishing years will be established following completion of stock assessments for the 1995 and 1996 fishing years using the adaptive management procedure (see section 3.6). The values listed here are estimated projections based on conditions at the time of passage of Amendment #3 and they will almost certainly be revised when updated information becomes available. Once required reductions have been calculated, states will have to submit additional plans by October 1, 1997.

**Reductions projected from the 1994 fishing year; the 1994 F rate is the most current terminal F estimate.

***These numbers represent the target values for fishing year 2000, established by the Weakfish Management Board.

Table 2: Percentage of fish numbers at each age (age 0 to 7 and older) from 1979 to 1994. Data comes from the 1994 Virtual Population Assessment model.

	Percentage of Weakfish at each Age							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7 and Older**
1979	56.17	22.11	11.91	6.04	2.56	0.86	0.18	0.16
1980	59.83	18.89	9.56	5.33	3.60	1.51	0.48	0.81
1981	69.47	17.71	6.47	2.94	1.84	1.06	0.26	0.26
1982	70.35	21.78	4.68	1.54	0.72	0.42	0.26	0.26
1983	72.02	19.18	6.18	1.56	0.44	0.25	0.16	0.21
1984	67.52	23.96	6.67	1.15	0.35	0.17	0.09	0.10
1985	75.43	16.96	6.59	0.62	0.21	0.09	0.05	0.05
1986	71.74	23.30	3.93	0.82	0.12	0.05	0.02	0.03
1987	60.58	28.44	8.93	1.78	0.21	0.04	0.01	0.01
1988	67.33	18.67	11.03	2.62	0.25	0.07	0.01	0.02
1989	72.35	19.01	5.63	2.64	0.30	0.02	0.02	0.02
1990	67.92	22.45	8.41	1.05	0.12	0.03	0.01	0.01
1991	75.92	17.55	5.16	1.27	0.09	0.01	0.00	0.00
1992	71.25	22.50	5.33	0.84	0.07	0.00	0.00	0.00
1993	69.69	21.53	7.92	0.75	0.09	0.01	0.00	0.00
1994	67.63	21.63	8.14	2.49	0.12	0.00	0.00	0.00
Average %	**68.45**	**20.98**	**7.28**	**2.09**	**0.69**	**0.29**	**0.10**	**0.12**

3. MANAGEMENT PROGRAM IMPLEMENTATION

So that the purposes of the Compact creating the Atlantic States Marine Fisheries Commission might be fulfilled, and in light of the foregoing analysis of the state of the resource and the need for coordinated conservation and management of the weakfish resource along the Atlantic coast in order for the states to achieve their mutual, shared interests, the Commission hereby recommends to the governors, legislatures and executive agencies of the respective states as follows: the coordination of the exercise of the police powers of the states within their respective jurisdictions, including appropriate regulations, according to the terms as set forth in this fishery management plan, IS essential to promote the preservation of the Atlantic coastal weakfish fisheries, and their protection against overfishing, waste, depletion or any abuse whatsoever and to assure a continuing yield therefrom.

Amendment #3 completely replaces all previous amendments and plans for weakfish.

3.1 HABITAT CONSERVATION AND RESTORATION

Each State should implement protection for weakfish habitat within its jurisdiction in order to ensure the sustainability of that portion of the spawning stock that either is produced or resides within its boundaries. Such a program should inventory historical habitats, identify habitats presently used and specify those that are targeted for recovery, and impose or encourage measures to retain or increase the quantity and quality of weakfish essential habitats. (See Appendix 3 for a listing of state habitat management agencies and authorities).

3.1.1 Preservation Of Existing Habitat

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

Where sufficient knowledge is available, States should seek to designate weakfish essential habitats for special protection. These locations should be designated High Quality Waters or Outstanding Resource Waters and should be accompanied by requirements of non-degradation of habitat quality, including minimization of non point source runoff, prevention of significant increases in contaminant loadings, and prevention of the introduction of any new categories of contaminants into the area (via restrictions on National Pollutant Discharge Elimination System (NPDES) discharge permits for facilities in those areas).

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

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

Water quality criteria for weakfish spawning and nursery areas should be established or existing criteria should be upgraded to levels that are sufficient to ensure successful reproduction (reference Mercer (1989) for suggested criteria). Any action taken should be consistent with Federal Clean Water Act guidelines and specifications.

All State and Federal agencies responsible for reviewing impact statements and permit applications for projects or facilities proposed for weakfish spawning and nursery areas should ensure that those projects will have no or only minimal impact on local stocks. Any project that would result in the elimination of essential habitat should be avoided.

3.1.2 Avoidance Of Incompatible Activities

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

Each State should establish windows of compatibility for activities known or suspected to adversely affect weakfish life stages and their habitats, such as navigational dredging, bridge construction, and dredged material disposal, and notify the appropriate construction or regulatory agencies in writing.

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

Each state which encompasses spawning areas within its jurisdiction should develop water use and flow regime guidelines that are protective of weakfish spawning and nursery areas and that will ensure the long-term health and sustainability of the stock. States should endeavor to ensure that proposed water diversions/withdrawals from rivers tributary to spawning and nursery habitats will not reduce or eliminate conditions favorable to weakfish use of these habitats.

3.1.3 Fisheries Practices

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

3.1.4 Habitat Restoration, Improvement And Enhancement

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

Every effort should be made to eliminate existing contaminants from weakfish habitats where a documented adverse impact occurs.

States should work in concert with the USFWS, Divisions of Fish and Wildlife Management Assistance and Ecological Services, and NMFS, Office of Fisheries Conservation and Management and Office of Habitat Conservation, to identify hydropower dams that pose significant threat to maintenance of appropriate freshwater flows to weakfish nursery and spawning areas and target them for appropriate recommendations during FERC relicensing.

