SECTION 1

Atlantic States Marine Fisheries Commission

Fishery Management Plan for Scup

Mid-Atlantic Fishery Management Council

Amendment 8 to the Summer Flounder Fishery Management Plan:
Fishery Management Plan for the Scup Fishery

SECTION 2

Atlantic States Marine Fisheries Commission

Fishery Management Plan for Scup Addendum 1

Mid-Atlantic Fishery Management Council

Regulatory Amendment to the Fishery Management Plan for the Summer Flounder and Scup Fishery

Scup Quota Management System

Atlantic States Marine Fisheries Commission

Fishery Management Plan for Scup

Mid-Atlantic Fishery Management Council

Amendment 8 to the Summer Flounder Fishery Management Plan:

Fishery Management Plan for the Scup Fishery

Fishery Management Report No. 26 of the
Atlantic States Marine Fisheries Commission

FISHERY MANAGEMENT PLAN and ADDENDUM 1 FOR SCUP

March 1996

2. EXECUTIVE SUMMARY

This Fishery Management Plan for the Scup Fishery (FMP), prepared by the Mid-Atlantic Fishery Management Council (Council), is intended to manage the scup (*Stenotomus chrysops*) fishery pursuant to the Magnuson Fishery Conservation and Management Act of 1976, as amended (MFCMA). The management unit is scup (*Stenotomus chrysops*) in US waters in the western Atlantic Ocean from Cape Hatteras northward. Chapter 10 specifies ASMFC compliance criteria and is not included in the Council FMP.

The objectives of the FMP are to:

1. Reduce fishing mortality in the scup fishery to assure that overfishing does not occur.
2. Reduce fishing mortality on immature scup to increase spawning stock biomass.
3. Improve the yield from the fisheries.
4. Promote compatible management regulations between state and federal jurisdictions.
5. Promote uniform and effective enforcement of regulations.
6. Minimize regulations to achieve the management objectives stated above.

Overfishing for scup is defined as fishing in excess of F_{max}. The Council and the Atlantic States Marine Fisheries Commission (Commission) have adopted a fishing mortality rate reduction strategy that will implement minimum fish sizes and commercial gear regulations in year 1 (1996) of the FMP. Beginning in year 2 (1997), exploitation rates will be reduced until a level of 19% (the exploitation rate associated with the current estimate of F_{max}) is reached in year 7. The recovery schedule is as follows:

	Exploitation rates
Current	69%
Year 2	47%
Year 5	33%
Year 7	19%

The following is a summary of the management measures adopted by the Council and Commission to implement the fishing mortality rate reduction strategy (a complete description of the adopted management measures is in section 9.1):

Management measures for all years

1. Operator permits for commercial and party and charter boats.

2. Vessel permits for party and charter boats.

3. Vessel permits for commercial vessels (permits to sell) under a moratorium on entry. Vessels with documented landings of scup for sale between 26 January 1988 and 26 January 1993 qualify for a moratorium permit to land and sell scup under this moratorium program.

4. Dealer permits (permits to purchase).

5. Permitted vessels may only sell to permitted dealers and permitted dealers may only buy from permitted vessels.

6. Party and charter boat, commercial vessel, and dealer reports.

7. Scup pots or traps are defined by the state regulations that apply to a vessel's principal port of landing.

8. Scup pots or traps are required to have an escape vent of 2.25" square, 3.1" diameter circular, or the equivalent.

9. The hinges and fasteners of one panel or door in scup pots or traps must be made of one of the following degradable materials:

a. untreated hemp, jute, or cotton string of 3/16" (4.8 mm) diameter of smaller;

b. magnesium alloy, timed float releases (pop-up devices) or similar magnesium alloy fasteners; or

c. ungalvanized or uncoated iron wire of 0.094" (2.4 mm) diameter or smaller.

10. A maximum size of 18" in diameter for rollers used in roller rig trawl gear.

Management Measures for Year 1

1. A 9" total length (TL) minimum fish size in the commercial fishery in federal and state waters. Scup less than 9" TL could not be sold.

2. A 4.0" minimum mesh size for vessels retaining more than 4,000 pounds of scup.

3. A 7" total length (TL) minimum fish size in the recreational fishery in both state and federal waters. States having larger minimum size limits would be encouraged to keep them.

Management Measures for Years 2 and Subsequent

Prior to year two and annually thereafter, the Council, working through a Monitoring Committee, would evaluate the success of the FMP relative to the overfishing reduction goal and propose adjustments to the management system. Beginning with year two, management measures would include:

For the commercial fishery:

1. A 9" TL minimum fish size which may be adjusted annually through framework action. Scup less than the size limit could not be sold.

2. A 4.0" minimum mesh size for vessels retaining more than 4,000 pounds of scup. The mesh size and the threshold may be adjusted annually through framework action

3. A coastwide quota with federal permit holders being prohibited from landing (selling) after the quota had been landed. Quota overruns would be deducted from the quota for the subsequent year. All states would need to prohibit scup sales following Federal sales prohibition.

4. A framework for time/area closures to reduce bycatch and prevent quota overruns.

For the recreational fishery:

1. A 7" TL minimum fish size, which may be adjusted annually through framework action.

2. A possession limit, which may be adjusted annually through framework action.

3. An open season in the recreational fishery, which may be adjusted annually through framework action.

4. A coastwide recreational harvest limit. Landings in excess of the limit would be deducted from the harvest limit for the subsequent year.

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4. INTRODUCTION

4.1. DEVELOPMENT OF THE PLAN

The Mid-Atlantic Fishery Management Council (Council) began the development of a fishery management plan (FMP) for scup in 1978. Although preliminary work was done to support the development of an FMP, a plan was not completed.

In January 1990, the Council and the Atlantic States Marine Fisheries Commission (Commission) began the development of a fishery management plan for scup as an amendment to the Summer Flounder FMP. However, the development of a scup plan was delayed through a series of amendments to the Summer Flounder FMP and work on a separate Scup FMP was not resumed until 1993.

The Council and the Commission adopted the Scup FMP for Secretarial approval in November, 1995. Subsequently, the National Marine Fisheries Service (NMFS) requested that the scup regulations be incorporated into another FMP to reduce the number of separate fisheries regulations issued by the federal government. As a result, the Council's Scup FMP was incorporated into the summer flounder regulations as Amendment 8 to the Summer Flounder FMP. The Commission approved the Scup FMP in March 1996.

4.2. PROBLEMS FOR RESOLUTION

4.2.1. Scup are Overexploited

Commercial scup landings have declined substantially since peak landings in the 1960's. In fact, in 1989, commercial landings decreased to 8.2 million pounds, the lowest value recorded during the ten-year period 1983 to 1992 and only about 17% of the 49 million pounds landed in 1960. Landings increased to approximately 15 million pounds in 1991 and then declined to 9.1 million pounds in 1993. Recreational landings in 1993 of 3.2 million pounds were below the ten year average of 5.4 million pounds. In addition, preliminary data indicate low landings in 1994 with commercial and recreational landings of 9.9 and 2.6 million pounds, respectively.

Abundance indices from NMFS trawl surveys and surveys conducted by the states of Massachusetts, Rhode Island, and Connecticut indicate recent adult biomass at low levels. For example, the NEFSC autumn offshore survey indices of scup (age 1+) abundance have declined dramatically in recent years. The 1993 index was the third lowest value observed in the time series and the 1994 index was the all-time lowest value observed since the survey began in 1967.

Reduced abundance is also evident in data collected for US commercial otter trawl vessels. Standardized catch per unit effort (CPUE) of these vessels peaked in 1978 at greater than 2.5 mt/day and has since fallen to about 1.0 mt/day in recent years. Based on the trawl survey and the CPUE indices, the NEFSC concluded that "the overall declining trend in survey indices suggest that recent exploitation has reduced stock abundance substantially" (NEFSC 1993).

In addition, length frequency distributions of scup in commercial landings have shifted to smaller, younger fish including young-of-year. Although scup may attain ages of 20 years, recent landings have been composed primarily of age 2 and 3 year old scup with a general absence of larger, older fish in the landed catch (NEFSC 1993). This truncated age distribution also suggests a reduced population level.

Overfishing for scup is defined as fishing in excess of the F_{max} level. Based on current conditions in the fishery,

yield per recruit analysis indicates that F_{max} for scup is 0.24 (19% annual exploitation rate). Current estimates of fishing mortality indicate that the current mortality rate is 1.3 (67% annual exploitation rate). This, coupled with the above information, that is, the decrease in landings, reduced CPUE, and low survey indices, as well as the truncated age distributions, indicate that scup are overexploited.

4.2.2. Mixed Species Fishery

The Mid-Atlantic mixed species trawl fishery relies principally on summer flounder, scup, and black sea bass, but also harvests significant quantities of *Loligo* squid, winter flounder, witch flounder, yellowtail flounder, and other species either as bycatch or in directed fisheries. Many of these species are also principal components of the southern New England trawl fisheries since stock migrations occur between the Mid-Atlantic Bight and this area.

Generally, fishing activity follows these species as they make annual migrations from south to north and from offshore to inshore waters. Fishing effort is concentrated northerly and inshore in summer when a wide range of vessels have access to the stocks. In winter, effort is concentrated southerly and offshore, primarily by larger vessels. Although the majority of landings are taken by otter trawls, scup are landed by many other types of fishing gear: midwater trawls, pots and traps, pound nets and hand lines. At any particular time, fishermen may target a single species with certain gear, but significant bycatch of other species usually occurs in conjunction with the targeted species, depending on the fishing technique.

The occurrence of scup and other species in commercial catches of the Mid-Atlantic and southern New England regions complicates the identification of appropriate and effective management strategies. Close coordination of regulatory measures is therefore necessary to properly manage this species assemblage.

The Council has included no measures in this FMP at this time to specifically address the mixed trawl fishery problem, although the Council considered the implications of the mixed trawl fishery when developing the proposed measures. The Council is working to develop a mixed trawl fishery management strategy and the framework management measures put in place through this FMP could be used to implement the measures developed through this process.

4.2.3. Increased Fishing Pressure

Nearly all the major groundfish fisheries in New England (haddock, yellowtail flounder, redfish, cod, etc.) have had their stocks severely depleted or have current catch levels which exceed long term potential catch (NEFSC 1993). There have also been declines in South Atlantic and Gulf of Mexico fishery resources. Consequently, it is probable that more effort will be directed towards the southern New England/Mid-Atlantic scup, exacerbating current problems of high exploitation rates. Because of the potential for an increased number of entrants into the fisheries, increases in effort by present participants, as well as technological advances that have increased the efficiency of gear, there is a need to limit and reduce effort in the scup fishery.

4.2.4. Lack of Uniform Management

The highly migratory nature of scup complicate the development of management strategies since fishing activities in the EEZ or waters of a few states could adversely impact the stocks. For example, the Atlantic coastal states have different size regulations pertaining to the harvest of scup.

4.2.5. Inconsistent and Inadequate Enforcement

There is a lack of uniform regulations affecting the scup fishery which is partly due to the inconsistent regulations among states and between states and federal jurisdictions. FMP advisors report a lack of consistency in enforcement between states, the EEZ, and/or parts thereof, due to various interpretations of the rules by enforcement officers, which led to confusion and resulted in fishermen seeking ways to avoid the rules. Adequate funding at the state and federal level for enforcement personnel, training, and equipment is problematic. In addition, sanctions resulting from noncompliance with regulations are insufficient to encourage conformity to

state and federal laws. Permit sanctions combined with fines are likely to be a more effective deterrent than fines alone.

Effective enforcement requires that fishery participants perceive both the likelihood of enforcement contact and the application of standards to be uniform throughout the management unit. The perception of fairness is essential in the promotion of voluntary compliance. Proper training of fishery enforcement officers is important in this regard.

4.2.6. Lack of Data

National Standard 2 states that "measures shall be based upon the best scientific information available." Although recreational and commercial catch data for scup are adequate to formulate and implement management measures, data collection should be improved. An improved data base will allow the Council to more finely tune the management system to the needs of the fishery. These data are necessary to assess the impact and effectiveness of management measures, as well as monitor reductions in fishing mortality and increases in stock size to determine if additional amendments to the FMP will be necessary. For example, the absence of a permit to sell requirement in some states, which allows direct sale of catch to retail establishments by fishermen, may result in under reporting of commercial landings that complicates the development, implementation, and enforcement of fishery management strategies.

4.2.7. Habitat Degradation

Scup are a continental shelf species that spend significant portions of their lives in coastal waters. Scup make inshore and northern migrations during warm months and are found in tidal bays and sounds as well as the ocean environment. Those same areas are known to be increasingly affected by coastal development (e.g., dredging, marinas, docks, etc.) and the related declines in habitat quality and quantity. This increase in habitat degradation plays an important role in scup population health.

4.3. MANAGEMENT OBJECTIVES

The objectives of the FMP are to:

1. Reduce fishing mortality in the scup fishery to assure that overfishing does not occur.

2. Reduce fishing mortality on immature scup to increase spawning stock biomass.

3. Improve the yield from the fisheries.

4. Promote compatible management regulations between State and Federal jurisdictions.

5. Promote uniform and effective enforcement of regulations.

6. Minimize regulations to achieve the management objectives stated above.

4.4. MANAGEMENT UNIT

The management unit is scup (*Stenotomus chrysops*) in US waters in the western Atlantic Ocean from Cape Hatteras, North Carolina northward to the US-Canadian border.

4.5. MANAGEMENT STRATEGY

Overfishing for scup is defined as fishing in excess of the F_{max} level. F_{max} is a biological reference point that corresponds to the level of fishing mortality (F) that produces the maximum yield per recruit. Based on current conditions in the fishery, F_{max} is 0.24.

The Council and the ASMFC Management Board approved a recovery strategy that reduces overfishing on scup over a 7 year time frame. The recovery strategy calls for minimum fish sizes and commercial gear regulations in year 1. These regulations would reduce mortality on small scup, i.e., those scup less than 9" TL . Beginning in year 2, additional regulations would be implemented to reduce mortality on larger fish. These regulations will include a commercial quota and a recreational harvest limit. In years 2 through 4, target exploitation rates would be 47% for scup. In years 5 and 6, the target exploitation rates would be 33% and in year 7 and subsequent years, the target exploitation rate would be based on F_{max}. Currently, the exploitation rate associated with F_{max} is 19%.

4.6 TECHNICAL DOCUMENTATION

Technical documentation related to this Fishery Management Plan will be contained in a separate Source Document to the Scup Fishery Management Plan. The Source Document will be made available through the ASMFC and will contain the following information:

1. Appendix 1. Alternatives to the FMP
2. Appendix 2. Public Hearing Summaries and Comment Letters.
3. Appendix 3. Final Environmental Impact Statement (DEIS).
4. Appendix 4. Regulatory Impact Review.
5. Appendix 5. Proposed Regulations.
6. Appendix 6. Abbreviations and Definition of Terms.

5. DESCRIPTION OF THE STOCK

5.1. SPECIES DESCRIPTION AND DISTRIBUTION

Scup are a schooling, continental shelf species of the Northwest Atlantic that are common from Cape Cod, Massachusetts to Cape Hatteras, North Carolina (Morse 1978). Scup and *Stenotomus chrysops* are the common and scientific names for the species (American Fisheries Society 1980). Scup are also known as porgy, porgee, scuppaug, mushcup, maiden, fairmaid and ironside (Morse 1978). Scup may attain ages as great as 20 years (Campbell *et al.* unpublished manuscript) but rarely exceed 18 inches in length or weights of over 4 pounds (Bigelow and Schroeder 1953). Scup have an ovate-elliptical body, a steep anterior profile, and are brownish/silver in color. A complete generic description of the species can be found in Jordan and Evermann (1896).

Scup undertake extensive seasonal migrations at least partially in response to changes in temperature. Scup winter in coastal water from southern NJ to Cape Hatteras at depths from 40 to 100 fathoms (Neville and Talbot 1964). Density and geographic distribution of scup during winter varies from year to year depending on water temperature, primarily the location of the 45 ^{o}F isotherm since this is their lower preferred temperature limit (Neville and Talbot 1964).

As water temperatures rise, scup migrate north and inshore to spawn. Scup appear during April off Chesapeake Bay (Hildebrand and Schroeder 1928) and off southern New England by early May (Baird 1873, Perlmutter 1939, Neville and Talbot 1964, and Finkelstein 1971). During these inshore migrations large fish (1.5 to 4 pounds) arrive first followed by successive waves or runs of smaller individuals (Baird 1873, Hildebrand and Schroeder 1928, Neville and Talbot 1964, Sisson 1974) suggesting that scup school by size.

During the summer, larger, older scup are found near the mouth of larger bays or in the ocean within the 20 fathom contour. Smaller fish are found in the shallow areas of bays (Morse 1978). As temperatures drop in the fall, scup migrate south within the 10 fathom isobath and then offshore (Hamer 1970) with most scup arriving at offshore wintering grounds by early December (Morse 1978).

Based on tagging data collected in the 1930's, Neville and Talbot (1964) hypothesized that two separate populations of scup existed along the Atlantic coast with a separation at New York-New Jersey during the summer. However, the authors indicated that these two populations probably mix on offshore wintering grounds and as a result form a common stock. Subsequent tagging data also supported the separation of scup into northern and southern contingents and but in contrast to earlier views, suggested that separation of these two groups occurred on the offshore wintering grounds (Hamer 1970). However, additional analyses of these data indicated no evidence to support the idea of two separate stocks (Pierce 1981). In addition, Mayo (1982) indicated that data on size composition and distribution of scup from NEFSC bottom trawl surveys supported the concept of a single unit stock. As such, all scup in the management unit are considered a unit stock in this management plan.

5.2. ABUNDANCE AND PRESENT CONDITION

Abundance indices from NMFS trawl surveys and surveys conducted by the states of Massachusetts, Rhode Island, and Connecticut indicate recent adult biomass at low levels. For example, the NEFSC autumn offshore survey indices of scup (age 1+) abundance have declined dramatically in recent years (Figure 1). The 1993 index was the third lowest value observed in the time series and the 1994 index was the all-time lowest value observed since the survey began in 1967.

Reduced abundance is also evident in data collected for US commercial otter trawl vessels. Standardized catch per unit effort (CPUE) of these vessels peaked in 1978 at greater than 2.5 mt/day and has since fallen downward to about 1.0 mt/day in recent years (NEFSC 1995). Based on the trawl survey and the CPUE indices, the NEFSC concluded that "the overall declining trend in survey indices suggest that recent exploitation has reduced stock abundance substantially" (NEFSC 1993).

In addition, length frequency distributions of scup in commercial landings have shifted to smaller, younger fish including young-of-year indicating that the fishery is dependent primarily on new year classes. Although scup may attain ages of 20 years, recent landings have been composed primarily of age 2 and 3 year old scup with a general absence of larger, older fish in the landed catch. In addition to commercial and recreational data, Simpson (pers. comm.) found that the age structure of scup in the CT trawl survey had truncated from 11 to 14 age groups in 1984-1986 to 7 age groups in 1992. This truncated age distribution suggests a reduced population level and reduced abundance of larger, older fish. In fact, the maximum length observed in NEFSC autumn surveys dropped from a mean of 14 inches between 1982 and 1986 to 9.5 inches for the years 1987 to 1992 (NEFSC 1993).

The scup stock was recently assessed using an age based virtual population analysis which provides annual estimates of total and adult stock biomass, recruitment and age specific fishing mortality for the period 1984-1993 (NEFSC 1995). Spawning stock biomass (SSB) increased from 20.1 m lbs (9,120 mt) in 1984 to roughly 26.0 m lbs (11,815 mt) in 1986 and has since declined to a record low of 10.2 m lbs (4,643 mt) in 1993 (Table 1). Although VPA derived estimates of SSB are available only for the years 1984-1993, NEFSC survey data indicate that much higher levels of adult stock biomass occurred in the mid-1970's (NEFSC 1995).

Declining trends in recruitment are also evident. Recruitment declined from 141 million age 0 fish in 1985 to an average of roughly 83 million during 1986-1993 (Table 1). The 1991 and 1992 year classes were among the poorest in the time series at 67 and 72 million fish, respectively. The 1993 year class was slightly below the 1984-1993 average (NEFSC 1995).

Results of virtual population analysis indicate that the fishing mortality rate for age 2-5 scup has been high in recent years, exceeding 1.0 every year from 1984-1993 except in 1990 when F was 0.96. Mean annual F peaked at 2.1 and has since fluctuated around 1.3 in recent years (NEFSC 1995). The most recent stock assessment concluded that the current fishing mortality rate for scup is 1.3 (67% annual exploitation rate). Based on the results of the analyses described above, NEFSC (1995) concluded that "the scup stock is over-exploited and near record low levels of abundance."

5.3. ECOLOGICAL RELATIONSHIPS AND STOCK CHARACTERISTICS

5.3.1. Spawning and Early Life History

Approximately 50% of scup are sexually mature by age 2 at a fork length of 6.1 inches (total length of approximately 6.8 inches) (NEFSC 1993). Scup spawn only once a year with spawning occurring over weed and sandy covered areas (Morse 1978). The sex ratio of scup on inshore spawning grounds was approximately 1:1 based on studies conducted by NMFS (Morse 1978).

Scup spawn from May through August at various locations along the coast with peak spawning activity in June. Reported spawning areas include locations from Southern New England to Long Island, NY (Goode 1884, Kuntz and Radcliffe 1918, Nichols and Breder 1927, Perlmutter 1939, Wheatland 1956, Bigelow and Schroeder 1953, Finkelstein 1969, Sisson 1974). Ferraro (1980) concluded that scup spawn during the morning hours based on plankton collection made in Peconic Bays, NY in 1972, 1973 and 1974.

Scup produce transparent, buoyant eggs that are spherical and approximately .03 inches in diameter (Kuntz and Radcliffe 1918). The relationship between body size and fecundity has not been determined. However, Finkelstein (1969) found that the ratio of ovary weight to body weight was highest during May for female scup collected in the Peconic Bays, NY. In addition, Howell and Simpson (1985) collected 36 female scup, 175 to 230 mm (9 inches) FL, during the spawning season and found an estimated mean fecundity of 7,000 eggs per female.

Fertilized scup eggs hatch in 40 hours at a temperature of 72^{o} C. Kuntz and Radcliffe (1918) described the embryonic and larval phase of scup and Griswold and McKenney (1984) completed a more complete morphological description of scup larvae. Larvae are pelagic until they are about 15 to 30 mm (0.1 in) in length, assuming the basic shape of adults at 40 to 60 mm (0.24 inches) in length (Morse 1978). Juvenile scup are 50 to 80

mm (3.15 inches) long during September, 60 to 100 mm (3.9 inches) long in November, and about 160 mm (6.3 inches) in length the following spring (Morse 1978).

5.3.2. Age and Growth

Scup are characterized as slow-growing, relatively long-lived fish (Crecco et al. 1981). Scup length-age data have been reported by Smith and Norcross (1968), Finkelstein (1969), Hamer (1979), Pierce (1980), Crecco *et al*. (1981), and Howell and Simpson (1985). Although difficulty in ageing scup scales has been identified by several researchers (Smith and Norcross 1968, Sisson 1974, Hamer 1979), scup up to age 19 have been aged (Campbell *et al*. unpub. manuscript). These age-growth studies indicated that mean lengths for scup doubled between ages 1 and 3, with a steady decline in growth thereafter (Table 2). Total lengths at age 1 ranged from 2.9 to 5.6 inches, whereas the lengths at age 2, when some scup become sexually mature, ranged from 6.2 to 8.6 inches.

The von Bertalanffy growth equation was also developed from length-age data in each of these separate studies. This equation, which relates age to length, is:

$$L_t = L_{inf} (1-e^{-k(t-t0)})$$

where L_t is mean length at age, L_{inf} is theoretical maximum length, K is the rate at which L_t approaches L_{inf}, $t_0$is the age at zero length, and t is the age of the fish (years). The L_{inf} (asymptotic size) estimates for the separate studies ranged from 14.4 to 18.8 TL inches and the K values from 0.22 to 0.34 (Table 3).
Most studies on age-length relationships for scup report lengths in fork length (FL). However, minimum size regulations in the states, as well as those proposed in this FMP, refer to total length (TL) measurements. Hamer (1979) developed a relationship between total length and fork length (both lengths in centimeters) of scup based on a sample of 129 fish:

$$TL = 1.14FL - 0.44.$$

5.3.3. Length-Weight Relationship

Length-weight relationships have been developed for scup in several studies (Smith and Norcross 1968, Briggs 1968, Hamer 1979, Pierce 1980, Crecco *et al*. 1981, Howell and Simpson 1985). Wilk *et al*. (1978) developed the following length-weight relationship for 2,234 scup, 27 to 380 mm in length, collected in the NY Bight from June 1974 to June 1975:

$$\log W = 3.1693 (\log FL) - 5.0222$$

where W is weight (grams) and FL is fork length in mm. The length-weight exponent (b=3.1693) is similar to the value reported by the other researchers (Smith and Norcross 1968, Briggs 1968, Hamer 1970, Howell and Simpson 1985). Wilk *et al*. (1978) found no significant difference between length-weight relationships of male and female scup.

5.3.4. Mortality

The instantaneous natural mortality rate (M) is defined as annual losses experienced by scup from all natural and anthropogenic factors except commercial and recreational fishing. Crecco et al. (1981) used the methodology of Taylor (1958) and the von Bertalanffy parameters of Campbell *et al*. (unpub. manuscript) to derive an estimate of M for scup of 0.2. Using a maximum age of 20 years, Howell and Simpson (1985) derived an identical value (0.2) using Hoenig's (1982) equation which relates natural mortality to longevity. The most recent stock assessment assumed a natural mortality rate of 0.2 (NEFSC 1995).

Studies conducted by the NEFSC and personnel from the state of Connecticut indicate that the level of instantaneous fishing mortality (F) has risen significantly over the last two decades. Mayo (1982) used catch at age data from the Southern New England scup fishery to determine that the level of F from 1974 to 1980 was approximately 0.3. Based on length frequencies of commercial and experimental trawl samples collected from 1981 to 1983, Howell and Simpson (1985) estimated that F was approximately 0.38.

Howell (1990) used annual age and length frequencies for scup collected in Connecticut and Massachusetts surveys to derive estimates of mortality using both catch curve and length-based (Parrish and Macall 1978) methods. Estimates of fishing mortality from the two surveys indicated that F had increased from a level of 0.4 in the late 1970's to over 1.0 in the mid to late 1980's. Estimates based on Connecticut survey data indicated that F was 1.11 based on 1986-1988 data.

Additional analyses conducted with more recent Connecticut trawl survey data (1984-91) indicate that total mortality has fluctuated between 1984 and 1991. Age based mortality estimates based on cohorts and pooled cohorts indicated that total mortality rates (Z) were approximately 1.4 in 1991. Based on this analysis, the ASMFC Scup technical committee concluded that current fishing mortality rates were 1.2 or higher.

In the most recent stock assessment, updated estimates of fishing mortality based on survey data were consistently greater than 1.0 and were as high as 2.4 in some years (NEFSC 1995). Although estimates of fishing mortality based on survey data are variable, annual means suggest that F has been above 1.0 during the period 1984-1992. These findings were verified based on the results of virtual population analysis which indicates that the fishing mortality rate for age 2-5 scup exceeded 1.0 every year from 1984-1993, except in 1990 when F was 0.96. Mean annual F peaked at 2.13 and has since fluctuated around 1.3 in recent years (NEFSC 1995). Based on the analyses described above, the most recent stock assessment concluded that the current fishing mortality rate for scup is 1.3 (67% annual exploitation rate).

5.3.5. Food And Feeding

Scup are bottom or near bottom feeders (Morse 1978) that eat a wide variety of food including small crustacea, worms, mollusks, squid, vegetable debris, hydroids, and sand dollars (Goode 1884, Nichols and Breder 1927, Bigelow and Schroeder 1953). Maurer and Bowman (1975) found that scup fed principally on polychaetes and coelenterates based on the stomach contents of 346 scup collected in southern New England and the Mid-Atlantic from 1969 to 1972. Scup may abstain from feeding during spawning (Morse 1978).

5.3.6. Predators And Competitors

Scup are preyed upon by a wide variety of piscivorous fish including striped bass, weakfish, and bluefish (Morse 1978). Scup share common food resources with a number of species including a number of northwest Atlantic finfish (Langton 1982).

5.3.7. Parasites, Diseases, Injuries and Abnormalities

Yamaguti (1963) found the parasitic Branchiuran *Argulus intectus* on scup and *Vibriosis* infection was found on scup held in tanks for tagging experiments (Sisson 1974). Stunkard (1980) identified scup as a host for the digenetic trematode *Neopechona cablei*. Scup collected from the Beaufort-Cape Hatteras area were found to be parasitized by three species of monogenetic trematodes (Suydam 1971).

5.4. MAXIMUM SUSTAINABLE YIELD

Maximum sustainable yield (MSY) has not been calculated for scup. MSY estimates are generally derived from production models and these models have not been used in scup stock assessments. However, participants of a Northeast Fisheries Science Center (NEFSC) Stock Assessment Workshop concluded that long-term potential catch (LTPC) can be used as a surrogate for MSY. The NEFSC has derived an estimate of LPTC for scup that ranges from 22 to 33 million pounds (10,000 to 15,000 MT). Preliminary data indicate that landings in 1994 were about 9.9 million pounds (4490 MT).

The Scup FMP would implement a fishing mortality rate (F) reduction strategy that would reduce fishing mortality rates on scup from current levels (1.3) to F_{max} (0.24) over a 7 year time frame. F_{max} is the biological reference point used to define overfishing and is the fishing mortality rate that maximizes the yield per recruit. This reduction in fishing mortality coupled with minimum fish size and gear regulations will allow for significant

stock rebuilding such that sustainable yields (i.e., annual landings) that equal the LTPC of 10,000 to 15,000 MT will be possible.

5.5. PROBABLE FUTURE CONDITION

The NEFSC concluded that scup are over-exploited and at record low levels of abundance. This conclusion was based on the truncated nature of the age structure of the stock, estimates of fishing mortality in excess of 1.0, declines in commercial CPUE indices to low levels in the late 1980's, and declining trends in spawning stock biomass.

Stock abundance will continue to decline without reductions in fishing mortality and improved recruitment to the stock. NEFSC (1995) concluded that "if both fishing mortality and recruitment remain at current levels, catch and SSB will remain near the record-low levels estimated for 1993." The Report of the 19th Northeast Regional Stock Assessment Workshop (19th SAW) also cautioned that "recruitment failure in a single year could result in a collapse of the fishery."

6. DESCRIPTION OF HABITAT

6.1. DISTRIBUTION OF THE SPECIES, HABITAT REQUIREMENTS, AND HABITATS OF SCUP

6.1.1. Distribution of Scup and Habitat Requirements

Scup is a continental shelf species of the northwest Atlantic that occurs regularly from Cape Hatteras to about Cape Cod (section 5.1). Bigelow and Schroeder (1953) report sporadic occurrences as far north as Sable Island Bank, but never in commercial quantities. During warm months both young and adults are found in tidal bays and sounds as well as in the ocean but generally inshore of the 120 foot contour (Morse 1978). In winter, scup are distributed in the offshore region from about Block Canyon to Cape Hatteras in depths of 420 to 600 feet of water (Neville and Talbot 1964, Pearson 1932, and Scarlett 1984). Their winter distribution seems to be closely associated with the 45 ^{o}F isotherm which is their lower preferred limit.

The spring migration is made between the offshore winter grounds and the inshore summer grounds and appears to be associated with spawning (Morse 1978). Scup arrive inshore during April off Chesapeake Bay (Hildebrand and Schroeder 1928) and off southern New England by early May (Baird 1873, Permutter 1939, Neville and Talbot 1964, and Finkelstein 1971). There is some evidence that larger fish arrive inshore first, followed by waves of increasingly smaller fish (Morse 1978). During summer, fish four years and older tend to stay in the ocean or near the mouth of larger bays while the younger fish enter the shallow areas and bays. The fall migrations begin during September with most fish arriving at the winter grounds by December (Morse 1978).

The winter distribution appears to be primarily associated with water temperature. Neville and Talbot (1964) report scup occur in water 45 ^{o}F or higher and that density and geographic distribution varies from year to year based on the 45 ^{o}F isotherm. The spring migration and summer residence are closely associated with spawning and increase in feeding activity. Very little growth occurs during the winter (Bigelow and Schroeder 1953) and it appears feeding is at a minimum during the winter.

Scup spawn mainly in nearshore ocean waters and in Long Island Sound bays from May to August with peak spawning occurring in June (Morse 1978). Juveniles tend to be found in shallower waters within bays and estuaries. Scup tend to inhabit the more saline areas of estuaries (Kendall 1973). Eggs are buoyant and larvae are pelagic. Scup probably end the pelagic stage at about 0.6 to 1.2 inches and become bottom dwelling (Lux and Nichy 1971). Scup can live to an age of 20 years, but for the last few years the population has been dominated by 1 to 3 year old fish.

Scup are prone to occur and move in schools on and off reef habitats (F. Steimle pers. comm.), as opposed to black sea bass that have a more restricted but diffuse usage of reef habitats. Steimle (pers. comm.) also speculates that scup also are likely to use small bivalves, such as blue mussels, as food and thus the habitat needs and quality for small bivalves might be an important issue for future consideration in the discussion of scup essential habitat.

6.1.2. Habitats of Scup

The near shore spawning areas and the inshore nursery areas are essential for the survival of scup. These areas are also utilized for summer feeding by adults. Major alterations to the habitat could be disruptive to the species' life cycle.

The Council, attempting to coordinate and obtain the best information available, requested each state from North Carolina to Maine to identify the critical scup habitat under their jurisdiction. The following paragraphs are paraphrased from the responses of the states' scup experts.

Large quantities of scup are not found inshore of about 120 feet off of North Carolina (J. Ross pers. comm.). Scup are traditionally harvested during the deep water component of the trawl fishery in 180 to 420 ft of water from December through April. They are commonly caught around the Cigar off Virginia, around Norfolk Canyon, and

the shelf edge north of Norfolk Canyon to Washington and Wilmington Canyons.

Scup were previously considered common to Virginia's Territorial Sea, seaside bays and lower Chesapeake Bay during spring, summer and fall months, moving offshore during winter (J. Travelstead pers. comm.). Although still consistently caught in some areas of the Chesapeake Bay, the occurrence of large numbers of scup in State waters is now infrequent. Commercial landings of this species from 1989-1992 have declined to approximately one tenth the poundage of scup caught between 1980 and 1984 (S. Davis pers. comm.). Trawl surveys conducted by the Virginia Institute of Marine Science collected scup from Chesapeake Bay waters primarily during the months of June through October (Bonzak *et al*. 1991, 1992, and 1993). Peak population abundances occur north of Virginia during warmer months (J. Musick pers. comm.). Young of the year scup occur annually in the Chesapeake Bay, but apparently not in large numbers. Adults prefer smooth to rocky bottoms, usually schooling in summer months at depths between 6 and 120 ft; overwintering occurs off Virginia and North Carolina from 120 to 300 ft, sometimes to 500 ft (Johnson 1978).

The use of coastal bay habitat by scup in Maryland appears minor (J. Casey pers. comm.). The vast majority of commercial scup landings occurs from beyond 12 miles and primarily by otter trawl. In 16 years of research trawl sampling in the coastal bay habitat by Maryland Department of Natural Resources personnel, only 18 individuals have been caught. Because of this and the low commercial landings, little is known of their use of Maryland coastal bay and near shore habitat (J. Casey pers. comm.).

Scup are collected in a large portion of Delaware Bay (Figure 2) with the northern most limit just off Port Mahon and the southern limit extending into the Atlantic Ocean (R. Cole pers. comm.). Generally 15 - 32‰ salinity regimes are considered suitable for scup. R. Cole (pers. comm.) reports that numbers of one and two year old scup taken in samples during 1990 and 1991 were among the highest recorded during the past two decades indicating that Delaware Bay can be an important summer nursery area. In addition, survey data collected from Indian River and Rehoboth Bays in 1989 indicated record catches of scup. The entire Delaware Bay and lower Delaware River to the C & D Canal serve as both nursery areas for juveniles and summer feeding areas for adult scup (R. Cole pers. comm.).

Scup migrate from offshore, overwintering grounds to inshore coastal and estuarine waters of New Jersey in April and May (P. Scarlett pers. comm.). Important summering, nursery or spawning habitat include inshore ocean waters out to the 120 ft contour along the shores of New Jersey and estuaries from Sandy Hook Bay to Delaware Bay. Sandy Hook Bay and Delaware Bay are probably more important than other smaller, shallower coastal estuaries. Scup begin an offshore migration in the fall and congregate within a migratory corridor inside the 60 ft contour off coastal New Jersey (P. Scarlett pers. comm.).

The critical habitat for scup in New York waters is similar to that defined below for Connecticut waters by Simpson (J. Mason pers. comm.). Structured bottom habitat is important to scup.

Scup (Figures 3 and 4) are among the most common species taken in Long Island Sound (LIS), occurring in local waters between May and November, with greatest numbers found from June through October (D. Simpson pers. comm.). Scup are found at all depths sampled (15 - 150 ft) and exhibit a strong preference for transitional sediments (mixed sand/mud). Young-of-year are also taken in large numbers on shallow sand/shell bottom along the north shore of Long Island, New York. Outside the geographic range of the trawl survey large numbers of scup are also taken by anglers in Fishers Island Sound located in eastern Connecticut near the borders with New York and Rhode Island. Limited numbers of young-of year scup have also been recorded from small (three foot) beam trawl samples in inshore estuaries where salinity is above 20 ppt. Eggs and larvae have been collected in eastern LIS in the course of power plant impact monitoring by Northeast Utilities Company providing evidence of spawning in LIS. Food habits have been reported by Richards (1963) who found that scup in LIS feed principally on polychaetes, amphipods, other crustaceans and mollusks. Copepods were most common in young-of-year, whereas mollusks were more common in age one and older fish.

Scup begin to move from offshore waters, into the coastal waters of Rhode Island and into Narragansett Bay and Mt. Hope Bay in April (Gray pers. comm.) and remain there through November until the fall migrations have

begun (Jeffries *et al.* 1988). All life stages of scup have been observed within Rhode Island waters, which provides critical habitat for each stage. Scup eggs have been collected in the waters of Narragansett Bay from May through August (Herman 1963, Bourne and Govoni 1988, Klein-MacPhee pers. comm.). Larval scup have been collected from May through September (Herman 1963 and Sisson *et al*. 1994). Indices of relative abundance indicate that Rhode Island coastal waters, especially Narragansett Bay, constitute a nursery area for 0 - 1 year old scup (Lynch and Karlsson 1990). Sisson (1974) found that Narragansett Bay provides important summer habitat for scup in age classes one through four. Young of the year scup have been collected over intertidal/subtidal sand, marine silty sand, mussel beds, eelgrass beds, and mud (Lynch pers. comm., Sisson *et al.* 1994, and Powell 1989). Adult scup have been collected throughout Narragansett Bay over hard to soft sandy bottoms, marine silty sand usually associated with or near submerged obstructions, rock piles, shoals and ledges (Lynch pers. comm., Satchwill and Gray 1994).

In Massachusetts, scup migrate to spawning and feeding grounds located in Buzzards Bay, Nantucket Sound, Vineyard Sound, and coastal waters south of Martha's Vineyard beginning in April (Figure 5). Larger individuals are the first to arrive from offshore wintering grounds. Schools of successively smaller fish arrive through May and June. Spawning fish are found in shoal areas (<30 ft) until late June when they move into deeper waters (between 30 and 60 ft). Recreational shore-based anglers capture juvenile scup from early July through September. In most years, commercial scup landings from Massachusetts waters peak in May, decrease in June, and continue to decline at a lower rate through October. Dates of larval capture range from May through September (Collings *et al*. 1981). Scup larvae decreased in density with sampling stations proceeding west to east from Buzzards Bay to Cape Cod Bay. Scup larvae were collected in Buzzards Bay at water temperatures ranging from 57 to 75 ^{o}F with greatest densities between 60 and 68 ^{o}F. Scherer (1984) collected scup eggs and larvae in Cape Cod Bay from June through August. He thought that scup did not spawn in Cape Cod Bay but rather their eggs and/or larvae were transported into the Bay via the Cape Cod Canal. However, eggs and larvae were captured north of Boston in the Beverly - Salem Harbor area (Elliot and Jimenez 1981) indicating that some spawning occurs north of Cape Cod. Southern Massachusetts estuaries, coastal embayments and near shore waters are primary nursery grounds for age 0 scup. The appearance of 0 age group scup (0.6 - 1.2 inches) in shoal waters in early July indicate that some end their pelagic post larval life at that time. They remain throughout the summer. Their departure to deeper water coincides with sharp drops in water temperature (Lux and Nichy 1971). Most scup leave inshore Massachusetts waters during late October and early November, although some individuals remain in local waters until at least December (T. Currier pers. comm.).