3.2 RECREATIONAL FISHERIES MANAGEMENT MEASURES

In order to achieve annual fishing mortality targets, recreational fisheries will be constrained by a combination of size limits, possession limits, and possibly restricted seasons or areas. Once a basic regime for these limits is established, states may vary according to a specified table of equivalency contained in the Components of an Evaluation Manual (O'Reilly 1996, Appendix 2; Table 3 lists the possession limits at the time of passage of Amendment #3) or by submitting an alternative management proposal as described in section 3.5 of this document. Any alternative management proposals may include, but are not limited to, season or area closures. The prescribed management measures in this section and any alternative state plans shall be designed to reach the annual target mortality reductions listed in Table 1.

The possession/size limit regime listed for recreational fisheries is extracted from the Components of an Evaluation Manual (O'Reilly 1996) and has been projected from the best science available at the time of passage of Amendment #3. The Components of an Evaluation Manual (O'Reilly 1996) is subject to change as new information becomes available (see section 3.7.2). In addition, the status of the weakfish stock will be reviewed annually and the Board has the flexibility to respond to changing conditions as described under section 3.6 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 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.

Table 3: Weakfish Possession limits under various minimum size limits for fishing years (April 1 to March 31) 1996 to 2000, as excerpted from the Components of an Evaluation Manual (O'Reilly 1996).

		Possession	Limits By	Fishing Year	
Minimum Size Limit (inches, Total Length)	**1996***	**1997***	**1998**	**1999**	**2000**
12	4	4	**	**	**
13	6	6	**	**	**
14	14	14	**	**	**
15	No limit	No limit	**	**	**
16	No limit	No limit	**	**	**

*State regulations must remain at least as restrictive as they were during Fishing Year 1995 in order to maintain a 33% reduction in exploitation.
**Possession limits for these years will be determined after the stock assessments for the 1995 and 1996 fishing years are completed.

3.2.1 Minimum Fish Size

Each state shall be required to promulgate regulations for their recreational fisheries that prohibit landing of weakfish less than 12 inches total length (TL). However, conservation equivalencies for minimum fish sizes larger than 12 inches will be allowed. In general, conservation equivalency would allow a longer fishing season or increased possession limits with a larger than 12 inch size limit.

3.2.2 Closed Seasons

States will be given flexibility to determine timing of closed seasons of sufficient length to reach their mortality reduction 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 as outlined in Table 1.

In addition to the possession/size limits listed in Table 3, a seasonal closure option is available to the states that could allow states to increase possession limits (see Components of an Evaluation Manual). However, these optional closures would be in addition to any seasonal closures that might be required to meet fishing mortality reduction goals.

3.2.3 Closed Areas

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 as outlined in Table 1.

3.3 COMMERCIAL FISHERIES

To achieve fishing mortality targets, commercial fisheries will be constrained by size limits, gear restrictions, and possibly season and/or area closures. The combined effect of these management measures shall be designed to achieve the required mortality reductions as outlined in Table 1..

3.3.1 Definition of Directed Fishery

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."

States may allow fishermen targeting species other than weakfish (i.e. non directed fisheries) to possess no more than 150 pounds in any one day or trip (whichever is the longer period of time) as allowable bycatch during any otherwise closed season. However, any state choosing to do so must have a reporting system in place that will allow adequate quantification of any such catch. Furthermore, each state choosing 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.

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

3.3.2 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.

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 currently listed in the Components of an Evaluation Manual. 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 Sections 3.5 and 4.1.3, no other gears may harvest and retain weakfish smaller than 12 inches TL.

3.3.3 Minimum Mesh Size For Nets

Directed weakfish fisheries will be required to use mesh sizes that retain only 25% or less of weakfish less than 12 inches TL (often called L_{25} mesh sizes). These mesh sizes for commercial gill nets and fish trawl nets are listed in Table 3 of the most current version of the Components of an Evaluation Manual (Appendix 2 contains the version that was current at the time of passage of this amendment). If a state chooses to allow mesh sizes which do not achieve a L_{25} of 12 inches, it can use conservation equivalency (e.g. longer closed seasons) to satisfy the mesh size requirement (see Table 4, Components of an Evaluation Manual). 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 L_{25} mesh sizes as currently listed in Table 4 of the Components of an Evaluation Manual 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 L_{25} mesh sizes and amend Table 4 of the Components of an Evaluation Manual.

3.3.4 Closed Seasons

States may determine timing of closed seasons of sufficient length to reach their mortality reduction 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.

3.3.5 Closed Areas

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 mortality.

3.3.6 Dealer, Vessel, Or Operator Permits And/Or Reports

To the extent possible, Amendment #3 will take advantage of existing state reporting and permitting systems. However, states are strongly encouraged to implement mandatory reporting and permitting systems that will provide adequate data for conducting weakfish stock assessments.

The newly created Atlantic Coastal Cooperative Statistics Program (ACCSP) will be utilized to the greatest extent possible when it is implemented. The ACCSP, begun in November 1995, is designed to implement a cooperative state-federal marine and coastal fisheries statistics program that adequately meets the needs of fishery managers, scientists, and fishermen. The Commission, ASMFC member states (including the Potomac River Fisheries Commission and the District of Columbia), the 3 Atlantic coast Fishery Management Councils, and the National Marine Fisheries Service and U.S. Fish & Wildlife Service are partners in this program.

3.3.7 Per Trip Catch Limits

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

3.3.8 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 any such measures meet their target mortality goals.

3.3.9 Bycatch Reduction Devices (BRDs) And Methods

Incentives, such as credits for reduced fishing mortality, will be allowed for use of bycatch reduction devices or methods in pound nets, haul seines, and other types of gears. States would have to present evidence to the technical committee and board supporting any claims of reduced mortality because of the use of these devices or methods. The Board would have to approve of any such proposals for states to receive credit for bycatch reduction.

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.

3.4 MORTALITY ADJUSTMENTS

Any state that fails to completely implement its approved management program in a given fishing year will be required to modify its plan in the following year. The plan must be modified to reduce mortality by an amount equal to the overage incurred in the previous fishing year. The board, in consultation with the technical committee, shall decide the amount of additional reductions required.