Scup are virtually unknown in New Hampshire waters (D. Grout pers. comm.).

Scup are also nearly absent from Maine waters (R. Langton pers. comm.).

In 1985, the National Oceanic and Atmospheric Administration (NOAA) began a program to develop a comprehensive data base on the distribution and relative abundance of selected fish and invertebrate species in the Nation's estuaries. The Estuarine Living Marine Resources (ELMR) program was conducted jointly by the National Ocean Services's Strategic Environmental Assessments (SEA) Division and the National Marine Fisheries Service (NMFS). The objective was to develop a consistent data base on the spatial and temporal distribution, relative abundance, and life history characteristics of fishes and invertebrates to enable comparisons among species and estuaries. These data are to be combined with other NOAA data sets to better define and understand the biological coupling of estuarine and marine habitats (USDC 1994a and 1994b.).

While the importance of estuarine areas to fish and invertebrate populations is well documented, few consistent and comprehensive data sets exist that allow examinations of the relationships of many species found in or among groups of estuaries. Most of the distribution and abundance data for estuarine-dependent species is for the offshore life stages where major sampling programs have focused, and does not adequately describe estuarine distributions. Because life stages of many species use both estuarine and marine habitats, it is necessary to combine information on distribution, temporal utilization, and life history strategies to understand the linkages between estuaries and nearshore/offshore areas. No nationwide data base that would allow these evaluations existed prior to ELMR.

Three salinity zones provide the spatial framework for organizing information on species distribution and abundance within each estuary. These zones are tidal fresh (0.0 to 0.5 ppt), mixing (0.5 to 25.0 ppt), and seawater (25.0 ppt and greater). Four criteria were used to identify species: commercial value, recreational value, indicator of environmental stress, and ecological value. A data sheet was developed for each species in each estuary, including information on spatial distribution by salinity zone, temporal distribution by life history stage, and relative abundance level. Each data sheet was then reviewed by experts with local knowledge of particular species and/or estuaries.

The ELMR program is an important step in developing an information base to bridge the gap between site-specific estuarine problems and regional management strategies. Filling this gap is more important now than ever, as it is clear that the cumulative effects of small changes in many estuaries may have a total systemic effect throughout large segments of the Nation's estuaries and coastal ocean. Although the knowledge available to conserve and protect estuaries continues to be limited, the ELMR data base will allow comparisons among species, groups of species, specific life stages and times of year within an estuary, and geographic regions. The estuaries evaluated for the North Atlantic and Mid-Atlantic are presented in Figures 6a and 6b, respectively.

The spatial distribution and relative abundance of scup was evaluated for both the North Atlantic (Table 4) and Mid-Atlantic (Table 5). The ELMR program in the South Atlantic did not delineate scup. The monthly temporal distribution of scup in the North Atlantic estuaries is identified in Tables 6 and 7. The monthly temporal distribution of scup in the Mid-Atlantic (south of Cape Cod) is identified in Tables 8 and 9.

6.2. HABITAT CONDITION

Scup are exposed to the full range of human activities and environmental conditions during their life history. Assessments made by the Ocean Pulse and Northeast Monitoring Programs indicate extensive, detrimental amounts of toxic organic and inorganic contaminants, such as heavy metals, PCBs, and petroleum hydrocarbons in the various physical compartments of the marine ecosystem (Boehm and Hirtzer 1982, Boehm 1983, Pearce 1979, Reid *et al*. 1982). This is particularly true for sediments in the Mid-Atlantic Bight that receive contaminated dredged materials, sewage sludge, and industrial wastes. Elevated levels of petroleum hydrocarbons have even been found in all estuaries as far north as Maine. Elevated PCB levels have been found in sediments and biota in Buzzards Bay, in the New York Bight apex, as well as other locations (Reid *et al*. 1982).

Generally, the nation's most contaminated estuaries are in highly urban areas (Turgeon *et al*. 1989) such as those around much of the Mid-Atlantic coast. Turgeon *et al.* (1989) describe concentrations of toxic metals and toxic organics in Long Island Sound and relate them to nation wide levels as found in mussel tissues and fish livers. Zdanowicz and Gadbois (1990) provide a data summary for the baseline phase of the National Status and Trends Program during 1984-1986. Estuaries over the entire range of scup were sampled for concentrations of selected chemical contaminants, as well as indicators of potential biological effects from 20 sites throughout the northeast region. Unfortunately, no data specific to scup are presented.

Most research on the toxicological effects of various contaminants in fish is recent and ongoing. Many anomalies probably have not been described or their magnitude documented. The Councils encourage fishermen to report or provide fish with tumorous type growths to: Dr. John C. Harshberger, Director, Registry of Tumors in Lower Animals, Smithsonian Institution, Museum of Natural History, Washington, DC 20560 (202-357-2647) or to Dr. Sharon MacLean, 28 Tarzwell Dr., Narragansett, RI (401-782-3258).

Chemical contaminants of coastal waters include inputs from municipal and industrial wastewater, agricultural pesticides and fertilizers, animal waste, urban nonpoint sources, stormwater runoff and atmospheric deposition. Within the Mid-Atlantic region (Cape May to Cape Fear, as defined in the Mid-Atlantic Marine Research Program (1994)), there are more than 75 coastal counties and cities that have one or more publicly owned treatment works discharging to coastal waters. Toxic components of these contaminants include heavy metals such as lead, cadmium, chromium, zinc, copper, silver and mercury, and organic compounds such as DDT, chlordane, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs). All of these compounds are generally due to discharges to coastal waters from human activities, although there are some

cases of natural concentrations. In the Mid-Atlantic region, northern Chesapeake Bay (especially Baltimore Harbor) and the Elizabeth River in Virginia contain the highest levels of these contaminants except for DDT (Mid-Atlantic Marine Research Program 1994). Lead, silver, zinc, DDT, chlordane, and PCBs have high concentrations at sites within Delaware Bay (Figures 7-10). DDT, chlordane and PCBs are now banned for the most part, but continue to exist in the environment and are used in other countries. Atmospheric deposition of toxins such as pesticides and PCBs may be more of a problem in marine waters than on land, since there may be more bioconcentration of pesticides and PCBs in marine food chains (NRC 1993). The National Research Council recommends source control of pollutants, since many toxic substances are difficult and/or expensive to remove from wastewater.

Coastal areas are vitally important as feeding, spawning, and nursery grounds for scup. However, population shifts to coastal areas and associated industrial and municipal expansion have accelerated competition for use of the same habitats. It has been projected (48 FR 53142-53147) that demographic shifts during the 1980's and 1990's will result in, 75% of the US population living within 50 miles of the coastlines (including the Great Lakes). As a result, these habitats have been substantially reduced and continue to suffer the adverse effects of dredging, filling, coastal construction, energy development, pollution, waste disposal, and other human related activities. In the case of wetlands, from 1954 to 1978 there was an average annual loss of 104,000 acres which was a ten fold annual increase in acreage lost between 1780 and 1954 (48 FR 53142 - 53147). The pressure on coastal and ocean habitats is nowhere greater than in the densely populated, industrialized Northeast. It is obvious that new systems are needed to conserve habitats and living marine resources, while facilitating the completion of necessary, compatible economic developments.

Toward this goal, NMFS issued its formal Habitat Conservation Policy in November 1983 (48 FR 53142-53147). The goal of the policy is: "to maintain or enhance the capability of the environment to ensure the survival of marine mammals and endangered species and to maintain fish and shellfish populations which are used, or are important to the survival and/or health of those used, by individuals and industries for both public and private benefits: jobs, recreation, safe and wholesome food and products." The Habitat Conservation Policy provided impetus to NMFS's Regional Action Plan (RAP) process which is to foster coordinated management and research responses to major habitat conservation issues and problems, and to develop better steps to address them in the future (USDC 1985).

The RAP process identified six water management units in the Northeast region (Figure 11). The boundaries of each water management unit (WMU) were established on the basis of the biogeographic consistency of the entire WMU and its distinctness from other WMUs. Each WMU is relatively consistent in its physical and chemical characteristics with normal latitudinal and seasonal variations in temperature, salinity, and nutrient content. The biota include both endemic and migratory species that exhibit normal seasonal fluctuations in species composition, individual population size, and geographic distribution. These six units are: Coastal Gulf of Maine, Gulf of Maine, Georges Bank West to Block Channel, Coastal Middle Atlantic, Middle Atlantic Shelf, and Offshelf (USDC 1985).

The Coastal Gulf of Maine WMU encompasses an area bounded seaward by the observable limits of coastal processes, including riverine and estuarine plumes, coastal upwelling and diurnal tidal fluxes. Geographically, the area is bounded on the northeast by the Canadian Border and on the southwest by Cape Cod. This zone is generally marked by steep terrain and bathymetry, joining at a rock bound coastline with numerous isles, embayments, pocket beaches, and relatively small estuaries. Circulation is generally to the southwest along Stellwagen Bank, and finally offshore at Cape Cod. The habitats are presently affected by ocean disposal and effluents from major urban areas, along with significant nonpoint source pollution associated with the various rivers. Continued pressure to fill already depleted marsh and shallow water areas occurs in most parts of the area (USDC 1985).

The Gulf of Maine is a partly enclosed sea of 55,000 square miles separated from the Atlantic Ocean by Browns and Georges Banks. It is an area of five major basins, floored with clays and gravelly silts, and broken by rocky outcroppings, numerous ledges and banks. The circulation is only generally understood: a seasonal clockwise gyre swings around the Gulf and joins the clockwise gyre on the northern edge of Georges Bank. Presently,

threats to the area are from the coastal Gulf of Maine and from ships transiting the area (USDC 1985).

The Georges Bank West to Block Channel WMU includes Georges Bank, the Great South Channel, and Nantucket Shoals. These areas have similar habitats, biota and hydrographic regimes. Overall, this WMU is highly productive and heavy fishing pressure is exerted on its numerous fish and shellfish. It is threatened by OCS exploratory drilling and by nonpoint source pollution from atmospheric fallout, general circulation patterns, and marine transportation activities (USDC 1985).

The Coastal Middle Atlantic WMU encompasses a zone from Cape Cod southwest to Cape Hatteras. The area is characterized by a series of sounds, broad estuaries, large river basins and barrier islands. The predominantly sand bottom is characterized by a ridge and swale topography. The waters of the Coastal Middle Atlantic have a complex and seasonally dependent pattern of circulation. Seasonally varying winds and irregularities in the coastline result in the formation of a complex system of local eddies and gyres. Currents tend to be strongest during the peak river discharge period in late spring and during periods of highest winds in the winter. In late summer, when winds are light and estuarine discharge is minimal, currents tend to be sluggish, and the water column is generally stratified. The Coastal Middle Atlantic provides major habitats for anadromous, estuarine, and endemic species. Migratory species play a major role in this WMU, and make up the predominant stocks in various seasons. Estuaries provide major spawning and nursery areas for many of the endemic and migratory species. These species are presently affected by nonpoint and point sources of pollution from major rivers and urban areas, as well as by direct loss of habitat caused by filling of wetlands, damming and diversion of rivers, and mosquito ditching in marshes (USDC 1985).

The Middle Atlantic Shelf WMU covers the area from the Block Island Front southward to Cape Hatteras. The inshore boundary follows the observable limits of coastal processes, primarily estuarine plumes, and lies approximately 30 miles from the coast. This WMU generally is characterized as a sandy plain, with a ridge and swale topography. Numerous submarine canyons intersect this area. The surface circulation over the shelf can be divided into a two celled system, separated at the Hudson Valley. The subsurface and bottom circulation tends to flow in a westerly-southwesterly direction that varies with the passage of weather systems and offshore warm core rings. Hydrographic conditions vary seasonally from vernal freshening and warming, through summer stratification, to fall/winter breakdown and cooling. This WMU has a different faunal composition than the Gulf of Maine or Georges Bank. Fish populations are predominantly migratory, and species composition varies with season. It is threatened by OCS exploratory drilling; by nonpoint source pollution from atmospheric fallout, general circulation patterns, and marine transportation activities; and by ocean disposal of sewage sludge and industrial wastes (USDC 1985).

The Offshelf WMU encompasses the zone defined by the mean observable limits of the shelf-slope front seaward to the mean axis of the Gulf Stream. The area is overlain by the Slope Water Regime, a mass of relatively warm saline water having a generally weak circulation to the southwest. The upwelling area along the inner boundary of the shelf-slope front is high in productivity and rich in commercially valuable fish and shellfish. Offshore, the Gulf Stream undulates as it moves to the northeast, forming a dynamic boundary from which warm core rings are borne. These rings spawned at a rate of about eight per year, are about 50 to 100 miles in diameter; they break off east of the area and transit to the southwest, eventually coming in contact with the shelf at southwestern Georges Bank. The passage of each ring marks a major event in the hydrographic regime and may significantly affect the biota of the shelf-slope front and possibly of the shelf itself. Other than ring passages, impacts on the offshelf waters are primarily from nonpoint source pollution from atmospheric fall out, marine transportation, and from point source pollution from dumping at Deep Water Dump Site 106 and ocean incineration (USDC 1985).

Each of the oceanic areas identified in section 6.1 as important for scup is subject to numerous man caused habitat threats. Rather than spend extensive efforts detailing degradation in individual local systems (an effort generally being addressed by some of the individual States), this section will broadly address the major types of abuse (i.e., agricultural, urbanization, and industrialization) dominant in the largest, most important areas (i.e., Chesapeake Bay, Hudson River/Long Island Sound, and the New England coast).

Extensive urban development along the western shore of the Chesapeake Bay has resulted in human population and industrial growth at the expense of the natural environment. The Baltimore - Washington - Norfolk corridor is a major demographic region where numerous commercial and industrial activities are centered. These activities have adversely affected the environment through habitat modification and destruction, and the introduction of contaminants in point and nonpoint source discharges. The eastern shore of the Bay is primarily agricultural and residential. Uncontrolled agricultural and suburban runoff, however, also introduces significant quantities of sediments, trace metals, and chemicals that degrade water quality.

The Hudson River/Long Island Sound area is heavily urbanized and in parts industrialized or supportive of large scale agriculture. The middle and upper Hudson River valley and eastern Long Island support extensive agricultural areas and large populations with the associated habitat abuses. The lower portion of the Hudson River area, northern New Jersey, and western Long Island are inhabited by the greatest concentration of people anywhere in the US as well as supporting extensive utility, petro-chemical, and other heavy industry.

The New England coast, since heavily developed, has some of all three major types of abuse. However, the areas are generally localized (i.e., an individual power generating station or urbanized center) and since the estuaries are used less by this species, the abuses do not seem as detrimental as those in the previously mentioned systems.

In summary, the most concise synopsis of the health of the Nation's marine environments can be viewed as that presented in the findings of the Office of Technology Assessment (1987) report:

"Estuaries and coastal waters around the country receive the vast majority of pollutants introduced into marine environments. As a result, many of these waters have exhibited a variety of adverse impacts, and their overall health is declining or threatened."

"In the absence of additional measures, new or continued degradation will occur in many estuaries and some coastal waters around the country during the next few decades (even in some areas that exhibited improvements in the past)."

"In contrast, the health of the open ocean generally appears to be better than that of the estuaries and coastal waters. Relatively few impacts from waste disposal in the open ocean have been documented, in part because relatively little waste disposal has taken place there and because wastes disposed of there usually are extensively dispersed and diluted. Uncertainty exists, however, about the ability to discern impacts in the open ocean."

6.3. GENERAL CAUSES OF POLLUTION AND HABITAT DEGRADATION

6.3.1. General Habitat Degradation Threats

The Council, in efforts to coordinate with NMFS, has adopted the NMFS Regional Action Plan (USDC 1985) identified environmental threats as potential issues that may affect the scup habitat.

Estuarine and coastal lands and waters are used for many purposes that often result in conflicts for space and resources. Some uses may result in the absolute loss or long term degradation of the general aquatic environment or specific aquatic habitats, and pose theoretically significant, but as yet unquantified, threats to the biota and their associated habitats. Issues arising from these activities, and the perceived threats associated with them, are of serious concern to the public.

Multiple use issues are constantly changing, as are the real or perceived impacts of certain activities on living marine resources. The coastal and oceanic activities that generate these issues can threaten living marine resources and their habitats. Threats to resources occur when human activities cause changes in physical habitat, water and sediment chemistry, and structure and function of biological communities.

The Coastal Middle Atlantic and Coastal Gulf of Maine WMU share similar activities that threaten habitats and the well being of living marine resources in estuarine and near shore areas (USDC 1985). Likewise, the Gulf of

Maine, Georges Bank, Middle Atlantic Shelf and Offshore WMUs share similar activities that threaten the welfare of biota and habitats in offshore areas.

The following discussion identifies and describes each multiple use issue and the potential threats associated with that issue (USDC 1985). For the purposes of this discussion, an "issue" is a point of debate or controversy evolving from any human activity, or group of activities, that results in an effect, product, or consequence. Environmental and socio-economic issues remaining to be resolved satisfactorily with regard to their impacts on marine organisms, their habitats, and man developed from the multiple, often conflicting uses of coastal lands and waters.

6.3.1.1. Waste Disposal and Ocean Dumping

The Atlantic Ocean off the northeastern United States has been used for the disposal of wastes, including sewage sludge, dredged material, chemical wastes, cellar dirt, and radioactive material. Some waste treatment methods, such as chlorination, pose additional problems to aquatic species. Habitats and associated organisms have been degraded by long term ocean disposal, particularly of sewage wastes. Sewage pollution causes closure of shellfish beds, and occasionally, of public swimming areas. Additional research on the impacts of ocean disposal at deep water dump sites is urgently needed (USDC 1985). A recent potentially serious problem is the at sea incineration of toxic wastes.

Ocean disposal of sewage sludge, industrial waste products, dredged material, and radioactive wastes degrades water quality and associated habitats. The deep water dump site is 106 miles offshore off of New Jersey. Concentrations of heavy metals, pesticides, insecticides, petroleum products, and other toxics all contribute significantly to degradation of waters off the northeastern States. Organic loading of estuarine and coastal waters is an emerging problem. Symptoms of elevated levels include excessive algae blooms, shifts in abundance of algal species, biological oxygen demand (BOD) increases in sediments of heavily affected sites, and anoxic events in coastal waters. Changes in biological components are a consequence of long term ocean disposal. Harmful human pathogens and parasites can be found in biota and sediments in the vicinity of ocean dump sites. In addition, shellfish harvesting grounds have been closed because of excessive concentrations of pathogenic and indicator species of bacteria.

Many of the above issues and concerns may also be germane to the dumping of fish and shellfish waste in the ocean. The closure of land based processing plants because of the plants inability to meet National Pollution Discharge Elimination System (NPDES) or State Pollution Discharge Elimination System (SPDES) effluent requirements encourages the attempts for at sea disposal. While fishery byproducts may be nutritive in value, problems of BOD increases, excessive algal blooms, and concentrations of pathogenic bacteria, may all be associated with ocean disposal of fisheries products. The onus of proof of no environmental harm must fall to the group that wants to use the ocean for disposal purposes.

The deeper waters of the offshore WMUs present a different set of problems, compared with shallower waters, with respect to oceanic currents, warm core rings, and other physical and chemical oceanographic processes. Furthermore, less is known and understood about deep water ecosystems than their shallow water counterparts. It is imperative that studies be undertaken to reveal the fate and role of contaminants in deep water ecosystems, and to refine information about the shelf ecosystem through which these materials may be transported (USDC 1985).

6.3.1.2. Coastal Urbanization

Half of the human population makes its home within 60 miles of one ocean or another (Zero Population Growth Reporter 1994a). In the US, the home is often accompanied by: a car, and an oil leak that trickles into the nearby stream and down to the shore; a lawn, showered with pesticides that wash "away" in the rain; a neighboring farm, and manure that seeps down to the bay, firing an algae bloom; and a paper mill, spilling traces of toxic dioxin into the river. The list goes on.

The US population rose 85 percent within 50 miles of the coastlines between 1940 and 1980, compared to 70 percent for the nation as a whole (Zero Population Growth Reporter 1994b). To accommodate development and create beach view property, mangroves, marshes and dunes are torn away. Some 110 million Americans live in marine coastal zones, and their number is growing. Each year more beaches close because of contamination as waste from overloaded sewage systems is dumped into oceans. In 1992, the 60 million Americans that live along the Atlantic coastal region saw 1,713 beach closings.

The US Census Bureau projects that by the year 2000, the US population will reach 275 million, more than double its 1940 population. The United States has the fourth highest population in the world.

The U.N. Food and Agriculture Organization now estimates that all 17 of the world's major fishing areas have either reached or exceeded their natural limits, and that 9 are in serious decline (Postel 1994). It is widely acknowledged that many of the North Atlantic fisheries are seriously depleted and arguments rage over who is to blame. Pogo had the answer: "We have met the Enemy, and he is Us."

Brouha (1994) points out our dilemma and states: "All our scientific work will be for naught if world human population growth and resource consumption are not stabilized soon. Unchecked growth, subsidies that support unsustainable resource use, and natural resource policies focused on short-term economic gains have created a conundrum for the long-term economic integrity and productivity of global ecosystems."

Ehrlich (1990) states the problem best: "No matter how distracted we may be by the number of problems now facing us, one issue remains fundamental: Overpopulation. The crowding of our cities, our nations, underlies all other problems."

Tremendous development pressures exist throughout the coastal area of the Northeast Region. More than 2,000 permit applications are reviewed and processed annually by the NMFS Northeast Region for commercial, industrial, and private marine construction proposals from other regulatory agencies. The proposals range from generally innocuous, open pile structures, to objectionable fills that encroach into aquatic habitats, thereby eliminating their productive contribution to the marine ecosystem. The projects range from small scale recreational endeavors to large scale commercial ventures to revitalize urban waterfronts.

Associated with marine construction are a number of impacts which affect living marine resources directly, and indirectly through habitat loss or modification. Many of these projects are of sufficient scope to singly cause significant, long term or permanent impacts to aquatic biota and habitat; however, most are small scale causing minor losses or temporary disruptions to organisms and environment. The significance of small scale projects lies in the cumulative effects resulting from the large number of these activities.

Urban construction is not limited to the shore, but upland development, too, which can adversely impact aquatic areas. One of the major problems arising from urban development is the increase in nonpoint source contamination of estuarine and coastal waters. Highways, parking lots, and the reduction in terrestrial vegetation and fringe marshes facilitate runoff loaded with soil particles, fertilizers, biocides, heavy metals, grease and oil products, PCBs, and other material deleterious to aquatic biota and their habitats. Atmospheric emissions resulting from certain industrial processes contain sulphurous and nitrogenous compounds that contribute to acid precipitation, a growing source of concern in some fresh water sections of tidal streams. Nonpoint pollution is incorporated in water, sediments, and living marine resources. Although nonpoint sources of pollution do not usually cause acute problems, they can contribute to subtle changes and increases of contaminants in the environment (USDC 1985).

As residential, commercial, and industrial growth continues, the demand for potable, process, and cooling water, flow pattern disruption, waste water treatment and disposal, and electric power increases. As ground water resources become depleted or contaminated, greater demands are placed on surface water through dam and reservoir construction or some other method of freshwater diversion. The consumptive use of significant volumes of surface freshwater causes reduced river flow that can affect down stream salinity regimes as saline waters intrude further upstream.

Water that is not lost through consumptive uses is returned to the rivers or streams as point source waste water discharges. Although the waste water generally is treated, it still contains contaminants. Domestic waste water contains residual chlorine compounds, nutrients, suspended organic and inorganic compounds, trace metals and bacteria. Industrial discharges may contain many dissolved and suspended pollutants, including metals, toxic substances, halogenated hydrocarbons, petroleum products, nutrients, organics and heat.

Construction in and adjacent to waterways often results in elevated suspended solids emanating from the project area. The distance the turbidity plume moves from the point of origin is dependent upon tides, currents, nature of the substrate, scope of work, and preventive measures employed by the contractor.

Excessive turbidities can abrade sensitive epithelial tissues, clog gills, decrease egg buoyancy, reduce light penetration; thereby affecting photosynthesis of phytoplanktonic and submerged vegetation, and cause localized oxygen depression. Suspended sediments subsequently settle, which can destroy or degrade productive shellfish beds and nursery sites.

The effects of turbidity and siltation are generally, but not always, temporary and short term. Other construction activities can result in permanent loss or long term disruption of habitat. The impacts of dredging and sediment resuspension on submerged aquatic vegetation can also be long term or permanent. Dredging can degrade productive shallow water and destroy marsh habitat or resuspend pollutants, such as heavy metals, pesticides, herbicides, and other toxins. Concomitant with dredging is spoil disposal, which traditionally occurred on marshes or in open water. Shoreline stabilization can result in gross impacts, through filling of intertidal and sublittoral habitat; or cause subtle effects, resulting in the elimination of the ecotone between shore and water, or through the scouring of benthic habitat by reflective wave energy.

Sewage treatment effluent produces changes in biological components as a result of chlorination and increased contaminant loading. Sewage treatment plants constructed where the soils are highly saturated often allow suburban expansion in areas that would have otherwise remained undeveloped, thereby exacerbating already severe pollution problems in some areas.
Another aspect of urban development is nonpoint source pollution, which is caused by land based activities that result in materials being transported to aquatic areas. Certain pollutants (pathogens, phosphorus, sediments, heavy metals, and acid precipitation) from nonpoint sources are demonstrable problems in Atlantic coastal and estuarine waters (USDC 1985). Nonpoint source pollution appears to be a chronic threat that will affect the Northwest Atlantic Ocean in the upcoming decades.
Diversion of freshwater to other streams, reservoirs, industrial plants, power plants, and municipalities can change the salinity gradient downstream and displace spawning and nursery grounds. Patterns of estuarine circulation necessary for larval and plankton transport could be modified. Such changes can expand the range of estuarine diseases and predators associated with higher salinities that affect commercial shellfish.

Industrial waste water effluent is regulated by EPA through permits. While the NPDES provides for issuance of waste discharge permits as a means of identifying, defining, and where necessary, controlling virtually all point source discharges, the problems remain due to inadequate monitoring and enforcement. It is not possible presently to estimate the singular, combined, and synergistic effects on the ecosystem impacted by industrial (and domestic) waste water.

6.3.1.3. Energy Production and Transport

Energy production facilities are widespread along Atlantic coastal areas. Electric power is generated by various methods, including land based nuclear power plants, hydroelectric plants, and fossil fuel stations. These facilities compete for space along the coastal zone; they require water for cooling and, in the case of coal fired plants, generate voluminous amounts of fly ash and sulfur dioxide, as well as electricity. In addition, hydroelectric plants, with their need for dams, substantially modify river courses and affect anadromous fish runs and/or restoration programs.

The impacts on the marine and estuarine environment resulting from the various types of power plants include water consumption, heated water and reverse thermal shock, entrainment and impingement of organisms, discharge of heavy metals and biocides in blow down water, destruction and elimination of habitat, and disposal of dredged materials and fly ash (USDC 1985).

The Outer Continental Shelf (OCS) exploratory and production drilling and transport may affect biota and their habitats through the deposition of drilling muds and cuttings. Oil spills resulting from well blowouts, pipeline breaks, and tanker accidents are of major concern. Seismic testing operations can interfere with fishing operations and damage or destroy fishing gear. In addition, exclusion areas around drilling rigs can result in conflicts between fishermen, both recreational and commercial, and the oil companies.

6.3.1.4. Port Development and Utilization

All ports require shoreside infrastructure, mooring facilities, and adequate channel depth. Ports compete fiercely for limited national and international markets and continually strive to upgrade their facilities. Dredging and dredged material disposal, filling of aquatic habitats to create fast land for port improvement or expansion, and degradation of water quality are the most serious perturbations arising from port development. All have well recognized implications to living marine resources and habitat.

6.3.1.5. Agricultural Development

Agricultural development can affect fisheries habitat directly through physical alteration and indirectly through chemical contamination. Fertilizers, herbicides, insecticides, and other chemicals are washed into the aquatic environment with the uncontrolled nonpoint source runoff draining agricultural lands. These chemicals can affect the growth of aquatic plants, which in turn affects fish, invertebrates, and the general ecological balance of the water body. Additionally, agricultural runoff transports animal wastes and sediments that can affect spawning areas, and generally degrade water quality and benthic substrate. Excessive uncontrolled or improper irrigation practices often exacerbate the contaminant flushing as well as deplete and contaminate ground water. One of the most serious consequences of erosional runoff is that the frequent dredging of navigational channels results in dredged material that requires disposal, often in areas important to living marine resources (USDC 1985). Additional impacts of erosion include the effects of sedimentation and decreased light on submerged aquatic vegetation, as well as changing harder bottom types to soft.

6.3.1.6. Marine Mineral Extraction

Mining for sand, gravel, and shell stock in near shore coastal and estuarine waters can result in the loss of benthic organisms, modifications of substrate, changes in circulation patterns, and decreased dissolved oxygen concentrations at deeply excavated sites where flushing is minimal. Sand and gravel mining tends to result in suspended materials at the mining sites, and turbidity plumes may move several miles from individual sites. Mining also results in ranges in sediment type or sediment quality, often over areas measurable in square miles. Deep borrow pits created by mining may become seasonally or permanently anaerobic (USDC 1985).

6.3.1.7. Other Effects of Nonpoint Pollution (NPS)

Many of the adverse impacts associated with NPS were discussed above under individual threats. Cumulatively, however, the effects of this environmental insult may have much more far reaching implications for fisheries resources. Estuarine and riverine plumes entering coastal waters are influenced by Coriolis and other dynamic forces. These plumes may remain as discrete water masses flowing close to the coast for hundreds of miles. Consequently, plumes from different estuaries may converge and act synergistically to affect changes in the structure of biological communities.

6.3.1.8. Coastal and Wetland Use and Modification

Intense population pressures have adversely affected many estuarine and marine habitats along the Atlantic

coast. Demand for land suitable for home sites, resorts, marinas, and industrial expansion has resulted in the loss or alteration of large areas of wetlands through dredging, filling, diking, ditching, upland construction, and shoreline modification.

As residential and commercial use of coastal lands increased, so does the recreational use of coastal waters. Marinas, public access landings, private piers, and boat ramps all vie for space. Boating requires navigational space, a place to berth for some boat owners, and boat yards for repair and storage.

As population densities increase in these areas, greater pressures are exerted to develop remaining lands, and the demand for nuisance insect control on adjacent undeveloped wetlands either through chemical or physical (i.e., ditching) methods, also intensifies.

In addition to residential and recreational development, other competing uses further contribute to the destruction or modification of wetland areas. Agricultural development can significantly affect wetlands. Common flood control measures in low lying coastal areas include dikes, ditches, and stream channelization. Wetland drainage is practiced to increase tillable land acreage. Wildlife management techniques that also destroy or modify wetland habitat include the construction of dredged ponds, low level impoundments, and muskrat ditches and dikes (USDC 1985).

In general wetland loss is not something the Council can directly affect. The Council's Congressional mandate is to reduce fishing mortality when a resource is overfished. Loss of habitat and reduced ability to reproduce because of environmental degradation are generally considered part of the natural mortality estimate when stock assessments are performed and thus outside the control of the MFCMA. The Council does play an indirect role in environmental issues by commenting under the limitations of the Magnuson Act. It is becoming increasingly apparent that fishing mortality reductions are significantly hampered by the constant loss of species habitat.

Significant coastal wetlands have been lost recently. Tiner (1987) in a report entitled "Mid-Atlantic wetlands: A disappearing natural treasure," quantifies the current status and recent trends in wetlands in the mid-Atlantic. The trends are alarming. Between 1955 and 1981, Delaware lost about 42,000 acres of coastal wetlands and inland vegetated wetlands. Delaware lost 3.8% of its coastal wetlands. Between 1955 and 1978, about 24,000 acres of Maryland's coastal wetlands and inland vegetated wetlands disappeared. Maryland lost 9% of its coastal wetlands. Between 1956 and 1977, over 63,000 acres of Virginia's coastal and inland vegetated wetlands were lost, with an overall loss of 6.3% of the coastal wetlands.

The NMFS 1985 priorities on the multiple use issues and threats to living marine resources were identified in the RAP document (USDC 1985). Activities identified as high priority included urban and port development, ocean disposal, dams and agricultural practices. Medium priority activities included industrial waste discharges, domestic waste discharges, and OCS oil and gas development (Table 10). These priorities are currently being re-evaluated (A. Peterson pers. comm.).

Finally, habitat alteration by the fishing activities themselves is perhaps the least understood of the important environmental effects of fishing (National Research Council 1994a). Alterations to resource habitats due to fishing may result from the loss of habitats of non-target species, such as species encrusting cobbles, or of other epibenthic habitats, which may be important nursery areas for juvenile fish; from the alteration of nutrient levels and bottom sediment, including destruction of habitat by bottom trawling, dredging, and other fishing and processing operations; and from the generation of suspended debris that can have lethal effects long after fishing activities have ceased.

6.4. PROGRAMS TO PROTECT, RESTORE, PRESERVE, AND ENHANCE THE HABITAT OF THE STOCKS FROM DESTRUCTION AND DEGRADATION

The MFCMA provides for the conservation and management of living marine resources (which by definition includes habitat), principally within the EEZ, although there is significant concern for management throughout the range of the resource which includes the state controlled waters. The MFCMA also requires that a

comprehensive program of fishery research be conducted to determine the impact of pollution on marine resources and how wetland and estuarine degradation affects abundance and availability of fish.

The MFCMA established Regional Fishery Management Councils that have the responsibility to prepare fishery management plans which address habitat requirements, describe potential threats to that habitat, and recommend measures to conserve those habitats critical to the survival and continued optimal production of the managed species. The NMFS Habitat Conservation Policy (48 FR 53142 - 53147), specifically Implementation Strategy 3, established the basis for a partnership between NMFS and the Councils to assess habitat issues pertaining to individual manages species. Under MFCMA, the action agencies (such as the Corps of Engineers) have to respond within 45 days to any Council's comments on habitat issues.

Other NMFS programs relative to habitat conservation are found in the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, and the Anadromous Fish Conservation Act of 1965. The NMFS shares responsibilities with the FWS for conservation programs under these laws.

In addition to the above mentioned NMFS programs, other laws regulate activities in marine and estuarine waters and their shorelines. Section 10 of the River and Harbor Act of 1899 authorizes the Army Corps of Engineers (COE) to regulate all dredge and fill activities in navigable waters (to mean high water shoreline). Section 404 of the Clean Water Act of 1980 authorizes EPA to regulate the discharge of dredged or fill material wastes into waters and adjacent wetlands. EPA has delegated authority under Section 404 to the COE to administer all dredge and fill activities under one program. Section 401 of the Clean Water Act authorizes EPA, or delegated states with approved programs, to regulate the discharge of all industrial and municipal wastes. The EPA and COE also share regulatory responsibilities under the Marine Protection, Research, and Sanctuaries Act of 1972.

All of the activities regulated by these programs have the potential to adversely affect living marine resources and their habitat. The NMFS, EPA, FWS, and state fish and wildlife agencies have been mandated to review these activities, assess the impact of the activities on resources within their jurisdiction, and comment on and make recommendation to ameliorate those impacts to regulatory agencies. Review and comment authority is provided by the Fish and Wildlife Coordination Act of 1934 (as amended 1958) and the National Environmental Policy Act of 1969. Consultative authority extends to all projects requiring federal permits or licenses, or that are implemented with federal funds.

Other legislation under which NMFS provides comments relative to potential impacts on living marine resources, their associated habitats, and the fisheries they support include, but are not limited to, the Coastal Zone Management Act of 1972; the Marine Protection, Research, and Sanctuaries Act of 1972; and the Endangered Species Act of 1973 (Section 7 consultation).

A more detailed discussion of the pertinent legislation affecting their protection, conservation, enhancement, and management of living marine resources and habitat can be found in the NMFS Habitat Conservation Policy (48 FR 53142-53147).

In addition, NMFS and the other Federal resource agencies are involved in other programs with the States (e.g., NMFS administers Saltonstall-Kennedy and Fish and Wildlife Service administers Wallop-Breaux programs) that provide grants to conserve fish habitats and improve fisheries management.

Individual states also regulate wetlands, which complements Federal habitat conservation programs. Over the past two decades, the United States has devised various public and private programs to protect and manage this valuable wetland resource. Unfortunately, most of these programs have addressed only limited aspects of the wetlands protection problem, and they have been adopted haphazardly and incoherently (The Conservation Foundation 1988). This has led to duplication and uncertainty, at times imposing burdensome costs. The existing programs also leave major gaps in the protection effort.

The members of the National Wetlands Policy Forum (The Conservation Foundation 1988) firmly believe the

nation cannot afford to allow the present situation -- with its inadequate wetlands protection, its confusion, its costs and frustration -- to continue. The National Wetlands Policy Forum members recognize that wetlands protection is only one of many issues the nation is facing, but they believe it clearly merits a higher priority than it has received in the past.

The preservation and restoration of wetlands and essential estuarine habitats are mainly state responsibilities as well as the Federal EPA and Corps of Engineers. The Council's Habitat Committee which generally includes personnel from ASMFC, Fish and Wildlife Service and the Coast Guard works closely with the ASMFC Habitat Committee and the EPA and Corps. Numerous meetings have been held with these agencies during the development of this FMP and its Amendments. Several projects (Cedar Island development, marina development in Ocean City, Dam Neck dredge spoil disposal, Assawoman canal dredging, etc.) have been commented on and modified because of impacts to habitat for species managed by MAFMC.

6.5. MID-ATLANTIC FISHERY MANAGEMENT COUNCIL HABITAT POLICY (adopted by Council January 1987)

Recognizing that all species are dependent on the quantity and quality of their essential habitats, it is the policy of the Mid-Atlantic Fishery Management Council (1987) to:

Conserve, restore and develop habitats upon which commercial and recreational marine fisheries depend, to increase their extent and to improve their productive capacity for the benefit of present and future generations. (for the purposes of this Policy, "HABITAT" is defined to include all those things, physical, chemical and biological that are necessary to the productivity of the species being managed.)

This policy shall be supported by three policy objectives which are to:

(1) Maintain the current quantity and productive capacity of habitats supporting important commercial and recreational fisheries, including their food base. (This objective will be implemented using a guiding principle of NO NET HABITAT LOSS.)

(2) Restore and rehabilitate the productive capacity of habitats which have already been degraded.

(3) Create and develop productive habitats where increased fishery productivity will benefit society.

The Council shall assume an aggressive role in the protection and enhancement of habitats important to marine and anadromous fish. It shall actively enter Federal decision making processes where proposed actions may otherwise compromise the productivity of fishery resources of concern to the Council.

COUNCIL HABITAT RESPONSIBILITIES:

The Council will assist in the development of each fishery management plan to insure that:

(1) Habitat significant to the species to be managed as well as its prey (where information is available) is adequately defined in the plan, and

(2) Recommendations to responsible agencies are included in the plan which identify habitat improvement or changes in Federal policies, which are necessary to achieve the objectives of the plan.

The Council will review those proposed habitat alterations, policy or other human actions which may have a significant adverse impact on those fisheries addressed in the Council's proposals and finding that adverse impacts will occur, the Council may file or present the Council's position to the Federal agency(s) responsible for the action which could (1) oppose the proposed action, (2) suggest project modifications or (3) seek full compensation for unavoidable fishery losses.

The Council may also recommend changes in the Federal statutes and their implementing regulations to protect marine fishery resources and their habitats in water development projects and policy.

GUIDELINES:
The following guidelines could assist the Council in making its assessment of the proposed actions:

(1) The extent to which the activity would directly affect the production of fishery resources or their essential food base (e.g., as a result of dredging, filled marshland, pollution, reduced access, etc.);
(2) The extent to which precedent would be set in relation to existing or potential cumulative impacts of similar or other developments in the project area;
(3) The extent to which the activity would indirectly affect the production of fishery resources (e.g., alteration of circulation, salinity regimes, detrital export, etc.);
(4) The extent of any adverse impact that can be avoided through project modification or other safeguards (e.g., piers in lieu of channel dredging);
(5) The existence of alternative sites available to reduce unavoidable project impacts;
and,
(6) The extent to which the activity requires a waterfront location if dredging or filling wetlands is involved.