3.5. ALTERNATIVE STATE MANAGEMENT REGIMES

Once approved, a state may not vary its regulatory specifications contained in Sections 3.2., and 3.3 , except with the approval of the Management Board. A state can request a change only if that state can show to the Board's satisfaction that the target fishing mortality rate will be achieved (see Table 1). Changes to state plans must be submitted in writing to the Board and to the ASMFC.

3.5.1. 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. 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.

States must submit draft proposals for implementation on or before July 1, for 1996; and before January 1 of every year thereafter, except that proposals for fall/winter fisheries may be submitted up to July 1.

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 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 then applicable, and the goals and objectives of this amendment.

3.5.2 Management Program Equivalency

The Weakfish Technical Committee will review any alternative state proposals under this section and provide to the Board its determination of the adequacy of such proposals.

3.5.3 *De minimis* Status

3.5.3.1 Definition

De minimis is defined in the ASMFC Interstate Fisheries Management Fisheries Program Charter as "a situation in which, under existing condition of the stock and scope of the fishery, conservation and enforcement actions taken by an individual state would be expected to contribute insignificantly to a coastwide conservation program required by an FMP or amendment."

States may apply for *de minimis* status if ,for the last two years , their combined average commercial and recreational landings (by weight) constitute less than 1% of coastwide commercial and recreational landings for the same two year period.

De minimis states are not required to implement the recreational or commercial fishing provisions of this FMP, except for:

- the bycatch reduction device requirement under section 3.3.9; and
- annual reporting to determine if continued *de minimis* status is warranted.

3.5.3.2 *Annual Review of De minimis Status*

Once *de minimis* status is granted, all designated states must submit annual reports to the Board justifying the continuance of *de minimis* status. Conversely, states may petition the Board at any time for *de minimis* if their fishery falls below the threshold level.

3.6. ADAPTIVE MANAGEMENT

The Management Board may vary the requirements specified in this Amendment as a part of adaptive management in order to achieve the goals and objectives specified in Section 2. Specifically, the Management Board may change target fishing mortality rates, size limits, creel limits, seasonal restrictions, commercial fishery quotas, bycatch reduction targets and recommendations to the Secretary. 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.

3.6.1. Procedures

The Plan Review Team will monitor the status of the fishery and the resource and report on that status to the Management Board on or about September 1. The PRT will consult with the Technical Committee, the Stock Assessment Committee and the relevant 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 Management Board will review the report of the PRT, and may consult further with the 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 PRT 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 PRT will also request comment from federal agencies and the public at large. After a 30-day review period, the PRT 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 PRT, and shall also consider the public comments received and the recommendations of the Technical Committee, the Stock Assessment Subcommittee and the Advisory Panel; and shall then decide whether to adopt or revise and adopt the addendum.

Upon adoption of 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.

3.6.2 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 #3. Procedures for implementation are addressed in the ASMFC Interstate Fisheries Management Program Charter, Section 6(c)(10) (ASMFC 1995).

3.7 ROLE OF MANAGEMENT INSTITUTIONS

Where not inconsistent with the following provisions, the management institutions for weakfish are subject to the provisions of the ISFMP Charter.

3.4 MORTALITY ADJUSTMENTS

Any state that fails to completely implement its approved management program in a given fishing year will be required to modify its plan in the following year. The plan must be modified to reduce mortality by an amount equal to the overage incurred in the previous fishing year. The board, in consultation with the technical committee, shall decide the amount of additional reductions required.

3.5. ALTERNATIVE STATE MANAGEMENT REGIMES

Once approved, a state may not vary its regulatory specifications contained in Sections 3.2., and 3.3 , except with the approval of the Management Board. A state can request a change only if that state can show to the Board's satisfaction that the target fishing mortality rate will be achieved (see Table 1). Changes to state plans must be submitted in writing to the Board and to the ASMFC.

3.5.1. 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. 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.

States must submit draft proposals for implementation on or before July 1, for 1996; and before January 1 of every year thereafter, except that proposals for fall/winter fisheries may be submitted up to July 1.

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 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 then applicable, and the goals and objectives of this amendment.

3.5.2 Management Program Equivalency

The Weakfish Technical Committee will review any alternative state proposals under this section and provide to the Board its determination of the adequacy of such proposals.

3.5.3 *De minimis* Status

3.5.3.1 Definition

De minimis is defined in the ASMFC Interstate Fisheries Management Fisheries Program Charter as "a situation in which, under existing condition of the stock and scope of the fishery, conservation and enforcement actions taken by an individual state would be expected to contribute insignificantly to a coastwide conservation program required by an FMP or amendment."

States may apply for *de minimis* status if ,for the last two years , their combined average commercial and recreational landings (by weight) constitute less than 1% of coastwide commercial and recreational landings for the same two year period.

De minimis states are not required to implement the recreational or commercial fishing provisions of this FMP, except for:

- the bycatch reduction device requirement under section 3.3.9; and
- annual reporting to determine if continued *de minimis* status is warranted.

3.5.3.2 *Annual Review of De minimis Status*

Once *de minimis* status is granted, all designated states must submit annual reports to the Board justifying the continuance of *de minimis* status. Conversely, states may petition the Board at any time for *de minimis* if their fishery falls below the threshold level.

3.6. ADAPTIVE MANAGEMENT

The Management Board may vary the requirements specified in this Amendment as a part of adaptive management in order to achieve the goals and objectives specified in Section 2. Specifically, the Management Board may change target fishing mortality rates, size limits, creel limits, seasonal restrictions, commercial fishery quotas, bycatch reduction targets and recommendations to the Secretary. 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.

3.6.1. Procedures

The Plan Review Team will monitor the status of the fishery and the resource and report on that status to the Management Board on or about September 1. The PRT will consult with the Technical Committee, the Stock Assessment Committee and the relevant 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 Management Board will review the report of the PRT, and may consult further with the 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 PRT 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 PRT will also request comment from federal agencies and the public at large. After a 30-day review period, the PRT 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 PRT, and shall also consider the public comments received and the recommendations of the Technical Committee, the Stock Assessment Subcommittee and the Advisory Panel; and shall then decide whether to adopt or revise and adopt the addendum.