PROJECT REVIEW PROCESS:
(1) Significant projects shall be selected by the Council using the following criteria:
  (a) Judgment that significant adverse effects may occur; or
  (b) Notification by the Council or staff of significant projects that should be considered.
(2) NMFS shall forward copies of public notices of significant Federally authorized projects or policy immediately to Council staff followed by special briefings, as appropriate, or by NMFS position statements, as developed.
(3) Council staff, when appropriate, shall catalog notices and forward copies to the Council. The staff shall request state and other Federal assessments (position statements) of project impact and forward them to the Council.
(4) When appropriate, Council shall develop a Council position.
  (a) The Council may file adverse comments or recommended project modifications to reduce environmental damage with the Federal construction or regulatory agency (COE, FERC, etc.).
  (b) Council staff or members may testify at public hearings, as needed.
  (c) Council may hold public hearings, as appropriate.
(5) The Council shall report on its actions at Council meetings as needed.

Criteria to Define Significant Projects
(1) Projects that may directly affect fisheries or habitat for which the Council has a management or research interest.
(2) Projects which significantly affect habitat important to species managed under the MFCMA or important to species upon which managed species are dependent for food.
(3) Projects that may be precedent setting or in unique or critical habitat areas.
(4) Projects having a substantial or significant indirect impact on surface water flow, detritus export, saltwater intrusion, isolating nursery areas, etc.
(5) Highly "controversial" projects, i.e., those which generate much publicity, strong opinions from user of the affected resource.

6.6. HABITAT PRESERVATION, PROTECTION AND RESTORATION RECOMMENDATIONS

Management of fisheries requires both control of fishing mortality (by the Councils) and preservation and restoration of habitat (by the States, EPA, and the Corps of Engineers). As noted above as a purpose for this action, the Council intends to work closely with these other agencies for habitat preservation.

As stated in section 4, scup are overexploited. Recognizing that scup are in poor shape, it is worthwhile to stress habitat conservation for increasing the survivability of juveniles, as well as management actions to control fishing

mortality, which will strengthen the use of the habitat information in meeting the MAFMC mandates that "irreversible or long term adverse effects on fishery resources and the marine environment are avoided."

Scup are dependent on estuarine habitats for much of their life (section 6.1). It is precisely these habitats that are most vulnerable to anthropogenic impacts and loss. It is probable that fishing mortality rates on scup may be the primary reason for the declines noted. However, the critical habitat areas designated by the States (section 6.1.2) must be protected in order to allow scup populations to rebuild and be maintained when fishing mortality rates are reduced.

In order to resolve the above problems and prevent overfishing for this species, very significant reductions in fishing mortality will be required. The reductions in fishing mortality are needed to reduce the risk of stock failure. The Council has the ability to control fishing mortality and reduce that component of risk through the Magnuson Act.

Equally important to reducing risk is the quality of the habitat. In this area the primary federal responsibility is that of EPA and the Corps of Engineers, since the Magnuson Act only allows the Council the right to comment on proposals. Spawning and nursery areas and migratory pathways must be protected and kept viable if the stringent fishing regulations are to succeed. Successful fishery management requires a partnership between the fishery managers and the habitat protection agencies for the programs to succeed. It would not be fair to place stringent regulations on the fishermen in order to solve the stock problems, only to lose any gains to pollution and habitat degradation. The recommendations that follow are made in keeping with this philosophy.

It is the policy of the Mid-Atlantic Fishery Management Council (section 6.5) to oppose any loss of aquatic habitat or wetlands which contributes to the conservation of fish stocks. Where loss of habitat is unavoidable locally, the Council endorses recreation of quantitatively and qualitatively equivalent habitat. The Council recognizes the multiple resource base of our coastal areas and recognizes the need to accommodate other natural resource management objectives with special sensitivity to goals that may be contrary to the objectives of fishery management. The intent of the Council is to support no net loss of fishery habitat while minimizing all detrimental alterations of these essential habitats.
This policy is intended to allow the MAFMC to optimize the management of fisheries in the mid-Atlantic EEZ through a concerted effort to establish a quality habitat and to seek to reverse the serious problems affecting the reproduction, size frequency and distribution of fish. The Council will accomplish this through participation in the review of private and government projects which would adversely affect fish production.

The Council is deeply concerned about the effects of marine and estuarine habitat degradation on fishery resources. They have a responsibility under the MFCMA to take into account the impact of habitat degradation on scup. The following recommendations are made in light of that responsibility and are in full accordance with the Council's Habitat Policy and Position Paper on Habitat and the Environment.

1. All available or potential natural habitat for migratory scup should be preserved by encouraging management of conflicting uses to assure access by the fish to essential habitat and maintenance of high water quality standards to protect scup migration, spawning, nursery, overwintering, and feeding areas.

2. Filling of wetlands should not be permitted in or near nursery summering areas. Mitigating or compensating measures should be employed where filling is unavoidable. Project proponents must demonstrate that project implementation will not negatively affect scup, their habitat, or their food sources.

3. Best engineering and management practices (e.g., seasonal restrictions, dredging methods, disposal options, etc.) should be employed for all dredging and in water construction projects. Such projects should be permitted only for water dependent purposes when no feasible alternatives are available. Mitigating or compensating measures should be employed where adverse impacts are unavoidable. Project proponents should demonstrate that project implementation will not negatively affect scup, their habitat, or their food sources.

4. The disposal of sewage sludge, industrial waste, and contaminated dredged material in scup habitat, including

the New York Bight, should not be allowed. Advanced garbage, industrial waste, and sludge handling techniques are now available and must be encouraged. Specifically:

a. The Council opposes ocean dumping of industrial waste, sludge and other harmful materials.

b. The Council requests EPA require each permitted ocean dumping vessel be required to furnish detailed information concerning each trip to the dump site. This might be in the form of transponders; locked Loran C recorder plots of trip to and from the dump site; phone call to EPA when vessel leaves and returns to port; or other appropriate method to ascertain that vessels dump only in designated areas.

c. The Council requests fishermen and other members of the public to report to the EPA, Coast Guard and the Council any observance of vessels dumping other than in the approved dump sites. A list of permitted vessels would accompany this request with the additional request for reporting of any vessel not on the approved list. The report should include date, time, location (longitude, latitude, Loran bearings), vessel name of the dumping vessel, the nature of the material dumped, name of reporting individual and vessel. This would enable EPA or the Coast Guard to take appropriate action against illegal dumping.

d. The Council strongly urges state and federal environmental agencies to reduce the amount of industrial waste, sludge and other harmful materials discharged into rivers and the marine environment, and for these agencies to increase their surveillance monitoring and research of waste discharge. The Council requests that the Environmental Protection Agency implement and enforce all legislation, rules and regulations with emphasis on the best available technology requirements and pretreatment standards.

5. Ocean disposal of fish waste should not be allowed in any areas where environmental harm may occur. The burden of proof that no environmental harm exists should be on the entity proposing the disposal. An environmental monitoring program to characterize the proposed site prior to, during, and after disposal occurs must be undertaken and is the financial responsibility of the entity benefiting from the use of the ocean environment. As an example, the dumping of fish wastes in areas of surf clams or scallops could provide enrichment that could trigger undesirable organisms, such as paralytic shellfish poisoning (PSP).

6. The siting of industries requiring water diversion and large volume water withdrawals should be avoided in scup critical areas. Project proponents must demonstrate that project implementation will not negatively affect scup, their habitat, or their food supply. Where such facilities currently exist, best management practices must be employed to minimize adverse effects on the environment.
7. Dechlorination facilities should be used to destroy chlorine at sewage treatment plants and power plants.

8. No toxic substances in concentrations harmful (synergistically or otherwise) to humans, fish, wildlife, and aquatic life should be discharged. The EPA's Water Quality Criteria Series should be used as guidelines for determining harmful concentration levels. Use of the best available technology to control industrial waste water discharges must be required in areas critical to the survival of scup. Any new potential discharge into critical areas must be shown not to have a harmful effect on scup. In calculating potential impacts, the stratification affects of mixing zones should be carefully considered.

9. The EPA, for the EEZ, and states, for the Coastal Zone, should review their water quality standards and make changes as needed with respect to the habitat requirements of scup migratory passage and feeding and to maintain edible scup; that is, flesh and organ buildup of contaminants must be considered.

10. Water quality standards in nursery, spawning, feeding, and areas of migratory passage should be enforced rigidly by state or local water quality management agencies, whose actions should be carefully monitored by the EPA. Where state or local management efforts (standards/enforcement) are deemed inadequate, EPA should take steps to assure improvement; if these efforts continue to be inadequate, EPA should assume authority, as necessary.

11. Appropriate measures must be taken as soon as possible to reduce acid precipitation and runoff into estuaries

and near shore waters.

12. EPA and appropriate agencies must establish and approve criteria for vegetated buffer strips in agricultural areas adjacent to scup nursery areas to minimize pesticide, fertilizer, and sediment loads to these areas critical for survival. The effective width of these vegetated buffer strips varies with slope of terrain and soil permeability. The Soil Conservation Service and other concerned Federal and State agencies should conduct programs and demonstration projects to educate farmers on improved agricultural practices that would minimize the wastage of pesticides, fertilizers, and top soil and reduce the adverse effects of these materials.

6.7. HABITAT RESEARCH NEEDS

The National Status and Trends Program of NOAA (USDC 1987 and 1989) should provide guidance in making intelligent decisions involving the use and allocation of resources in the nation's coastal and estuarine regions. These decisions require reliable and continuous information about the status and trends on environmental quality in the marine environment. Four general objectives have been established for the early years of the National Status and Trends Program (USDC 1987 and 1989). Those objectives are (1) to establish a national data base using state of the art sampling, preservation, and analysis methodologies; (2) to use the information in the data base to estimate environmental quality, to establish a statistical basis for detecting spatial and temporal change, and to identify areas of the nation that might benefit from more intensive study; (3) to seek and validate additional measurement techniques, especially those that describe a biological response to the presence of contaminants; and (4) to create a cryogenic, archival specimen bank containing environmental samples collected and preserved through techniques that will permit reliable analysis over a period of decades. While the Council concurs with these objectives, efforts by this program or other NMFS programs, as well as any capable scientists (universities, State agencies, environmental groups, etc.) also must look at specific issues which include:

1. It is necessary that scientific investigations be conducted on scup to emphasize the long term, synergistic effects of combinations of environmental variables on, for example, reproductive capability, genetic changes, and suitability for human consumption.

2. The Council recommends the following areas for future habitat directed investigations: field studies on the direct and indirect effects of contaminants on mortality of scup; studies on the interactive effects of pH, contaminants, and other environmental variables on survival of scup; and continued studies on the importance of factors controlling the production and distribution of food items that appear in the diet of young scup.

7. DESCRIPTION OF FISHING ACTIVITIES

7.1. DOMESTIC COMMERCIAL FISHERY

Scup have supported important commercial fisheries since colonial times (Neville and Talbot 1964). Prior to the 1930's, most scup were harvested by fixed gears such as pound nets and floating traps. Since then otter trawls have increased in importance and are now the predominant gear used to catch scup commercially. A more detailed description of the historic fisheries for scup can be found in Neville and Talbot (1964) and Morse (1978).

Commercial landings have steadily increased since the early 1900's to a peak of approximately 50 million pounds in 1960 (Figure 12). However, landings began to decline in the mid 1960's and reached a low of less than 8.2 million pounds in 1989. Since 1989, landings have increased to approximately 13 million pounds in 1992 and have since declined to under 10 million pounds in both 1993 and 1994.

Since 1983, commercial scup landings have averaged approximately 13 million pounds per year or 70% of the total landings, recreational and commercial landings combined (Table 11). In 1993, for example, fishermen landed approximately 12.3 million pounds of scup of which commercial landings accounted for approximately 9.1 million pounds. This represents a decline from 17.2 million pounds; the amount of scup landed by commercial fishermen in 1983.

Although scup were harvested in both state and federal waters by a variety of commercial gears, two gears accounted for the majority of the commercial landings from 1983 to 1992. Coastwide, the greatest proportion of scup, 74%, were landed by otter trawls (Table 12). The other predominant gear, shallow floating traps, accounted for 12% of the landings over this time period. Other important gears included paired trawls, pound nets, fish pots/traps, and hand lines.

Otter trawls were the dominant gear in most states in which scup were landed (Table 13). However, pound nets accounted for most of the landings in Massachusetts (29%) and floating traps were important in Rhode Island, accounting for 31% of the landings in that state over a ten year period.

Coastwide, otter trawls were consistently the predominant gear from 1983 to 1992 accounting for 69 to 85% of the landings (Table 14). The percent of scup harvested by floating traps fluctuated over this time period with this gear accounting for only 5% of the landings in 1989 and almost 18% in 1988.

In 1992, approximately 70% of the commercial landings came from the EEZ (Table 15). Coastwide, from 1983 to 1992, an average of 69% of the scup landed commercially came from federal waters. By subregion, EEZ landings were predominant in the Mid-Atlantic area each year from 1983 to 1992 (Table 16). However, in New England the landings were almost equally divided between state and federal waters with a slight predominance in the EEZ in most years except 1983 and 1984. In 1992, EEZ landings accounted for 52 and 90% of the landings in the New England and Mid-Atlantic regions, respectively. Scup landed in North Carolina have been taken almost exclusively from the EEZ (Table 17).

Based on average monthly landings for the period 1983-1992, most scup were harvested in federal waters from November through April with peak landings in March and April (Table 18). In state waters, landings peaked in May. Coastwide, in state and EEZ waters combined, landings peaked in May with a ten-year average of 2.5 million pounds.

In 1992, almost 45% of the commercial landings came from one state, Rhode Island (Table 19). Scup landings from Rhode Island have fluctuated over the ten-year time period with 1992 landings of approximately 5.9 million pounds. More scup were harvested in Rhode Island than any other state in all years over the time period. In general, three states, Rhode Island, New York, and New Jersey, have accounted for more than 80% of the coastwide scup landings on average from 1983 to 1992 (Table 20).

7.2. DOMESTIC RECREATIONAL FISHERY

Saltwater angling surveys were conducted for the entire Atlantic coast in 1960 (Clark 1962) and 1965 (Deuel and Clark 1968) by the US Fish and Wildlife Service and in 1970 (Deuel 1973) by the National Marine Fisheries Service. Beginning in 1979 and continuing to present, the NMFS has conducted annual Marine Recreational Fishing Statistical Surveys (MRFSS). This survey is designed to expand interview data on catch and angler effort from both on site creel census and telephone surveys to state and regional levels. The MRFSS distinguishes between fish available for identification and measurement by the interviewers (Type A), fish used as bait, filleted, or discarded dead (Type B1), and fish released alive (Type B2). The sum of types A, B1, and B2 comprise the total recreational catch whereas types A and B1 constitute total recreational landings.

Recreational fishermen caught over 5.6 million scup in 1994; they landed approximately 4.3 million (Table 21). Both the recreational catch and landings were below the 1983-1994 average of 12 and 9.6 million scup, respectively.

In 1994, recreational landings were almost equally divided between the North Atlantic and Mid-Atlantic subregions (Table 22). The predominance of recreational landings by subregion varied from one year to the next with more scup landed by recreational fishermen in the North Atlantic states in most years. Few scup were landed by recreational fishermen in North Carolina.

Recreational fishermen landed (by number) more scup caught from state waters than in the EEZ in 1994, with 84% and 85% of all scup caught in the North Atlantic and the Mid-Atlantic areas, respectively (Table 23). State landings were predominant in all years from 1983 to 1994 at an average of 86% of the landings by number in the North Atlantic and 93% by number in the Mid-Atlantic. In 1994, most of the scup by weight were attributed to anglers fishing in state waters in both the North Atlantic and Mid-Atlantic.

Recreational fishermen using private/rental boats accounted for most of the scup catch and landings from 1983-1992 (Table 24). Conversely, anglers fishing from party/charter boats caught 12% of the total and landed 14% by weight.

Anglers in New York landed the highest proportion of all scup landed along the Atlantic coast, accounting for 37% of the total scup landed by recreational fishermen from 1983 to 1992. Recreational landings from the states of Massachusetts, Rhode Island, Connecticut, and New York accounted for nearly all of the recreational landings from 1983-1992. Few if any scup were caught by anglers fishing in states north of Massachusetts or south of Delaware.

8. ECONOMIC CHARACTERISTICS OF THE FISHERY

Scup is an important component of the commercial and recreational fisheries from North Carolina through Massachusetts. The economic characteristics of the commercial and recreational scup fisheries are described in the following sections. Throughout this description, it is important to note the distinction between economic value and economic impact.

Economic value is a measure of willingness to pay for a good or service. Ex-vessel value in the commercial sector is thus a measure of processor and wholesaler willingness to pay for scup in the dockside market. Likewise, retail value is a measure of final consumer willingness to pay for scup at supermarkets, seafood shops and restaurants. Economic impact, on the other hand, is a measure of expenditures made by people engaged in a particular activity, and the employment, income, tax revenues, etc. which result from these expenditures. Often, it is said that recreational fishermen spend "x" dollars on gear, boats, travel, etc., and generate "y" amount of employment or "z" dollars in tax revenue.

Clearly, scup are valuable to both recreational anglers and seafood consumers who do not or cannot fish for themselves. Also, individuals and firms engaged in the commercial harvesting and marketing of scup make expenditures and generate employment in the course of business activities, just as participants in the recreational fishery do. Scup have economic value in both recreational and commercial uses and scup related activities have economic impact in each use.

When considering the relative benefits of scup to the two sectors, commercial values must be compared to recreational values and commercial impacts must be compared to recreational impacts. Unfortunately, recreational values are not easily measured and too often, economic impacts of recreational fishing are erroneously contrasted with ex-vessel value in the commercial sector. The reader is cautioned to avoid this confusion when impact and value estimates are presented in the following sections.

8.1. COMMERCIAL FISHERY

As a general rule, commercial fisheries are divided into three different components: harvesting, processing and marketing. Different degrees of specialization and integration within each of these components exists among different fisheries. That is, many individuals and firms specialize in a single sector, although some vertically integrated companies span all sectors, and diversified companies are often involved in food related industries besides seafood. The intent of the following section is to examine each component in order to better understand the scup fishery.

8.1.1. Harvesting Sector

8.1.1.1. Ex-vessel value and price

Commercial landings of scup decreased approximately 47% from 17.2 million pounds in 1983 to 9.1 million pounds in 1993 (Table 11). Commercial landings in 1993 were 31% below the 1992 level and 29% below the 1983-1993 mean. The value of commercial landings in 1993 indicated a 26% decrease from the 1992 level and a 25% decrease from the 1983-1992 mean (Table 26). The effects of decline in landings on ex-vessel value or revenues to harvesters have been mitigated by an increase in prices (constant 1993 dollars) from $0.55 per pound to $0.58 per pound from 1983 to 1993 (Table 26). Inflation adjusted average prices for scup have ranged from $0.53 per pound to $0.87 per pound for the 1983-1992 period.

A record high average price (all sizes) for scup occurred in 1989 in both nominal and inflation adjusted (1993) dollars (Table 26). Price fluctuations were likely associated with supply responses; generally it was found that higher prices corresponded to significant decreases in landings. On a monthly basis, the supply-price relationship was also evident. As expected, an inverse relationship between landings and average ex-vessel prices was found with overall higher prices corresponding to months with lower landings (Table 27).

The value of scup landings relative to the value of total landings in 1993 varied for each state from less than 1% (New Hampshire, Massachusetts, Connecticut, Maryland, Virginia and North Carolina) to about 2.3% of the total value of landings in New Jersey (Table 28).

Prices received for scup harvested in state waters were generally higher than for scup harvested in EEZ waters throughout the year (Table 27). Prices received by fishermen tracked the seasonal supply relationship for scup caught in state waters as well as in EEZ waters. The 1993 coastwide average ex-vessel price per pound for jumbo scup was $1.33, $0.92 for large, $0.66 for large/mix, $0.54 for medium, $0.28 for small, $0.18 for pins, and $0.68 for unclassified (Table 30). Price differentials in 1993 indicate that the ex-vessel price per pound for large scup was 70% greater than for small and 80% greater than for pins.

8.1.1.2. Fishing Vessel Activity

At the present time there is no annual permit requirement for commercial fishing vessels taking scup within US waters. Without individual logbooks, information on the total number of vessels actually landing scup (or the extent of dependence on scup) is difficult to assemble. The NMFS weighout system records can be used to estimate the number of vessels landing scup in covered states (NC is not included). However, the data do not constitute a complete census. NMFS weighout files indicate that 498 vessels employing diverse types of gear landed scup in 1993. This statistic provides a lower boundary for the number of commercial vessels involved in the scup commercial fishery. In 1993, there were about 80-100 vessels that could have participated in the scup fishery in North Carolina (R. Monaghan pers. comm.). Thus, the number of vessels currently fishing for scup could range from 498 to 598 vessels. It is likely that most of the vessels that qualify for scup permits would apply for them in order to maintain flexibility of fishing operations pending the availability of species, or to maintain eligibility given concerns about a potential limited entry program. It is expected that about 700 vessels would qualify for scup permits (see section 9.2.2.2.1).

In 1992 and 1993, 394 and 427 otter trawl vessels, respectively, landed scup that were recorded in NMFS weighout records (Table 31). Scup represented 24% of the total pounds landed and 28% of the total ex-vessel value of all otter trawl trips harvesting 4,000 pounds or more of scup in 1992 (Table 32). The top ten species (by weight) contributed 93% of the total pounds and 92% of the total value of the harvest of otter trawl vessels landing 4,000 pounds or more of scup. When considering the value per pound of these species (obtained by dividing total value by total pounds) scup had the fifth largest ex-vessel value per pound.

Based on trips landing more than 4,000 pounds of scup (Table 32), the average ex-vessel scup value per trip was $9,415 in 1993 (obtained by dividing ex-vessel value in Table 32 by number of trips in Table 31). Otter trawl vessels which land scup also harvest other species throughout the year. This activity categorizes this type of fishery as a mixed fishery, where squid, summer flounder, Atlantic mackerel, silver hake and other species are harvested on the basis of local availability (opportunistic fishery), or land scup as a bycatch from the involvement in other directed fisheries.

In 1993, scup landings and value represented 0.5% and 0.6% of the Atlantic coast total commercial landings and value, respectively (Table 28). Scup ex-vessel value was highest in New Jersey ($2.2 million), followed by Rhode Island ($1.6 million) and New York ($1.1 million) (Table 33). When scup value is compared to the total value of all species landed in each state, scup was most important to fishermen in New Jersey, at 2.3% of the total commercial value, followed by New York (2.1%) and Rhode Island (2.0%) (Table 28). Rhode Island, New Jersey and New York accounted for 82% of all scup harvested during the period 1983-1992 (Table 20).

Activities at the port level indicate that 78% of all scup commercial landings occurred in four ports: Point Judith, Rhode Island; Montauk, New York; Cape May, New Jersey; and Newport, Rhode Island (Finlayson and McCay 1994). The degree of reliance on scup for these ports is low. Scup landed value as a percent of total port landed value was: 5.43% for Point Judith, 6.41% for Montauk, and 13% for Cape May.

8.1.1.3. Fishing Costs

Vessel costs are composed of ownership costs and operating costs. Ownership costs are incurred once the durable

goods are purchased. These are added costs whether or not the assets (equipment/materials) are used in the production process, that is they remain constant regardless of the output level. Ownership costs are frequently referred to as "fixed costs." They include depreciation, debt, insurance, routine maintenance, and insurance, among others. Operating costs are incurred when the production process occurs. These costs are commonly known as "variable costs." They include fuel, oil, maintenance, wages, food, sale and unloading fees, among others.

Vessel variable costs are proportionate to the hours traveling and fishing (operating maintenance, fuel, ice) and the quantity of fish landed (wages, sales and unloading fees, ice). Costs vary in different locations and the cost components have changed over the years. Due to the variation in vessels landing scup (home port, tonnage class, directed fishery, etc.), exact cost information is difficult to obtain and generally applicable only to a hypothetical "average" vessel. A general description based on unpublished NMFS data follows.

Wages are almost always in the form of a share or "lay" system. The captain, crew, and vessel owner split the net revenue based on a predetermined, set ratio. Ratios are in many instances set according to what is traditional in that port. The particular ratio of the lay system utilized varies between vessels. Often certain expenses such as fuel, ice and in some cases food are deducted from the gross revenues with the remainder divided about 60-40 between the vessel owner and the captain and crew (A. Kitts pers. comm.). When one or the other of the parties is responsible for additional costs, the share split normally reflects this.

Fuel costs vary among ports. As of May 1994, diesel fuel costs for selected ports in the Mid and North Atlantic ranged from about $.60 per gallon to $1.10 per gallon, with an average of $.75 per gallon (A. Kitts pers. comm.). Total vessel fuel costs are directly proportional to the amount of time spent steaming and fishing as well as the size and drag of the fishing gear used.

Ice costs also vary among ports. On a per-ton basis, ice costs $50 in Boston, MA; $35 in Gloucester, MA; $75 in Montauk, NY; and $40 in Cape May, NJ. Typically ice costs will range from $40 to $70 coastwide (A. Kitts pers. comm.). Ice costs are related to the amount of fish expected to be caught, the expected trip length, and the type and size of storage system utilized on board.

Variable maintenance costs are related to the number of hours the engines, fishing gear, etc. are used and the weather conditions. Much of the minor repair work is conducted by crew members and, on larger vessels, by an engineer. Since these crew members perform this labor as part of their normal responsibilities, there is no added labor cost (Crutchfield 1986). However, most major engine, electronics, and gear repairs are contracted to specialists.

Selling costs consist of lumpers (unloaders) fees, transportation costs, etc. Lumpers fees are variable among ports. In Point Judith, RI the cost is $6 per 1,000 lbs (J. McCauley pers. comm.), $3 per 1,000 in Cape May, NJ (C. Bergman pers. comm.) and $5 per 1,000 lbs in Newport, RI (A. Kitts pers. comm.). In Montauk (NY) lumpers fees are not applicable, since the fish are boxed at sea (A. Kitts pers. comm.). The market charges $.10 per pound for unloading and packaging in Cape May, with transportation charges between $.06 to $.07 per pound (C. Bergman pers. comm.). In Point Judith unloading charges will depend on the value of the fish unloaded. Costs associated with washing, sorting, and packing scup in a carton with ice (including labor) are between $.08 to $.10 per pound. Transportation charges range from $.05 and $.07 per pound (J. McCauley pers. comm.).

The New England full-time otter trawl fleet increased 66% between 1976 and 1985, while per-vessel deflated gross revenue decreased 20% (Kurkul and Terrill 1986). This appears to be a result of decreased landings per vessel rather than increased expenses.

Fishing costs for pound nets, fish traps, and hand line operations are much less than costs for otter trawlers (Norton *et al*. 1984). There are no studies addressing scup fishing costs by type of gear. Fishing costs of commercial striped bass harvesters using fish traps and hook and line gear were developed by Norton *et al.* (1983). The design of floating traps allows for the harvesting of species such as scup, butterfish, squid and fluke. Fish trap fishermen typically use 70 ft vessels with major expenditures for wages (41%) followed by nets (15%)

and taxes (14%). Hook and line fishermen typically use a small boat (17 ft average), have major expenses of wages (35%), fuel (16%), and tackle (16%) (Norton *et al*. 1983).

Estimates of vessel costs based on sea sampling data of otter trawl vessels landing mackerel from Maine to Virginia were developed by Walden (1993). In Walden's study, costs were broken down into trip costs or variable costs (fuel, ice and food, etc.) and yearly costs or fixed costs (insurance, engine and gear repair, electronic equipment expenses, etc.). Labor costs were not included in the analysis because labor is generally paid as a percentage of the total revenue after certain expenses are subtracted. Table 34 summarizes estimated average cost data for otter trawlers that operated in the mackerel fishery developed in Walden's study. Otter trawl vessels involved in the squid and scup fishery may generally have similar equipment to the otter trawl vessels in the mackerel fishery. The cost data results developed by Walden might be used to an extent when analyzing cost data for otter trawl vessels in the scup fishery. Vessels that participate in mixed fisheries have their fixed costs distributed over various activities. Utilization of such fixed costs to evaluate the financial performance of a vessel in only one fishery would yield inappropriate results.

An analysis by Buss and Kitts (1994) utilized three data sources (Capital Construction Fund Files, Northeast Fisheries Science Center Weighout Files and Northeast Fisheries Science Center Master Vessel Files) to compile a data base containing information regarding revenues, landings, and expenditures for vessels operating in the US Northeast Atlantic coast for the period 1983-1992. Preliminary results from Buss and Kitts' (1994) work indicated that costs as a percent of total gross revenues (from tax return files) for trawlers in the following categories were: trip costs (fuel, oil, ice, water, food, etc.) 18.3%; other variable operating expenses (gear, supplies, freight, payment to lumpers, auction fee, etc.) 5.9%; indivisible operating expenses (insurance, licenses and permits, office expenses, taxes (not income), utilities (telephone), etc.) 16.8%; insurance cost 7.7%; crew share 36.9%; salary (payment to officers) 6.2%; and employee benefits 6%. Since expenses are recorded by individuals differently in tax forms, missing information was treated as missing values, therefore the above percentages do not add up to 100. The economic interpretations of the data provided by Buss and Kitts have limitations. Two significant drawbacks are: 1) data are based on tax returns and techniques dealing with different aspects of the return can vary significantly from one return to the next and 2) the data set does not fully represent the population of Northeast fishing vessels and results in the analysis are probably more applicable to more profitable vessels or "highliners" (Buss and Kitts 1994).

8.1.2. Processing Sector, Marketing and Consumption

Most scup are sold fresh (C. Bergman and R. Ross pers. comm.). The catch is generally refrigerated or iced during long trips and might or might not be iced during short trips. When the catch arrives at the dock, it is sorted, washed, weighed, and boxed and iced for shipment. Scup might be frozen for future marketing when demand is low or when the market is glutted. When scup is frozen, processing is minimal, mainly consisting of handling and freezing. Boxes containing scup for shipment typically weigh 100 pounds, however, higher value scup may be boxed in 50 pound cartons (J. McCauley pers. comm.).

Scup are generally transported to market by truck. The Fulton Fish Market in New York City is the primary wholesale outlet for scup (Finlayson and McCay 1994). Marketing channels for scup appear to be well established.

Scup is generally a low priced fish. The greatest proportion of small scup go to dealers in Philadelphia, Washington, Baltimore and points south (Finlayson and McCay 1994). Some of the large scup marketed from Point Judith, Rhode Island are shipped to the Boston area (J. McCauley pers. comm.).

8.1.3. Economic Impact of the Commercial Fishery

The economic impact of the commercial scup fishery as it relates to employment and wages is difficult to determine given the nature of the fishery. Since, most scup landings are bycatch or associated with opportunistic fisheries, and scup represents less than 1% of both the total landings and total value for all finfish and shellfish from North Carolina to Maine, it can be assumed that only a small amount of the region's fishing vessel

employment, wages and sales is dependent on scup.

8.2. RECREATIONAL FISHERY

Recreational fishing contributes to the general well being of participants by affording them opportunities for relaxation, experiencing nature, and socializing with friends. The potential to catch and ultimately consume fish is an integral part of the recreational experience, though studies have shown that non-catch related aspects of the experience are often as highly regarded by anglers as the number and size of fish caught. Since equipment purchase and travel related expenditures by marine recreational anglers have a profound effect on local economies, the maintenance of healthy fish stocks and development of access sites is as important to fishery managers as the status of commercial fisheries.

8.2.1. Recreational Fishing Activity

The participation of scup anglers by region and mode indicates that from 1983 to 1992, 77% of scup (by number) were caught from private or rental vessels (Table 24). Ownership of a private vessel involves sizable investment and maintenance expenditures, thus contributing greatly to measures of economic impact. Private vessels are also used for non-fishing purposes, however, and are used to fish for many different species. Expenditure and cost data must be prorated for scup trips to account for multipurpose use.

In addition to private and rental boats, 11% of scup were caught from shore and 12% from party and charter boats (Table 24). At the present time, annual permit requirements for party and charter boats (vessels for hire) which take anglers to fish for scup within the US EEZ do not exist. Without individual logbooks, the total number of party and charter vessels actually directing trips on scup is difficult to determine.

In 1985, a total of 454 party and 1,626 charter boats operated out of Atlantic coast ports from Maine through North Carolina (Table 35). These vessels generated revenues of $101 million in 1985. Estimates of party and charter boat trips directed at scup are lacking for specific regions along the coast. In 1993, a random sample of 821 New Jersey marine recreational fishermen (regardless of mode) indicated that scup was targeted by less than 1% of the recreational fishermen (B. Brown pers. comm.).

The National Marine Fisheries Service estimated that in 1991, a total of 23,416,000 trips were taken by marine recreational anglers in the Mid-Atlantic and North Atlantic regions (USDC 1992). Intercept surveys show that 2.74% and 7.25% of the anglers interviewed indicated that they preferred or sought scup as the primary species targeted in the Mid-Atlantic and North Atlantic regions, respectively. That is, an estimated 2,339,250 angler trips (all modes) were nominally directed at scup in 1991. Over 72% of those directed scup trips were made in the North Atlantic region.

8.2.2. Economic Impact of the Recreational Fishery

In 1985, direct sales related to marine recreational fishing for all species from North Carolina to Maine amounted to over $1.8 billion. Angler purchases or expenditures generate and sustain employment and personal income in the production and marketing of goods and services bought. These sales and services required an estimated 30 thousand person-years of labor and generated wages of $370 million (SFI 1988). These estimates correspond to all marine recreational fishing and help to illustrate the relative importance of the recreational fishery. Unfortunately, estimates of the economic activity specifically associated with scup were not provided separately, but were combined with other species. In the North and Middle Atlantic regions, scup impacts were not specifically enumerated due to the greater relative popularity and abundance of other species. Furthermore, the fact that fishermen may target more than one species or may incidentally encounter other fish creates difficulty when addressing the direct economic impact associated with a single species.

8.2.3. Value of Scup to Anglers

Estimates of aggregate economic value for scup are not currently available. The value that anglers place on the

recreational fishing experience can be divided into actual expenditures and non-monetary benefits associated with satisfaction (consumer surplus). Anglers incur expenses for fish (purchase of gear, bait, boats, fuel, etc.), but do not pay for the fish they catch or retain nor for the enjoyment of many other attributes of the fishing experience (socializing with friends, contact with nature, etc.). Despite the obvious value of these fish and other attributes of the experience to anglers, no direct expenditures are made for them, hence the term "non-monetary" benefits.

A demand curve for recreational fishing trips for scup is not available. The demand for recreational fishing trips would be determined by travel expenditures, catch rates, costs of equipment and supplies, accessibility of fishing sites, social experience, weather and a variety of other factors affecting angler enjoyment. A decrease in the catch rate or retention rate, holding all other factors constant, e.g weather, travel costs, etc., would move the demand curve to the left. On the other hand, an increase in the catch or retention rate would shift the demand curve to the right. Each move will have an associated decrease, increase in angler expenditures and total benefits, respectively.

Economic estimates of total expenditures made for fishing are useful for economic impact analysis. In order to estimate the total value (willingness to pay) of scup, an estimate of the marginal value per trip would be required. However, as already mentioned above, in the case of scup, as with many recreational sought species, an aggregate demand curve is not available.

Estimates of the value of a recreational fishing day for salt water angling have been made in several studies. A recent study by Strand *et al.* (1991) provides information about marine recreational fishing in the Middle and South Atlantic. Table 36 presents estimated total cost (travel and services) or estimated value for a recreational fishing day for selected states. The range of average values were $43.35 to $69.69 for party vessels, $59.88 to $146.66 for charter vessels and $40.33 to $44.38 for private vessels. Travel cost tended to be higher in Delaware for all modes of fishing.

Other studies have estimated the value of a recreational fishing day for saltwater angling along the Atlantic coast. Value per trip for marine recreational fishing for nine sites in Delaware was estimated by Rockland (1983). The travel cost method with a variety of estimation approaches was employed. On average, the values for boat fishing sites ranged from $20.58 to $39.90 per day, while the range for shore fishing was $37.47 to $62.53 per day. Norton *et al.* (1983) estimated $39 to $169 per day in a study of the recreational striped bass fishery on the Atlantic coast. Bell *et al.* (1982) estimated values from $18.97 to $57.99 per day for all marine species in the state of Florida. It is important to note that the average cost of a scup trip or fishing day is not equivalent to the marginal value of a recreationally caught scup. Attributes of a recreational fishing day other than catching fish are valued by anglers, so all expenditures are not dependent on scup catch. The marginal value of scup catch must be estimated, and as with any normal good, marginal value declines with increasing quantity.

Addressing the economic value associated with marine recreational fishing when developing fishery management plans is important. Ideally the value that anglers are willing to pay for the recreational opportunity that they enjoy should be considered when evaluating plans that affect both the recreational and the commercial fishery. An estimate of the total expenditures made fishing for scup can be made by multiplying the number of trips taken by an estimate of average cost per day. However, it is not possible to address the non-monetary benefit derived from fishing without more sophisticated statistical techniques enabling an estimate of the marginal value per trip.

The National Marine Fisheries Service recognizes the importance of the proper valuation of fish stock resources by commercial and recreational fisheries. Currently, a survey is being analyzed to assess socio-economic data on the people who participate in marine recreational fishing in the Northeast region. This data will be employed to estimate statistical models of the demand for marine recreational fishing for eight important recreational species (bluefish, striped bass, summer flounder, Atlantic cod, black sea bass, tautog, scup, and weakfish) (R. Roe pers. comm.).

8.2.4. 1990 Survey of Charter and Party Boats

The charter and party boat industry is important in several states in the management unit of this FMP. On average for the 1983-1992 period, 12% of the scup (in numbers) landed by anglers off the Atlantic coast were caught from party or charter boats (Table 24).

To provide additional information on this segment of the industry, the Council conducted a survey of charter and party boat owners in the summer of 1990 with the purpose of acquiring information in support of management efforts for the summer flounder, scup, and black sea bass fisheries. A mailing list was compiled from the NMFS vessel permit files, including all vessels which indicated they were involved in party and charter activities (permit Category 2). The list included 402 vessels.

Consultation with Council members yielded concerns that a number of vessels did not hold Federal permits, and would not be included in the survey. Representatives from New Jersey, New York, and Virginia supplied the Council with lists supplementing the NMFS permit files, and an additional 190 questionnaires were mailed.

A total of 592 surveys were sent out to 13 east coast states (Table 37). Massachusetts, New Jersey, New York, and Virginia were most heavily represented, together accounting for 80% of survey mailings.

A total of 202 surveys were returned to the Council, 172 of which were usable. The 30 returns which could not be used were inappropriate mailings that fell into the following general categories: did not charter/fish in 1989; private boat, not for hire; dive boat, primarily after lobsters; returned as undeliverable by Post Office; or sold boat. Usable returns equaled 29% of total mailings, with the percentage ranging from approximately 20% - 50% for individual states.

Some of the analyses conducted on the survey divided the responses into "Party boat" versus "Charter boat" categories. Typically, charter vessels are thought of as hiring out for a day's fishing to a small number of individuals at a cost of over $100 per person. They provide a high level of personal attention to the passengers and will make special efforts to find the particular species of interest to their clients.

"Party boats" are generally larger vessels which run on a fixed schedule and carry from 10 to 100 passengers, averaging around 20. They offer fewer options and less attention to passengers, yet charge much lower fares than charter boats (in the $20 - $40 range).

In order to have the ability to differentiate between these two groups, the data were partitioned based on the reported number of passengers each vessel could carry. Examination of the data showed a logical division between those vessels which reported carrying 8 or fewer passengers, and those able to carry more than 8. The average fee charged per person dropped significantly for those vessels carrying more than 8 passengers. For purposes of this analysis, then, "charter boats" are defined as those boats carrying 8 or fewer passengers, and "party boats" those which may carry 9 and above. It is recognized that charter boats are generally licensed for six passengers and, in fact, responses to another question indicated that the average charter boat carried 6 passengers (SD = 0.4), while the average party boat carried 53 (SD = 32), so it is quite likely that the respondents which indicated they owned a charter boat that carried eight people were including the captain and mate whereas in the subsequent question they were referring to the six paying passengers.

The first question on the survey attempted to gauge the interest or demand which party and charter boat customers exhibited for common species (or species groups). Given a five point scale, owners were asked to rank each species as being: 1 = Low, 2 = Somewhat Low, 3 = Moderate, 4 = Somewhat High, or 5 = High in interest to their customers. Calculating mean values of responses allows comparison of the different species using a single number for each.

Spot ranked as the most desirable fish for party boats (mean interest = 4.7), illustrating its importance to the well-represented boats of Virginia (Table 38). It was followed by bluefish (4.6), then summer flounder (3.6), Atlantic Mackerel (3.5), and striped bass (3.5). Scup ranked as one of the least desirable fish for party boats (2.2). The top four fish which party boats reported catching were: bluefish (4.0), Atlantic mackerel (3.5), spot (3.4), and black sea

bass (2.9).

For party boats, summer flounder ranked as the fish anglers were least successful in catching (mean success=1.5). It was followed by weakfish and striped bass (1.7), sharks (other than dogfish) (1.9), and scup (2.0).

An additional perspective can be gained on the situation by creating what might be termed a "frustration index," or simply the difference between fishermen's interest in catching a particular species and their success in doing so. Summer flounder stands out by having the largest difference between interest and success values for party boat fishermen (2.1), followed by striped bass and weakfish. Scup showed one of the smallest differences between interest and success value for party boat fishermen (0.2), second to Atlantic mackerel.

Charter boat owners reported a preference ordering similar to that of party boats for their customers, with the exception that large pelagics took the second ranked spot along with bluefish (Table 38). The top five species were: spot (4.6), large pelagics (3.9), bluefish (3.9), striped bass (3.7), and summer flounder (3.2). The preference for scup for charter boat owners (1.4) was ranked as the least desirable species.

In 1989, the average party boat customer traveled 67 miles, with a standard deviation (SD) of 43 miles. The farthest party boat customer traveled 695 miles (SD = 1,125 mi.). In 1989, the average charter boat customer traveled 123 miles (SD = 194 mi.). The farthest charter boat customer traveled 727 miles (SD = 914 mi.).

Charter boat respondents indicated that 38% of their customers were more interested in a particular species, 15% were more interested in fishing enjoyment, and 46% were about equally interested in each. For party boats, the responses were 43% for a particular species, 12% for the fishing experience, and 45% equally for each.

For charter boats, 89% of the respondents were both owner and operator (7% just owner, 5% just captain). The party boat responses were 94% owner and captain, 2% just owner, and 4% just captain. Only 14% of the charter boats were used year round (86% seasonally), while 18% of the party boats were used year round (82% seasonally). The average charter boat carried 6 passengers (SD = 0.4), while the average party boat carried 53 (SD = 32).

Thirty six percent of the charter boat respondents indicated that they fished commercially in 1989, with 91% of those fishing commercially from the charter boat and 9% from another boat. For party boats, 26% of the respondents indicated they had fished commercially in 1989, with 69% of those fishing commercially from the party boat and 31% from another boat.

On a scale of 1 (almost none) to 5 (almost all), respondents were asked what part of their personal earnings in 1989 came from party and charter boat fishing, commercial fishing, or other sources. For charter boat respondents the mean answers were: charter or party boat fishing, 2.2; commercial fishing 1.5; and other sources, 4.0. For party boat respondents the mean answers were: charter or party boat fishing, 3.2; commercial fishing 1.3; and other sources, 2.4.

Respondents were also asked what their perception of fishing success was for 1989 and what they thought their customers' perceptions of 1989 fishing success was. Ranking was on a scale of 1 (good) through 3 (bad). For charter boats, the operators reported a mean of 2.1 (SD = 0.7) for their own view and 1.9 (SD = 0.7) for their customers. For party boat operators, their own perception was 2.2 (SD = 0.6), while they thought their customers would rate the season at 2.0 (SD = 0.6).

The survey included a series of questions to determine how the respondents felt business was in 1989 compared to 1985. Both charter and party boats made slightly fewer trips in 1989 compared to 1985 (Table 39). The days per trip and/or trips per day were essentially unchanged. They operated fewer days per week, on average, and carried slightly fewer customers. The average price per trip increased from $121.80 to $149.50 for charter boats and $26.20 to $29.20 for party boats. The average number of fish taken per customer for charter boats fell from 10.9 to 8.3 for charter boats and from 15.2 to 9.9 for party boats between 1985 and 1989. The number of crew members stayed relatively constant. The average cost per trip rose from $96.10 to $131.10 for charter boats and

from $113.30 to $146.60 for party boats during the period.

8.3. INTERNATIONAL TRADE

Scup occur primarily on the continental shelf of the northwest Atlantic, and there are no imports of this species into the US. International trade of scup appears to be very limited. In 1991 there were no scup exports and in 1992 about 93,000 pounds valued at $67,200 were exported to China (R. Ross pers. comm.). These figures minimum export values. Given the export classification codes employed by the NMFS, it is possible that some scup were exported under the "unclassified" species category.

9. FISHERY MANAGEMENT PROGRAM

9.1. MEASURES TO ATTAIN MANAGEMENT OBJECTIVES

9.1.1. Specification of OY, DAH, DAP, JVP, TALFF, Overfishing Definition, and Fishing Mortality Rate Reduction Strategy

Section 303(a)(3) of the MFCMA requires that FMP's assess and specify the OY from the fishery and include a summary of the information utilized in making such specification. OY is to be based on MSY, or on MSY as it may be adjusted for social, economic, or ecological reasons. The most important limitation on the specification of OY is that the choice of OY and the conservation and management measures proposed to achieve it must prevent overfishing.

OY is all scup harvested pursuant to this FMP. OY cannot be specified as a quantity because it will change as the fishing mortality rate target varies and is dependent on the level of recruitment.

The Council has concluded that US vessels have the capacity to, and will, harvest the OY on an annual basis, so DAH equals OY. The Council has also concluded that US fish processors, on an annual basis, will process that portion of the OY that will be harvested by US commercial fishing vessels, so DAP equals DAH and JVP equals zero. Since US fishing vessels have the capacity and intent to harvest the entire OY, there is no portion of the OY that can be made available for foreign fishing, so TALFF also equals zero.

Overfishing for scup is defined as fishing in excess of the F_{max} level. F_{max} is a biological reference point that corresponds to the level of fishing mortality (F) that produces the maximum yield per recruit. Based on current conditions in the fishery, F_{max} is 0.24.

Stock assessment information indicates that scup are overfished. Age based analyses indicate that current fishing mortality rates (F) are at least 1.3.

The Council and the ASMFC Management Board approved a recovery strategy that reduces overfishing on scup over a 7 year time frame. The recovery strategy calls for minimum fish sizes and commercial gear regulations in year 1. In years 2 through 4, target exploitation rates would be 47% for scup. In years 5 and 6, the target exploitation rates would be 33% and in year 7 and subsequent years, the target exploitation rate would be based on F_{max}. Based on current conditions in the fishery, F_{max} is 0.24 and the associated exploitation rate is 19%. This recovery schedule is:

	Exploitation Rates
Current	69%
Year 2	47%
Year 5	33%
Year 7	19%

9.1.2 Specification of Adopted Management Measures

9.1.2.1. Permits and fees

9.1.2.1.1. Vessel permits and fees

9.1.2.1.1.1. General

Any owner of a vessel desiring to fish for scup within the US EEZ for sale, or transport or deliver for sale, any scup taken within the EEZ, must obtain a moratorium permit from NMFS for that purpose. The vessel must meet the criteria set forth in 9.1.2.1.1.2 in order to qualify for the moratorium permit.

The owner of a party and charter boat (vessel for hire) must obtain a party or charter boat permit.

A recreational vessel, other than a party or charter boat (vessel for hire), is exempt from the permitting requirement if it catches no more than the recreational possession limit, multiplied by the number of persons on board, of scup per trip.

A party or charter boat may have both a party or charter boat permit and a commercial moratorium permit to catch and sell if the vessel meets the commercial vessel qualification requirements set forth in 9.1.2.1.1.2. However, such a vessel may not fish under the commercial rules if it is carrying passengers for a fee. When a party or charter boat is operating as a commercial vessel, the crew size must not be more than 5 when it is a party boat and not more than 3 when it is a charter boat.

9.1.2.1.1.2. Moratorium on entry to the commercial fishery

There will be a moratorium on entry of additional commercial vessels into the scup fishery in the EEZ. Each state is encouraged to adopt complementary moratorium measures for those participating in the commercial fishery. Vessels with documented landings of scup for sale between 26 January 1988 and 26 January 1993 qualify for a moratorium permit to land and sell scup under this moratorium program.

Under the moratorium, vessels and moratorium permits together may be bought and sold with the approval of the Regional Director. Vessels that involuntarily leave the fishery (for example, vessels that were sunk or burnt) may be replaced with vessels of the same Gross Registered Tonnage (GRT) and overall registered length as the vessel being replaced. Commercial vessels that are judged unseaworthy by the Coast Guard for reasons other than lack of maintenance may be replaced by a vessel with the same GRT and vessel registered length. Permits may not be combined to create larger replacement vessels. The moratorium may be terminated or replaced at any time by FMP amendment establishing an alternative limited entry system.

A vessel is eligible for a moratorium permit if it meets any of the following criteria:

1. The owner or operator of the vessel landed and sold scup in the management unit for scup between 26 January 1988 and 26 January 1993; or

2. The vessel was under construction for, or was being re-rigged for, use in the directed fishery for scup on 26 January 1993 and provided the vessel has landed scup for sale prior to implementation of this Amendment. For the purpose of this paragraph, "under construction" means that the keel has been laid, and "being re-rigged" means physical alteration of the vessel or its gear had begun to transform the vessel into one capable of fishing commercially for scup; or

3. The vessel is replacing a vessel of substantially similar harvesting capacity which involuntarily left the scup fishery during the moratorium, and both the entering and replaced vessels are owned by the same person. "Substantially similar harvesting capacity" means the same GRT and vessel registered length for commercial vessels.

4. Vessels that are judged unseaworthy by the Coast Guard for reasons other than lack of maintenance may be replaced by a vessel with the same GRT and vessel registered length for commercial vessels.

Eligibility must be established during the first year of the FMP. In other words, the moratorium permit may not be applied for more than twelve months following the effective date of the final regulations or if a vessel is retired from the fishery. This does not affect annual permit renewals.

Vessel permits issued to vessels that involuntarily leave the fishery may not be combined to create larger replacement vessels.

Applicants for moratorium permits shall provide information with the application sufficient for the Regional

Director to determine if the vessel meets the eligibility requirements. Sales receipts or dealer weighout forms signed by the dealer and, for condition 3, a notarized statement from marine architects or surveyors or shipyard officials will be considered acceptable forms of proof.

9.1.2.1.1.3. Permit application

The owner or operator of a qualified US vessel may obtain the appropriate Federal permit by furnishing on the form provided by NMFS at least the following information, and any other information required by the Regional Director: vessel name; owner name, mailing address, and telephone number; U.S. Coast Guard documentation number and a copy of the vessel's U.S. Coast Guard documentation or, if undocumented, the vessel's state registration number and a copy of the state registration; home port and principal port of landing; length; gross tonnage; net tonnage; engine horsepower; year the vessel was built; type of construction and type of propulsion; approximate fish hold capacity; type of fishing gear used by the vessel; number of crew; permit category; if owner is a corporation, a copy of the Certificate of Incorporation, and the names and addresses of all shareholders owning 25 percent or more of the corporation's shares; if the owner is a partnership, a copy of the Partnership Agreement and the names and addresses of all partners; if there is more than one owner, names of all owners having owned more than a 25-percent interest; the name and signature of the owner or the owner's authorized representative; permit number of any current or, if expired, previous Federal fishery permit issued to the vessel; and a copy of charter/party boat license and number of passengers the vessel is licensed to carry (charter and party boats). Operators of commercial vessels must also supply information required to establish that the vessels qualify for a permit pursuant to the moratorium. The Regional Director will notify the applicant of any deficiency in the application. If the applicant fails to correct the deficiency within 15 days following the date of notification, the application will be considered abandoned.

Applicants for a permit under this FMP must agree, as a condition of issuance of the permit, to fish in accordance with federal rules whether they are fishing in the EEZ or state waters.

Permits expire: (1) when the owner or operator retires the vessel from the fishery, or (2) on 31 December of each year, or (3) when the ownership of the vessel changes; however, the Regional Director may authorize continuation of a vessel permit for the scup fishery if the new owner so requests. Applications for continuation of a permit must be addressed to the Regional Director.
The permit must be carried, at all times, on board the vessel for which it is issued, and must be maintained in legible condition. The permit, the vessel, its gear and catch shall be subject to inspection upon request by any authorized official.

The Federal costs of implementing an annual permit system for the sale of scup shall be charged to permit holders as authorized by section 303(b) (1) of the Magnuson Act. In establishing the annual fee, the Regional Director will ensure that the fee does not exceed the administrative costs incurred in issuing the permit, as required by section 304(d) of the Magnuson Act. Proper accounting for administrative costs may include labor costs (salary and benefits of permitting officers plus prorated share of secretarial support and supervision at both the NMFS regional and headquarters levels), computer costs for creating and maintaining permit files (prorated capital costs, time share and expendable supplies), cost of forms and mailers (purchase, preparation, printing and reproduction), and postage costs for application forms and permits.

9.1.2.1.2. Dealer permits and fees

Any dealer of scup must have a permit. A dealer of scup is defined as a person or firm that receives scup for a commercial purpose from the owner or operator of a vessel issued a moratorium permit pursuant to this FMP for other than transport.

An applicant must apply for a dealer permit in writing to the Regional Director. The application must be signed by the applicant and submitted to the Regional Director at least 30 days before the date upon which the applicant desires to have the permit made effective. Applications must contain the name, principal place of business, mailing address and telephone number of the applicant. The Regional Director will notify the applicant of any

deficiency in the application. If the applicant fails to correct the deficiency within 15 days following the date of notification, the application will be considered abandoned. Except as provided in Sub-part D of 15 CFR Part 904, the Regional Director will issue a permit within 30 days of the receipt of a completed application.

A permit expires on 31 December of each year or if the ownership or the dealer changes. Any permit issued under this section remains valid until it expires, is suspended, is revoked, or ownership changes. Any permit which is altered, erased, or mutilated is invalid. The Regional Director may issue replacement permits. Any application for a replacement permit shall be considered a new permit.

A permit is not transferable or assignable. It is valid only for the dealer to whom it is issued.

The permit must be displayed for inspection upon request by an authorized officer or any employee of NMFS designated by the Regional Director.

The Regional Director may suspend, revoke, or modify, any permit issued or sought under this section. Procedures governing permit sanctions or denials are found at Sub-part D of 15 CFR Part 904. The Regional Director may, after publication of a notice in the *Federal Register*, charge a permit fee. Within 15 days after the change in the information contained in an application submitted under this section, the dealer issued the permit must report the change in writing to the Regional Director.

The Regional Director shall recognize state dealer permits in lieu of federal dealer permits if the permits contain the necessary information and are forwarded to the Regional Director by the appropriate state.

The states would recognize federal permit holders fishing in state waters. In addition, state permits would be required for persons harvesting or dealing in fish exclusively from state waters.

9.1.2.1.3. Operator permit and fees

An operator of a vessel with permit issued pursuant to this FMP (either a moratorium permit or a party/charter boat permit) must have an Operator's Permit issued by NMFS. Any vessel fishing commercially for scup under a moratorium permit or recreationally with a party/charter boat permit must have on board at least one operator who holds a permit. That operator may be held accountable for violations of the fishing regulations and may be subject to a permit sanction. During the permit sanction period, the individual operator may not work in any capacity aboard a federally permitted fishing vessel.

The permit program has the following requirements:

1. Any operator of a vessel fishing for scup must have an operator's permit issued by the NMFS Regional Director.

2. An operator is defined as the master or other individual on board a vessel who is in charge of that vessel (see 50 CFR 620.2).

3. The operator is required to submit an application, supplied by the Regional Director, for an operator's permit. The permit will be issued for a period of up to three years.

4. The applicant would provide his/her name, mailing address, telephone number, date of birth and physical characteristics (height, weight, hair and eye color, etc.) on the application, and would be requested to provide his/her social security number. In addition to this information, the applicant must provide two passport-size color photos.

5. The permit is not transferable.

6. Permit holders would be required to carry their permit aboard the fishing vessel during fishing and off-

loading operations and must have it available for inspection upon request by an authorized officer.

7. The Regional Director may, after publication in the *Federal Register*, charge a permit fee.

9.1.2.2. Scup FMP Monitoring Committee

The Scup Monitoring Committee will be made up of staff representatives of the Mid-Atlantic, New England, and South Atlantic Fishery Management Councils, the Northeast Regional Office, the Northeast Fisheries Center, and ASMFC representatives. The MAFMC Executive Director or his designee will chair the Committee.

The Scup Monitoring Committee will annually review the best available data including, but not limited to, commercial and recreational catch/landing statistics, current estimates of fishing mortality, stock status, the most recent estimates of recruitment, VPA results, target mortality levels, beneficial impacts of size/mesh regulations, as well as the level of noncompliance by fishermen or states and recommend to the Council Committee and ASMFC Management Board commercial (annual quota, minimum fish size, and minimum mesh size) and recreational (possession and size limits and seasonal closures) measures designed to assure that the target mortality level on scup is not exceeded (as specified in section 9.1.1.). The Committee will also review state regulatory programs for consistency with the FMP. The Committee will also review the gear used to catch scup to determine whether additional gears need to be regulated to help assure attainment of the fishing mortality rate target and propose such regulations as appropriate.

The Council and ASMFC will receive the report of the Committee and make its recommendations to the Regional Director. The Regional Director will receive the report of the Council and ASMFC and publish his report in the *Federal Register* for public comment by the date specified in the regulations which provide states sufficient time to implement quotas and other management measures. Following the review period, the Regional Director will set the final quota and other management measure adjustments for the year.

In summary, the steps from the Monitoring Committee for action by the Regional Director are:

1. The Monitoring Committee reviews the data and makes its recommendations to the Demersal Species Committee and ASMFC Management Board.

2. The Demersal Species Committee and ASMFC Management Board consider the recommendations of the Monitoring Committee and makes their recommendations to the Council and ASMFC.

3. The Council and ASMFC consider the recommendations of the Demersal Species Committee and ASMFC Management Board and make their recommendations to the Regional Director.

4. The Regional Director considers the recommendations of the Council and ASMFC and publishes proposed measures in the *Federal Register*.

The Monitoring Committee, Demersal Species Committee, ASMFC Management Board, and Council meetings will all be open to the public and provide an opportunity for public comment. The publication of the Regional Director's proposed action in the *Federal Register* provides an opportunity for public comment at that level.

9.1.2.3. Commercial management measures

9.1.2.3.1. Commercial fish size limitations

It would be illegal for owners or operators of vessels issued moratorium permits, except party and charter boats carrying passengers for hire, to possess scup less than 9" total length (TL). It would also be illegal to possess parts of scup less than 9" to the point of landing. Scup less than 9" TL could not be sold.

Vessels with commercial moratorium permits issued pursuant to this FMP would be required to fish and land

pursuant to the provisions of this FMP unless the vessels land in states with larger minimum fish sizes than those provided in the FMP, in which case the minimum fish size would be required to meet the state limits. States with minimum size larger than those in the FMP are encouraged to maintain them.

The minimum fish size may be changed annually, if appropriate, following the Scup FMP Monitoring Committee process set forth in 9.1.2.2.

9.1.2.3.2. Minimum mesh requirement

Owners or operators of otter trawl vessels possessing 4,000 lbs or more of scup, may fish only with nets that have a minimum mesh size of 4.0" diamond mesh, inside measure, applied throughout the cod end for at least 75 continuous meshes forward of the terminus of the net, or, if the net is not long enough for such a measurement, the terminal 1/3 of the net, measured from the terminus of the cod end to the head rope.

Mesh would be allowed to be larger than the minimum size, but it could be no smaller than the minimum size. If the fish were landed in a state that has a more stringent net mesh regulation, the state regulation would prevail. States with minimum mesh regulations larger than those established in this FMP would be encouraged to maintain them.

In addition, this alternative would require that owners or operators of otter trawl vessels possessing 4,000 lbs or more of scup not have available for immediate use any net, or any piece of net not meeting the minimum mesh size requirements, or mesh that is rigged in a manner that is inconsistent with the minimum mesh size. A net that conformed to one of the following specifications and that could be shown not to have been in recent use is considered to be not "available for immediate use":

(1) A net stowed below deck, provided:

(i) it is located below the main working deck from which the net is deployed and retrieved;

(ii) the towing wires, including the "leg" wires, are detached from the net; and

(iii) it is fan-folded (flaked) and bound around its circumference.

(2) A net stowed and lashed down on deck, provided:

(i) it is fan-folded (flaked) and bound around its circumference;

(ii) it is securely fastened to the deck or rail of the vessel; and

(iii) the towing wires, including the leg wires, are detached from the net.

(3) A net that is on a reel and is covered and secured, provided:

(i) the entire surface of the net is covered with canvas or other similar material that is securely bound;

(ii) the towing wires, including the leg wires, are detached from the net; and

(iii) the codend is removed from the net and stored below deck.

(4) Nets that are secured in a manner approved by the Regional Director, provided that the Regional Director has reviewed the alternative manner of securing nets and has published that alternative in the *Federal Register*.

Any combination of mesh or liners that effectively decreases the mesh below the minimum size would be

prohibited.

This alternative would prohibit the owner or operator of a fishing vessel from using any device, gear, or material, including, but not limited to, nets, net strengtheners, ropes, lines, or chaffing gear, on the top of the regulated portion of a trawl net; except that, one splitting strap and one bull rope (if present), consisting of line or rope no more than 2" in diameter, may be used if such splitting strap and/or bull rope does not constrict in any manner the top of the regulated portion of the net; and one rope no greater than 0.75 inches in diameter extending the length of the net from the belly to the terminus of the cod end along each of the following: the top, bottom, and each side of the net. "Top of the regulated portion of the net" means the 50% of the entire regulated portion of the net which (in a hypothetical situation) would not be in contact with the ocean bottom during a tow if the regulated portion of the net were laid flat on the ocean floor. For the purpose of this paragraph, head ropes shall not be considered part of the top of the regulated portion of a trawl net.

The minimum net mesh size and threshold level could be changed annually, if appropriate, following the Scup FMP Monitoring Committee process set forth in 9.1.2.2. Based on the recommendations of the Scup Monitoring Committee and Council, the Regional Director, by regulatory amendment, shall implement regulations on gear other than otter trawls to achieve discards of scup equivalent to the discards with otter trawls given the minimum net mesh requirements. This provision is intended to address the problem that could develop if gear currently not in significant use in the scup fishery are developed as a way of avoiding the minimum otter trawl mesh rule.

9.1.2.3.3. Maximum roller diameter

It would be illegal for owners or operators of vessels issued moratorium permits to use roller rig trawl gear equipped with rollers greater than 18" in diameter.

The maximum roller diameter may be changed annually, if appropriate, following the Scup FMP Monitoring Committee process set forth in 9.1.2.2.

9.1.2.3.4. Minimum escape vent requirement

Scup pots and traps would be required to have a circular escape vent of with a minimum of 3.1" in diameter or a square escape vent with a minimum of 2.25" for each side or an equivalent rectangular escape vent. The escape vent provision would be implemented at the start of the first calendar year following FMP approval so that fishermen would not be required to pull their pots and add vents in the middle of the season.

A scup pot or trap would be defined by the state regulations that applied to a vessel's principal port of landing. The definition and the minimum escape vent requirement would apply to pots fished in both state and federal waters.

The escape vent requirement may be changed annually, if appropriate, following the Scup FMP Monitoring Committee process set forth in 9.1.2.2.

9.1.2.3.5. Degradable fasteners in traps and pots

Scup pots and traps would be required to have hinges and fasteners on one panel or door made of one of the following degradable materials:

a. untreated hemp, jute, or cotton string of 3/16" (4.8 mm) diameter or smaller;

b. magnesium alloy, timed float releases (pop-up devices) or similar magnesium alloy fasteners; or

c. ungalvanized or uncoated iron wire of 0.094" (2.4 mm) diameter or smaller.

A scup pot or trap would be defined by the state regulations that applied to a vessel's principal port of landing. The definition and the minimum escape vent requirement would apply to pots fished in both state and federal waters.

9.1.2.3.6. Seasonal and area closures

Gear-specific seasonal and area closures could be implemented to reduce discards in the commercial scup fishery and prevent quota overruns. During a closure all gear capable of catching scup would be removed from the closed area for the specified time period.

Seasonal and area closures would be based on the recommendations of the Scup FMP Monitoring Committee to the Council and ASMFC Board. The Council and ASMFC would consider those recommendations and submit their recommendations to the Regional Director. The Regional Director would then set the season and area closures.

9.1.2.3.7. Commercial quota

Beginning in year 2, a quota would be allocated to the commercial fishery to reduce exploitation rates on the fully recruited age groups (i.e., fish larger than 9" TL). The commercial quota will be derived from a total allowable catch (TAC). The TAC will be calculated each year based on the target exploitation rate and the projected stock size estimates derived from annual stock assessment information.

The TAC will be allocated to the commercial and recreational fisheries based on the proportions of commercial and recreational catch (landings plus discards) for the years 1988-1992 (Table 40). Based on this data, 78% of the TAC would be allocated to the commercial fishery. An estimate of total coastwide discards would then be subtracted from the commercial TAC to derive the allowable level of harvest (commercial quota).

During the first year of the FMP, a system to distribute and manage the annual commercial quota will be developed by the Council and Commission. Coastwide, regional and state by state quotas will be considered in combination with different fractions of the fishing year, e.g., bimonthly quotas.

The annual commercial quota will be set at a range of between 0 and the commercial share of the maximum allowed by the adopted fishing mortality rate reduction strategy. The commercial quota includes all landings for sale by *any* gear.

All landings by any vessel that has a commercial moratorium permit (permit to sell) counts against the quota, whether the scup are caught with an otter trawl, a scallop dredge, hook and line, or any other gear. If the vessel does not have a commercial moratorium permit, the fish may not be sold and the recreational rules on size, possession, and season apply.

The annual commercial quota would be based on the recommendations of the Scup FMP Monitoring Committee to the Council and ASMFC Board. The Council and ASMFC would consider those recommendations and submit their recommendations to the Regional Director. The Regional Director will set the commercial quota annually.

The quota must apply throughout the management unit, that is, in both state and federal waters. All commercial landings would count toward the quota. When the quota had been landed, fishing for and/or landing scup would be prohibited. The Regional Director shall close the EEZ to fishing for scup by commercial vessels when the quota has been landed.

Any landings in excess of the quota would be subtracted from the following year's quota. For example, if the quota was exceeded by 10,000 pounds in 1997, 10,000 pounds would be subtracted from the quota in 1998.

Using data collected through this FMP (section 9.1.3), NMFS will monitor the fishery to determine when a quota will be reached. It is expected that the states will assist NMFS with data collection.

9.1.2.4. Recreational Fishery Measures

9.1.2.4.1. Recreational Size, Possession, and Seasonal Limits

Beginning in year 1 of the management program, it would be illegal for recreational fishermen to possess whole scup or parts of scup less than 7" total length (TL).

Beginning in year 2, the recreational fishery throughout the management unit would be managed through an annual evaluation of a framework system (section 9.1.2.2) of possession limits, size limits, and seasonal closures. Beginning in year 2, recreational landings would be compared to annual target harvest levels established through the FMP Monitoring Committee process to determine if modifications to the recreational possession limit and size limit were required for the following year or if the fishery needed to be closed for certain periods.

The annual recreational possession limit, size limit, and season will be set at a range of between 0 and the maximum allowed by the recreational share of the adopted fishing mortality rate reduction strategy.

On vessels with several passengers, where catches are pooled in one or more containers, the number of scup contained on the vessel may not exceed the possession limit multiplied by the number of people aboard the vessel.

It is the responsibility of each state to assure that it implements measures equivalent with the Federal FMP. The Regional Director may prohibit landing scup from the EEZ by recreational vessels (party, charter, and private boats) of any state not in compliance with this FMP (possession limit, size limit, and season). If the inaction of one or more states leads the Regional Director to conclude that the FMP will be adversely affected, he may close the entire EEZ to scup fishing.

9.1.2.4.2. Recreational Harvest Limit

Beginning in year 2, a recreational harvest limit would be allocated to the recreational fishery to reduce exploitation rates on the fully recruited age groups. The recreational harvest limit will be derived from an total allowable catch (TAC). The TAC will be calculated each year based on the target fishing mortality rate and the projected stock size estimates derived from annual stock assessment information.

The TAC will be allocated to the commercial and recreational fisheries based on the proportions of commercial and recreational catch for the years 1988-1992 (Table 40). Based on this data, 22% of the TAC would be allocated to the recreational fishery. An estimate of total coastwide discards would then be subtracted from the recreational TAC to derive the recreational harvest limit.

The annual recreational harvest limit will be set at a range of between 0 and the maximum allowed by the recreational share of the adopted fishing mortality rate reduction strategy.

Any landings in excess of the target harvest level would be subtracted from the following year's target level. For example, if the target was exceeded by 10,000 pounds in 1997, 10,000 pounds would be subtracted from the target harvest level in 1998.

9.1.2.5. Experimental Fishery

The Regional Director, in consultation with the Executive Director, may exempt any person or vessel from the requirements of this FMP for the conduct of experimental fishing beneficial to the management of the scup resource or fishery.

The Regional Director may not grant such exemption unless it is determined that the purpose, design, and administration of the exemption is consistent with the objectives of the FMP, the provisions of the Magnuson Act,

and other applicable law, and that granting the exemption will not:

1. have a detrimental effect on the scup resource and fishery or cause any quota to be exceeded; or

2. create significant enforcement problems.

Each vessel participating in any exempted experimental fishing activity is subject to all provisions of this FMP except those necessarily relating to the purpose and nature of the exemption. The exemption will be specified in a letter issued by the Regional Director to each vessel participating in the exempted activity. This letter must be carried aboard the vessel seeking the benefit of such exemption.

All experimental activities must be consistent with the fishing mortality rate reduction schedule in the FMP.

It is the Council's intention that experimental fisheries are to be short-term fisheries to answer specific management questions and are not to be used to resolve short-comings in existing fishery management plans.

9.1.2.6. Enforcement recommendations

It is recommended that violators of the mesh regulations be severely punished. This is necessary to minimize abuses of the flexibility introduced into the management regime that allow for several meshes on-board. An example of a possible penalty would be a permit sanction.

9.1.2.7. Other measures

Only persons with a dealer permit may buy scup landed by a vessel that has a commercial moratorium permit issued pursuant to this FMP at the point of first sale.

Owners or operators of vessels with moratorium permits may sell scup at the point of first sale only to a dealer that has a dealer permit issued pursuant to this FMP.

Owners or operators of vessels with moratorium permits may not land scup during a period when the Regional Director has determined that the commercial quota has been landed.
All scup on vessels fishing with a mesh smaller than the legal minimum size must have any scup on board boxed in a manner that will facilitate enforcement personnel knowing whether the vessel has 4000 lbs or more of scup on board to meet the minimum mesh size criterion. Any un-boxed scup on board a vessel fishing with a net smaller than the legal minimum is considered a violation of this FMP. A standard 100 pound tote has a liquid capacity of 18.2 gallons (70 liters), or a volume of not more than 4,320 cubic inches (2.5 cubic feet).

The Regional Director may place sea samplers aboard vessels if he determines a voluntary sea sampling system is not giving a representative sample from the scup fishery.

No foreign fishing vessel shall conduct a fishery for or retain any scup. Foreign nations catching scup shall be subject to the incidental catch regulations set forth in 50 CFR 611.13, 611.14, and 611.50.

No vessel may use a net capable of catching scup in which the bars entering or exiting the knots twist around each other.

No person may assault, resist, oppose, impede, harass, intimidate, or interfere with either a NMFS-approved observer aboard a vessel, or an authorized officer conducting any search, inspection, investigation, or seizure in connection with enforcement of this FMP.

9.1.3. Specification and Sources of Pertinent Fishery Data

9.1.3.1. Domestic and foreign fishermen

Section 303(a)(5) of the MFCMA requires at least information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, and number of hauls must be submitted to the Secretary. In order to achieve the objectives of this FMP and to manage the fishery for the maximum benefit of the US, it is necessary that, at a minimum, the Secretary collect on a continuing basis and make available to the Councils: (1) scup catch, effort, and ex-vessel value and the catch and ex-vessel value of those species caught in conjunction with scup for the commercial fishery provided in a form that analysis can be performed at the trip, water area, gear, month, year, principal (normal) landing port, landing port for trip, and State levels of aggregation; (2) data on commercial fishery discards; (3) catch and effort for the recreational fishery; (4) biological (e.g., length, weight, age, and sex) samples from both the commercial and recreational fisheries; and (5) annual and fully comparable NMFS bottom trawl surveys for analyses of both CPUE and age/size frequency. The Secretary may implement necessary data collection procedures through amendments to the regulations. It is mandatory that these data be collected for the entire management unit, including North Carolina, on a compatible and comparable basis.

Commercial logbooks must be submitted on a monthly basis by federal moratorium permit holders in order to monitor the fishery.

Operators of party and charter boats with federal permits issued pursuant to this FMP must submit logbooks monthly showing at least name and permit number of the vessel; total numbers of each species taken; date(s) fished; number of trips; duration of trip; locality fished; crew size; landing port; number of anglers carried on each trip; and discard rate. A sample of party and charter boats may be required to report length frequencies of species caught for a sample of their trips.

States are encouraged to implement equivalent fishery data collection systems for the development of a coordinated statistics gathering effort.

It is intended that the reports required by this section are the same as the reports required by the Summer Flounder FMP, the Northeast Multispecies FMP, and the Atlantic Sea Scallop FMP. That is, fishermen need to submit one logbook report, not one report for each FMP.

Foreign fishermen are subject to the reporting and record keeping requirements in 50 CFR 611.

9.1.3.2. Dealers

In order to monitor the fishery and enable the Regional Director and the States to forecast when a closure will be needed, dealers with permits issued pursuant to this FMP must submit weekly reports showing at least the quantity of scup purchased (in pounds), and the name and permit number of the vessels from whom the scup was purchased.

Buyers that do not purchase directly from vessels are not required to submit reports under this provision. Dealers should report only those purchases from vessels (fishermen with commercial moratorium permits).

It is intended that the report required by this section is the same as the report required by the Summer Flounder FMP. That is, dealers need to submit one logbook report, not one report for each FMP.

9.1.3.3. Processors

Section 303(a)(5) of the MFCMA requires at least estimated processing capacity of, and the actual processing capacity utilized by US fish processors must be submitted to the Secretary. The Secretary may implement necessary data collection procedures through amendments to the regulations.

9.2. ANALYSIS OF BENEFICIAL AND ADVERSE IMPACTS OF ADOPTED MANAGEMENT MEASURES

9.2.1. The FMP Relative to the National Standards

Section 301(a) of the MFCMA states: "Any fishery management plan prepared, and any regulation promulgated to implement such plan pursuant to this title shall be consistent with the following national standards for fishery conservation and management." The following is a discussion of the standards and how this FMP meets them:

9.2.1.1. Conservation and management measures shall prevent overfishing while achieving, on a continuous basis, the optimum yield from each fishery.

MSY (section 5.4) has not been specified for scup. OY is all scup harvested pursuant to this FMP.

Overfishing in the Scup FMP is defined as fishing in excess of the F_{max} level. F_{max} is a biological reference point that corresponds to the level of fishing mortality (F) that produces the maximum yield per recruit. The Council has adopted an overfishing definition for scup based on an estimate of F_{max}. F_{max} is a biological reference point derived from yield per recruit analysis and is defined as the fishing mortality rate that maximizes the yield per recruit. Best available information indicates that F_{max} is 0.24 for scup based on current conditions in the fishery.

Mortality rates on scup have increased substantially in recent years. Based on a review of coastwide data, mortality rates in the early 1980's were slightly greater than 0.3, the value derived by Mayo (1982) for scup caught in the late 1970's. Howell (1990) estimated that F increased from 0.4 in the early 1980's to over 1.0 in 1988 based on catch curve and length based analysis of scup taken in Connecticut and Massachusetts surveys. Current estimates of F are 1.3 or higher. This information would indicate that scup have been overexploited (F's in excess of F_{max}) since the early 1980's. Assuming a current fishing mortality rate of 1.3 for scup, exploitation rates would have to be reduced 72% to achieve an F_{max} of 0.24.

The Council has adopted a strategy that will reduce mortality to the F_{max} level by the seventh year following FMP implementation. The following recovery strategy will be implemented. In year 1, minimum fish sizes and commercial gear regulations will be imposed. In year 2 to 4, target exploitation rates will be 47% for scup. In years 5 and 6, the target exploitation rates will be 33% and in year 7 and subsequent years, the target exploitation rate will be the one associated with F_{max} which is currently an F of 0.24 or an exploitation rate of 19%.

This seven-year strategy reflects the pressure now being placed on fishermen by other FMPs. Although the scup resource should be rebuilt as quickly as possible, scup management measures can be implemented over an seven-year time frame to minimize the short term economic burden placed on fishermen and still reduce the overfished condition of the stocks.

9.2.1.2. Conservation and management measures shall be based upon the best scientific information available.

This FMP is based on the best and most recent scientific information available. Future scup research should be devoted toward both data collection and analysis in order to evaluate the effectiveness of this FMP. This species should be reviewed annually by the NEFSC Stock Assessment Workshop process.

9.2.1.3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

The FMP's management unit is scup throughout their range on the Atlantic coast from Maine through Cape Hatteras, North Carolina, including the EEZ, territorial sea, and internal waters. This specification is considered to be consistent with National Standard 3.

9.2.1.4. Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such a manner that no particular

individual, corporation, or other entity acquires an excessive share of such privileges.

The FMP does not discriminate among residents of different states. It does not differentiate among US citizens, nationals, resident aliens, or corporations on the basis of their state of residence. It does not incorporate or rely on a state statute or regulation that discriminates against residents of another state. Commercial and recreational regulations would be applied coastwide.

This FMP would establish a commercial fishery quota system and recreational harvest limit for scup, based on historical landings data. This allocation, based on traditional landings patterns, would ensure that fishermen received a fair and equitable share of the resource.

The commercial minimum fish size, minimum net provisions, threshold, and commercial quota and the recreational size limits, possession limits, season, and recreational harvest limit are all specified so that they may be adjusted annually following procedures set forth in the FMP to assure that the fishing mortality reductions strategy is followed. These provisions are, therefore, "reasonably calculated to promote conservation."

The moratorium is fair and equitable. The Council voted to establish 26 January 1990 as a control date for limiting entry into the fishery at its February 1990 meeting. The Federal Register notice of this date was published 7 June 1990. The moratorium was part of the preferred alternative in the public hearing draft of this FMP.

Vessels with any documented landings (i.e., greater than 0 lbs) of scup between 26 January 1988 and 26 January 1993 would qualify for a moratorium permit. Thus, any vessel which actively fished for and landed any amount of scup between these dates would be guaranteed access to the fishery.

The only vessels excluded by the moratorium provisions of the FMP would be those that landed scup prior to 1988 or after 26 January 1993. Unpublished NMFS weighout data (Maine-Virginia) indicates that between 1983 and 1987, 798 vessels landed 66.9 million pounds of scup. Forty-one percent of these vessels (326) landed 5.1 million pounds (7.6%) of the total scup landed commercially during the 1983-1987 period, but did not land scup during the moratorium period (1988-1992). These vessels may have switched to fishing for other species or discontinued fishing for scup due to retirement from the fishery.

In 1993, 9.2 million pounds of scup were landed by 498 vessels. Seventy-eight of these vessels landed 260 thousand pounds (2.8%) of the total scup commercially landed in 1993, but did not participate in the scup commercial fishery during the 1988-1992 period. Taking into consideration the limited degree of participation by these vessels in the scup fishery in 1993, and the fact that they did not land any scup between 1988-1992, it is likely that these vessels did not participate in a directed fishery for scup in 1993 but retained scup as a bycatch when fishing for other species. In addition, vessels entering the fishery after 26 January 1993 would have known that a control date for scup had been published on 26 January 1990. Thus, it is likely that few individuals would have made large investments to participate in a directed fishery for scup after this date.

Unpublished NMFS weighout data indicates that a total of 597 vessels participated in the fishery between 1988 and 1992. An additional 100 vessels from North Carolina could have participated in the scup fishery between 1988 and 1992 (R. Monaghan pers. comm.). Thus, it is likely that approximately 600-700 vessel owners would apply for commercial moratorium permits.

9.2.1.5. Conservation and management measures shall, where practicable, promote efficiency in the utilization of the fishery resources; except that no such measure shall have economic allocation as its sole purpose.

The management regime is intended to allow the fishery to operate at the lowest possible cost (e.g., fishing effort, administration, and enforcement) given the FMP's objectives. The objectives focus on the issue of administrative and enforcement costs by encouraging compatibility between federal and state regulations since a substantial portion of the fishery occurs in state waters. The FMP places no restrictions on processing, or marketing and no unnecessary restrictions on the use of efficient techniques of harvesting.

9.2.1.6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

The management regime was developed to be compatible with and reinforce the management efforts of the states and the Commission. The minimum size regulations were developed with the recognition that the commercial and recreational fisheries have traditionally relied on different sizes of scup. In addition, reductions in stock size and specifically reductions in the availability of larger scup, have resulted in a situation such that most of the scup caught by recreational fishermen in recent years are 9" TL or less.