Upon adoption of 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.

3.6.2 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 #3. Procedures for implementation are addressed in the ASMFC Interstate Fisheries Management Program Charter, Section 6(c)(10) (ASMFC 1995).

3.7 ROLE OF MANAGEMENT INSTITUTIONS

Where not inconsistent with the following provisions, the management institutions for weakfish are subject to the provisions of the ISFMP Charter.

3.7.1 Atlantic States Marine Fisheries Commission And ISFMP Policy Board

The Atlantic States Marine Fisheries Commission and the Interstate Fisheries Management Program Policy Board are generally responsible for the oversight and management of the Commissions fisheries management activities. The Commission must approve all fishery management plans and amendments thereto, including this Amendment #3; and must also make all final determinations concerning state compliance or noncompliance. The ISFMP Policy Board reviews recommendations of the various Management Boards and, if it concurs, forwards them on to the Commission for action.

3.7.2 Weakfish Management Board

The Weakfish Management Board is established by the Commissions ISFMP Policy Board and is generally responsible for carrying out all activities under this Amendment. It establishes and oversees the activities of the Plan Review Team, the Technical Committee and the Stock Assessment Subcommittee; and requests the establishment of the Commission's Weakfish Advisory Panel, and approves any changes to the Components of an Evaluation Manual (see Appendix #2). Among other things, the Management Board makes changes to the management program under adaptive management and approves state programs implementing the amendment and alternative state programs under Sections 3.5 and 3.6. The Management Board reviews the status of state compliance with the FMP at least annually, and if it determines that a state is out of compliance reports that determination to the ISFMP Policy Board under the terms of the ISFMP Charter.

3.7.3 Weakfish Plan Development/Review Team

The Plan Development (PDT) and the Plan Review Team (PRT) are composed of a small group of staff whose responsibility is to provide all of the staff support necessary to carry out and document the decisions of the Management Board. Both are chaired by an ASMFC Weakfish Coordinator. The Weakfish PRT is directly responsible to the Management Board for providing information and documentation concerning the implementation, review, monitoring and enforcement of Amendment #3. The Weakfish PDT is comprised of personnel from state and federal agencies who have scientific and management ability and knowledge of weakfish. The PDT is responsible for preparing all documentation necessary for the development of Amendment #3, using the best scientific information available and the most current stock assessment information. The PDT will disband or assume inactive status upon completion of Amendment #3.

3.7.4 Weakfish Technical Committee

The Weakfish Technical Committee will consist of one representative from each state and federal agency with an interest in the weakfish fishery. Its role is to act as a liaison to the individual state agencies, providing information to the management process and review and recommendations concerning the management program. The Technical Committee will report to the Management Board, normally through the Plan Review Team. The Management Board may authorize additional seats on the Technical Committee.

3.7.5 Stock Assessment Subcommittee

The Stock Assessment Subcommittee will consist of scientists with expertise in the assessment of weakfish populations. Its role is to assess weakfish populations and provide scientific advice concerning the implications of proposed or potential management alternatives, or to respond to other scientific questions of the Management Board. The Stock Assessment Subcommittee will report to the Management Board, normally through the Plan Review Team.

3.7.6 Advisory Panel

The Weakfish Advisory Panel is 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 Management Board with advice directly concerning the Commissions weakfish management program. Normally, the Advisory Panels meetings will be held at and in conjunction with selected Management Board meetings.

3.7.7 Federal Agencies

3.7.7.1 Management in the Exclusive Economic Zone

Management of weakfish within the Exclusive Economic Zone (EEZ) is within the jurisdiction of the appropriate Regional Fishery Management Council. If there is no council plan management is the responsibility of the National Marine Fisheries Service, as mandated by the Atlantic Coastal Fisheries Cooperative Management Act (16 U.S.C. 5101 *et seq.*) and the Magnuson Fisheries Conservation and Management Act (16 U.S.C. 1801 *et seq.*).

3.7.7.2 Federal Agency Participation in the Management Process

In addition, the Commission has accorded NMFS and USFWS voting status on the ISFMP Policy Board and the Weakfish Management Board; and the federal agencies participate on the Plan Development Team, the Technical Committee and the Stock Assessment Subcommittee.

3.7.7.3 Consultation with Fishery Management Councils

The Mid-Atlantic Fishery Management Council (MAFMC), is the council with jurisdiction over weakfish in the EEZ. At the time of passage of Amendment #3, the MAFMC did not have a management plan for weakfish. The commission consulted the MAFMC throughout the development of Amendment #3 via several methods: the MAFMC received regular reports from director of the Interstate Fishery Management Program; MAFMC staff are members of the weakfish technical committee and stock assessment subcommittee; and all relevant documents were sent to the MAFMC.

3.7.8 Recommendations To The Secretary Of Commerce For Management In The Exclusive Economic Zone

As contemplated in 16 USC 5102 (1)(C) and 5103 (b), the Atlantic States Marine Fisheries Commission recommends that the Secretary Of Commerce take the following steps by October 1, 1996 concerning management of weakfish in the Exclusive Economic Zone:

- require a minimum weakfish size of 12 inches total length;
- require that weakfish 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 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 sizes may possess no more than 150 pounds of weakfish during any one day or trip, whichever is longer in duration (see section 3.3.1); 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 Fishery Conservation and Management Act or the Atlantic Coastal Fisheries Cooperative Management Act.

4. 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 that the Commission will consider in determining state 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 1995).