The commercial minimum size and mesh regulations were designed to reduce the discarding of small scup by otter trawl vessels, increase yields, and allow more scup to reach sexual maturity and spawn. The regulations differentiate between fishermen who encounter small amounts of legal-sized scup while fishing for other species and those fishermen targeting scup and exceeding the 4,000 threshold. Fishermen would be required to utilize a 4.0" mesh when a 4,000 lb threshold was reached. Vessels targeting scup now have an economic incentive to catch and discard large numbers of small scup using small mesh because they have the capability of sorting through large numbers of fish relatively quickly to cull the size of scup that can be sold at market. Discards would not be reduced without the mesh provision for these vessels.

9.2.1.7. Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

The management regime was developed to be compatible with and reinforce the management efforts of the states and the Commission. The minimum size limits, quotas, possession limits, and, to some extent, closed seasons, can be enforced on shore, thus eliminating the need for high cost at sea enforcement. The provisions of this FMP have already been adopted by the Commission.

9.2.2. Cost/Benefit Analysis

9.2.2.1. Implications of overfishing definitions and need to reduce fishing mortality rate

The cost/benefit analysis must be considered with regard to the guidelines established in 50 *CFR* 601, which require that a Council define overfishing for the managed species, determine whether the species is in an overfished condition, and, if it is, develop a strategy for ending the overfished condition. The Council has adopted an overfishing definition for scup. The Council has also determined that scup are currently overfished and has adopted a seven-year strategy to reduce fishing mortality to prescribed levels in order to end the overfished condition.

This seven-year strategy reflects the pressure now being placed on fishermen by other FMPs. Although the scup resource should be rebuilt as quickly as possible, scup management measures can be implemented over a seven-year time frame to minimize the short term economic burden placed on fishermen and still reduce the overfished condition of the stocks.

The excessive take of scup will cease when fishing mortality is at the F_{max} level, which current analyses indicate is F = 0.24. Current fishing mortality rates are at least 1.3. Thus, there is at least a five fold difference between the F_{max} and the current F. In order to achieve F_{max}, current exploitation rates would have to be reduced by 72%.

An immediate reduction to an F_{max} level was seen as having an unnecessarily negative impact on the industry, so the Council and ASMFC Board adopted the following strategy. In year 1, minimum fish sizes and commercial gear regulations will be imposed. In years 2 through 4, target exploitation rates will be 47% for scup. In years 5 and 6, the target exploitation rates will be 33% and in year 7 and subsequent years, the target exploitation rate would be based on the F_{max} level which is currently an F of 0.24 (an exploitation rate of 19%). This recovery schedule is:

<u>Exploitation Rates</u>

Current	67%
Year 3	47%
Year 6	33%
Year 8	19%

9.2.2.2. Commercial Fishery

9.2.2.2.1. Moratorium on commercial vessels

The MFCMA allows the Council to limit entry into a fishery if the Council considers the factors set forth in section 303(b)(6) of the Act: "establish a system for limiting access to the fishery in order to achieve optimum yield if, in developing such system, the Council and the Secretary take into account (A) present participation in the fishery, (B) historical fishing practices in, and dependence on, the fishery, (C) the economics of the fishery, (D) the capability of fishing vessels used in the fishery to engage in other fisheries, (E) the cultural and social framework relevant to the fishery, and (F) any other relevant considerations;"

Participation in the scup commercial fishery between 1988 and 1992 was estimated to range between 600 and 700 vessels. In addition to scup, these vessels land *Loligo* squid, Atlantic mackerel, silver hake, summer flounder, black sea bass, and other species. Most of the marketable species caught in the mixed trawl fishery are depleted, if not technically overfished. A moratorium exists for vessels in the summer flounder fishery. The Mid-Atlantic Council has already determined that black sea bass are overfished, and has adopted a control date for limited entry. The New England Council has approved moratoria for the Northeast Multispecies FMP and the Scallop FMP.

The measures proposed in this Amendment will significantly impact fishermen. They are considered to be the most reasonable and fair given the need to dramatically reduce fishing mortality. The real issue is that, if the measures proposed in this Amendment are not implemented, the negative impact on the fishermen will be even greater.

Given the likely number of vessels operating in this fishery and the level of probable quotas beginning in year 2 of the management program, not controlling the number of vessels could lead to a significant waste of capital resources as the ever decreasing probability of profits are dissipated over more operating units.

The Amendment proposes a moratorium on new entrants to the commercial scup fishery. The main purpose of this provision is simply to cap entry so that any future gains in productivity and profitability which may occur in the fishery will not be dissipated by future entrants. In this way, the individuals who make sacrifices today will be able to share in the benefits of future stock recovery, rather than others who experienced none of the hardship.

The initial impacts of this provision are purely administrative. Vessel owners or operators will be asked to provide evidence that they harvested scup between 26 January 1988 and 26 January 1993.

There are a number of impacts which will occur in the short term. The very fact that entry into the industry has been curtailed will give vessels with moratorium permits a scarcity value that they would not otherwise possess. Experience in the surf clam fishery has shown that, over time, the value these moratorium permits can accrue is substantial, though the magnitude in the scup fishery will be reduced because a larger quantity of permits will be issued.

Fishermen will also be impacted by the provision controlling vessel replacement. This is intended as a means to reduce the number of vessels in the fishery slightly by attrition.

A final impact is the reduction in flexibility which fishermen with genuinely lost vessels will have in replacing them. The current specification of the preferred alternative requires that replacement vessels not have a larger tonnage or registered length than the original. On balance, this limitation is considered necessary to inhibit a

large scale increase in the fishing power of the fleet through such replacements.

The MFCMA (Section 303(b)(6)) provides that a fishery management plan may establish a system for limiting access to a managed fishery in order to achieve Optimum Yield if, in developing such a system, the Council and the Secretary take into account six factors. A discussion of those factors and their application to the proposed limited entry program for the scup fishery follows:

A. Present participation in the fishery.

Present participation in the scup commercial fishery is estimated to range from 498 to 598 vessels. The proposed program of limited entry seeks to reduce the size of the fleet gradually through natural attrition. No vessel which actively fished for scup between 26 January 1988 and 26 January 1993 would be denied access to the fishery. Approximately 600 to 700 vessels would qualify for the moratorium permit.

B. Historical fishing practices in, and dependence on, the fishery.

Fishermen using otter trawls account for the majority of commercial landings; 74% based on 1983 to 1992 data (Table 12). Other important commercial gears include floating traps, paired trawls, pound nets, pots and traps, and hand lines. Many species are caught in conjunction with scup (Table 32). Economically, scup is an important species in the mixed trawl fishery (Table 32).

C. The economics of the fishery.

Scup are economically one of the most important species in the mixed trawl fishery. The provisions of this Amendment, in order to solve the overfishing problem, will impose restrictions on the industry. Limiting entry is the only tool available under the MFCMA to allow vessel owners and operators to recover, at least in part, losses incurred during the rebuilding program. If entry remains open, profits will likely be dissipated among new entrants following recovery.

D. The capability of fishing vessels used in the fishery to engage in other fisheries.

Scup vessels traditionally harvest other species. However, a number of species in the mixed trawl fishery have also been determined to be overfished. The Mid-Atlantic Council has determined that summer flounder and black sea bass are overfished and is preparing an amendment to the Bluefish FMP to eliminate the overfished nature of that resource. The ASMFC has adopted an Amendment to their Weakfish FMP to eliminate an overfished situation. The Mid-Atlantic Council has also prepared an Amendment to the Atlantic Mackerel, Squid, and Butterfish FMP to limit entry into the squid and butterfish fisheries.

The proposed limited entry program will not force operators out of the fishery unless they clearly do not meet a minimum standard of involvement and activity in the fishery. The program is designed to continue over a period long enough to allow the number of operators to seek its own equilibrium level through natural attrition.

E. The cultural and social framework relevant to the fishery.

Many of the vessels in the fishery are owned and operated by independent, individual fishermen who have obtained their position of ownership through individual enterprise. There is a strong tradition of scup fishing within families. Many of the family operated businesses are the most vulnerable to an influx of additional vessels because they are not in a position to survive long periods without revenue, or to operate at significantly lower levels of gross revenue.

F. Any other relevant consideration.

The management program is designed to rebuild the stocks. However, the vessels currently in the fishery will have to sacrifice income opportunity as a part of the rebuilding program. While the net benefits to society from the management program are not in question, the benefits to individual operators who make the sacrifice could quickly be lost or eroded among new entrants. The length of the period of sacrifice is unknown. It would be unfair to dissipate the investment of these operators among a flood of opportunistic new entrants when it begins to appear that the stock is rebuilding. The proposed program of limited entry allows traditional operators to recoup at least a portion of their sacrifice. Such a program will promote resource stability and industry efficiency which is in the best interests of the fishing community and the nation.

9.2.2.2.2. Minimum fish size

Historic commercial length frequencies were used as an estimate of potential short-term impacts of length limits on the commercial scup fisheries (Tables 41 to 44). Specifically, commercial length frequencies from the NMFS Weighout Data and North Carolina DMF from 1982 to 1994 were used to determine potential size limit effects. In general, size frequency data indicated that potential size limit effects increased from north to south, were gear dependent, and varied from one year to the next.

Based on NMFS weighout data, approximately 19% of the measured scup were less than 9" TL for all otter trawl vessels with sampled landings (Table 44). This gear is associated with most of the commercial landings coastwide; otter trawl vessels accounted for over 74% of the coastwide landings based on 1983-1992 General Canvass data (Table 12).
A 9" TL minimum size regulation would have a slightly greater effect on landings from floating traps, the other predominant gear in the scup fishery. Based on NMFS weighout data, almost 26% of the measured fish were less than 9" TL for the 316 scup obtained from this gear from 1983 to 1991 combined (Table 44).

Size limit effects were more pronounced in North Carolina landings from the winter trawl fishery (Table 42). From 1982 to 1994, the amount of measured fish less than 9" TL ranged from 31.0% to 90.2%. However, North Carolina accounted for only 2% of the coastwide commercial landings on average from 1983-1992.

Combined, a coastwide commercial size limit of 9" TL would have affected approximately 10% to 39% of the scup landed by commercial fishermen for the years 1983-1993. Assuming that undersized fish are not caught and discarded, minimum size regulations have positive impacts on the stock. In general, because minimum sizes increase the size at full recruitment, yields are increased as fishermen catch larger, heavier fish. In addition, minimum size regulations can increase the resilience of the stock to overfishing, i.e., the biological reference points (F_{max}) can increase. Finally, minimum size regulations can increase spawning stock biomass by allowing more fish to spawn. Sexual maturity data for scup indicate that 50% of the scup are mature by a size of 6.8" TL and almost all are sexually mature by the time they reach a size of 10" TL.

A preliminary economic analysis of the impact of a reduction in discards was conducted by Mark Simonitsch (see comment letter in Appendix 2) and made available to Council staff during the hearing process. This analysis was modified slightly by Council staff and the results are as follows.

According to the Northeast Fishery Science Center (NEFSC), approximately 9.4, 9.2, and 13.9 million scup of age 0, 1, and 2, respectively, were discarded yearly on average from 1989 to 1993. If these scup had not been discarded but were allowed to survive to age 3 (average weight of 0.638 pounds), approximately 14.5 million additional pounds of scup would have been available for harvest over a three year period. Assuming an ex-vessel value of $0.54 per pound (Table 30), these discarded scup could have generated ex-vessel revenues of $7.8 million.

In addition to the reduction in discards, the implementation of a 9" TL minimum size limit will also have positive economic benefits. According to the NEFSC, on average (1989-1993), approximately 16 thousand pounds of age 0, 1.5 million pounds of age 1, and 8.1 million pounds of age 2 scup are landed yearly. Using the mean weight at age for commercial landings, and assuming that a 9" TL scup is a fish of age class 3 or less (Table 1), this would represent approximately 4.1 million pounds of scup measuring less than 9" TL. If these fish are assumed to be

worth $0.18 per pound (Table 30), the potential forgone revenues from commercially landed scup measuring less than 9" TL would be $742,217 per year or approximately $2.2 million for a 3-year period.

However, this decrease in annual revenues are considered forgone earnings in one time period which may be realized later when the fish have grown to a larger size. If these scup were not landed but were allowed to survive to age 3, approximately 4.9 million additional pounds of scup would be available for harvest in the future. If these fish are assumed to be worth $0.54 per pound (Table 30), their potential ex-vessel value would be approximately $2.6 million. Thus the net benefit from delaying harvest until 9" TL would be at least $0.4 million for the three year period.

9.2.2.2.3. Minimum mesh size

Owners or operators of otter trawl vessels possessing 4,000 lbs or more of scup would only be allowed to fish with nets that have a minimum mesh size of 4.0" in the codend. During the development of this FMP, the Council and Commission were presented with data that indicated that the L_{50} (the length at which 50% of the scup are retained) is 8.3 inches for this mesh size (Table 45).

Retention lengths for scup were calculated by Mayo (1982) and are based on the relationship between length and body depth as derived by Smith and Norcross (1968). Although retention lengths were derived using body measurements, the results agree very well with selectivity experiments conducted by personnel at the University of Rhode Island (DeAlteris and Reifsteck 1990). Their results also indicated that the L_{50} for scup was 8.3" TL for a mesh size of 4.0" (Figure 14).

The results of the URI study indicate that approximately 80% of the 9" fish caught with a 4.0" mesh would be retained. These results suggest that a 9" minimum fish size combined with a 4.0" mesh may not decrease discards, i.e., a 4.0" mesh would catch a large number of 8" and smaller fish that would be discarded dead.

In addition to theoretical and empirical selectivity data, at-sea observations of the size distribution of scup caught and discarded are available from the NEFSC Sea Sampling Program. Scup discard data by mesh size based on 1989-1993 NEFSC sea sampling of otter trawl tows which caught and measured scup are summarized in Table 46. It should be noted that this characterization of scup discards is based upon a limited number of sea sampled tows, especially for mesh sizes greater than 3.0 inches. Because of the limited nature of available data, all tows that caught scup which were subsequently measured were included in the analysis. As a result, the data set includes many tows where scup was not the target species.

In general, discarding of scup was high for the tows sampled, especially for mesh sizes less than 4.0 inches. This was due to the fact that the vast majority of scup caught in these mesh sizes were less than 9.0 inches (Table 46). The percent of scup discarded was highest for 3.0 inch mesh (93%), followed by liners (78%), 2.0 inch (74%), 4.5 inch (48%), and finally was lowest for 4.0 inch mesh (40%). The percent of scup retained that were less than 9.0 inches for the 4.0 and 4.5 inch meshes was considerably less compared to the smaller mesh sizes. From this perspective, the 4.0 inch mesh requirement should greatly reduce the proportion of scup below 9.0 inches that would have to be discarded relative to the status quo (i.e., the allowance of the use of smaller mesh sizes.) However, sea sampling data do suggest that some proportion of the scup less than 9" TL encountered would be retained by a 4.0 inch mesh.

During public testimony at Council and Commission meetings, commercial fishermen stated that a 4.0" mesh was the appropriate mesh for a 9" TL fish. They suggested that the results of the URI study were flawed because researchers had used a covered cod end technique to estimate selectivity and, in fact, based on their personal experience at sea, a significant portion of the 9" TL fish that would encounter a 4.0" mesh would escape. Furthermore, these fishermen suggested that because most fishermen knew that this mesh was the appropriate size, compliance would be higher with the 4.0" mesh than it would be with a larger mesh size. As such, a greater reduction in the discard of small scup would occur with this mesh size then it would with a larger mesh.

Landings of scup represent only a portion of the fishing mortality experienced by the stock. Undersized scup,

those less than 9" TL, experience both discard mortality and deaths due to encounters with commercial gear. The amount of fish dying due to these causes can be high with the current mesh sizes now used in the fishery, that is, an effective mesh size of 2.0" or less. Sea sampling data indicate that the weight of the discarded fish may be almost equivalent to the weight of the landings in some years. Discard rates are higher in years of good recruitment, that is, years when more small fish were available.

Scup are a component of the mixed trawl fishery in Southern New England and the Mid-Atlantic. Although Sea Sampling data indicate that fishermen may differentiate between species on a per tow basis (i.e., target a single species on a tow), fishermen land many different species on a per trip basis. Based on NMFS weighout data, scup are most frequently landed with *Loligo* squid, Atlantic mackerel, and silver hake. In fact, for trips landing 4,000 or more pounds of scup per trip, more *Loligo* squid were landed than scup in 1992 (Table 32).

However, this predominance of *Loligo* may reflect reduced availability of scup in 1992. Based on 1983 to 1987 data, the landings of otter trawl vessels landings 1,000 lbs or more of scup were composed primarily of scup (41%) (Table 47). *Loligo* accounted for only 17% of the landings.

The 4000 pound threshold would not affect the majority of the vessels or trips that landed scup in 1992 or 1993. Based on NMFS weighout data, a threshold of 4000 lbs per trip would have affected approximately 27% of the vessels and 10% of the trips landing scup in 1992 and 1993 (Tables 48 and 49). However, these trips accounted for 80% of the scup landed by otter trawl vessel in 1992 and 1993. Also, regulations that allow multiple nets on-board would allow fishermen who traditionally targeted multi-species on a trip, to fish for and retain other species with small mesh until the 4,000 pound threshold of scup was reached. These fishermen would then have to use the 4.0" mesh if they decided to target more scup. Once the threshold was reached fishermen would have to properly stow other cod ends for the remainder of the trip.

Landings of scup by fishermen targeting *Loligo* squid on the same trip could be affected by these regulations. Based on 1992 NMFS weighout data, 45% of the vessels and 29% of the trips landing 2,500 pounds or more of *Loligo* squid, landed over 95% of *Loligo* landed by all *Loligo* otter trawl fishermen (Tables 50 and 51). Based on this 2,500 pound threshold, scup comprise slightly more than 6% of the total fish landed on these trips (Table 52). However, the total pounds is slightly more than 50% of all scup landed by otter trawl fishermen in 1992.

In general, these regulations would modify some traditional fishing practices. The fishermen most affected by these regulations would be those fishermen who targeted scup first on their trip and retained more than 4000 pounds of scup, before switching to other species for the remainder of their trip. Although, this group of fishermen is likely to be relatively small compared to total number of fishermen landing scup, landings of other species taken as bycatch by these fishermen could be affected.

Minimum mesh and fish size provisions will ensure that discards of sub-legal scup will be reduced. Greater gains will accrue to fishermen through protecting scup until they reach legal size. Discard mortality is extremely high for trawl caught fish and the problem is particularly acute when new year classes are abundant. The benefits of the proposed minimum fish size and mesh size regulations will be manifested through a more balanced age structure of the scup stock. Further, waste will be reduced due to (1) lower total discards and (2) lower mortality of net encounter.

The minimum net mesh size and threshold level could be changed annually, if appropriate, following the Scup FMP Monitoring Committee process set forth in 9.1.2.2.

9.2.2.2.4. Maximum roller diameter

It would be illegal for owners or operators of vessels issued moratorium permits to use roller rig trawl gear equipped with rollers greater than 18" in diameter. A 18" diameter corresponds to a maximum roller diameter used by some states to regulate this gear in state waters.

Roller diameter is correlated with vessel size and the ability of vessels to fish rough, hard bottom areas. Larger

roller sizes require larger engine sizes to pull the net. An engine size with an associated horsepower of 800-900 hp is required to tow a net with 18" to 24" rollers whereas 10" to 12" rollers can be pulled by a boat using a-175-200 hp engine (D. Simpson pers. comm.).

Information is lacking as to the relationship between roller diameter and the size of obstruction that it can clear. In general, 10-12" diameter rollers can be used for fishing over rough bottom that can include ledges and cliffs. Limitations on roller size will make some areas of the ocean inaccessible to trawls by preventing fishermen from trawling in the harder, rough bottom areas. Thus scup associated with these areas would be protected from harvest allowing more fish to grow to maturity and spawn increasing stock biomass and yields.

9.2.2.2.5. Minimum escape vent requirement

Scup pots and traps would be required to have a circular escape vent of with a minimum of 3.1" in diameter or a square escape vent with a minimum of 2.25" for each side or an equivalent rectangular escape vent. The escape vent provision would be implemented at the start of the first calendar year following FMP approval so that fishermen would not be required to pull their pots and add vents in the middle of the season.

The body depth/length relationship derived by Smith and Norcross (1968) was used to derive the minimum sizes of scup that would be retained by fish traps fitted with escape vents (Table 53). An escape vent of 3.1" would allow scup less than approximately 9.0" TL to escape from the trap before it was brought to the surface.

Pots and traps accounted for approximately 2% of the total commercial landings for the period 1983-1992. Although only a small portion of scup are landed by fishermen using this gear, escape vents will allow for some undersized fish to escape alive increasing the amount of mature fish in the stock and increasing yields.

9.2.2.2.6. Degradable fasteners in traps

Scup pots would be required to have hinges and fasteners of one panel or door made of degradable materials. These materials would allow the door or panel of a trap to fall away from an unattended trap. This would prevent lost traps from "ghost fishing," i.e., continuing to catch and retain fish that could not be removed from the trap. Thus scup and other species of fish and invertebrates typically caught by these traps could escape preventing waste and lost yields in a number of fisheries.

9.2.2.2.7. Seasonal and area closures

Gear-specific seasonal and area closures could be implemented to control fishing mortality and reduce discards in the commercial scup fishery. During a closure all gear capable of catching scup would be removed from the water.

Seasonal and area closures would be based on the recommendations of the Scup FMP Monitoring Committee to the Council and ASMFC Board. The Council and Commission would consider those recommendations and submit their recommendations to the Regional Director. The Regional Director would then set the season and area closures.

NMFS General Canvass Data from 1988 to 1992 were used to determine the potential impact of seasonal closures on commercial landings of scup. The ASMFC technical committee decided that these years would be most representative of current conditions in the fisheries.

The Committee decided that seasonal closures for scup fishermen be applied on a coastwide basis. Calculations restricted the smallest unit of closure to one week. Seasonal closures were derived assuming that fishermen would recoup 0% and 15% of their landings during the open season. The 15% level applied to all mobile gears, including hook and line. Because of the fixed nature of the pots and traps, only a 0% (no recoupment) level was used for these gears.

If a recoupment level was assumed, calculations were made using a simple algorithm that accounted for changes in landings per day (LPD) during the open and closed seasons. For example, for scup landed by otter trawl fishermen, the time period from November 15 to January 31 accounted for 28% of the landings during 1988-1992. A closed season during these months would result in a fishing season that would be open for 8 1/2 months (February through November 14) or approximately 288 days. The amount of discretionary time during this open period would be 43 days (15% x 288 days). Since 72% of the landings occurred during the open period, the LPD during the open period would be 72 divided by the days fished or 245 (288-43). This LPD multiplied times the discretionary time (43 days) would result in a recoupment of 13%. As a result, the realized reduction in landings for the closed period February through May would be 15% (28% - 13%).

Seasonal closures ranged from slightly more than one month to four months depending on location (north or south) and gear type (Table 54). Seasonal closures could achieve the desired reductions if the following criteria were met:

1. The level of discretionary time used to derive the reductions is realistic. The assumed value of 15% may be an underestimate for some mobile gears.

2. All gear capable of catching scup be removed from the water during the closed period. Without such a provision, fishermen would continue to fish for other species during the closed period, catching and discarding scup in the process. For trawl fisheries, the technical committee recommended that mesh sizes of 5.5" diamond mesh or larger could continue to operate.

3. Landings patterns do not vary much from one year to the next, i.e., anticipated landings in year three of the management program are similar to the landings observed for 1988-1992.

Seasonal closures could be combined with area closures to reduce discards and prevent quota overruns. For example, based on 1989-1993 sea sampling and weighout data, statistical areas 537, 539, 616, and 622 (Figure 15), accounted for 75% of the landings (Table 55). Discard rates in these areas were approximately 40% or higher for these years (Table 56).

Any effective area/seasonal closure would require that NMFS be able to track commercial vessels on a real time basis to ensure compliance. Such a system could be comparable to the Vessel Monitoring System that will be implemented for groundfish and scallops by NMFS.

Seasonal and area closures would be designed to complement the quota based management system and reduce discards in the commercial fishery. However, it is important to note that seasonal and area closures would have to be designed such that fishermen would not negate seasonal and area closure effects by increasing effort or efficiency during the open season or area. In addition, the economic impact of the requirement that all gear capable of catching scup be removed from the water during a closure would have to be considered in regard to the catch of other important species that have been traditionally landed with scup on the same trip.

9.2.2.2.8. Commercial quota

Beginning in year 2, a quota would be allocated to the commercial fishery to reduce exploitation rates on the fully recruited age groups (i.e., fish larger than 9" TL). The commercial quota will be derived from a total allowable catch (TAC). The TAC will be calculated each year based on the target fishing mortality rate and the projected stock size estimates derived from annual stock assessment information.

The TAC will be allocated to the commercial and recreational fisheries based on the proportions of commercial and recreational catch for the years 1988-1992. Based on this data, 78% of the TAC would be allocated to the commercial fishery. An estimate of total coastwide discards would then be subtracted from the commercial TAC to derive the allowable level of harvest (commercial quota).

In determining how to allocate the TAC to the commercial and recreational fishermen, the Council and Commission examined several alternatives that allocated either catch or landings. They determined that allocating the TAC to the fisheries and then removing the discards to determine the annual harvest limits was fair and equitable to both the commercial and recreational fisheries.

A TAC has not yet been derived for 1997, the second year of the management program. As such, catch data for 1988-1992 were used to derive the average catch for those years to calculate a possible TAC for illustrative purposes. Based on these data, a 32% reduction in exploitation would equate to a TAC of 16.83 million pounds.

Based on a TAC of 16.83 million lbs, 13.13 million lbs would be allocated to the commercial fishery and 3.70 million lbs to the recreational fishery. Then, assuming an average discard rate based on 1988-1992 data for each fishery, and subtracting these discards from the catch, 5.64 million lbs would be allocated to the commercial fishery as a quota and 3.46 million lbs to the recreational fishery as a harvest limit (Table 57). If total discards (commercial and recreational) were removed from the TAC and then the landings allocated to each fishery (70% commercial and 30% recreational based on historic percentages), the commercial quota would have been slightly larger at 9.1 million lbs and the recreational harvest limit lower at 2.73 million lbs. Under this rejected alternative, the recreational fishery allocation would have been reduced because of high discards in the commercial fishery, i.e., the higher the commercial discards the lower the recreational harvest limit.

However, under the chosen allocation system, the commercial fishery has a direct incentive to reduce discards, i.e., the lower the discards the higher the quota for a given TAC. For example, if commercial discards were reduced by 30% to 5.24 million lbs and the TAC remained constant at 16.83 million lbs, the commercial quota would increase to 7.89 million lbs (Table 57). Conversely, if discards were to increase 30%, the commercial quota would be reduced to 3.39 million lbs. In both cases, the recreational harvest limit would remain the same at 3.46 million lbs. In addition to the direct benefit of an increase in quota, a reduction in discards will benefit both the commercial and recreational fisheries as fish survive to grow larger and spawn increasing the biomass available for harvest.

In summary, changes in the discard rate in the commercial fishery would affect the commercial quota when allocations are based on catches as well as landings. However, changes in the discard rate in the commercial fishery would only have a direct effect on the recreational harvest limit when allocations are based on landings. When allocations are based on catches, the commercial sector would receive the full effect of a change in the rate of discards, i.e., commercial quota would increase proportionally to the level of discard reduction. Under allocations based on catches, each fishery would be treated fairly with respect to their contribution to discards and the effect of those discards on their shares of TAC.

During the first year of the FMP, a system to distribute and manage the annual commercial quota will be developed by the Council and Commission. Coastwide, regional and state by state quotas will be considered in combination with different fractions of the fishing year, e.g., bimonthly quotas. The following is an analysis of two possible management systems; a state-by-state and a bimonthly, coastwide system.

In a state-by-state system, quotas would be distributed to the states based on their percentage share of commercial landings for the period 1988-1992. Assuming a coastwide quota of 5.64 million pounds, quotas would range from 7,890 lbs to 2.46 million lbs based on these percentages (Table 58).

A state-by-state quota system could allow for the most equitable distribution of the commercial quota to fishermen. Specifically, states under this alternative would have the responsibility of managing their quota for the greatest benefit of the commercial scup industry in their state. States could design allocation systems based on trip limits and seasons. States would also have the ability to transfer or combine quota increasing the flexibility of the system to respond to year to year variations in fishing practices or landings patterns.

However, state-by-state allocations would negatively affect fishermen who land in those states that do not have the capability of regulating a quota. Based on the quota system implemented for summer flounder, a few states have not been able to establish trip limit systems that ensure a continuous and steady supply of product over the

season for producers and/or a fair an equitable distribution of flounder to all fishermen who have traditionally landed summer flounder in their state. In addition, some states have had problems coordinating their regulations with neighboring states to prevent large scale landings by fishermen in states with the most favorable trip limits. A similar situation could occur if a state-by-state system was implemented for scup.

As one alternative to a state-by-state system, the coastwide quota could be allocated on a bimonthly basis. The Regional Director would be required to prohibit landings by federally permitted vessels when any bimonthly quota had been reached.

The quota must apply throughout the management unit, that is, in both state and federal waters. All commercial landings during a bimonthly period would count toward the quota for that period. When the quota had been landed for a bimonthly period, fishing for and/or landing scup would be prohibited for the remainder of the period.

A bimonthly quota system could allow for an equitable allocation of the commercial quota to northern and southern participants as well as between the smaller day boats and larger offshore vessels. Due to the seasonal nature of the scup fishery, the quota would have to be divided into bimonthly units. To minimize effects on traditional landings patterns, the allocation to each period would be based on past landings instead of a system that divided the quota equally over the six periods. Based on 1988-1992 data, 22.4% would be allocated to period 3 (May-June) and only 5.3% to period 4 (July-August) (Table 59). The bimonthly allocations would range from 298,638 lbs to 1,713,199 lbs based on a annual quota of pounds 5.63 million lbs (Table 59). Based on state data for those years, fishermen would be able to maintain traditional landings patterns in most states (Tables 60 and 61).

A coastwide system would allow fishermen to land in any port along the coast and all commercial landings during a bimonthly period would count toward that quota for that period. When the quota had been landed for a bimonthly period, fishing for and/or landing scup would be prohibited for the remainder of the period. Landings in excess of the allocation for the period would be subtracted from the following years's quota for the same period. Trip limits would have to be implemented. Bimonthly allocations without trip limits would encourage derby-style fishing practices that would allow the quota to be landed by larger, more mobile vessels at the beginning of each period. As a result, supplies of scup would be discontinuous and smaller boats would be disadvantaged.

Trip limits would be established and modified throughout the two-month period to allow for a continuous supply of product and equitable distribution of scup to fishermen using both small and large vessels. For example, almost all of the landings in period 1 are attributable to fishermen using otter trawl vessels. A 10,000 pound trip limit could be established for the beginning of period 1. The limit would decrease to 5000 lbs when 50% of the allocation was reached, 1000 lbs when 75% of the quota was taken, and 500 lbs when 90% of the landings were reached.

Different trip limit systems could be designed for each period to ensure equitable distribution over each two-month period. Unlike a system where states have the flexibility to design their own systems, NMFS would be responsible for implementing trip limits for each period.

An overall quota for the commercial fishery is important to control mortality on the scup population. The minimum size regulation may reduce discard and escape mortality of undersized scup. However, decreases in mortality would occur only with the smaller fish; reductions in mortality would not occur for scup once they reached the legal size of 9" TL. Essentially the fish that contribute the most to the spawning population, fish 9" TL and larger, would continue to experience high mortality rates; overfishing would not be reduced. The commercial quota will control mortality on fully recruited, older fish.

This management measure will result in a short term reduction in the marketable catch and long term benefits as more fish mature and increase the size of the spawning stock. In addition, a reduction in the mortality of small scup will allow for an increase in yield or harvest as small fish that were previously killed grow larger and add weight to the stock.

Combined, these management measures, the minimum mesh and size regulations and the commercial quota, will prevent overfishing and reduce waste. As the stock rebuilds and exploitation rates remain constant, commercial quotas would increase.

9.2.2.3. Recreational Fishery

9.2.2.3.1. Possession limits, minimum size limits, and seasonal closures

Based on 1983 to 1994 MRFSS data, only 14% and 7% of the scup caught by recreational fishermen in the North and Mid-Atlantic, respectively, were caught in the EEZ (Table 23). In 1994, 15% of the total scup caught by recreational fishermen in these subregions originated in the EEZ. Thus, the effect of a 7" TL minimum size in the EEZ would be inconsequential for both fishermen and the stock.

However, because most of the recreational landings are attributed to state waters, minimum size limits would effect state landings. Based on 1990-94 intercept data, almost 4% of the measured scup were less than 7" TL for scup landed along the coast (Table 62). Analysis of intercept data from the states from New Jersey through North Carolina indicated that anglers harvested smaller fish in these states. Assuming a post-release mortality of 15%, the percent reduction in the number of scup killed by anglers associated with the minimum size limits would be 3.2% for the coast based on combined 1990-1994 data (Table 63).

The assumed level of post-release mortality (hooking and handling mortality) used in the above calculations is based on a study conducted in 1981. Howell and Simpson (1985) estimated hooking mortality for 360 scup caught by angling between July-September 1981. Scup were caught using No. 4 and No. 6 Mustad stainless steel hooks baited with squid or sandworms. Mortality estimates were derived by assuming that all fish hooked in the gills or esophagus were lethally injured (100% mortality) and all others would survive (0% mortality). Based on these assumptions, hooking mortality increased from 0% to 15% with increasing lengths of fish.

Based on the fishing mortality reduction schedule adopted by the Council and Commission, exploitation would have to be reduced 32% in year 2 to achieve the target F. MRFSS data for 1990-94 indicate that catch frequencies for scup ranged from 1 to 200 fish per day on a coastwide basis (Table 64). Based on these data, the reductions in exploitation associated with various possession limits for 1 to 50 scup per trip were calculated (Table 65). The coastwide possession limit associated with a 32% reduction in exploitation is 15 fish. The possession limit would increase when combined with size limits and/or seasons.

Analysis of scup recreational data indicated that nearly 90% of the annual landings occurred from July through October for the years 1990 to 1994 combined (Table 66). Seasons based on this MRFSS data could be established on a coastwide basis to reduce exploitation. A season could be combined with the size limit to allow for higher possession limits.

9.2.2.3.2. Evaluation of framework provisions

Based on a recommendation by the Council and the ASMFC Policy Board, the Regional Director and the states in their respective jurisdictions could modify the possession limit to between 0 and 50 scup per angler, the size limit from 7" TL to 10" TL, and open or close the fishing season for the entire year. Recreational limits would be revised according to specific criteria to account for changes in stock abundance and meet the time frame of the fishing mortality reduction strategy.

Short term impacts due to restrictive limits would be outweighed by the long term benefit of conserving the scup stock for future generations of recreational anglers. The possession limit could be as high as 50 scup, the size limit as low as 7" TL, and the season open throughout the year. However, decreases in restrictions would only occur under circumstances of increased scup abundance. Since the prevailing rate of fishing success would reflect increased stock abundance, the number of anglers catching their limit would be high for overly restrictive limits. Decreasing recreational restrictions by raising the possession limit, decreasing the size limit, or increasing the

length of the fishing season would therefore decrease the number of affected anglers and have less adverse impact than the limit in force at the time.

If stock levels are allowed to continue to decline or the amount of effort by recreational anglers increases (more trips or more people) disproportionately to increases in stock size, landing rates for anglers would decline regardless of specific limits. Adverse impacts would therefore be measured against the prevailing rate of fishing success and would not be as great as when scup are abundant or angler effort is less. Although it is not possible to estimate exact impacts for hypothetical levels of scup abundance, it is clear that more restrictive limits than those proposed initially would have substantially less impact than a total fishery closure precipitated by stock collapse.

A zero possession limit or a season closed for the entire year would prohibit retention of scup by recreational fishermen and would have significant impacts, depending on the level of fishing success currently operative and the value anglers place on retention of catch. A 10" TL minimum size, the most restrictive minimum size limit proposed for this framework measure, would have had an associated percent reduction in exploitation of nearly 57% based on 1990-1994 coastwide MRFSS data (Table 63). These severe restrictions would only be implemented in the event that the stock continues to decline and stock collapse becomes imminent.

Reductions associated with these limits assume 100% compliance by recreational fishermen. Levels of noncompliance will be considered in annual reviews when assessing the impact of bag/size limits on the recreational fishery and determining if modification to the possession/size/season limits are necessary. A thorough and consistent enforcement program is required for this or any other FMP to succeed.

9.2.2.3.3. Recreational Harvest Limits

Beginning in year 2, a recreational harvest limit would be allocated to the recreational fishery to control fishing mortality. The harvest limit would be based on stock assessment information on projected stock size estimates for that year. Estimates of stock size coupled with the target fishing mortality rate would allow for a calculation of total allowable catch (TAC). An estimate of discards would then be subtracted from the TAC to derive the allowed level of landings (harvest limit). Based on the historic proportions of commercial and recreational catch for 1988 to 1992, 22% of the total target would be allocated to the recreational fishery. An analysis of this system was presented in section 9.2.2.2.8 above (commercial quota).

Because stock size has not been projected for 1997, the second year of the management program, landings data were used from 1988-1992 to derive average landings for those years to assess the potential impacts of the harvest limit. Based on these data, a 32% reduction in exploitation would equate to a recreational harvest limit of 3.46 million lbs in the second year of the management program (Table 57). This harvest limit would be achieved on a coastwide basis through a system of possession limits, size limits, and/or season. Year end total recreational landings would be compared to the harvest limit to ensure that the landings target was not exceeded.

9.2.2.4. Administrative, enforcement, and information costs

Currently, a reporting system is being implemented by the NMFS. This system has been designed to collect information for various fisheries according to their respective FMP's.

The cost of enforcing the scup size limit equals the value of the additional capital and labor resources required to expand current enforcement efforts to encompass the new regulations. Minimum size regulations for scup are currently enforced in Rhode Island, Connecticut, New York and New Jersey. The additional cost to existing dockside enforcement in these states from the implementation of the minimum size limit alternative is expected to be minimal. In addition, in states with minimum size regulations for other species, additional reporting and enforcement from scup regulations should also be minimal.

It is assumed that most individuals that will potentially apply for scup operator permits already hold operator permits for summer flounder, multispecies, and/or scallops. It is also expected than since most of the vessel's

operators already submit logbook reports under the Northeast Multispecies, Scallop, and Summer Flounder FMPs, the implementation of this plan would not affect the reporting process to any significant extent.

9.2.2.5. Prices to consumers

In recent years, the ex-vessel price per pound of scup caught commercially has shown a slight upward trend, indicating that supply and/or demand factors may be shifting. For the period between 1983 to 1992, the highest price for all size categories of scup occurred in 1989, at $.79 per pound. NMFS weighout data for 1993 indicate an average ex-vessel price of $.58 per pound coastwide, ranging from $0.18 per pound for pins to $1.33 per pound for jumbos. Continual increase in the demand of fish and shellfish in general (due to health awareness) could be the cause for increased ex-vessel revenue. However, the effects of this factor on ex-vessel price can not be address quantitatively at the time.

Potential reduction in landings and value attributed to this plan in its early years are not expected to significantly increase overall ex-vessel scup price. Future increases in scup supply due to reduction in mortality, higher harvest weight, and stock stability, should maintain the consumer scup price level.

9.2.2.6. Redistribution of costs

The FMP is designed to give fishermen the greatest possible freedom of action in conducting business and pursuing recreational opportunities consistent with the objectives. It is not anticipated that the proposed management measures will redistribute costs between users or from one level of government to another.

9.2.2.7. Fishery impact statement

The impacts of the proposed actions on participants in the scup fisheries including analyses of biological, economic, and social impacts are described in section 9.2 (Analysis of Beneficial and Adverse Impacts of Adopted Management Measures), in Appendix 1 (Alternatives to the Amendment) and in Appendix 2 (Regulatory Impact Review) of the FMP. The Mid-Atlantic Fishery Management Council commissioned two reports to assess the probable socio-economic impacts of management options identified in the draft FMP. The first report titled "Part 2, Phase I, Fishery Impact Statement Project, Mid-Atlantic Fishery Management Council" by McCay *et al*. (1993), described the people and communities involved in the region's fisheries. The second report titled "Social and Economic Impacts of the Draft Management Plans for Black Sea Bass and Scup" by Finlayson and McCay (1994), assessed the probable socio-economic impacts of management options identified in the draft FMP. This section is intended to further describe the potential effects of the proposed FMP on the people and the communities involved in the scup fisheries throughout the region based on these reports.

The principal approaches employed to compile the information presented in the two reports mentioned above were open-ended phone interviews, port visits, data analysis, and interviews of people involved in different aspects of the fishing industry. It is important to note the potential biases in the comments provided by some of the individuals interviewed. In the second report, Finlayson and McCay (1994) stated that:

"When assessing the claims and opinions of members of the fishing industry cited and quoted in this report, the reader should remain critically aware that in many if not all cases there is an element of self-interest at work. This is particularly true where there is a real or perceived conflict between gear sectors and/or regions in competition for a limited, and declining, resource, and where they fear that draft regulations will result in an unequal, and hence unfair, distribution of economic impacts among the user groups."

The first report (McCay *et al*. 1993), identified ports that appeared in the top 10, in terms of landed value, for any of the species that the Mid-Atlantic Fishery Management Council has full or shared responsibility for the preparation of Fishery Management Plans (tilefish, scup, black sea bass, summer flounder, dogfish, Atlantic mackerel, *Loligo* squid, *Illex* squid, butterfish, weakfish, bluefish, and angler or monkfish). The ports identified as relevant in the first report covered ports from Chatham, Massachusetts, to Wanchese, North Carolina. The second

report (Finlayson and McCay 1994), identified ports that met one or both of the following criteria: the port or closely related port group accounted for more than 1 percent by landed value of the total landings of black sea bass or scup, or the landings of black sea bass or scup accounted for more than 1 percent of all commercial landings in that port or port group (Finlayson and McCay 1994). The ports identified as relevant on the second report covered ports from Gloucester, Massachusetts, to Hampton Roads, Virginia.

Landing statistics and values are from the National Marine Fisheries Service weighout data. Information about the ports is from interviews with key informants and from earlier studies conducted by McCay's research team (McCay *et al.* 1993).

In this section, both reports will be used to assess the socio-economic implications of the proposed FMP at the individual and aggregate level as permitted by the available information. For a more through review of the potential socio-economic implications of the FMP, refer to these reports.

Table 67 shows port groups ranked by landed value of scup as a percentage of the value of port landings for all species. In 1992, scup accounted for approximately 10% of the value of total port landings in Freeport/Brooklyn; 6% in Montauk; 5% in Point Judith; 3% in Cape May; 2% in Stonington; and less than 2% for the rest of the ports. Three ports accounted for 65% of all scup landed value in 1992: Point Judith, Montauk, and Cape May (Table 68). Newport is an important component of the two sets of ports ranked above. However, due to the confidentiality of data it was not ranked (see footnotes in Tables 67 and 68). Point Judith accounted for approximately 26% of the total scup landed value; Montauk 23%; Cape May 15%; Freeport/Brooklyn 6%; and less than 4% for the rest of the ports. Scup landings and values are higher for ports located in the northern part of the region (Tables 67 and 68).

The degree of reliance on scup for selected ports from Gloucester, Massachusetts, to Hampton Roads, Virginia, is low . One port represented more than 10% of the total landed value of scup (Freeport/Brooklyn), with the rest of the ports having a value somewhere between 0 to 6% (Table 67).

9.2.2.7.1. Port level - Commercial Fishery

The port discussion includes a description of the fleet (number of vessels and type of gear employed), a description of the landings (species and value) and a general description of the community and port characteristics as permitted by the available information. The discussion provided in the port description is based on findings by McCay *et al.* (1993). The overall description may vary from port to port due to the confidentiality of data.

9.2.2.7.1.1. Freeport/Brooklyn Area, New York

According to McCay *et al.* (1993), there is a total of 71 permitted commercial fishing vessels in Freeport and 33 in Brooklyn. The average length, gross tonnage and horse power are slightly larger in the Brooklyn vessels than in the Freeport vessels.

The total value of all species landed in the area was about $4 million in 1992. Surf calms represented the most important fisheries in terms of landed value (45%), followed by *Loligo* (13%), summer flounder (11%), scup (10%), and lobster (6%). In 1992, the majority of the landed value by gear type corresponded to bottom otter trawls with 48%, and surf clam dredges with 45%. The four major species targeted by otter trawlers in the Freeport area are whiting, winter flounder, summer flounder and squid.

There are three lobster boats working out of Freeport. Some fishermen have unsuccessfully tried potting for scup and black sea bass, and according to some Freeport fishermen, no one in Nassau County fishes with traps (McCay *et al.* 1993). Inshore and offshore lobster potting accounted for about 6% of the total landed value by gear in the area in 1992.

The otter trawl boats pay on the share system, and most boats use a captain and a crew member. The dredgers

are all owner operated and mostly day boats.
The level of tourism in the Freeport area is substantial. Freeport is located near Jones Beach and has a number of charter boats.

9.2.2.7.1.2. Montauk Area, New York

The Montauk area ports (Montauk, Shinnecock/Hampton Bay, and Greenport) had a total of $28 million in landings of fish and shellfish in 1992. Scup accounted for about 6% of the total landed value in the area in 1992, ranking sixth, after *Loligo* squid, tilefish, lobster, silver hake, and big eye tuna. The Montauk area is characterized by a high diversity of species and gear types, reflecting the coexistence of estuarine, inshore, and offshore fisheries. An interesting fishing innovation called "double crewing" has developed in Montauk and other ports. The double crew strategy provides the boats and the crew with a greater degree of operational flexibility. According to McCay *et al.* (1993):

"Boats that double crew have two sets of captains and crews. In a double crewing situation one set of captain and crew comes in and unloads the boat and then the other captain and crew comes on board and takes the boat out for another trip. "They are willing to spend money, they are making money, and they are doing it by making the boat work harder," said one informant regarding double crewing. This same person commented that one of the reasons they are working the boats harder today in 1993 than fifteen years ago are the large mortgages that are on these vessels that they did not have before."

There are between 20 and 35 draggers in Montauk. The major gear types, in terms of percentage of landed value in 1992 were: bottom dragging (finfish) 40%, tilefish longlining (25%), and pelagic longlining (swordfish and tuna) 18%. Handlining (scup, black sea bass, and Atlantic mackerel) accounts for 6% of the total landed value.

Loligo squid is the main target of the Montauk fishing fleet. Scup contributes 7% of the total landed value per species for bottom draggers. The typical dragger in Montauk is owner operated, and vessels might have a second captain and a double crew.

There are approximately fifty-five commercial fishing boats operating in the Shinnecock/Hampton Bays area. Most of these boats are draggers. Otter trawlers and dredgers (scallop/ocean quahog) accounted for 66% and 24% of the total landed value for all species in these ports in 1992, respectively.

The top four species in landed value in 1992 in this area were: *Loligo* squid, silver hake, ocean quahog, and surf clam. They contributed for about 68% of the total landed value. *Loligo* accounted for 27% of the total landed value (97% caught by trawlers). Scup ranked sixth, with 6% of the total landed value for the same period.

Loligo squid and whiting are the major targeted species for draggers from the Shinnecock/Hampton Bays area, representing 66% of the total landed value for all species in 1992. Scup ranked third with 8% of the total landed value. *Loligo* squid and whiting are both targeted all year round. Scup is targeted for about three to four weeks as they migrate through the Hampton area.

Sink gill netting and inshore lobster potting were the third and fifth fisheries in terms of total landed value in 1992, (5% and 1%, respectively). However, they do not target scup.

Pound nets represented 0.13% of the total value for all species in 1992. *Loligo* squid accounted for approximately 34% of the total landed value for pound nets in 1992, scup for 16%, winter flounder for 14% and butterfish for 10%.

Based on McCay *et al.* (1993), fishery trends and changes in Shinnecock indicate that:

"Whiting has always been targeted but more so in the last six months (July-December 1993) because of a new market for juvenile whiting. Within the last year (1993), very small whiting has become a big export item to

Spain. The Spanish want the really small whiting; it is prepared by putting the tail in the mouth like a donut and frying it. There are about a half a dozen boats targeting small whiting as of December 1993. There is an export operation in Greenport for these small whiting."

"According to informants, whiting and squid are plentiful right now, (December 1993). Scup are becoming harder and harder to get every year. The species caught by Shinnecock boats depends on availability and the market. If whiting is in big demand, the fishermen go for that."

Ninety-five percent of the fish (except squid, swordfish, and tuna) in Shinnecock goes to Fulton Market in New York. Swordfish and tuna are sold by the vessel owner. Squid is usually sent to New Jersey for processing.

The social nature of the Shinnecock fishing community indicates that most boats are owner operated. Many fishermen in Shinnecock have families in the commercial fishing industry. It is also evident that father-son operations are more common in this community than in Montauk. The crews are mostly integrated by local men that are not usually family members. Crews are paid using the share system. Most crew members in Shinnecock are white males with about 60-70% of them having a high school education.

At the present time, there are no women fishing in Shinnecock. However, fishermen's wives have been very active in pushing for the maintenance of the Shinnecock Inlet.

In addition to a stable year-round population, Hampton Bays has a large tourist community. Numerous businesses such as bars, banks, liquor stores and restaurants cater to the tourist. The growth of the service industry in the area provides additional opportunities of summer employment in the community. Overall, construction, fishing and tourism are the largest sources of employment.

In Shinnecock a small number of support businesses to the fishing industry exist. There is one craftsman who does boat work exclusively. Welders and wood workers can do wood work as well as other types of work. Their electronic repairmen in the community are very specialized in marine electronics.

Three principal types of fishing are done by Greenport vessels: bottom dragging, offshore and inshore potting, pound netting and gillnetting. Between ten and twenty otter trawlers are home ported in Greenport. These bring about 60% of the total landed fish value. Offshore and inshore potting accounted for more than 25% of the landed value by gear in 1992. There are ten boats in the pound net fishery, which account for about 6% of the total landed value by gear in 1992. The four major species caught as a percent of the total landed value by all gear in 1992 were: lobster (28%), *Loligo* squid (13%), silver hake (12%), and scup (9%).

Loligo squid, whiting, scup, winter flounder, and summer flounder were the top five species by landed value for Greenport otter trawlers in 1992, with 21%, 20%, 14%, 10%, and 10% of the total landed value of otter trawlers, respectively. Scup is typically targeted in the late fall and early winter. *Loligo* squid is targeted in the spring and fall and it is also a bycatch with whiting. Summer flounder are targeted during the summer and through the fall.

Lobster potting is the second most important fishery in Greenport in terms of landed value. Scup is not an important bycatch of the inshore lobster fishing.

Pound-net fishing accounts for a small percentage of the total landed value in Greenport. In 1992, scup accounted for about 16% of the total landed value for pound-netters.

The number of boats engaged in fishing activities in Greenport has been increasing in the last two to six years. This has created an upward trend in the importance of ancillary services such as ice and fuel. Other support businesses include a local welding business and Greenport Yacht and Shipping. These last two businesses are diversified and serve both commercial and recreational boats.

There are three packing facilities in Greenport. Most of the fish either go to Fulton market in New York or are exported (juvenile whiting).

To an extent, family is important in commercial fishing in Greenport. About half of the boats may have a family member (primarily a son) working on the boats. During the summer a number of high school students may work aboard a relative's boat.

The crews are full-time, local men. Most fishermen are high school or college graduates. The average age of the crew members and captains is between 25 and 35, and 40 to 60 years of age, respectively. The crews are typically paid using the share system.

There are no women working as part of the crews or the packing staff. However, some wives may be involved in other support aspects of the fishing operations.

The ethnic background of the fishing community in Greenport is quite diverse. There are African-Americans, Puerto Ricans, Russians and Poles working either as crews or as packing staff.

9.2.2.7.1.3. Point Judith, Rhode Island

Point Judith has a large fishing fleet of trawlers, gillnetters and lobster boats. Estimates on the number of boats in the area vary. However, about 200 commercial boats dock in Point Judith, including 80 trawlers, 30 gillnetters, and approximately 100 lobster boats. Otter trawls accounted for 67% of the total landed value of all gear, while lobster pot fishing accounted for 28% of the total landed value in 1992. Of the total landed value by species caught with otter trawlers, *Loligo* squid was first with 23% of the total, scup ranked fifth with 7% of the total.

The total value of fish landed in Point Judith in 1992 was $37 million. The top 10 species by percent landed value in 1992 were: lobster (28%), *Loligo* squid (15%), silver hake (10%), angler (10%), summer flounder (8%), scup (5%), butterfish (4%), winter flounder (4%), yellowtail flounder (2%), and cod (2%). Point Judith boats mainly target whiting, fluke, and monkfish. The commercial importance of monkfish is increasing. It is the second most available finfish after fluke. In 1992, six million dollars worth of monkfish was caught. Squid is also increasing in economic importance in the area.

Point Judith's boats are described by an informant McCay *et al.* (1993), as being diverse in their approach to the fisheries. This allows commercial fishermen to target different species year round even if they have to switch boats during the year.

Fishermen target *Loligo* throughout the year. In the summer, some butterfish is caught inshore, by fall good catches occur when the butterfish moves offshore. Scup, fluke, and black sea bass are caught inshore during the summer, and offshore during the winter. The majority of the scup landings occur in the spring and summer.

Some minor fisheries occur in Point Judith. Pot fisheries, besides lobster, accounted for 0.48% of the total landed value for all gear in 1992. Pot fisheries are heavily dependent on scup. In 1992, scup contributed about 89-96% of the total landed value.

Overall, the role of other types of gear in Point Judith is minor in all cases. Among these the highest levels are: fish pots which caught approximately 8% of the value of scup and 3.5% of the value of black sea bass. Gill-nets contributed with 7% of the value of anglers and 3% of the value of bluefish.

McCay *et al.* (1993) described Point Judith as follows:

"Point Judith, which is part of the Narragansett, is almost exclusively a fishing community, having a core group of fishermen who fish full-time. During the summers the streets are filled with tourists coming or going on the Block Island ferry. Yet there is little for tourists to do in Point Judith. The town does not have the condominiums, shops, and hotels that other ports such as Chatham, Newport, and Montauk have. Only one hotel stands out in Point Judith, the Dutch Inn, which is circa 1960. The few restaurants, shops, and tourist venues, such as fudge shops, are enough to take care of the summer onslaught of ferry passengers and the year round working

population centered around commercial fishing."

9.2.2.7.1.4. Newport, Rhode Island

There are three commercial fishing packaging and distributing businesses in Newport. One primarily deals with draggers, gillnetters, and some scallopers, and brings in a large amount of groundfish. Another is a lobster house, which also handle trappers. There is also a trap company located in Newport.

The total landed value for all species in Newport in 1992 was $14.5 million. Lobster ranked first accounting for 44% of the total landed value. Scup ranked fifth. In 1992, lobster pots accounted for about 50% of the landings in Newport. About 33% of the landings were associated with otter trawls.

The dragger fishery mainly targets northeastern groundfish, as well as *Loligo* squid. Scup is a minor component of this fishery. In the summer time there is a scup pot fishery in Newport. The future of this fishery is in question given declines in scup landings. Scup is one of the half dozen or so species targeted by the floating trap fishery. Scup is also important to the small handline fishery in the area.

The people who make up the crews in Newport are not necessarily fishermen from the area. Some crew members come from Point Judith, New Jersey, New York, and New Bedford. The owners of the boats do not typically work the boats.

Newport is a reasonably large coastal community. The town is known for its colonial history. The town's water front is mainly occupied by various marinas, hotels, shops, and condominiums.

9.2.2.7.1.5. Cape May, New Jersey

There are about 33 local draggers operating from Cape May docks, most of which are wet boats. There are some equipped with refrigerated sea water (RSW) capacity and seven boats are wet boats. Many transit boats (57 in 1992) land in the Cape May/Wildwood area from places like Point Pleasant, and Point Judith, mainly to take advantage of winter stocks of *Loligo* squid and to find safe harbor during storms.

The total landed value of all species for the Cape May/Wildwood area was approximately $37 million in 1992. Cape May alone landed about $30.4 million, Wildwood landed $4.5 million, and other ports in the Cape May area landed $2.3 million. The landed value of the major species landed in 1992 included sea scallops (28%), ocean quahog (11%), *Illex* squid (10%), *Loligo* squid (9%), and surf clams (8%). Scup contributed 3% of the total landed value of all species. Other ports in this area and the statistics that follow include Cold Spring Harbor, near Cape May, and Sea Isle City, located to the north. There are now two tilefish boats, two fish trap (pot) boats and one dragger working out of Sea Isle City. Tilefish and black sea bass are species targeted.

The general outline of Cape May/Wildwood fisheries is described by McCay *et al.* (1993) at continuation:

"Tilefish are not landed in the Cape May/Wildwood area, except in Sea Isle City. Scup are targeted by draggers. Black sea bass are caught by pot boats and some draggers. Fluke are targeted by draggers. Dogfish are caught by gillnetters in November, December and in the spring at which time they switch from the spiny dogfish to the smooth dogfish. Draggers target dogfish in the early winter months. Some draggers may just catch them if they happen to run into them. Atlantic mackerel are targeted by draggers in the winter. Loligo squid is almost a year round fishery for draggers. But they may be going for either squid on a trip. Illex squid is caught by draggers from May to October. Butterfish are a bycatch of squid and are rarely targeted. Gillnetters catch weakfish but there aren't many doing this any more because of state regulations. So there is a drop in these landings. Draggers also target weakfish. Bluefish are caught by gillnetters and they are a bycatch for draggers."

Bottom fish otter trawling, along with bottom sea scallop trawling accounted for 39% of the total landed value by gear in the Cape May/Wildwood area in 1992. The major species caught by value by bottom fish otter trawl in

1992 were: *Illex* squid (27%), *Loligo* squid (25%), and summer flounder (20%). Scup ranked fourth with 8%.

Different species may be targeted at different times of the year by different types of boats or gear. *Loligo* squid is targeted during the winter by freezer trawlers. Once aboard the boat the squid is flash frozen into blocks of ice and kept in cold storage until the boat reaches port. The demand for *Loligo* squid is mostly for an export market in flash frozen squid. To a lesser extent, squid is marketed domestically in the fresh fish markets in New York and Philadelphia. Both the domestic and foreign markets are slowly growing.

Illex squid is the largest summer fishery for freezer trawlers. It is a relatively new fishery because *Illex* is very susceptible to higher temperatures. Recirculating sea water technology is required to handle large volumes of *Illex*. However, flash freezers are desirable in order to ensure a better product. *Illex* is mainly marketed as a flash frozen product in Europe.

Butterfish sometimes is a bycatch of the squid fishery. When butterfish is caught with large amounts of squid, it is unmarketable (sometimes it is consumed by the captain and crew of the vessel). However, if landed in considerably large quantities it can be marketed.

During the winter, scup sometimes is targeted by RSW and normal trawlers. Mixed trawl and porgy nets are employed to fish for scup. The product is marketed in the fresh fish markets.

Cape May is the most southerly town in New Jersey. Cape May has a vibrant tourist and beach economy during the summer. The commercial docks are located along one stretch of the road separated from the rest of the community.

9.2.2.7.2. Individual level - Commercial fishery

The possibility of significant impacts of the management actions may be expected to be quite different at the individual level than at the "global" or "port level." That is, the proposed management actions may significantly affect a specific group of fishermen employing specific gear types that depend or mainly target the species being managed. The purpose of this section is to address the potential effects at the individual level of the proposed management actions.

Table 69 shows the degree of specialization in the scup fishery by gear type for selected ports from Gloucester, Massachusetts, to Hampton Roads, Virginia. The pot fishery in Point Judith, Rhode Island is an example of specialization or "reliance" on the fishery. Even though only 2% of the value of scup throughout the region caught with pot gear was landed in Point Judith, scup represented about 95% of the landed value of fish caught with fish pots in this port.
The scale of the pot fishery is relatively small. It is expected that the two management alternatives most relevant to this fishery (escapement and minimum size limit) will have little negative impact. This fishery is conducted inshore in relatively shallow waters and the state. It is expected that if fish are handle with care and quickly returned to the water discard survival would be high.

Table 13 indicates that, on average, scup was predominantly targeted by pots and traps in Connecticut, Massachusetts and Rhode Island for the 1983-1992 period. In Massachusetts and in both Connecticut and Rhode Island a 9" and a 8" total length recreational and commercial size limit has been established by state laws, respectively. Furthermore, Rhode Island has established minimum vent size regulations, and Massachusetts is thinking about establishing it. The existence of the minimum size limit mentioned above, in addition to the fact that fishermen in the pot fishery mainly target large fish indicates that the minimum size limit alternative addressed in the FMP would likely have minimum consequences on the fishery.

The hook and line fishery does not appear to be a strong component of the scup fishery (Table 12). Hook and line fishermen typically target large fish and the minimum size limit addressed in the FMP is not expected to substantially affect this fishery. Finlayson and McCay (1994) reported that a substantial undocumented hook and line scup fishery may be operating in western Long Island (the Freeport/Brooklyn port group). In addition to

this, “weekend warriors” may also participate in the scup fishery. The degree to which this type of activity extends is not known. “Weekend warriors” are described by Finlayson and McCay (1994) as follows:

"...people who may have full-time jobs during the week but who have developed private unregulated and unreported markets for the fish they catch on the weekends. They may sell to restaurants or to retail fish markets. They may have very sophisticated electronics and fish-finding gear including color side-scan sonar. They may be using multiple rods with motorized reels. It is impossible to estimate with any useful precision how many of these people are out there or what their impact is on the stocks. But most commercial fishermen are in agreement that their numbers are large and that their aggregate catch is significant."

Scup does not appear to be targeted with gill nets from Gloucester, Massachusetts to Hampton Roads, Virginia (Table 60).

9.2.2.7.3. Recreational fishery

Section 9.2.2.3 of the FMP, and section 2.3.4 of the RIR provide detailed discussions of the potential effects of the proposed management plan on the recreational fishery. As it was indicated in section 2.3.4 of the RIR, the group of individuals that could be most likely affected by the possession and minimum size limits are fishermen that are largely interested in obtaining very large catches per fishing trip. Such as fishermen that participate in the “party” or “head boats” fishery.

“Party” or “head” boats are described by Finlayson and McCay (1994) as follows:

“...boats which take large numbers of people out for a day or half-day fishing for a fee. From the point of view of the owners, skippers, and crew of these boats, this is a business and is therefore, in a sense, a commercial fishery. A significant portion of the "party" or "head" boat business from Massachusetts to Virginia is now comprised of organized bus tours from remote urban centers whose subscribers are fishing for personal and family sustenance and/or monetary gain, and seek, and sometimes find, very large catches. The demographics of this sub-set of the recreational fishery should be the subject of further detailed study. The fishers are best characterized as "ethnic" with Spanish, Italian, Greek, and Portuguese-speaking people appearing to predominate in the northern Scup fishery while African Americans from urban centers such as Philadelphia and Washington predominate in the ports from Cape May south. Anecdotal evidence suggests that many of these recreational fishers see the $30-50 fee for a day's fishing as money well-spent if they can return with 100 lbs. or more of fish in their cooler. Whether these fish are primarily destined for personal or family consumption or for sale is not known although many commercial fishers believe that the latter is true. Certainly, some of the practices used by the operators of these boats such as cash pools for "high hook"--the person who catches the greatest number or weight of fish-- should receive critical attention from management.”

Table 36 indicates that the average total cost for a party boat day trip for selected states ranges from $43 to $70. It is likely that the implementation of size and bag limits would mostly have some impact on the number of individuals that are willing to pay between that range for a fishing day.

The degree of the impact derived from different management actions would depend on the experience and expectations of what constitutes a “good fishing trip” and the degree to which these boats have become dependent upon people fishing for subsistence or sale.

A survey of charter and party boats conducted in 1990, indicates that for “party boats”, the relative customer interest for scup ranked as the second lowest (Table 38). Overall, the proposed management alternatives in the FMP are likely to have minimal impacts on the recreational fishery.

9.2.2.7.4. Summary

According to the 1992 landings statistics, scup is not of critical importance to the commercial fishery industry in the ports addressed above. Given the degree of port reliance on scup, it can be expected that the proposed regulatory measures will have a minimal effect on the communities and local economies of these ports. The effects of proposed regulations on individual commercial fishermen and recreational fishermen are also expected to be minimal.

The adopted management measures are considered the most reasonable to achieve the fishing mortality rate reduction target available at this time. The moratorium is included to increase probability of compliance with the management program in the near term. It will also provide a mechanism for participants to share in the recovery of the resource rather than having the dividend of recovery dissipated over additional vessels that could enter the fishery as soon as the resource has recovered. This technique was used to great success with the surf clam fishery.

In terms of the consultative requirement of this provision of the Magnuson Act, since the management unit of the FMP is scup in US waters in the western Atlantic Ocean from Cape Hatteras, North Carolina northward to the US - Canadian border, the South Atlantic and New England Councils were invited and did designate members of their Councils to the Mid-Atlantic Council's Demersal Species Committee, the oversight committee for this FMP. Additionally, both Councils were invited to appoint industry advisors to the Mid-Atlantic Council Scup Advisory Panel.

9.3. RELATION OF RECOMMENDED MEASURES TO EXISTING APPLICABLE LAWS AND POLICIES

9.3.1. FMPs

This FMP is related to other plans to the extent that all fisheries of the northwest Atlantic are part of the same general geophysical, biological, social, and economic setting. US fishermen often are active in more than a single fishery. Thus regulations implemented to govern harvesting of one species or a group of related species may impact on other fisheries by causing transfers of fishing effort.

Many fisheries of the northwest Atlantic can cause significant nontarget species fishing mortality on other stocks. In addition, scup are food items for many commercially and recreationally important fish species, as well as themselves utilizing many finfish and invertebrate species as food items.

9.3.2. Treaties or international agreements

No treaties or international agreements, other than GIFA's entered into pursuant to the MFCMA, relate to this fishery.

9.3.3. Federal law and policies

9.3.3.1. Marine Mammals and Endangered Species

Numerous species of marine mammals and sea turtles occur in the northwest Atlantic Ocean. The most recent comprehensive survey in this region was done from 1979-1982 by the Cetacean and Turtle Assessment Program (CETAP), at the University of Rhode Island (University of Rhode Island 1982), under contract to the Minerals Management Service (MMS), Department of the Interior. The following is a summary of the information gathered in that study, which covered the area from Cape Sable, Nova Scotia, to Cape Hatteras, North Carolina, from the coastline to 5 nautical miles seaward of the 1,000 fathom isobath.

Four hundred and seventy one large whale sightings, 1,547 small whale sightings and 1,172 sea turtles were encountered in the surveys. The "estimated minimum population number" for each mammal and turtle in the area, as well as those species currently included under the Endangered Species Act, were also tabulated (Table 70).

CETAP concluded that both large and small cetaceans were widely distributed throughout the study area in all

four seasons, and grouped the 13 most commonly seen species into three categories, based on geographical distribution. The first group contained only the harbor porpoise, which is distributed only over the shelf and throughout the Gulf of Maine, Cape Cod, and Georges Bank, but probably not southwest of Nantucket. The second group contained the most frequently encountered baleen whales (fin, humpback, minke, and right whales) and the white-sided dolphin. These were found in the same areas as the harbor porpoise, and also occasionally over the shelf at least to Cape Hatteras or out to the shelf edge. The third group indicated a "strong tendency for association with the shelf edge" and included the grampus, striped, spotted, saddleback, and bottlenose dolphins, and the sperm and pilot whales.

Loggerhead turtles were found throughout the study area, but appeared to migrate north to about Massachusetts in summer and south in winter. Leatherbacks appeared to have had a more northerly distribution. CETAP hypothesized a northward migration of both species in the Gulf Stream with a southward return in continental shelf waters nearer to shore. Both species usually were found over the shoreward half of the slope and in depths less than 200 feet. The northwest Atlantic may be important for sea turtle feeding or migrations, but the nesting areas for these species generally are in the South Atlantic and Gulf of Mexico.

This problem may become acute when climatic conditions result in concentration of turtles and fish in the same area at the same time. These conditions apparently are met when temperatures are cool in October but then remain moderate into mid-December and result in a concentration of turtles between Oregon Inlet and Cape Hatteras, North Carolina. In most years sea turtles leave Chesapeake Bay and filter through the area a few weeks before the scup fishery becomes concentrated. Efforts are currently under way (by VIMS and the US Fish and Wildlife Service refuges at Back Bay, Virginia, and Pea Island, North Carolina) to more closely monitor these mortalities due to trawls. Fishermen are encouraged to carefully release turtles captured incidentally and to attempt resuscitation of unconscious turtles as recommended in the 1981 *Federal Register* (pages 43976 and 43977).

The only other endangered species occurring in the northwest Atlantic is the shortnose sturgeon (*Acipenser brevirostrum*). The Councils urge fishermen to report any incidental catches of this species to the Regional Director, NMFS, One Blackburn Drive, Gloucester, MA 01930, who will forward the information to persons responsible for the active sturgeon data base.

The range of scup and the above mentioned marine mammals and endangered species overlap and there always exists a potential for an incidental kill. Except in unique situations, such accidental catches should have a negligible impact on marine mammal or abundances of endangered species, and the Councils do not believe that implementation of this FMP will have any adverse impact upon these populations.

Commercial and recreational fisheries lose thousands of pounds of fishing gear annually. Incidences of entanglement in and ingestion of this gear is common among sea turtles and marine mammals, and may result directly or indirectly in some deaths.

9.3.3.2. Marine Sanctuaries

National marine sanctuaries are allowed to be established under the National Marine Sanctuaries Act of 1973. Currently there are 11 designated marine sanctuaries (Figure 13) that creates a system that protects over 14,000 square miles (National Marine Sanctuary Program 1993).

There are two designated national marine sanctuaries in the area covered by the FMP: the *Monitor* National Marine Sanctuary off North Carolina, and the Stellwagen Bank National Marine Sanctuary off Massachusetts. There are currently five additional proposed sanctuaries, but only one, the Norfolk Canyon is on the east coast.

The *Monitor* National Marine Sanctuary was designated on 30 January 1975, under Title III of the Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA). Implementing regulations (15 CFR 924) prohibit deploying any equipment in the Sanctuary, fishing activities which involve "anchoring in any manner, stopping, remaining, or drifting without power at any time" (924.3 (a)), and "trawling" (924.3 (h)). The Sanctuary is clearly designated on all National Ocean Service (NOS) charts by the caption "protected area." This minimizes the

potential for damage to the Sanctuary by fishing operations. Correspondence for this sanctuary should be addressed to: *Monitor* NMS, NOAA, Building 1519, Fort Ousts, VA 23604.

NOAA/NOS issued a proposed rule on 8 February 1991 (56 FR 5282) proposing designation under MPRSA of the Stellwagen Bank National Marine Sanctuary, in federal waters between Cape Cod and Cape May, Massachusetts. On 4 November 1992, the Sanctuary was Congressionally designated. Implementing regulations (15 CFR 940) became effective March 1994. Commercial fishing is not specifically regulated by Stellwagen Bank regulations. The regulations do however call for consultation between Federal agencies and the Secretary of Commerce on proposed agency actions in the vicinity of the Sanctuary that "may affect" sanctuary resources. The process for consultation is currently (late 1995) being worked out between the Regional office of NMFS, the Sanctuary, and NEFMC for Amendment 7 to groundfish. Correspondence for this sanctuary should be addressed to: Stellwagen Bank NMS, 14 Union Street, Plymouth, MA. 02360.

Details on sanctuary regulations may be obtained from the Chief, Sanctuaries and Reserves Division (SSMC4) Office of Ocean and Coastal Resource Management, NOAA, 1305 East-West Highway, Silver Spring, MD 20910.

9.3.3.3. Indian treaty fishing rights

No Indian treaty fishing rights are known to exist in the fishery.

9.3.3.4. Oil, Gas, Mineral, and Deep Water Port Development

While Outer Continental Shelf (OCS) development plans may involve areas overlapping those contemplated for offshore fishery management, no major conflicts have been identified to date. The Councils, through involvement in the Intergovernmental Planning Program of the MMS, monitor OCS activities and have opportunity to comment and to advise MMS of the Councils' activities. Certainly, the potential for conflict exists if communication between interests is not maintained or appreciation of each other's efforts is lacking. Potential conflicts include, from a fishery management position: (1) exclusion areas, (2) adverse impacts to sensitive biologically important areas, (3) oil contamination, (4) substrate hazards to conventional fishing gear, and (5) competition for crews and harbor space. The Councils are unaware of pending deep water port plans which would directly impact offshore fishery management goals in the areas under consideration, and are unaware of potential effects of offshore FMPs upon future development of deep water port facilities.

9.3.3.5. Vessel Safety

Section 303(a)(6) of the MFCMA requires that FMPs consider access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safety of vessels. The proposed management measures of this FMP do not limit the times or places when or where vessels may fish. Therefore, the Council has concluded that the proposed FMP will not impact or affect the safety of vessels fishing in this fishery.

9.3.4. State, Local, and Other Applicable Law and Policies

9.3.4.1. State management activities

State regulations for scup are summarized in Table 71.

Several states have minimum size limits pertaining to the possession of scup. Massachusetts has the largest size limit (9" TL), which applies to both the commercial and recreational fisheries. Rhode Island and Connecticut have 8" TL minimum size limits which also apply to all fisheries. New York and New Jersey have 7" TL minimum size limits for scup which apply to the commercial fisheries only. None of the remaining states in the management unit (ME, NH, DE, MD, VA, and NC) regulate the minimum size of scup. Some states have minimum mesh size requirements, but none pertain directly to scup. Minimum mesh requirements vary by state, area, and season. In addition, many of the states have season, area, and gear restrictions which may affect fishing for scup. No state

has a recreational possession limit pertaining to scup.

9.3.4.2. Impact of federal regulations on state management activities

The management measures of this Amendment complement or are identical to those proposed by ASMFC for the coastal States.

9.3.4.3. Coastal Zone Management Program Consistency

The CZM Act of 1972, as amended, provides measures for ensuring stability of productive fishery habitat while striving to balance development pressures with social, economic, cultural, and other impacts on the coastal zone. It is recognized that responsible management of both coastal zones and fish stocks must involve mutually supportive goals.

The Council must determine whether the FMP will affect a state's coastal zone. If it will, the FMP must be evaluated relative to the state's approved CZM program to determine whether it is consistent to the maximum extent practicable. The states have 45 days in which to agree or disagree with the Councils' evaluation. If a state fails to respond within 45 days, the state's agreement may be presumed. If a state disagrees, the issue may be resolved through negotiation or, if that fails, by the Secretary.

The FMP was reviewed relative to CZM programs of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. Letters were sent to all of the states listed along with a hearing draft of the FMP. The letters to all of the states stated that the Council concluded that the FMP would not affect the state's coastal zone and was consistent to the maximum extent practicable with the state's CZM program as understood by the Council. New Hampshire, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, and North Carolina have concurred with the Council's opinion.

9.4. COUNCIL REVIEW AND MONITORING OF THE FMP

9.4.1. Monitoring

The Councils and ASMFC will monitor the fishery using the best available data, including that specified in section 9.1.3. The commercial, recreational, biological, and survey data specified in section 9.1.3 are critical to the evaluation of the management measures adjustment mechanism. It is necessary that NMFS incorporate all of the above data types from North Carolina scup fisheries into the overall NEFSC data bases. Additionally, improved stock assessments are necessary for FMP monitoring. As a result of that monitoring, the Councils and ASMFC will determine whether it is necessary to amend the FMP.

The primary organization in the review and monitoring process will be the Scup FMP Monitoring Committee (section 9.1.2.2).

9.4.2. Research and Data Needs [pursuant to MFCMA 303(a)(8)]

Estimates of discarded scup will be very important, especially from freezer trawlers, for adjusting the overall quota in order to meet the target mortality levels. It is, therefore, important that levels of sea sampling effort be sufficient and representative of the fisheries that contribute to scup fishing mortality to accurately describe the level of discard. It must be recognized that this sea sampling will likely involve some vessels not in the directed scup fishery, but vessels in the squid and groundfish fisheries, for example, where large quantities of scup are caught and possibly discarded.

10. COMPLIANCE

This section outlines the specific regulatory, monitoring, and research requirements that each state must implement in order to comply with the FMP. The relative burden of the Plan's conservation program and management measures may vary from state to state relative to the importance of the fishery in that state as compared to other states throughout the range.

This plan will apply to all states from North Carolina to Maine.

10.1 MANDATORY COMPLIANCE ELEMENTS FOR STATES

10.1.1 Mandatory Elements of State Programs

A state will be found out of compliance if;

its regulatory and management programs for scup have not been approved by the Management Board,

it fails to meet any implementation schedule established for this FMP or any addendum prepared under adaptive management,

it has failed to implement a change to its program when determined necessary by the Management Board;

or,

it fails to adequately enforce any aspect of its regulatory and management programs.

10.1.1.1 Regulatory Requirements

All state programs must include a regime of restrictions on recreational and commercial fisheries consistent with the requirements of Chapter 9.

10.1.1.2 Monitoring Requirements

Section 9.1.3.1 outlines specific monitoring requirements of the NMFS regarding scup commercial fisheries. Recreational fisheries are monitored through the MRFSS. States are expected to develop voluntary reporting programs in cooperation with the charter and party boat industry. Each state should take the necessary measures to ensure that all landings from state waters are reported to NMFS.

10.1.1.3 Research Requirements

This Plan does not identify any mandatory research requirements.

10.1.2 Compliance Schedule

Measures requiring compliance by June 30 1996:

Commercial Fishery:

9″ minimum size (9.1.2.3.1)
4″ minimum mesh requirement and threshold provision (9.1.2.3.2)
18″ maximum roller diameter on roller rig trawl (9.1.2.3.3)

3.1″ round and 2.25″ square pot and trap escape vent requirements (9.1.2.3.4)
Degradable fasteners in pots and traps (9.1.2.3.5)

Recreational Fishery:

7″ minimum size

Measures requiring compliance by January 1 1997:

Dealer and commercial vessel permitting requirements as contained in section 9.1.2.1

Commercial quota and quota management system as established through Plan Addendum

Any changes made under framework provisions for 1997

10.1.3 Compliance Reporting Contents and Schedules

Each state must submit an annual report concerning its scup fisheries and management program on or before June 1 each year, beginning June 1 1997. The report shall cover:

A) the previous calendar year's fishery and management program including activity and results of monitoring, regulations which were in effect and harvest information that is available, including estimates of non-harvest losses if available, and

B) 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.

10.2 PROCEDURES FOR DETERMINING COMPLIANCE

Procedures for determining a state's compliance with the provisions of a fisheries management plan are contained in Section 7 of the Interstate Fisheries Management Program Charter (ASMFC 1995). The following represents compliance determination procedures as applied to this plan:

The Plan Review Team will continually review the status of state implementation, and advise the Management Board at any time that a question arises concerning state compliance. The PRT will review state reports submitted under sections 10.1.3 and prepare a report by August 1 for the Management Board summarizing the status of the resource and the fishery and the status of compliance on a state-by -state basis.

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

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

Management Program.

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

10.3 ADAPTIVE MANAGEMENT

The Management Board may vary the requirements specified in this FMP to achieve the goals and objectives specified, as part of adaptive management or "framework provisions" and as outlined in section 6(b)(1)(E) of the Commission's ISFMP Charter. These changes will follow the procedure outlined in section 9.1.2.2, and the Board may request reviews of proposed changes by the Plan Review Team or Scup Advisory Panel.

10.3.1 Circumstances Under Which Change May Occur

The Management Board may make changes to specific elements of this plan if necessary to meet the stated FMP objectives and goals. Plan requirements may be changed and gear may be regulated if necessary to achieve the target fishing mortality. The Plan will be reviewed annually by the joint ASMFC/MAFMC Technical Monitoring Committee to determine if management changes are needed.

During Year 1 (1996) the Council and Commission will develop a quota management system for scup. This system will be developed and implemented as a Commission Scup FMP Addendum, and a Council Regulatory Amendment.

10.3.2 Measures Subject to Change

The following measures may change annually under framework provisions or adaptive management:

Commercial and recreational minimum sizes
Commercial mesh restriction and threshold
Roller diameter restriction
Pot and trap escape vent size
Pot and trap degradable fastener requirements
Commercial quota and recreational TAC
Recreational possession limits may be implemented
Seasonal and area closures may be implemented
Additional commercial gear restrictions

10.3.3 Procedural Steps to Effect Change

A description of the procedure necessary to effect adaptive management changes in this FMP is contained in Section 9.1.2.2 and in Section 6(b)(1)(E) of the Commission's ISFMP Charter.

10.4 RECOMMENDED (NON-MANDATORY) MANAGEMENT MEASURES

States having regulations which are more stringent than the requirements of this Plan should maintain their existing regulations to enhance stock conservation. States are encouraged to adopt entry moratorium regulations complementing the EEZ regulations in section 9.1.2.1.1.2. States are encouraged to implement fishery data collections systems to complement the NMFS system (section 9.1.3.1) and provide a coordinated statistics

gathering effort.

10.5 RECOMMENDATIONS FOR THE EXCLUSIVE ECONOMIC ZONE

This plan was developed jointly by the ASMFC and the Mid-Atlantic Fisheries Management Council, therefore, management measures for both the EEZ and state waters are contained in chapter 9. The ASMFC recommends that the Secretary adopt the management measures in chapter 9 for the EEZ.