4.1. ESSENTIAL COMPLIANCE ELEMENTS FOR STATES

4.1.1. Essential Elements Of State Programs

A state will be determined to be out of compliance with the provisions of this fishery management plan, according to the terms of Section 7 of the ISFMP charter if:

- its regulatory and management programs to implement sections 3.2, 3.3, and 3.4 for weakfish have not been approved by the Management Board; or
- it fails to meet any schedule to implement sections 3.2, 3.3, and 3.4 established for this amendment (see section 4.4.) or any addendum prepared under adaptive management (see Section 3.6.); or
- it has failed to implement a change to its program when determined necessary by the Management Board; or
- it makes a change to its regulations required under sections 3.2 , 3.3 or 3.4 without prior approval of the Board.

4.1.1.1 Regulatory Requirements

States may begin to implement Amendment #3 after final approval by the Commission. Each state must submit its required weakfish regulatory program to the Commission through the ASMFC staff for approval by the 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 Amendment or than contained in current state law.

Each state's required weakfish regulations and management program must be approved by the Management Board. States may not implement any regulatory changes concerning weakfish, nor any management program changes that affect their responsibilities under this Amendment, without first having those changes approved by the Board.

4.1.2. State Reporting

Each state must submit an annual report concerning its weakfish fisheries and management program before June 1 each year, beginning June 1, 1997 (although reports for 1995 fisheries are due June 3, 1996). The report shall cover:

- the previous calendar year's fishery and management program including activity and results of monitoring, regulations that were in effect and harvest, including estimates of nonharvest losses; and

- the planned management program for the current calendar year summarizing regulations that will be in effect and monitoring programs that will be performed, highlighting any changes from the previous year.

4.1.3. Essential Measures To Be Included In State Programs

To be considered in compliance with this fishery management plan, all state programs must include a regime of restrictions on recreational and commercial weakfish fisheries consistent with the requirements of Sections 3.2, 3.3, and 3.4.; except that a state may propose an alternative management program under Section 3.5., which, if approved by the Management Board, may be implemented as an alternative regulatory requirement for compliance.

4.2. PROCEDURES FOR DETERMINING COMPLIANCE

Detailed procedures regarding compliance determinations are contained in the ISFMP Charter, Section Seven.

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 #3 will be reviewed at least annually. The Management Board, Policy Board or the ASMFC may request the 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 to be out of compliance, a rationale for the recommended noncompliance finding will be included addressing specifically the required measures of Amendment #3 that the state has not implemented or enforced, a statement of how failure to implement or enforce required measures jeopardizes weakfish conservation, and the actions a state must take in order to comply with Amendment #3 requirements.

The Policy Board will review any recommendation of noncompliance from the Weakfish Management Board within 30 days. If it concurs in the recommendation, it shall recommend at that time to the ASMFC that a state be found out of compliance.

The Commission shall consider any Amendment #3 noncompliance recommendation from the Policy Board within 30 days. Any state which is the subject of a recommendation for a noncompliance 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 the Amendment #3, and specify the actions the state must take to come into compliance.[9]

Any state that has been determined to be out of compliance may request that the Commission rescind its noncompliance findings, provided the state has revised its weakfish conservation measures.

[9]Upon a noncompliance determination, the Executive Director of the Atlantic States Marine Fisheries Commission will notify the state and the Secretaries of Commerce and the Interior within ten working days.

4.3. OTHER MANAGEMENT MEASURES

States are strongly encouraged to implement the management measures contained in Section 3.1. (Habitat Conservation and Restoration), and Section 5 (Management Research Needs).

4.4. IMPLEMENTATION SCHEDULE

States must implement this Amendment according to the following schedule:

The initial implementation schedule and requirements for penaid shrimp trawl bycatch reduction is as specified in Amendment #2 to the Weakfish Fishery Management Plan (see Appendix 1).

June 3, 1996: All states must submit their reports on their 1995 weakfish fisheries.

July 1, 1996: States must submit state programs to implement Amendment #3 or request *de minimis* status for approval by the Management Board. Programs must be implemented upon approval by the Management Board.

October 1, 1996: Full implementation of all provisions of Amendment #3, including state programs in place with complete implementation and enforcement.

July 1, 1997: States with food shrimp (penaeid) trawl fisheries must implement the additional gear requirements for bycatch reduction.

5. MANAGEMENT RESEARCH NEEDS

The list of management research needs provided below was developed through input from the Advisory Panel, Management Board, Technical Committee and Plan Development Team during development of the Amendment. It reflects current weakfish management research needs at the time of passage of the Amendment, and is subject to future revision as the identified needs are satisfied by federal, state or university partners in the fishery management process.

5.1 HABITAT

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

5.2 STOCK ASSESSMENT AND POPULATION DYNAMICS

- Conduct sensitivity analyses on current state and federal fishery dependent and independent monitoring programs to determine which, if any, may be eliminated. Programs determined essential will be used to improve a coastwide virtual population analysis model. Further evaluation of assessment models best suited for weakfish should continue.
- Refine estimates of mortality due to at-sea discard of below minimum size fish.
- Periodically reassess discard mortality rates for all commercial gear types from both directed and non-directed fisheries, including the southern penaeid food shrimp fishery. Assessment should also focus on factors such as distance from shore and geographical differences.
- Continue studies on recreational hook-and-release mortality rates, including factors such as depth, warmer water temperatures, and fish size in the analysis.
- Increase length-frequency sampling, particularly in fisheries from New Jersey and further north. As recreational catches increase, increased sampling in these fisheries will be needed.
- Revise model inputs to accurately reflect otolith-derived ages rather than on scale-derived ages.
- Develop latitudinal /seasonal / gear specific age length keys for the Atlantic coast.
- 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.
- Study the north-south gradient in weakfish growth rates.
- Determine stock boundaries relative to migratory patterns and seasonal distribution, including characterization of stocks in overwintering grounds.
- Develop a coastwide tagging database.
- Continue research on female spawning patterns: what is the seasonal and geographical extent of "batch" spawning; do females exhibit spawning site fidelity?

6. REFERENCES

Atlantic States Marine Fisheries Commission. 1995. Interstate Fisheries Management Program Charter. 32 pp.