10.6 ANALYSIS OF ENFORCEABILITY OF PROPOSED MEASURES

All states are responsible for adequately enforcing the measures contained in this FMP. Realized enforcement is dependent on many factors. These include, but are not limited to, budgetary concerns affecting manpower and equipment availability, the nature of the fishery, the degree of regulatory consistency over time and among states and fisheries, and participant awareness of regulations. The provisions in this plan are shared with many other management programs, and therefore should not present additional enforcement difficulties. Enforcement benefits when measures are compatible with regulations in existing plans, as in the case of the degradable pot and trap fasteners provisions in this plan which are consistent with the Lobster plan.

10. COMPLIANCE - Scup Addendum 1
Note: Text file for Addendum 1 not received from Council. Printed version of FMP incorporated photocopy of Addendum 1 text.

This section specifies compliance criteria and dates as required in the ISFMP Charter.

This Addendum will apply to all states from North Carolina to Maine (Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina.)

10.1 MANDATORY COMPLIANCE ELEMENTS FOR STATES

This section is unchanged from the Scup FMP except as noted below.

10.1.1.1 Regulatory Requirements

All state programs must include a regime of restrictions on recreational and commercial fisheries consistent with the requiremtents of Chapter 9 and as amended by this addendum.

Commercial and recreational quotas for 1997 and commercial landings limits are listed below.

1997 Scup Total Allowable Landings (TAL), Discards, Commercial Quota, and Recreational Catch Limit, in millions of pounds:

	TAL	Discards	Quota
Total	9.107	1.160	7.947
Commercial	7.103	1.103	6.0
Winter 1	3.203	.4976	2.707
Summer	2.767	.4296	2.337
Winter 2	1.133	.1758	0.956
Recreational	2.004	.057	1.947

1997 Landing Limits:

Winter 1 (January-April) 30,000 pounds, 1,000 pounds once 85% projected, closure once 100% projected

Winter 2 (November-December) 12,000 pounds, closure once 100% projected.

Mid-Year implementation of the quota management system provision:

NMFS has indicated that this Regulatory Amendment will not be in place by 1/1/97. Therefore, potential quota overages during Winter 1 1997 must be addressed. Any overages resulting from the mid-year implementation will first be deducted from Winter 2 1997, then from winter 1 1998, then from subsequent winter 1 allocations as necessary.

10.1.2 Compliance Schedule

FRAMEWORK ADJUSTMENTS

Compliance required by **January 1 1997**:

Minimum mesh – 4.5" minimum mesh required

Mesh threshold – 4,000 pounds in Winter 1 and 2, 1,000 pounds in Summer

Permitting and reporting

Permits and reporting are required of those who harvest scup for sale from state waters and who do not possess a federal moratorium permit.

Permits and reporting are required of those who deal in scup from state waters and who do not have a federal scup dealers permit.

NOTE: Existing state fisherman, vessel, and dealer permitting and reporting systems are acceptable, provided scup is included or will be included in the system by **January 1 1997.**

QUOTA MANAGEMENT

Compliance required by the latter of: **January 1 1997**, or upon NMFS approval of the Regulatory Amendment:

Landing limits:

Process to implement and enforce period landing limits and in-period adjustments
Process to notify federal/state permit holders of landing limits, adjustments, closures

Compliance by 5/1/97:

Closure
Ability to close the summer fishery once the state share is harvested

Compliance by: appropriate time

Closure
Ability to close the winter fisheries if the period quota is taken

10.2 PROCEDURES FOR DETERMINING COMPLIANCE

There is no need to change this section at this time.

10.3 ADAPTIVE MANAGEMENT

The following measures may change annually under framework provisions or adaptive management:

Commercial and recreational minimum sizes
Commercial mesh restriction and threshold
Roller diameter restriction
Pot and trap escape vent size
Pot and trap degradable fastener requirements
Total Allowable Landing limit, commercial quota and recreational TAC
Commercial landing limits
Recreational possession limits may be implemented

Seasonal and area closures may be implemented
Additional commercial gear restrictions may be implemented

10.4 RECOMMENDED (NON-MANDATORY) MANAGEMENT MEASURES

Party/Charter boats fishing exclusively in state waters are not required to have permits or to report. States are expected to work with the industry to develop a voluntary reporting system.

10.5 RECOMMENDATIONS FOR THE EXCLUSIVE ECONOMIC ZONE

The ASMFC recommends that the Secretary adopt the management measures in chapter 9 of this addendum for the EEZ.

10.6 ANALYSIS OF ENFORCEABILITY OF PROPOSED MEASURES

There is no need to change this section at this time.

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Table 1. Estimates of annual recruitment, spawning stock biomass (SSB) and fishing mortality (F) for scup based on VPA results (from NEFSC 1995).

Year	Recruits (millions of age 0)	SSB (m lbs)	F (ages 2 - 5)
1984	137.7	20.1	1.18
1985	141.3	19.8	1.18
1986	70.1	26.0	1.20
1987	80.7	18.4	1.43
1988	112.1	13.4	2.13
1989	60.2	14.2	1.60
1990	113.0	21.0	0.96
1991	66.6	18.8	1.29
1992	71.7	14.5	1.31
1993	92.2	10.2	1.32

Table 2. The mean back-calculated lengths (inches TL) of scup ages 1 to 10 from various studies. The number in parenthesis is sample size.

	Age (Years)									
	1	2	3	4	5	6	7	8	9	10
Sisson 1974 (250)	2.9	6.2	8.5	10.2	11.4	12.3	12.9	13.3	13.6	13.8
Hamer 1979 (1429)	5.6	8.6	10.1	11.2	11.8	12.5	13.3	14.1	14.8	15.4
Pierce 1980 (230)	4.6	7.5	9.7	11.4	12.7	13.7	14.5	15.2	15.7	16.1
Crecco *et al.* 1981										
research trawl (697)	4.4	7.4	9.3	10.6	11.9	12.8	13.6	14.1	14.5	14.8
commercial trawl (543)	4.8	7.9	9.7	11.0	11.9	12.7	13.3	14.1	14.6	16.0
Howell/Simpson 1984 (5999)	4.0	7.7	9.6	11.0	12.2	13.1	13.7	14.3	14.7	15.3
Campbell *et al.* (unpub.) (2170)	4.3	6.6	8.6	10.2	11.6	12.8	13.7	14.5	15.3	15.8

Note: FL in millimeters converted to TL in inches.

Table 3. Theoretical growth parameters for scup collected in various studies.

	L-inf FL (mm)	TL (in)	k	t_o	
Sisson 1975	324	(14.4)	0.34	-0.31	
Hamer 1979	341	(15.1)	0.29	-0.80	
Pierce 1980	396	(17.6)	0.24	-0.35	
Finkelstein 1969					
male	343	(15.2)	0.27	-0.41	
female	374	(16.6)	0.22	-0.47	
Crecco *et al.* 1981	366	(16.3)	0.25	-0.35	
Howell/Simpson 1984	389	(17.3)	0.22	-0.35	
Campbell *et al.* (unpub.)	422	(18.8)	0.18		

table 4 insert

table 5 insert

Table 6. insert

Table 7. insert

Table 8. insert

Table 9. insert

Table 10. Preliminary ranking of major threats to living marine resources and habitats in the Northeast.

1. Urban and port development *
2. Ocean Disposal #
3. Dams
4. Agricultural Practices M
5. Industrial Waste Discharges @
6. Domestic Waste Discharges @
7. OCS Oil and Gas Development
8. Insect Control
9. Water Division
10. Sand and Gravel Mining
11. Power Generation

* Includes dredge and fill and construction activities covered by Section 10/104 permits, as well as point source pollution covered by NPDES permits and nonpoint source pollution.

\# Includes dredged material disposal in State waters, as well as actual ocean dumping of dredged material, sewage sludge, etc., covered by Section 103 permits.

M Includes nonpoint source pollution (fertilizers, animal wastes, biocides, sediments, heavy metals, etc.) that affects coastal aquatic areas.

@ Point source pollution covered by NPDES permits.

Source: USDC 1985.

Table 11. Commercial and recreational landings (thousands of pounds) of scup, 1983-1994.

Year	Comm	Rec	Total	% Comm	% Rec
1983	17,183	6,252	23,435	73	27
1984	17,128	2,416	19,544	88	12
1985	14,828	6,093	20,921	71	29
1986	15,252	11,605	26,857	57	43
1987	13,380	6,197	19,577	68	32
1988	12,628	4,267	16,895	75	25
1989	8,192	5,557	13,749	60	40
1990	9,518	4,140	13,658	70	30
1991	15,140	8,087	23,227	65	35
1992	13,184	4,412	17,596	75	25
1993	9,147	3,197	12,344	74	26
1994	9,861*	2,628	12,489	79	21
Avg		12,953	5,404	18,358	

* Preliminary

Source: NMFS General Canvass and MRFSS data.

Table 12. Scup commercial landings, by gear, Maine to Cape Hatteras, NC, 1983-1992 combined.

Gear					1,000 Lbs	Percent
Haul Seines, Beach	123	*				
Haul Seines, Long(Danish)	0	*				
Stop Nets	4	*				
Purse Seines, Menhaden	0	*				
Otter Trawl Bottom, Fish	101,330		74			
Otter Trawl Bottom, Lobster	0	*				
Otter Trawl Bottom, Scallop	22	*				
Otter Trawl Bottom, Shrimp	16	*				
Otter Trawl Midwater	70	*				
Trawl Midwater, Paired	4,334	3				
Trawl Bottom, Paired	1,290	*				
Scottish Seine	0	*				
Pound Nets, Fish	3,456	2				
Pound Nets, Other	366	*				
Floating Traps (Shallow)	17,706	12				
Fyke And Hoop Nets, Fish	3	*				
Pots And Traps, Crab, Blue	1	*				
Pots And Traps, Fish	2,739	2				
Pots And Traps, Lobster Inshore	506	*				
Pots And Traps, Lobster Offshore	0	*				
Pots And Traps, Other	37	*				
Gill Nets, Other	103	*				
Gill Nets, Sink, Other	0	*				
Gill Nets, Drift, Other					14	*
Gill Nets, Drift, Runaround					22	*
Gill Nets, Stake					0	*
Trammel Nets					0	*
Lines Hand, Other					3,998	2
Lines Troll, Other					268	*
Lines Long Set With Hooks					9	*
Dredges Scallop, Sea					5	*
All Gear					136,438	100

* = less than 1%

Source: Unpublished NMFS General Canvass data.

Table 13. Scup commercial landings, by State and gear type, 1983-1992 combined.

ME	MA	RI	CT	NY	NJ	MD	VA	NC	
% of	% of	% of	% of	% of	% of	% of	% of	% of	
Total	Total	Total	Total	Total	Total	Total	Total	Total	
Gear									
Haul Seines, Beach	.	.	0.0	0.0	0.6	.	.	0.1	.
Haul Seines, Long(Danish)	.	0.0	.	.	.	.	.	.	.
Stop Nets	.	0.0	0.0	.	.	.	.	.	.
Purse Seines, Menhaden	.	.	.	.	.	0.0	.	.	.
Otter Trawl Bottom, Fish	99.9	21.0	60.7	64.1	82.8	99.7	95.4	99.3	100.0
Otter Trawl Bottom, Lobster	.	.	.	.	.	.	.	0.0	.
Otter Trawl Bottom, Scallop	.	.	.	.	.	0.0	0.2	0.1	.
Otter Trawl Bottom, Shrimp	0.1	0.0	0.0	.	.	.	.	.	.
Otter Trawl Midwater	.	.	0.1	.	.	.	.	.	.
Trawl Midwater, Paired	.	25.1	3.2	.	.	.	.	.	.
Trawl Bottom, Paired	.	.	2.2	.	0.1	.	.	.	.
Scottish Seine	.	0.0	.	.	.	.	.	.	.
Pound Nets, Fish	.	29.0	.	0.0	2.6	0.1	.	0.1	.
Pound Nets, Other	.	3.6	.	.	.	.	.	.	.
Floating Traps (Shallow)	.	.	31.1	.	.	.	.	.	.
Fyke And Hoop Nets, Fish	.	0.0	0.0	0.0	.	.	.	.	.
Pots And Traps, Crab, Blue	.	.	.	.	.	0.0	.	0.0	.
Pots And Traps, Fish	.	11.4	1.6	18.7	0.1	0.1	0.4	0.0	.
Pots And Traps, Lobster Inshore	.	1.0	0.0	10.6	0.1	0.0	.	.	.
Pots And Traps, Lobster Offshore	.	.	.	.	0.0	0.0	0.1	.	.
Pots And Traps, Other	.	.	0.1	.	.	.	.	.	.
Gill Nets, Other	0.1	0.1	0.1	0.0	0.1	0.0	0.5	0.1	.
Gill Nets, Sink, Other	.	0.0	.	.	.	.	.	.	.
Gill Nets, Drift, Other	.	0.0	.	0.0	.	0.0	2.5	0.2	.
Gill Nets, Drift, Runaround	.	0.0	.	.	0.0	0.1	.	.	.
Gill Nets, Stake	.	.	.	0.0	.	.	.	.	.
Trammel Nets	.	.	.	.	.	0.0	.	.	.
Lines Hand, Other	.	8.1	0.5	6.5	13.6	0.0	1.0	0.0	.
Lines Troll, Other	.	0.5	0.4	.	.	.	.	.	.
Lines Long Set With Hooks	.	0.1	0.0	.	.	0.0	.	.	.

Dredges Scallop, Sea	.	0.0	0.0	.	.	0.0	.	0.0	.
All Gear	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Unpublished NMFS General Canvass data.

Table 14. Scup commercial landings, landings by year and gear type, Maine to Cape Hatteras, NC, 1983-1992.

	Year										
	83	84	85	86	87	88	89	90	91	92	
	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	% of Total	
Gear											
Haul Seines, Beach		0.2	0.2	0.2	0.1	.	0.0	.	0.0	0.0	0.0
Haul Seines, Long(Danish)		.	0.0	.	0.0	0.0	.	.	.	.	.
Stop Nets		.	.	.	.	.	.	0.0	.	0.0	.
Purse Seines, Menhaden		.	.	.	.	.	.	.	.	.	0.0
Otter Trawl Bottom, Fish		75.2	72.3	72.2	74.7	75.7	72.2	85.4	74.2	75.9	69.3
Otter Trawl Bottom, Lobster		.	0.0	.	.	.	.	.	.	.	.
Otter Trawl Bottom, Scallop		.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Otter Trawl Bottom, Shrimp		.	.	0.0	.	.	0.1	.	.	.	0.0
Otter Trawl Midwater		.	.	.	0.3	0.2	.	.	.	0.0	.
Trawl Midwater, Paired		5.1	1.7	4.6	3.4	3.8	2.3	2.4	4.6	2.2	1.6
Trawl Bottom, Paired		.	1.8	1.6	4.4	0.0	0.6	.	.	0.0	0.1
Scottish Seine		0.0	.	.	.	.	.	.	.	.	0.0
Pound Nets, Fish		5.0	3.8	3.4	4.8	3.2	0.9	0.1	0.6	0.5	0.3
Pound Nets, Other		.	.	.	.	.	.	1.9	0.8	0.1	0.8
Floating Traps (Shallow)		10.9	16.3	15.2	9.1	9.7	18.4	5.2	11.7	14.4	15.6
Fyke And Hoop Nets, Fish		.	0.0	0.0	0.0	.	.	.	0.0	0.0	.
Pots And Traps, Crab, Blue		.	.	.	.	.	0.0	0.0	0.0	0.0	.
Pots And Traps, Fish		0.1	0.1	0.0	0.1	3.8	2.0	2.7	5.5	3.6	4.8
Pots And Traps, Lobster Inshore		0.0	0.0	0.0	0.0	0.1	.	0.1	0.0	0.1	3.5
Pots And Traps, Lobster Offshore		.	.	0.0	.	0.0	.	.	.	.	0.0
Pots And Traps, Other		.	.	.	.	.	.	.	.	0.1	0.2
Gill Nets, Other		0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.1	0.1
Gill Nets, Sink, Other		.	.	.	.	.	.	.	.	.	0.0
Gill Nets, Drift, Other		0.0	.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gill Nets, Drift, Runaround		0.0	.	.	.	.	0.0	0.0	0.1	0.1	0.0
Gill Nets, Stake		.	.	.	.	.	.	.	0.0	.	.
Trammel Nets		.	.	.	.	.	.	.	.	0.0	.
Lines Hand, Other		3.4	3.7	2.7	3.0	3.1	2.7	1.8	2.0	2.7	3.2
Lines Troll, Other		0.0	.	.	0.2	0.3	0.6	0.3	0.3	0.1	0.4
Lines Long Set With Hooks		.	0.0	0.0	.	.	0.0	.	0.0	0.0	0.1

Dredges Scallop, Sea	0.0	0.0	.	.	.	.	.	0.0	0.0	0.0
All Gear	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Unpublished NMFS General Canvass data.

Table 15. Scup commercial landings by year and water area, Maine to Cape Hatteras, NC, all gears combined.

State <3 mi		EEZ >3mi		Total		
1,000 Lbs	% of Total	1,000 Lbs	% of Total	1,000 Lbs	% of Total	
YEAR						
83	5,342	31	11,840	68	17,183	100
84	6,147	35	10,981	64	17,128	100
85	4,034	27	10,793	72	14,828	100
86	4,628	30	10,624	69	15,252	100
87	3,764	28	9,616	71	13,380	100
88	3,868	30	8,759	69	12,628	100
89	1,751	21	6,441	78	8,192	100
90	3,029	31	6,489	68	9,518	100
91	4,417	29	10,722	70	15,140	100
92	3,954	29	9,230	70	13,184	100
MEAN	4,093	30	9,550	69	13,643	100

Source: Unpublished NMFS General Canvass data.

Table 16. Scup commercial landings by region and year, 1983-1992.

		Year									
83		84	85	86	87	88	89	90	91	92	
REGION/AREA											
NEW ENGLAND											
State	1000 Lbs	3,988	4,847	3,337	3,776	3,160	3,540	1,405	2,618	3,735	3,439
(<3 mi)	% REG	54	62	37	46	47	45	34	49	47	47
EEZ	1000 Lbs	3,295	2,850	5,506	4,320	3,445	4,222	2,637	2,667	4,077	3,764
(>3 mi)	% REG	45	37	62	53	52	54	65	50	52	52
All1000 Lbs	7,283	7,698	8,843	8,096	6,605	7,762	4,042	5,286	7,813	7,204	
% REG	100	100	100	100	100	100	100	100	100	100	
% CST	42	44	59	53	49	61	49	55	51	54	
MID-ATLANTIC											
State	1000 Lbs	1,354	1,300	697	852	604	328	346	392	673	514
(<3 mi)	% REG	14	15	12	12	9	6	8	9	9	9
EEZ	1000 Lbs	7,880	7,076	4,690	5,925	5,922	4,409	3,771	3,660	6,500	5,186
(>3 mi)	% REG	85	84	87	87	90	93	91	90	90	90
All	1000 Lbs	9,234	8,376	5,388	6,777	6,526	4,737	4,117	4,052	7,174	5,701
% REG	100	100	100	100	100	100	100	100	100	100	
% CST	53	48	36	44	48	37	50	42	47	43	
SOUTH ATLANTIC											
State	1000 Lbs	0	.	.	0	.	0	0	18	8	.
(<3 mi)	% REG	*	.	.	*	.	*	*	10	5	.
EEZ	1000 Lbs	665	1,054	596	378	248	128	32	161	144	279
(>3 mi)	% REG	99	100	100	99	100	99	99	89	94	100
All	1000 Lbs	665	1,054	596	378	248	128	32	179	152	279
% REG	100	100	100	100	100	100	100	100	100	100	
% CST	3	6	4	2	1	1	*	1	1	2	
ALL											
State	1000 Lbs	5,342	6,147	4,034	4,628	3,764	3,868	1,751	3,029	4,417	3,954
(<3 mi)	% REG	31	35	27	30	28	30	21	31	29	29
EEZ	1000 Lbs	11,840	10,981	10,793	10,624	9,616	8,759	6,441	6,489	10,722	9,230
(>3 mi)	% REG	68	64	72	69	71	69	78	68	70	70
All	1000 Lbs	17,183	17,128	14,828	15,252	13,380	12,628	8,192	9,518	15,140	13,184
% REG	100	100	100	100	100	100	100	100	100	100	
% CST	100	100	100	100	100	100	100	100	100	100	

% REG = area % of regional total, % CST = area % of coastwide area total

0 = less than 1000 lbs

* = less than 1%

. = none

Source: Unpublished NMFS General Canvass data.

Table 17. Scup commercial landings by year, state and area, 1983-1992.

YEAR	DIST	ME	MA	RI	CT	NY	NJ	MD	VA	NC	All	Sta
83												
State	1000 Lbs	.	1,370	2,517	100	1,348	2	.	3	0	5,342	
(<3 mi)	%	.	92	44	92	55	*	.	*	*	31	
EEZ (>3	1000 Lbs	0	109	3,176	8	1,083	5,589	28	1,179	665	11,840	
mi)	%	100	7	55	7	44	99	100	99	99	68	
All1000 Lbs	0	1,480	5,693	108	2,431	5,591	28	1,182	665	17,183		
%	100	100	100	100	100	100	100	100	100	100		
84												
State	1000 Lbs	.	1,134	3,643	70	1,292	7	.	0	.	6,147	
(<3 mi)	%	.	95	56	99	64	*	.	*	.	35	
EEZ (>3	1000 Lbs	.	57	2,792	0	700	4,879	12	1,484	1,054	10,981	
mi)	%	.	4	43	0	35	99	100	99	100	64	
All1000 Lbs	.	1,191	6,435	70	1,992	4,886	12	1,484	1,054	17,128		
%	.	100	100	100	100	100	100	100	100	100		
85												
State	1000 Lbs	.	642	2,604	90	690	6	.	0	.	4,034	
(<3 mi)	%	.	75	32	100	36	*	.	*	.	27	
EEZ (>3	1000 Lbs	0	211	5,295	.	1,207	3,283	36	163	596	10,793	
mi)	%	100	24	67	.	63	99	100	99	100	72	
All1000 Lbs	0	853	7,899	90	1,897	3,290	36	163	596	14,828		
%	100	100	100	100	100	100	100	100	100	100		
86												
State	1000 Lbs	.	1,117	2,511	146	847	3	.	1	0	4,628	
(<3 mi)	%	.	81	38	100	43	*	.	*	*	30	
EEZ (>3	1000 Lbs	0	246	4,073	.	1,122	4,173	30	599	378	10,624	
mi)	%	100	18	61	.	56	99	100	99	99	69	
All1000 Lbs	0	1,364	6,585	146	1,969	4,176	30	600	378	15,252		
%	100	100	100	100	100	100	100	100	100	100		
87												
State	1000 Lbs	.	997	1,641	521	601	2	.	0	.	3,764	
(<3 mi)	%	.	85	34	78	29	*	.	*	.	28	
EEZ (>3	1000 Lbs	10	167	3,125	142	1,406	4,002	0	512	248	9,616	
mi)	%	100	14	65	21	70	99	100	99	100	71	
All1000 Lbs	10	1,165	4,766	663	2,008	4,004	0	512	248	13,380		
%	100	100	100	100	100	100	100	100	100	100		
88												
State	1000 Lbs	.	617	2,572	350	315	5	1	6	0	3,868	

(<3 mi)	%	.	87	41	44	20	*	48	2	*	30
EEZ (>3	1000 Lbs	19	89	3,671	440	1,198	2,935	1	274	128	8,759
mi)	%	100	12	58	55	79	99	51	97	99	69
All1000 Lbs	19	706	6,244	791	1,514	2,940	2	280	128	12,628	
%	100	100	100	100	100	100	100	100	100	100	
89											
State	1000 Lbs	0	610	751	43	326	15	0	4	0	1,751
(<3 mi)	%	*	88	24	22	24	0	5	4	*	21
EEZ (>3	1000 Lbs	69	75	2,339	153	1,002	2,672	1	94	32	6,441
mi)	%	99	11	75	77	75	99	95	95	99	78
All1000 Lbs	69	685	3,090	196	1,328	2,687	2	98	32	8,192	
%	100	100	100	100	100	100	100	100	100	100	

Table 17 (continued). Scup commercial landings by year, state and area, 1983-1992.

		State									
	ME	MA	RI	CT	NY	NJ	MD	VA	NC	All	
YEAR	DIST										
90											
State	1000 Lbs	.	911	1,533	174	361	26	0	3	18	3,029
(<3 mi)	%	.	93	38	47	21	1	6	2	10	31
EEZ (>3	1000 Lbs	8	64	2,404	190	1,302	2,187	8	161	161	6,489
mi)	%	100	6	61	52	78	98	93	97	89	68
All1000 Lbs	8	975	3,937	364	1,663	2,214	9	164	179	9,518	
%	100	100	100	100	100	100	100	100	100	100	
91											
State	1000 Lbs	.	680	2,622	432	571	97	1	3	8	4,417
(<3 mi)	%	.	90	40	68	21	2	4	2	5	29
EEZ (>3	1000 Lbs	34	69	3,774	200	2,124	4,222	32	120	144	10,722
mi)	%	100	9	59	31	78	97	95	97	94	70
All1000 Lbs	34	749	6,397	632	2,696	4,320	34	123	152	15,140	
%	100	100	100	100	100	100	100	100	100	100	
92											
State	1000 Lbs	.	739	2,548	151	473	34	2	4	.	3,954
(<3 mi)	%	.	84	43	35	21	1	5	2	.	29
EEZ (>3	1000 Lbs	.	137	3,351	274	1,777	3,216	34	157	279	9,230
mi)	%	.	15	56	64	78	98	94	97	100	70
All1000 Lbs	.	877	5,900	426	2,251	3,251	36	161	279	13,184	
%	.	100	100	100	100	100	100	100	100	100	

0 = less than 1000 lbs

* = less than 1%

. = none

Source: Unpublished NMFS General Canvass data.

Table 18. Average ex-vessel commercial landings of Scup by month, Maine to Cape Hatteras, NC, 1983-1992.

Water Area		
State (<3 mi)	EEZ (>3 mi)	All
1,000 Lbs	1,000 Lbs	1,000 Lbs
MONTH		
JAN	5	1,165	1,171
FEB	4	1,168	1,172
MAR	2	1,749	1,752
APR	200	1,699	1,899
MAY	1,922	589	2,512
JUN	460	294	755
JUL	298	110	408
AUG	271	72	343
SEP	263	106	370
OCT	212	455	668
NOV	66	938	1,004
DEC	13	1,022	1,035
All	3,722	9,372	13,095

Source: Unpublished NMFS General Canvass data.

Table 19. Scup commercial landings by year and state.

Year											
	83	84	85	86	87	88	89	90	91	92	93
Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	
State											
ME	0	.	0	0	10	19	69	8	34	.	.
MA	1,480	1,191	853	1,364	1,165	706	685	975	749	877	653
RI	5,693	6,435	7,899	6,585	4,766	6,244	3,090	3,937	6,397	5,900	2,937
CT	108	70	90	146	663	791	196	364	632	426	326
NY	2,431	1,992	1,897	1,969	2,008	1,514	1,328	1,663	2,696	2,251	1,607
NJ	5,591	4,886	3,290	4,176	4,004	2,940	2,687	2,214	4,320	3,251	4,016
MD	28	12	36	30	0	2	2	9	34	36	23
VA	1,182	1,484	163	600	512	280	98	164	123	161	160
NC	665	1,054	596	378	248	128	32	179	152	279	116

0 = less than 1,000 **.** = none reported

Source: Unpublished NMFS General Canvass data.

Table 20. Average annual commercial landings of Scup by state, 1983-1992.

State	10 Year Average Landings 1,000 Lbs	Percent
ME	14	*
MA	1,005	7
RI	5,695	41
CT	349	2
NY	1,975	14
NJ	3,736	27
MD	19	*
VA	477	3
NC	371	2
All States	13,643	100

Source: Unpublished NMFS General Canvass data.

Table 21. The number ('000) of scup caught and landed by recreational anglers each year 1983-1994.

	Catch	Landings	% Catch released
1983	10,155	8,837	13
1984	7,775	6,057	22
1985	13,861	10,810	22
1986	30,872	24,823	20
1987	12,377	9,916	20
1988	7,539	6,062	20
1989	11,394	9,176	19
1990	10,172	8,043	21
1991	16,852	13,279	21
1992	10,077	7,764	23
1993	7,076	5,663	20
1994	5,650	4,270	24
Avg	11,983	9,558	

Source: Unpublished MRFSS data.

Table 22. Recreational landings ('000 lbs) of scup by year and region, Maine to North Carolina.

Number			Weight		
NA	MA	SA	NA	MA	SA
19833,465	5,372	0	2,502	3,750	0
19842,199	3,859	0	1,185	1,230	0
19855,655	5,155	0	3,243	2,850	0
198614,890	9,933	0	7,525	4,080	0
19877,512	2,402	2	4,854	1,343	1
19884,525	1,536	1	3,383	883	1
19895,259	3,909	9	3,564	1,990	3
19903,209	4,833	1	1,746	2,394	1
19917,823	5,449	7	5,003	3,082	2
19923,923	3,804	37	2,300	2,102	10
19933,702	1,946	16	2,275	920	3
19942,011	2,233	26	1,542	1,076	9
Avg5,348	4,203	8	3,260	2,124	3

Source: Unpublished MRFSS data.

Table 23. The percent of total number and total weight of scup landed by marine recreational fishermen from state waters and the EEZ in each Atlantic coast subregion, 1983-1994.

	% of Total Number			% of Total Weight	
Subregion	Year	State	EEZ	State	EEZ
NA	1983	77	23	73	27
	1984	76	24	77	23
	1985	95	5	97	3
	1986	87	13	82	18
	1987	69	31	64	36
	1988	92	8	88	12
	1989	96	4	96	4
	1990	90	10	91	9
	1991	95	5	94	6
	1992	97	3	98	2
	1993	75	25	68	32
	1994	84	15	88	12
	Avg	86	14	85	15
MA	1983	58	41	48	51
	1984	100	0	100	0
	1985	98	2	100	0
	1986	97	3	96	4
	1987	98	2	98	2
	1988	97	3	96	4
	1989	93	7	95	5
	1990	93	7	94	6
	1991	94	6	94	7
	1992	99	1	99	1
	1993	98	2	98	2
	1994	85	15	85	15
	Avg	93	7	91	8

Source: Unpublished MRFSS data.

Table 24. The proportion (%) of scup caught and landed by recreational fishermen for each mode, 1983-1992 combined.

Mode	Catch (Number)	Landing (Number)	Landing (Weight)
Shore	11	11	6
Party/Charter	12	13	14
Private/Rental	77	75	80

Source: Unpublished MRFSS data.

Table 25. The average annual recreational landings of scup by state, 1983-1992.

State	1,000 lbs	%
ME	-	-
NH	-	-
MA	1,989	33.70
RI	429	7.27
CT	1,112	18.84
NY	2,204	37.35
NJ	130	2.21
DE	16	0.28
MD	3	0.04
VA	17	0.28
NC	2	0.03

Source: Unpublished MRFSS data.

Table 26. Ex-vessel value of scup commercial landings by year, Maine to Cape Hatteras, NC.

Year	Nominal Value 1,000 $	Nominal Price Mean	Mean Price in constant 1993 $
83	7,695	0.45	0.55
84	7,754	0.45	0.54
85	8,401	0.57	0.68
86	8,471	0.56	0.68
87	8,896	0.66	0.78
88	8,306	0.66	0.76
89	6,447	0.79	0.87
90	6,552	0.69	0.72
91	7,850	0.52	0.53
92	7,688	0.58	0.59
93	5,707	0.58	0.58
Avg	7,615	0.57	

Prices adjusted with PPI (1982=100)

Source: Unpublished NMFS General Canvass data.

Table 27. Average ex-vessel commercial landings of scup, value and price by month, Maine to Cape Hatteras, NC, 1983-1992.

	Water Area								
	State(<3mi)			EEZ(>3mi)			All		
	1000 Lbs	Value in constant 1992 $ ('000)	Mean price in constant 1992 $	1000 Lbs	Value in constant 1992 $ ('000)	Mean price in constant 1992 $	1000 Lbs	Value in constant 1992 $ ('000)	Mean price in constant 1992 $
MONTH									
JAN	5	7	1.24	1,165	791	0.68	1,171	798	0.68
FEB	4	3	0.87	1,168	743	0.64	1,172	747	0.64
MAR	2	1	0.72	1,749	1,100	0.63	1,752	1,102	0.63
APR	200	129	0.64	1,699	962	0.57	1,899	1,091	0.57
MAY	1,922	883	0.46	589	250	0.43	2,512	1,134	0.45
JUN	460	307	0.67	294	190	0.64	755	497	0.66
JUL	298	256	0.86	110	101	0.92	408	358	0.88
AUG	271	231	0.85	72	65	0.90	343	296	0.86
SEP	263	243	0.92	106	98	0.93	370	342	0.92
OCT	212	180	0.85	455	344	0.76	668	524	0.79
NOV	66	50	0.77	938	606	0.65	1,004	657	0.65
DEC	13	15	1.12	1,022	595	0.58	1,035	610	0.59
All	3,722	2,312	0.62	9,372	5,850	0.62	13,095	8,163	0.62

Prices adjusted with PPI (1982=100)

Source: Unpublished NMFS General Canvass data.

Table 28. Total landings and ex-vessel value for all finfish and shellfish, total landings and value for scup, and scup percent of total landings and value by state, 1993.

	All fish and finfish		Scup		Scup %	
	Total Landings (1,000 lbs)	Total Value ($1,000)	Total Landings (1,000 lbs)	Total Value ($1,000)	Total Landings	Total Value
ME	236,406	181,136	0	0	0.0	0.0
NH	10,971	11,836	a	a	b	b
MA	219,166	232,103	653	501	0.3	0.2
RI	120,756	76,320	2,937	1,558	2.4	2.0
CT	17,398	50,885	326	147	1.9	0.3
NY	54,340	54,163	1,607	1,115	3.0	2.1
NJ	196,101	96,288	4,016	2,233	2.0	2.3
DE	7,191	4,628	0	0	0.0	0.0
MD	84,938	53,399	23	10	b	b
VA	728,345	108,117	160	90	b	0.1
NC	164,883	57,890	116	54	0.1	0.1
Total	1,840,495	926,765	9,838	5,708	0.5	0.6

[a] less than 1,000

[b] less than 0.1%

Source: USDC 1995.
Unpublished NMFS General Canvass data.

Table 29. Ex-vessel value of scup commercial landings by year and water area, Maine to Cape Hatteras, NC, all gears combined.

	State <3 mi		EEZ >3mi		Total	
	1,000 $	% of Total	1,000 $	% of Total	1,000 $	% of Total
YEAR						
83	2,867	37	4,827	62	7,695	100
84	2,527	32	5,227	67	7,754	100
85	2,389	28	6,012	71	8,401	100
86	2,776	32	5,695	67	8,471	100
87	2,381	26	6,514	73	8,896	100
88	2,549	30	5,757	69	8,306	100
89	1,592	24	4,854	75	6,447	100
90	1,859	28	4,692	71	6,552	100
91	2,323	29	5,527	70	7,850	100
92	2,133	27	5,555	72	7,688	100
AVG	2,340	29	5,466	70	7,806	100

Source: Unpublished NMFS General Canvass data.

Table 30. Landings, ex-vessel value and price of scup by size category for 1993, all states and gears combined.

Size Category[1]	Landings (1,000 lbs)	Value ($ 1,000)	Price ($ /lb)
Jumbo	24	32	1.33
Large	1,189	1,099	0.92
Large/Mix	2,337	1,544	0.66
Medium	1,930	1,047	0.54
Small	2,184	617	0.28
Pins	141	25	0.18
Unclassified	1,818	1,245	0.68

[1] Parameters associated with size categories are determined by dealers and vary among ports. For example, in Cape May (NJ), the primary sizes ranges are: small 9" to .75 lb and large/mix >.75 lb. In Cape May, scup sometimes may be graded as follows: pins <9"; small 9" to .75 lb; medium .75 lb to 1.25 lbs; and large 1.25 lbs to 2 lbs (W. Makowski pers. comm.). In Point Judith (RI), scup is classified as follows: pins <.40 lb; small .40 lb to .49 lb; medium .50 lb to .74 lb; large .75 lb to 1.99 lbs; and jumbo >2 lbs (E. Hutchins pers. comm.).

Source: Unpublished NMFS Weighout data.

Table 31. The number of otter trawl vessels, trips, and associated pounds for a given threshold (pounds) of scup landings, 1992 and 1993.

1992

Threshold	Vessel	Trips	Pounds
>= 1	394	4,135	9,220,675
>= 200	287	1,961	9,120,186
>= 400	255	1,607	9,018,579
>= 600	230	1,408	8,922,550
>= 800	217	1,262	8,822,145
>= 1000	203	1,155	8,726,706
>= 4000	115	488	7,364,205
>= 5000	99	401	6,976,707
>= 10000	60	213	5,648,598

1993

Threshold	Vessel	Trips	Pounds
>= 1	427	4,802	8,260,554
>= 200	278	1,745	8,132,544
>= 400	245	1,412	8,038,801
>= 600	229	1,258	7,964,578
>= 800	211	1,117	7,867,326
>= 1000	197	1,015	7,776,723
>= 4000	117	462	6,649,490
>= 5000	105	388	6,319,130
>= 10000	68	206	5,000,346

Source: NMFS Weighout data.

Table 32. Scup - Otter Trawl Trips harvesting 1,000 pounds or more

Common Name	Pounds*	Species % of Total Pounds	Value	Species % of Total Value	
SQUID (LOLIGO)	13,018,782	29.350%	7,284,066	30.199%	
SCUP		8,726,706	19.674%	5,359,489	22.220%
MACKEREL, ATLANTIC		6,154,322	13.874%	937,815	3.888%
HAKE, SILVER		6,005,925	13.540%	2,621,675	10.869%
FLOUNDER, SUMMER		1,756,288	3.959%	2,893,398	11.996%
BUTTERFISH		1,327,231	2.992%	735,860	3.051%
ANGLER		1,072,460	2.418%	786,734	3.262%
BLUEFISH		1,057,301	2.384%	265,791	1.102%
FLOUNDER, WINTER		1,028,547	2.319%	989,719	4.103%
HAKE, RED		818,438	1.845%	215,078	0.892%
SKATES UNC		707,300	1.595%	70,080	0.291%
SEA BASS, BLACK		527,857	1.190%	485,966	2.015%
HERRING, ATLANTIC		394,617	0.890%	27,616	0.114%
FLOUNDER, YELLOWTAIL		283,940	0.640%	282,531	1.171%
COD		214,515	0.484%	190,671	0.791%
SQUID (ILLEX)		165,623	0.373%	42,347	0.176%
WEAKFISH, SQUETEAGUE		159,393	0.359%	122,011	0.506%
TAUTOG		153,497	0.346%	87,188	0.361%
DOGFISH (NK)		101,820	0.230%	17,607	0.073%
DOGFISH SPINY	99,379	0.224%	10,701	0.044%	
LOBSTER		86,447	0.195%	313,335	1.299%
TILEFISH		63,173	0.142%	43,101	0.179%
EEL, CONGER		58,399	0.132%	15,301	0.063%
FLOUNDER, WITCH		54,691	0.123%	63,336	0.263%
FLOUNDER, SAND-DAB		47,298	0.107%	13,090	0.054%
SEA ROBINS		40,407	0.091%	9,945	0.041%
POUT, OCEAN		34,588	0.078%	5,396	0.022%
SCALLOP, SEA	32,234	0.073%	152,331	0.632%	
HAKE, WHITE		30,625	0.069%	11,346	0.047%
OTHER FISH		20,590	0.046%	824	0.003%
CRAB, HORSESHOE		16,420	0.037%	1,675	0.007%
OTHER FISH		12,539	0.028%	8,407	0.035%
STURGEONS		9,249	0.021%	10,213	0.042%

CONCHS		8,872	0.020%	14,242	0.059%
SQUIDS (NS)		8,833	0.020%	4,459	0.018%
MENHADEN		8,545	0.019%	541	0.002%
CRAB, JONAH		8,151	0.018%	3,575	0.015%
FLOUNDERS (NK)		6,510	0.015%	4,235	0.018%
SHAD, AMERICAN		6,473	0.015%	2,304	0.010%
POLLOCK		4,540	0.010%	2,709	0.011%
MACKEREL, SPAN		4,211	0.009%	2,764	0.011%
BONITO		3,570	0.008%	1,219	0.005%
WHELK, KNOBBED		2,511	0.006%	1,365	0.006%
PUFFER, NORTHERN		2,313	0.005%	1,222	0.005%
SHARK, NK		1,785	0.004%	1,092	0.005%
WHELK, CHANNELED		1,193	0.003%	777	0.003%
JOHN DORY		1,026	0.002%	472	0.002%
BASS, STRIPED	940	0.002%	1,603	0.007%	

Table 32 Continued. Scup - Otter Trawl Trips harvesting 1,000 pounds or more

Common Name	Pounds*	Species % of Total Pounds	Value	Species % of Total Value	
FLOUNDER, AM. PLAICE		850	0.002%	554	0.002%
CUNNER		757	0.002%	66	0.000%
HERRING (NK)		706	0.002%	101	0.000%
WHITING, KING	699	0.002%	180	0.001%	
SHARK, PORBEAGLE		687	0.002%	195	0.001%
SHARK, SANDBAR		556	0.001%	200	0.001%
WHITING, BLACK		515	0.001%	155	0.001%
SHARK, THRESHER		365	0.001%	102	0.000%
WOLFFISHES		340	0.001%	217	0.001%
SHARK, TIGER		321	0.001%	69	0.000%
CRAB, ROCK		227	0.001%	225	0.001%
CROAKER, ATLANTIC		171	0.000%	40	0.000%
REDFISH		165	0.000%	84	0.000%
PERCH, WHITE	160	0.000%	42	0.000%	
TRIGGERFISH		145	0.000%	68	0.000%
HADDOCK		137	0.000%	122	0.001%
SWORDFISH		72	0.000%	243	0.001%
AMBER JACK		38	0.000%	24	0.000%
ALEWIFE		31	0.000%	2	0.000%
SPOT		20	0.000%	5	0.000%
DOGFISH SMOOTH		18	0.000%	8	0.000%
COBIA		15	0.000%	15	0.000%
SHARK, DUSKY	14	0.000%	4	0.000%	
HAKE MIX RED & WHITE		5	0.000%	2	0.000%
CRAB, BLUE		5	0.000%	2	0.000%
TOTAL		44,357,093	100.000%	24,119,947	100.000%

Note: Records with Vessel identity unknown were excluded.