Boreman, J. and R.J. Seagraves. 1984. Status of weakfish along the Atlantic Coast, 1984. U.S. Department of Commerce, National Marine Fisheries Service, Northeast Fisheries Center, Woods Hole Laboratory, MA. Reference Document No. 84-19. 27 pp. + figures.

Gibson, M.R. 1995. Draft assessment of Atlantic Coast weakfish in 1994. Rhode Island Division of Fish and Wildlife, Marine Fisheries Office, Wickford, RI. Report to ASMFC Weakfish Technical Committee and Management Board. 21 pp.

Hall, R.A., E.G. Zook and G.M. Meaburn. 1978. National Marine Fisheries Service survey of trace elements in the fishery resource. NOAA Technical Report NMFS SSRF-721. 313 pp.

Hogarth, W.T., T. Meyer, P. Perra and R.H. Shaefer. 1995a. Draft environmental impact statement and draft regulatory impact review for regulations for the Atlantic Coast weakfish fishery in the Exclusive Economic Zone (EEZ). U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Fisheries Conservation and Management, Recreational and Interjurisdictional Fisheries Division, Silver Spring, MD. 88 pp.

Hogarth, W.T., T. Meyer, P. Perra and R.H. Shaefer. 1995b. Final environmental impact statement and draft regulatory impact review for a regulatory amendment for the Atlantic Coast weakfish fishery in the Exclusive Economic Zone (EEZ). U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Fisheries Conservation and Management, Recreational and Interjurisdictional Fisheries Division, Silver Spring, MD. 84 pp.

Mercer, Linda P. 1985. Fishery management plan for weakfish. Atlantic States Marine Fisheries Commission, Washington, D.C. Fisheries Management Report No. 7. 129 pp.

Mercer, Linda P. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic)--weakfish. U.S. Fish and Wildlife Service, Washington, D.C. Biological Report 82 (11.109). U.S. Army Corps of Engineers, Waterways Experiment Station, Coastal Ecology Group, Vicksburg, MS. Report TR EL-82-4. 17 pp.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991a. Recovery Plan for U.S. Population of Loggerhead Turtle. National Marine Fisheries Service, Washington, DC.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991b. Recovery Plan for U.S. Population of Atlantic Green Turtle. National Marine Fisheries Service, Washington, DC.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1992a. Recovery Plan for U.S. Population for Leatherback Turtles in the U.S. Caribbean Sea, Atlantic Ocean and Gulf of Mexico. National Marine Fisheries Service, Washington, DC.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1992b. Recovery Plan for U.S. Population for the Kemp's Ridley Sea Turtle (Lepidochelys kempii) Turtle. National Marine Fisheries Service, St. Petersburg, FL.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1993. Recovery Plan for U.S. Population for Hawksbill Turtles in the U.S. Caribbean Sea, Atlantic Ocean and Gulf of Mexico. National Marine Fisheries Service, St. Petersburg, FL.

North Carolina Department of Environment, Health and Natural Resources. 1991. Albemarle-Pamlico Estuarine Study fish tissue baseline study, 1989. Water Quality Section, N.C. Division of Environmental Management, Raleigh. Water Quality Technical Report 91-05. 119 pp.

O'Reilly, Robert L. 1996. Components Of An Evaluation Manual — Assessing States' Compliance With Amendment #3 To The ASMFC Fishery Management Plan For Weakfish.

Seagraves, Richard J. 1991. Weakfish fishery management plan amendment #1. Atlantic States Marine Fisheries Commission, Washington, D.C. Fisheries Management Report No. 20. 68 pp.

Seagraves, Richard J. and P. Perra. 1991. Weakfish. pp. 84-86 In P.E. Hamer et al., Eds. Interstate Fisheries of the Atlantic Coast. Atlantic States Marine Fisheries Commission, Washington, D.C. 131 pp.

U.S. Environmental Protection Agency. 1992. National study of chemical residues in fish. Volume 1. Office of Science and Technology, Washington, D.C. Report EPA 823-R-92-008a. 166 pp. + appendices.

U.S. Environmental Protection Agency. 1995. Guidance for assessing chemical contaminant data for use in fish advisories. Volume 1. Fish sampling and analysis, Second Edition. Office of Water, Washington, D.C. Report EPA 823-R-95-007.

Vaughan, D.S., R.J. Seagraves and K. West. 1991. An assessment of the status of the Atlantic weakfish stock, 1982-1988. Atlantic States Marine Fisheries Commission, Washington, D.C.9 pp. + tables and figures.

APPENDIX 1: AMENDMENT #2 TO THE ATLANTIC STATES MARINE FISHERIES COMMISSION'S FISHERY MANAGEMENT PLAN FOR WEAKFISH

The Atlantic States Marine Fisheries Commission (ASMFC) adopted a management plan for the Atlantic coast weakfish fisheries in 1985. Important management objectives include understanding the coastal biology of the species, maintaining a spawning stock sufficient to minimize the possibility of recruitment failure and optimizing yield per recruit.

Amendment 1 to the Weakfish Fishery Management Plan (FMP) was adopted in 1991 to address declines in weakfish harvest and spawning biomass, and the lack of implementation of the 1985 plan recommendations. Amendment #1 recommends size limits, mesh size restrictions, and other harvest control strategies, such as seasonal closures of fisheries, to reduce annual exploitation. Reduction-in-exploitation schedules called for a 15-25% reduction in 1992, a 25% reduction for 1993 and 1994, and a 1995 reduction in exploitation that would achieve a 20% level of maximum spawning potential. Another important management objective of Amendment #1 recommends that South Atlantic states (North Carolina through Florida) implement programs to reduce by-catch mortality of weakfish in their shrimp trawl fisheries by 50% by January, 1994.

Although some states made progress in 1992 and 1993 in meeting the required reduction in exploitation, none of the states with a directed fishery adopted management measures in 1993 which would achieve the full 25% reduction in exploitation, and most states achieved little progress toward this reduction target. Compared to the 1987-1989 period, quantifiable reductions in weakfish by-catch associated with shrimp trawl operations have occurred. However, only North Carolina shrimp trawl fisheries have implemented management measures to achieve a 50% reduction in by-catch of weakfish.

The purpose of Amendment 2 is to allow for full implementation of the first phase of this reduction strategy (a 25% reduction in the weakfish fishing mortality rate followed by a 25% in the weakfish exploitation rate), to clarify the shrimp by-catch requirements and schedule, and incorporate other modifications approved by the weakfish management Board during the development of the Schedule for Compliance of existing ASMFC FMPs under the Atlantic Coastal Fisheries Cooperative Management Act.

The Weakfish Fishery Management Plan is proposed to be amended as follows. The effective date of this amendment is 20 October 1994.

Measure 1. Each state with directed fisheries for weakfish must immediately implement a minimum size limit of 12 inches, or establish equivalent conservation measures approved by the Weakfish Management Board. Such equivalent conservation, if implemented, will be in addition to reductions specified in Measure 3.

Measure 2. Mesh size requirements of the FMP for gill nets and trawl nets are suspended until July 1995. States that have mesh restrictions will maintain at least their current minimum mesh sizes as of September 1, 1994.

Measure 3. All states with directed weakfish fisheries must implement harvest control strategies to reduce exploitation by 25% by April 1, 1995. These plans will remain in place until March 31, 1996. State compliance for fishing period 1 April 1994 - 31 March 1995 will be judged on the basis of a 25% reduction in fishing mortality (rate at which fish die due to fishing). State proposals with respect to fishing April 1, 1995 to March 31, 1996 will be evaluated on the basis of a 25% reduction in exploitation (proportion of existing stock harvested in a given period). A 33% reduction in fishing mortality will achieve a 25% reduction in exploitation with a 12-inch minimum size limit (Table 4 revised, Components of an Evaluation Manual).

Measure 4. All South Atlantic states (North Carolina - FL) must implement management measures to achieve the 50% reduction in by-catch of weakfish in the shrimp trawl fisheries for the 1996 shrimping season. States that currently require the use of by-catch reductions devices (BRDs) in the shrimp trawl fisheries will maintain those requirements. By-catch reduction plans must be submitted to the ASMFC by October 1, 1995, and approved by the weakfish Management Board prior to each state's 1996 shrimp fishing season.

Measure 5. In the event the ASMFC does not complete Amendment #3 by March 31, 1996, the state with directed weakfish fisheries must implement harvest control strategies that achieve F_{20} for the fishing year that begins April 1, 1996.

COMPONENTS OF AN EVALUATION MANUAL

ASSESSING STATES' COMPLIANCE WITH AMENDMENT #3 TO THE ASMFC FISHERY MANAGEMENT PLAN FOR WEAKFISH

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September 1996

[Note: This manual was based upon the best available science at the time of passage of Amendment #3. However, it is subject to change as additional information becomes available (see section 3.7.2). Please contact ASMFC for a copy of the current version of this manual]

Reduction in Weakfish Exploitation

Status of stock

The biological stability of the weakfish population is less than optimal. The current (1994) fishing mortality rate (F) of 1.88 is nearly four times greater than the target rate of F = 0.5 established by Amendment #3 (Lockhart et. al. 1996).The current (1994) rate of exploitation is 76%, as determined by a Virtual Population Analysis (Gibson 1995). Amendment #3 to the Atlantic States Marine Fisheries Commission (ASMFC) Fishery Management Plan for Weakfish (Lockhart et. al. 1996) requires a 55% reduction in the current exploitation rate by March 31, 2001, in order to meet the target fishing mortality rate (F) of 0.5.

Stock biomass and spawning stock biomass remained low in 1994 yet were higher than in any year since 1988. The recent (1994) level of spawning stock biomass (21.2 million pounds) is an improvement over 1989-93 levels. However, it is estimated that this level of spawning stock is only about one half the level need for stable recruitment (Gibson 1995). Effects of recent (1995, 1996) reductions in harvest and fishing effort have yet to be analyzed but are expected to improve the status of the weakfish stock.

Reported weakfish landings (includes commercial, bait, recreational and estimates of weakfish as by-catch in the shrimp fishery) averaged 30.7 million pounds during the 1985-89 period and declined to an average of 16 million pounds during the 1990-94 period (after Vaughan 1996; after Gibson 1995). Part of the recent decline in reported landings owes to North Carolina's imposition of by catch reduction devices in its shrimp trawl fishery. In addition, part of the general decline in landings can be attributed to weakfish harvest control measures implemented by Atlantic coastal states to achieve compliance with Public Law 103-206. Yet, the major decline in weakfish landings is linked to extremely high exploitation rates which occurred during a period (1988-94) of relatively low stock biomass. Stock biomass averaged 76.1 million pounds for the 1982-87 period and declined to an annual average of 46.4 million pounds, for the 1988-94 period. The average annual exploitation rate increased from 60% during the 1982-87 period to 77.2% for the 1987-94 period (after Gibson 1995).

Another indicator of stock status is maximum spawning potential (MSP). Compared to an unexploited population (where MSP = 100%), a viable weakfish population should contain roughly 15% as many spawners. At the present time, the maximum spawning potential of weakfish is only 3% (Gibson 1995). A further indication of the low stability of this stock concerns the age composition. Catch-at-age data for the 1995 fisheries (commercial, commercial bait and recreational) indicate that less than one percent of the total 1995 harvest was greater than four years in age (Vaughan 1996).

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 (Attachment II).

Tables 1 and 2 characterize the commercial and recreational harvests, relative to the current reference, or baseline, period (1990-92). 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 is scheduled under Amendment #3 to continue until March 31, 1998.

The current (1994) exploitation rate has been estimated as 76%, with the fishing mortality rate (F) equal to 1.88. Amendment #3 requires 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% is necessary to achieve the reference point, F = 0.5, and Amendment #3 establishes 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 #3.

Evaluation guidelines

Commercial fishery

Minimum size and mesh size limits

Minimum size limits are scheduled to be 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 4 and Attachment III are the reference tables for states to use in calculating reductions in the fishing mortality rate. Table 4 also provides L_{25} values for associated minimum mesh and size limit combination. Required minimum mesh sizes are provided in Table 3. 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 4).

Reductions in F mainly result from using minimum gear mesh sizes which 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 4 and Attachment II).

Shrimp by-catch level

Amendment #3 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

Most states have submitted reduction in weakfish mortality proposal which 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 4). In the analysis, he accounted for various sources of non-harvest mortality such as discard mortality and non-directed F (see Attachment II). 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 III and IV).

An illustration of the calculation of the reduction associated with a gear-based, time closure which accounts for recoupment is shown in Attachment III. 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 III).

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

By-catch Allowance

During a closure, states may establish a 150-pound by-catch allowance for fisheries which are not directing effort on weakfish (see Amendment #3 for details).

Recreational fishery

Minimum size and possession limits

Table 5 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 5 shows the combinations of minimum possession size and possession limits which meet compliance with Amendment #3.

Temporal Closures

There still is no workable mechanism to allow states to achieve reductions in the exploitation rate through temporal closures of recreational fisheries. This management strategy, when available, would allow states to maintain higher bag limits than currently afforded by Table 5. For example only, a state may be able to maintain a 13-inch size limit and a 10-fish bag limit, if the state closes an appropriate portion (in days) of its recreational season.

Literature Cited

Crecco, V. 1996. Update to: Effects of changes in mesh regulations (L_{25}) on the 1995 reduction in F for the commercial weakfish fishery. A report to the Atlantic States Marine Fisheries Commission's Weakfish Technical Committee, May, 1995.

Crecco, V. 1994. Proposed creel limits in the recreational fishery for Atlantic Coast Weakfish from 1992 through 1995. A report to the Atlantic States Marine Fisheries Commission's Weakfish Technical Committee, January, 1994. 8p.

Crecco, V. 1993a. Changes in F20 and F20so for Atlantic Coast weakfish following increases in the minimum size limit and reductions in current F. A report to the Atlantic States Marine Fisheries Commission, May 1993. 18p.

Crecco, V. 1993b. Seasonal reductions in the commercial fishery for Atlantic coast weakfish based on yield-per-recruit modeling. September 1993. 18p.

Gibson, M. R. 1995. Assessment of Atlantic coast weakfish in 1994. Report to the ASMFC Weakfish Technical Committee and Management Board. December 1995. 44 p.

Gibson, M. R. 1994. Alternative estimates of weakfish bycatch in shrimp trawl fisheries in the South Atlantic using shrimp effort and relative weakfish abundance data. Report to the ASMFC Weakfish Technical Committee. November 1994. 19 p.

Gibson, M. R. 1993. Assessment of Atlantic Coast weakfish 1992 using Separable Virtual Population Analysis with projections of stock size. A report to the Atlantic States Marine Fisheries Commission, February 1993. 27p.

Hogarth, W.T., T. Meyer, P. Perra and R. H. Schaefer. 1995. Final environmental impact statement and draft regulatory impact review for a regulatory amendment for the Atlantic coast weakfish fishery in the Exclusive Economic Zone (EEZ); U. S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries service, Office of Fisheries Conservation and Management, Recreational and Interjurisdictional Fisheries Division, Silver Spring, MD. 84 pp.

Lockhart, F., R. W. Laney and R. O'Reilly. 1996. Amendment #3 to the interstate fishery management plan for weakfish. Fishery management report No. 27 of the Atlantic States Marine Fisheries Commission. May 1996. 43 pp.

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.

Vaughan, D. S. 1993a. Information on catch estimates, catch in numbers at age, fishing mortality and MSP based on 1982-91 data, presented to the ASMFC S & S Committee, May 1993. 17 p.

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 1. Coastwide landings (pounds) of weakfish, by fishery and gear type, 1990-1992.

		Landings (pounds) by Year						
Fishery	**Gear Type**	**1990**	**1991**	**1992**	**Totals**	**3 year average**	**Percent of Commercial**	**Percent of Combined**
Recreational	**Hook & Line**	1,778,400	2,367,400	1,805,600	5,951,400	1,983,800	--	17.5
Commercial	**Trawl**	4,440,700	3,591,200	3,560,200	11,592,100	3,864,033	41.3	34.1
	Gillnet	5,037,200	4,097,500	3,145,900	12,280,600	4,093,533	43.8	36.1
	Haul Seine	1,157,100	521,700	464,700	2,143,500	714,500	7.6	6.3
	Pound Net	1,130,500	555,500	193,600	1,879,600	626,533	6.7	5.5
	Hook & Line	55,900	60,900	45,800	162,600	54,200	0.6	0.5
Totals	**Commercial**	11,821,400	8,826,800	7,410,200	28,058,400	9,352,800	100	82.5
	Combined	13,599,800	11,194,200	9,215,800	34,009,800	11,336,600	--	100

fisheries to the economy and culture of the Atlantic Coast. The reader is referred to the referenced reports for literature which 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, and undoubtedly older, 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 (Fig. 1A & 1B).

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 size than do northern fish. Recent 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. Consequently, fecundity estimates for Atlantic weakfish will need to be revised.. The fertilized eggs hatch into larvae in 36-40 hours at temperatures of 20-21° 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 navigation channels characterized by moderate depths, slightly higher salinities, and presence of sand and/or sand-seagrass bottom. Juveniles remain in coastal sounds and estuaries until October through December of their first year, after which they migrate to the Atlantic Ocean (Fig 2 a, b, c, d). 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 warming water temperatures in the spring, the mature adult fish migrate to the spawning areas to complete their life cycle (Fig 3 a, b, c, d).

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 clupeids or 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 cruising around the edges of eelgrass habitats. Weakfish are also found in estuaries without eelgrass, such as in the bays and estuaries of South Carolina.

Table 3. 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 11.6 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	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).