Number of Trips = 1,155.

Table 33. Scup commercial landings, value and price by state, 1993.

State	Landings 1,000'S	Ex-vessel Value 1,000'S	Price $/lb	
NH		0	0	1.06
MA		653	501	0.77
RI	2,937	1,558	0.53	
CT		326	147	0.45
NY		1,607	1,115	0.69
NJ		4,016	2,233	0.56
MD		23	10	0.44
VA		160	90	0.56
NC		116	54	0.46

0= less than 1,000

Source: Unpublished NMFS General Canvass data.

Table 34. Estimated cost data for otter trawlers that operated in the US mackerel fishery from 1989-1991 by gross tonnage.

Vessel Size						
Item	5-50	GRT	51-150	GRT	>150	GRT
	$	%	$	%	$	%
Fixed Costs						
Gear	8,902	22.43	14,095	15.12	33,407	19.46
Electronics	3,509	8.84	3,385	3.62	8,352	4.87
Engine	3,123	7.87	9,216	9.88	26,951	15.70
Other hull costs	4,038	10.17	5,090	5.46	6,170	3.59
Insurance	7,800	19.65	21,095	22.63	34,256	19.95
Subtotal	27,372	68.95	52,881	56.72	109,146	63.57
Variable costs						
Fuel	6,371	16.05	26,624	28.56	42,656	24.84
Ice	3,534	8.90	7,584	8.13	11,160	6.50

Food	2,418	6.09	6,144	6.59	8,730	5.08
Subtotal	12,323	31.04	40,352	43.28	62,546	36.43
Total	39,695	100	93,233	100	171,692	100

[1] All values are in 1987 dollars.

[2] GRT=gross registered tonnage.

Source: Adapted from Walden 1993.

Table 35. Estimated number of party and charter boats operating along the Atlantic Coast and associated revenues by state, 1985.

State	Charter	Party	Revenues ('000 1985 $)
Maine	35	10	2,696
New Hampshire	19	21	3,226
Massachusetts	136	41	10,717
Rhode Island	78	6	4,164
Connecticut	46	15	3,753
New York	300	100	24,723
New Jersey	375	100	28,074
Delaware	80	12	2,511
Maryland	221	109	11,307
Virginia	200	30	5,196
North Carolina	136	10	4,376
Total	1,626	454	100,723

Source: Sport Fishing Institute 1988.

Table 36. Average total cost [a] for a day trip, by mode for selected states (1980-1989).

State	Mode: Pier	Beach	Party	Charter	Rental	Private
New York	$16.09	$13.77	$43.35	$59.88	$78.19	$44.38
New Jersey	21.10	16.32	45.36	146.66	92.41	40.93
Delaware	34.15	44.44	69.69	73.66	b	40.33

[a] Travel and services (services might be composed of a combination of the following: costs for bait, tackle, cleaning, fuel, pier fees, and boat fees).

[b] Not enough observations for precise estimates.

Source: Adapted from Strand ***et al.*** 1991.

Table 37. Charter and party boat survey distribution and returns, 1990.

State	Number sent	Usable returns	Non-usable returns
ME	24	5	1
NH	21	5	-
MA	80	17	9
RI	15	7	2
CT	17	4	2
NY	92	24	3
NJ	159	51	6
PA	16	7	1
DE	14	3	-
MD	4	2	-
VA	143	44	5
NC	1	1	-
FL	6	2	1
Total	592	172	30

Table 38. Relative customer interest and success in catching selected species in 1989. (1 = Low, 2 = Somewhat Low, 3 = Moderate, 4 = Somewhat High, and 5 = High).

	Charter boats		Party boats	
Species	Interest (mean)	Success (mean)	Interest (mean)	Success (mean)
Large pelagics (marlin, tunas)	3.9	2.4	3.1	2.8
Sharks (other than dogfish)	3.2	2.4	2.1	1.9
Bluefish	3.9	3.9	4.6	4.0
Atlantic mackerel	2.4	3.0	3.5	3.5
Summer flounder	3.2	1.9	3.6	1.5
Scup	1.4	1.7	2.2	2.0
Black sea bass	2.1	2.6	3.2	2.9
Hakes	1.4	1.6	2.3	2.5
Groundfish (cod, haddock, yellowtail)	3.0	2.6	3.0	2.4
Weakfish	3.1	1.7	3.3	1.7
Striped bass	3.7	2.5	3.5	1.7
Other: spot	4.6	3.9	4.7	3.4

Table 39. Party and charter boat operating experience in 1985 and 1989.

	Charter 1985 (mean)	Charter 1989 (mean)	Party 1985 (mean)	Party 1989 (mean)
Ave. number of trips per year	57.0	50.0	142.0	130.0
Ave. number of trips per day OR	1.0	1.0	1.3	1.4
Ave. number of days per trip	1.1	1.1	1.2	1.3
Ave. number days fishing per week	3.2	3.1	5.0	4.6
Ave. number of anglers per trip	5.2	5.1	20.9	19.5
Ave. trip price per customer ($)	121.8	149.5	26.2	29.2
Ave. number of fish Taken per customer	10.9	8.3	15.2	9.9
Ave. number of crew members	1.4	1.4	2.1	2.0
Ave. cost of fuel & supplies ($)	96.1	131.1	113.3	146.6

Table 40. Commercial and recreational catch, landings, and discards ('000 lbs), 1983-1994.

		Commercial		Recreational	Total
Year	Landings	Disard	Landings	Discard	Catch
83	17,183	-	6,252	124	-
84	17,128	4,744	2,417	88	24,377
85	14,828	9,233	6,145	140	30,346
86	15,252	4,418	11,605	103	31,378
87	13,380	5,598	6,198	260	25,436
88	12,628	3,662	4,267	424	20,981
89	8,192	4,791	5,557	231	18,771
90	9,518	8,547	4,140	156	22,361
91	15,140	7,793	8,088	201	31,222
92	13,184	12,674	4,412	164	30,435
93	9,147	3,161	3,203	326	15,837
94	9,861	-	2,628	197	-
Avg 88-92	11,732	7,494	5,293	235	24,754

-= no estimates available

Source: NMFS weighout and MRFSS data and NEFSC (1995)

Table 41. The percent of measured scup (TL) less than a given size based on 1983-1993 NEFSC weighout data.

Year	< 7.0	< 8.0	< 9.0	< 10.0	N
1983	1.5	10.2	28.9	53.2	7,860
1984	1.4	11.4	32.1	53.1	6,303
1985	6.0	20.4	36.5	56.7	3,058
1986	0.3	3.1	9.9	48.7	5,467
1987	1.8	8.4	34.6	65.2	6,491
1988	0.9	7.1	32.3	64.0	8,691
1989	0.3	9.8	29.9	55.3	4,806
1990	1.4	11.4	38.7	72.4	4,736
1991	0.1	7.6	38.3	69.9	3,150
1992	1.6	33.1	58.1	82.7	3,260
1993	0.9	28.3	57.3	81.0	2,287

Table 42. The percent of measured scup (TL) less than a given size based on 1982-1994 North Carolina winter trawl data.

Fishing Season	< 7.0	< 8.0	< 9.0	< 10.0	N
1982-1983	1.1	16.7	43.4	67.0	280,569
1983-1984	1.7	20.5	44.8	65.7	316,294
1984-1985	5.1	49.1	83.8	92.2	209,902
1985-1986	1.6	10.9	31.0	50.8	113,944
1986-1987	17.1	20.2	34.2	52.4	152,994
1987-1988	16.9	21.4	46.2	78.0	96,060
1988-1989	57.0	74.4	90.2	97.1	38,826
1989-1990	4.5	13.3	33.3	67.7	87,877
1990-1991	3.0	25.2	58.8	82.9	224,146
1991-1992	6.7	37.2	80.2	89.8	130,715
1992-1993	15.9	42.8	66.8	81.9	223,642
1993-1994	4.8	24.3	65.9	88.1	389,097

Table 43. The percent of measured scup (TL) less than a given size based on 1983-1991 NEFSC weighout data for each state.

State	< 7.0	< 8.0	< 9.0	< 10.0	N
MA	0.4	6.0	22.4	81.8	1,010
RI	0.2	5.8	13.3	48.9	17,436
CT	-	-	-	-	-
NY	1.6	8.9	29.7	59.1	2,438
NJ	1.7	10.4	37.3	67.1	23,533
DE	-	-	-	-	-
MD	2.0	41.0	92.0	100.0	100
VA	3.2	16.0	24.8	54.8	6,045

Table 44. The percent of measured scup (TL) less than a given size based on 1983-1991 NEFSC weighout data for each major gear type.

Gear	< 7.0	< 8.0	< 9.0	< 10.0	N	
Handline	0.0	1.0	13.2	43.2	486	
Otter Trawl, Bottom	1.4	9.5	19.3	59.1	48,077	
Float Traps	0.0	13.6	25.9	59.2	316	
Pound Nets	0.6	8.4	30.8	97.7	704	
Otter Trawl, Mid-Water	0.4	0.6	8.7	37.5	472	
Pot/Traps	0.0	6.3	19.3	66.9	507	

Table 45. The average length (L_{50}) at which scup are first fully recruited to the trawl fishery by mesh size. Estimates are based on retention lengths as derived by Mayo (1982).

Mesh Size	Total Length
1.5	3.9
2.0	4.8
2.5	5.7
3.0	6.5
3.5	7.4
4.0	8.3
4.5	9.1
5.0	10.1
5.5	10.9

Note: Mesh sizes are inside stretch measurements.

Note: Total lengths were derived from fork lengths using the following relationship (Hamer 1979): TL = 1.14(FL)-0.44.

Table 46. Summary of scup discards by mesh size based on 1989-1993 NEFSC Sea Sampling data.

Mesh (In)	No. of Tows	Total No. Scup	% scup < 9"	% scup Discarded
liner*	97	8,025	78	78
2	25	2,023	72	74
3	34	3,305	93	93
4	10	818	47	40
4.5	2	196	65	48

*liner sizes ranged from 1.0 - 2.0 inches

Table 47. Catch composition (%) for scup otter trawl trips, 1983-1987 average.

>0 Species	>100 Lbs/Trip	>250 Lbs/Trip	>500 Lbs/Trip	>1,000 Lbs/Trip	Lbs/Trip
Black sea bass	1	1	1	1	1
Scup 17	26	31	36	41	
Bluefish	2	2	2	2	2
Butterfish	7	8	8	8	8
Croaker	*	*	*	*	*
Winter flounder	6	4	3	3	2
Summer flounder	20	16	13	11	9
Mackerel	4	6	7	8	9
Weakfish	*	*	*	*	*
Tautog	*	*	*	*	*
Whiting	12	10	9	8	7
Lobster	*	*	*	*	*
Sea scallop	*	*	*	*	*
Loligo	17	18	18	18	17
Other 12	8	7	5	4	
Trips 13,183	6,459	4,959	3,881	2,911	

* = less than 0.5%.

Source: NMFS NEFC Weighout data.

Table 48. The number of otter trawl vessels, trips, and associated pounds for a given threshold (pounds) of scup landings, 1992 and 1993.

1992

Threshold	Vessel	Trips	Pounds
>= 1	394	4,135	9,220,675
>= 200	287	1,961	9,120,186
>= 400	255	1,607	9,018,579
>= 600	230	1,408	8,922,550
>= 800	217	1,262	8,822,145
>= 1000	203	1,155	8,726,706
>= 4000	115	488	7,364,205
>= 5000	99	401	6,976,707
>= 10000	60	213	5,648,598

1993

Threshold	Vessel	Trips	Pounds
>= 1	427	4,802	8,260,554
>= 200	278	1,745	8,132,544
>= 400	245	1,412	8,038,801
>= 600	229	1,258	7,964,578
>= 800	211	1,117	7,867,326
>= 1000	197	1,015	7,776,723
>= 4000	117	462	6,649,490
>= 5000	105	388	6,319,130
>= 10000	68	206	5,000,346

Source: NMFS Weighout data.

Table 49. The percent of otter trawl vessels, trips, and associated pounds for a given threshold (pounds) of scup landings, 1992 and 1993.

1992

Threshold	Vessel	Trips	Pounds
>= 1	100	100	100
>= 200	73	47	99
>= 400	65	39	98
>= 600	58	34	97
>= 800	55	31	96
>= 1000	52	28	95
>= 4000	29	12	80
>= 5000	25	10	76
>=10000	15	5	61

1993

Threshold	Vessel	Trips	Pounds
>= 1	100	100	100
>= 200	65	36	98
>= 400	57	29	97
>= 600	54	26	96
>= 800	49	23	95
>= 1000	46	21	94
>= 4000	27	10	80
>= 5000	25	8	76
>= 10000	16	4	61

Source: NMFS Weighout data

Table 50. The number of otter trawl vessels, trips, and associated pounds for a given threshold (pounds) of *Loligo* landings, 1992 and 1993.

1992

Threshold	Vessel	Trips	Pounds
>=1	383	5,608	39,548,368
>=200	313	3,794	39,426,206
>=400	283	3,187	39,252,701
>=600	260	2,806	39,066,885
>=800	245	2,529	38,875,824
>=1000	229	2,352	38,716,974
>=2500	172	1,644	37,605,209
>=5000	139	1,159	35,857,109
>=10000	110	719	32,697,193

1993

Threshold	Vessel	Trips	Pounds
>= 1	430	7,400	48,305,947
>= 200	370	5,015	48,156,477
>= 400	328	4,260	47,938,730
>= 600	308	3,790	47,708,294
>= 800	295	3,844	47,500,127
>= 1000	285	3,223	47,265,249
>= 2500	234	2,226	45,671,028
>= 5000	197	1,494	43,069,430
>= 10000	153	921	39,002,004

Source: NMFS Weighout data.

Table 51. The percent of otter trawl vessels, trips, and associated pounds for a given threshold (pounds) of *Loligo* landings, 1992 and 1993.

1992

Threshold	Vessel	Trips	Pounds
>=1	100	100	100
>=200	82	68	100
>=400	74	57	99
>=600	68	50	99
>=800	64	45	98
>=1000	60	42	98
>=2500	45	29	95
>=5000	36	21	91
>=10000	29	13	83

1993

Threshold	Vessel	Trips	Pounds
>= 1	100	100	100
>= 200	86	68	100
>= 400	76	58	99
>= 600	72	51	99
>= 800	69	52	98
>= 1000	66	44	98
>= 2500	54	30	95
>= 5000	46	20	89
>= 10000	36	12	81

Source: NMFS Weighout data.

Table 52. Landings by species for all otter trawl trips harvesting 2,500 pounds or more of *Loligo*, 1992.

Common Name	Species % of Total Pounds*	Pounds	Species % of Total Value	Value
SQUID (*LOLIGO*)	37,605,209	48.861%	21,946,834	51.956%
HAKE, SILVER	9,431,248	12.254%	4,082,811	9.665%
MACKEREL, ATLANTIC	7,063,093	9.177%	1,214,848	2.876%
SCUP	4,685,335	6.088%	3,186,156	7.543%
BUTTERFISH	3,983,006	5.175%	2,510,065	5.942%
SQUID (*ILLEX*)	3,963,974	5.150%	1,137,752	2.693%
FLOUNDER, SUMMER	2,195,269	2.852%	3,595,796	8.513%
ANGLER	1,379,661	1.793%	922,119	2.183%
BLUEFISH	1,150,885	1.495%	287,213	0.680%
HAKE, RED	1,114,031	1.447%	303,351	0.718%
FLOUNDER, WINTER	1,008,942	1.311%	969,747	2.296%
SKATES UNC	641,492	0.834%	64,277	0.152%
SEA BASS, BLACK	502,602	0.653%	456,282	1.080%
HERRING, ATLANTIC	428,410	0.557%	38,235	0.091%
FLOUDER, YELLOWTAIL	393,679	0.512%	405,059	0.959%
COD	218,049	0.283%	204,273	0.484%
DOGFISH (NK)	190,695	0.248%	25,416	0.060%
TILEFISH	175,398	0.228%	97,953	0.232%
WEAKFISH, SQUETEAGUE	96,904	0.126%	92,866	0.220%
EEL, CONGER	93,578	0.122%	19,914	0.047%
TAUTOG	93,516	0.122%	59,635	0.141%
FLOUNDER, WITCH	89,113	0.116%	109,019	0.258%
LOBSTER	72,531	0.094%	277,736	0.657%
HAKE, WHITE	65,306	0.085%	23,264	0.055%
POUT, OCEAN	51,657	0.067%	8,548	0.020%
WHITING, BLACK	40,206	0.052%	10,258	0.024%
SEA ROBINS	39,423	0.051%	10,135	0.024%
FLOUNDER, SAND-DAB	21,551	0.028%	6,172	0.015%
OTHER FISH	20,590	0.027%	824	0.002%
SCAllOP, SEA	19,941	0.026%	101,002	0.239%
DOGFISH SPINY	16,350	0.021%	1,512	0.004%
OTHER FISH	10,387	0.013%	4,746	0.011%
POLLOCK	10,066	0.013%	5,266	0.012%
CONCHS	9,005	0.012%	11,410	0.027%
CROAKER, ATLANTIC	6,844	0.009%	1,383	0.003%
STURGEONS	6,338	0.008%	7,469	0.018%
FLOUNDER, AM. PLAICE	5,954	0.008%	7,768	0.018%
SHAD, AMERICAN	5,762	0.007%	2,398	0.006%
DOGFISH SMOOTH	5,349	0.007%	1,782	0.004%
SHARK, SANDBAR	5,225	0.007%	1,859	0.004%
SQUIDS (NS)	5,209	0.007%	2,738	0.006%
MENHADEN	4,900	0.006%	294	0.001%
JOHN DORY	4,490	0.006%	2,502	0.006%
MACKEREL, SPAN	4,141	0.005%	2,730	0.006%
WHITING, KING	4,102	0.005%	811	0.002%
WOLFFISHES	3,802	0.005%	2,304	0.005%

Table 52 (continued). Landings by species for all otter trawl trips harvesting 2,500 pounds or more of *Loligo*, 1992.

Common Name	Species % of Total Pounds*	Pounds	Species % of Total Value	Value
HADDOCK	3,335	0.004%	747	0.002%
SWORDFISH	2,829	0.004%	8,022	0.019%
PUFFER, NORTHERN	2,313	0.003%	1,237	0.003%
BONITO	1,946	0.003%	623	0.001%
HERRING (NK)	1,506	0.002%	240	0.001%
SHARK, NK	1,460	0.002%	1,664	0.004%
SHARK, THRESHER	1,400	0.002%	1,076	0.003%
REDFISH	869	0.001%	523	0.001%
BASS, STRIPED	698	0.001%	1,214	0.003%
SHARK, BLACK TIP	666	0.001%	120	0.000%
CUNNER	598	0.001%	51	0.000%
SHARK, DUSKY	582	0.001%	91	0.000%
CRAB, JONAH	425	0.001%	309	0.001%
COBIA 207	0.000%	267	0.001%	
CRAB, ROCK	172	0.000%	170	0.000%
SPOT	170	0.000%	42	0.000%
TRIGGERFISH	145	0.000%	68	0.000%
FLOUNDER, FOURSPOT	102	0.000%	19	0.000%
SHARK, PORBEAGLE	97	0.000%	52	0.000%
FLOUNDERS (NK)	59	0.000%	60	0.000%
CRAB, HORSESHOE	40	0.000%	4	0.000%
ALEWIFE	31	0.000%	2	0.000%
HALIBUT, ATLANTIC	29	0.000%	40	0.000%
SHARK, MAKO SHORTFIN	15	0.000%	46	0.000%
MACKEREL, KING	10	0.000%	9	0.000%
TUNA, ALBACORE	9	0.000%	4	0.000%
CUSK	6	0.000%	2	0.000%
WHELK, CHANNELED	6	0.000%	5	0.000%
WHELK, KNOBBED	6	0.000%	4	0.000%
Total 76,962,949	100.000%	42,241,243	100.000%	

Note: Records with unknown vessel identity were excluded.

Number of Trips = 1,644.

Source: NMFS Weighout data.

Table 53. The minimum theoretical size of scup (TL inches) that would be retained by a fish trap fitted with circular or square escape vents (inches). The derived lengths are based on the body depth/total length relationship for scup derived by Smith and Norcross (1968).

Scup Size	Circular Vent Diameter	Square Vent Sides
8	2.7	2.0
9	3.1	2.25

Table 54. Closed seasons necessary to achieve the third year reduction in exploitation for scup.

		% Reduction		
	Closed	0%	15%	
Gear	Season	Rec	Rec	
Otter Trawl	Nov 15 - Jan 31	28	15	
		Oct 15 - Feb 7	38	28
Float Traps	Apr 1 - May 7	34	-	
Pair trawls	Mar 1 - May 31	28	15	
		Mar 1 - Jun 15	39	28
Pots/Traps	Jun 1 - Jul 31	29	-	
Pound Nets		Jun 1 - Jul 21	30	-
Hand Lines	May 1 - Jul 31	32	20	
	May 1 - Aug 7	38	27	

Table 55. Scup landings (lbs), 5 year average by 3-digit statistical area and month, 1989-1993 combined[1], all gears.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Totals	Percent
AREA														
511	0	0	0	8	0	0	0	0	0	0	0	0	8	0.0%
513	0	0	0	0	0	0	0	0	0	29	46.8	0	75.8	0.0%
514	44.6	0	7	148.4	145.6	89.8	225.8	0	45.2	1292.4	4254.6	354	6607.4	0.1%
515	0	0	0	0	0	0	0	0	50	0	0	0	50	0.0%
521	21	0.2	0	364.8	3365.2	1983	253.8	314.2	552	423.2	628.2	212.4	8118	0.1%
522	0	0	0	0	28	0	0.2	347.8	105	2	0	0	483	0.0%
525	13	0.8	44.2	22.4	4915	132.2	0.4	0	2	1	0	5	5136	0.0%
526	1318.6	871.6	19670.6	20771.6	5921.6	552	1.8	19.4	45.2	478.4	2462.4	1135	53248.2	0.5%
533	0	0	0	1366.6	0	0	0	0	0	0	0	0	1366.6	0.0%
537	111272.2	38821	49957.4	224882.2	144395.6	33633.6	18960.4	26696	37139.4	162868.2	263167.6	184838.4	1296632	12.5%
538	0	0	0	32976.8	372337.8	174723	81955.2	72576	78039.4	110121.2	27144.6	0	949874	9.2%
539	6500	4930.4	1574.4	222991.8	1031981	91734.2	100660.8	92690.6	88524.8	119665.8	249486.2	41674.4	2052415	19.9%
562	0	0	0	0	365.6	0.6	0	0	8	1.6	3	0	378.8	0.0%
611	2900	2060	5275	10003.2	29083	50841	43046.4	43059.4	43262.6	30837.2	15850.2	4722.2	280940.2	2.7%
612	1884.4	1299.6	7	13472.6	4009	996.8	364	5069.4	4960.6	22442.6	50980.6	18231	123717.6	1.2%
613	42803	18995.4	19765	111771.2	52949.6	46063.8	30746.4	19597	19255.2	69248.2	203476.4	170033.6	804704.8	7.8%
614	0	67	0	0	42.6	12	3	5	603.2	14711.8	1041.4	146.4	16632.4	0.2%
615	3474.8	41666.8	29706	4767.6	6	12.8	0	0	7.6	1612	7521.6	33342.6	122117.8	1.2%
616	335374.6	262188.6	519090	588786	87218.6	14176	21250.2	0	223.2	16597.2	197581.6	274911.4	2317397	22.4%
621	1657.6	3821	7783.2	8674	67.4	481.2	55.2	59.2	4813	12900.8	5888.4	8251.6	54452.6	0.5%
622	439379.8	466022.2	668078	356914.2	9842.4	0	0	0	0	338	19283	102414.8	2062272	20.0%
623	14149.2	14118.6	3827	308	0	0	0	0	0	0	214.8	0	32617.6	0.3%
625	27	0	0	169	24.6	10.2	192.6	1100.6	559.8	2441.8	496.4	123.4	5145.4	0.0%
626	10243.6	16942	67470.4	25550	844.2	0	0	0	0	55	168.4	4416.2	125689.8	1.2%
627	0	0	460	0	0	0	0	0	0	0	0	0	460	0.0%
631	259.6	106.8	157.4	0	0	0	0.2	2	31	244.2	202.2	91.8	1095.2	0.0%
632	2443.8	762.2	5858.2	234.8	0	0	0	0	0	0	1804	353	11456	0.1%
635	141.6	1.6	0	0	0	0	0	0	0	0	4.6	0.6	148.4	0.0%
ALL	973908.4	872675.8	1398731	1624183	1747543	415442.2	297716.4	261536.6	278227.2	566311.6	1051707	845257.8	10333240	100.0%
PERCENT	9.4%	8.4%	13.5%	15.7%	16.9%	4.0%	2.9%	2.5%	2.7%	5.5%	10.2%	8.2%	100.0%	

[1] Excludes landings for unknown area and/or month. This figure represents 93.9% of the total scup landings between 1989-1993.

Source: NMFS Unpublished Weighout data.

Table 56. Scup harvests and discards (lbs) by 3-digit area, 1989 - 1993 combined, All Gears.

Sea Sampling data
Weighout data

Area	Number Of Tows	5-year Total Catch	Percent Of Catch	5-year Total Discards	Percent Discarded	5-year Total Landings[1]	Percent Of Landings
511	0	0	0.0%	0	-	40	0.0%
513	17	25	0.0%	19	76.0%	379	0.0%
514	33	672	0.1%	46	6.8%	33037	0.1%
515	1	678	0.1%	0	0.0%	250	0.0%
521	11	27	0.0%	27	100.0%	40590	0.1%
522	2	3	0.0%	0	0.0%	2415	0.0%
525	1	1	0.0%	0	0.0%	25680	0.0%
526	40	2217	0.3%	1531	69.1%	266241	0.5%
533	0	0	0.0%	0	-	6833	0.0%
537	400	104937	16.3%	41342	39.4%	6483160	12.5%
538	109	34017	5.3%	22547	66.3%	4749370	9.2%
539	225	15920	2.5%	6586	41.4%	10262073	19.9%
562	0	0	0.0%	0	-	1894	0.0%
611	22	2817	0.4%	2162	76.7%	1404701	2.7%
612	11	124	0.0%	102	82.3%	618588	1.2%
613	352	183822	28.5%	91831	50.0%	4023524	7.8%
614	31	1462	0.2%	932	63.7%	83162	0.2%
615	9	32657	5.1%	1816	5.6%	610589	1.2%
616	339	167461	25.9%	82599	49.3%	11586987	22.4%
621	247	12526	1.9%	11806	94.3%	272263	0.5%
622	201	67843	10.5%	26927	39.7%	10311362	20.0%
623	13	16406	2.5%	15145	92.3%	163088	0.3%
625	21	96	0.0%	77	80.2%	25727	0.0%
626	43	1863	0.3%	1094	58.7%	628449	1.2%
627	0	0	0.0%	0	-	2300	0.0%
631	17	39	0.0%	13	33.3%	5476	0.0%
632	9	20	0.0%	9	45.0%	57280	0.1%
635	8	71	0.0%	66	93.0%	742	0.0%
ALL	2162	645704	**100.0%**	306677	**47.5%**	51666200	**100.0%**

Source: NMFS Unpublished Sea Sampling and Weighout Data.

[1] Excludes landings for unknown area and/or month. This figure represents 93.9%

of the total scup landings between 1989-1993.

Table 57. Hypothetical scenario developed to assess the impacts of a change in the commercial discard rate on the commercial quota and recreational harvest limit from allocations based on catch or landings.

Allocations based on catches

Comm. Discards	TAC	Comm. TAC	Comm. Discards	Comm. Quota	Rec. TAC	Rec. Discards	Harvest Limit
Average	16.83	13.13	7.49	5.64	3.70	0.24	3.46
+30%	16.83	13.13	9.74	3.39	3.70	0.24	3.46
- 30%	16.83	13.13	5.24	7.89	3.70	0.24	3.46

Allocations based on landings

Comm. Discards	TAC	Total Discards	Harvest Limit	Comm. Quota	Rec. Harvest Limit
Average	16.83	7.73	9.10	6.37	2.73
+30%	16.83	9.98	6.85	4.80	2.06
-30%	16.83	5.48	11.35	7.95	3.41

Table 58. State shares of a coastwide quota of 5.64 million pounds. Shares are based on five years of landings data, 1988-1992.

State	%	lbs
ME	0.22	12,398
MA	6.81	383,779
RI	43.60	2,457,088
CT	4.11	231,620
NY	16.12	908,446
NJ	26.28	1,481,015
MD	0.14	7,890
VA	1.41	79,461
NC	1.31	73,825
Total	100.00	5,635,522

Table 59. Bimonthly allocations based on a coastwide quota of 5.64 million pounds. Shares are based on ten years of bimonthly landings data, 1988-1992.

Bimonthly Period	%	lbs
Jan - Feb	18.0	1,014,394
Mar - Apr	30.4	1,713,199
May - June	22.4	1,262,357
Jul - Aug	5.3	298,683
Sep - Oct	7.3	411,393
Nov - Dec	16.6	935,497
Total	100.0	5,635,522

Table 60. Average Bimonthly Landings by State, Maine to Cape Hatteras, NC. Percentage of Total Scup Landings by Period, 1988-1992.

State	Jan - Feb	Mar - Apr	May - Jun	Jul - Aug	Sep - Oct	Nov - Dec
ME	0.1%	0.3%	0.5%	0.0%	0.0%	0.3%
NH	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
MA	0.0%	1.1%	9.2%	22.9%	15.9%	0.6%
RI	22.4%	34.7%	80.6%	38.4%	49.3%	51.0%
NY	14.0%	13.2%	8.1%	38.4%	29.1%	24.8%
NJ	58.2%	44.5%	1.6%	0.3%	5.2%	22.5%
MD	0.2%	0.3%	0.0%	0.0%	0.1%	0.1%
VA	3.7%	2.4%	0.0%	0.0%	0.5%	0.3%
NC	1.4%	3.6%	0.0%	0.0%	0.0%	0.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Unpublished NMFS General Canvass data.

Table 61. Average Bimonthly Landings of Scup, Maine - Cape Hatteras, NC. Percentage of Total Landings by State, 1988-1992.

	Jan - Feb		Mar - Apr	May - Jun	Jul - Aug	Sep - Oct	Nov - Dec	Total
ME	3.9%	33.5%	43.8%	0.0%	0.0%	18.7%	100.0%	
NH	0.0%	0.0%	11.8%	0.0%	88.2%	0.0%	100.0%	
MA	0.0%	7.1%	42.1%	24.9%	23.8%	2.1%	100.0%	
RI	8.6%	22.6%	38.6%	4.4%	7.7%	18.1%	100.0%	
NY	15.1%	24.1%	10.9%	12.2%	12.8%	24.8%	100.0%	
NJ	36.7%	47.5%	1.3%	0.0%	1.3%	13.1%	100.0%	
MD	23.0%	66.8%	0.1%	0.2%	2.9%	7.1%	100.0%	
VA	45.2%	48.1%	0.2%	0.1%	2.5%	3.8%	100.0%	
NC	18.1%	76.4%	0.0%	0.1%	0.0%	5.3%	100.0%	

Source: Unpublished NMFS General Canvass data.

Table 62. The percent of measured scup (TL) less than a given size based on 1990-1994 MRFSS intercept data for each state.

State	< 7.0	< 8.0	< 9.0	< 10.0	N
ME	-	-	-	-	-
NH	-	-	-	-	-
MA	0.9	5.9	27.2	57.8	3,184
RI	4.3	13.7	33.6	63.0	3,418
CT	0.8	4.1	22.9	56.3	1,358
NY	4.1	16.3	38.9	67.8	5,171
NJ	5.7	35.1	82.9	94.8	995
DE	5.7	53.9	85.5	97.5	401
MD	0.0	27.8	88.9	100.0	18
VA	24.7	51.0	84.5	100.0	239
NC	21.6	57.6	79.2	91.2	125
Coast	3.8	15.6	39.1	66.9	14,909

Table 63. The percent reduction in exploitation associated with various size limits for scup, 1990-1994. The reductions are based on measured fish from the MRFSS survey and assume a post-release mortality of 15%. The number in parentheses is the sample size.

Size (TL)	Coast (14,909)
7	3.2
8	13.2
9	33.2
10	56.9

Table 64. The percent of successful anglers landing 1 to 200 scup (MRFSS A fish) per day, coastwide, 1990-1994.

Catch Per	Cumulative	Cumulative

Trip	Frequency	Percent	Frequency	Percent

1	1,138	23.6	1,138	23.6

2	549	11.4	1,687	35.1

3	453	9.4	2,140	44.5

4	262	5.4	2,402	49.9

5	277	5.8	2,679	55.7

6	203	4.2	2,882	59.9

7	119	2.5	3,001	62.4

8	172	3.6	3,173	65.9

9	80	1.7	3,253	67.6

10	167	3.5	3,420	71.1

11	59	1.2	3,479	72.3

12	102	2.1	3,581	74.4

13	61	1.3	3,642	75.7

14	47	1.0	3,689	76.7

15	176	3.7	3,865	80.3

16	50	1.0	3,915	81.4

17	43	0.9	3,958	82.3

18	43	0.9	4,001	83.1

19	24	0.5	4,025	83.6

20	73	1.5	4,098	85.2

21	16	0.3	4,114	85.5

22	16	0.3	4,130	85.8

23	28	0.6	4,158	86.4

24	45	0.9	4,203	87.3

25	46	1.0	4,249	88.3

26	31	0.6	4,280	88.9

27	29	0.6	4,309	89.5

28	18	0.4	4,327	89.9

29	9	0.2	4,336	90.1

30	84	1.7	4,420	91.9

31	17	0.4	4,437	92.2

32	12	0.2	4,449	92.5

33	15	0.3	4,464	92.8

34	8	0.2	4,472	92.9

35	12	0.2	4,484	93.2

36	24	0.5	4,508	93.7

37	7	0.1	4,515	93.8

38	8	0.2	4,523	94.0

39	9	0.2	4,532	94.2

40	29	0.6	4,561	94.8

41	12	0.2	4,573	95.0

42	10	0.2	4,583	95.2

43	4	0.1	4,587	95.3

44	10	0.2	4,597	95.5

45	16	0.3	4,613	95.9

46	1	0.0	4,614	95.9

47	4	0.1	4,618	96.0

48	6	0.1	4,624	96.1

49	2	0.0	4,626	96.1

50	47	1.0	4,673	97.1

51	4	0.1	4,677	97.2

52	4	0.1	4,681	97.3

53	4	0.1	4,685	97.4

54	11	0.2	4,696	97.6

55	10	0.2	4,706	97.8

56-200	106	2.2	4,812	100.0

Table 65. The percent reduction in exploitation associated with various possession limits for scup, 1990-1992. The reductions assume a post-release mortality of 15%.

Bag	Coast
1	76.9
2	70.8
3	65.6
4	61.2
5	57.2
6	53.6
7	50.4
8	47.4
9	44.7
10	42.1
11	39.7
12	37.5
13	35.5
14	33.5
15	31.7
16	30.1
17	28.6
18	27.2
19	25.8
20	24.5
21	23.3
22	22.2
23	21.0
24	19.9
25	18.9
26	18.0
27	17.1
28	16.3
29	15.5
30	14.7
31	14.0
32	13.4
33	12.8
34	12.2
35	11.6
36	11.1
37	10.6
38	10.1
39	9.6
40	9.1
41	8.7
42	8.3
43	7.9
44	7.6
45	7.2
46	6.9
47	6.5
48	6.2
49	5.9
50	5.6

Table 66. Scup recreational landings number by wave, 1990-1994 combined.

	% of Total
J - F	*
M - A	0
M - J	9.8
J - A	45.7
S - O	43.0
N - D	1.6

* = None landed

0 = less than 1%

Table 67. Estimated commercial scup landed value as a percentage of the total port landings for all species for selected ports from Gloucester, Massachusetts, to Hampton Roads, Virginia, all gears combined, 1992.

Port Group	Scup % of Port Value[a]
Freeport/Brooklyn	10.46
Montauk	6.41
Point Judith	5.43
Cape May	3.13
Stonington	2.25
Monmouth	1.79
Other Wash.	1.28
Barnstable	0.80
Pt. Pleasant	.56
Hampton Roads	.28
Ocean City	.22
New Bedford	.01
Barnegat Light	.01
Gloucester	.00

[a] Ports for which there is confidential data have been removed, including Newport.

Source: Adapted from Finlayson and McCay 1994.

Table 68. Estimated commercial scup landed value as a percentage of the of total port landed value of scup for selected ports from Gloucester, Massachusetts, to Hampton Roads, Virginia, all gears combined, 1992.

	Scup
Port Group	% of Port Value[a]
Point Judith	26.16
Montuak	23.18
Cape May	15.35
Freeport/Brooklyn	5.74
Barnstable	3.50
Other Wash.	3.46
Stonington	2.18
Monmouth	2.30
Hampton Roads	1.22
Pt. Pleasant	1.21
Ocean City	.24
New Bedford	.18
Barnegat Light	.01
Gloucester	.00

[a]Ports for which there is confidential data have been removed, including Newport.

Source: Adapted from Finlayson and McCay 1994.

Table 69. Estimated percentage of commercial landings of scup by port and gear for selected ports, 1992[a].

Port	Gear[b]	Port/Gear	All Scup
Pt. Judith	OT	7.25%	23.47%
Pots	95.12%	2.48%	
FT/PN	65.02%	.15%	
Other Wash./RI	Pots	93.16%	.71%
Montauk	H&L	5.39%	3.56%
OT	10.35%	19.12%	
FT/PN	15.28%	.47%	
Freeport/Brooklyn	OT	21.89%	5.74%
Monmouth	OT	9.28%	2.29%
Cape May	OT	7.94%	15.35%

Source: Adapted from Finlayson and McCay 1994.

[a]Criteria for port selection (ports considered ranged from Gloucester, MA to Hampton Roads, VA): Percent landed value of all fish caught per gear type, per Port (>5%); percent landed value of all scup caught in the region (>5%), 1992.

[b]Legend: H&L = hook and line; OT = otter trawls; Pots = pots, fish pots, lobster pots, FT/PN = fish traps, pond nets.

Note: An example of how to read this table: Scup represented 7.25% of the landed value of fish caught with otter trawls in Port Judith, RI and Point Judith otter trawls caught 23.47% of the landed value of scup throughout the region.

Table 70. Cetaceans and Turtles found in Survey Area.

Scientific name	Common name	Est. Minimum Number in Study Area	Endan-gered	Threat-ened
LARGE WHALES				
Balaenoptera physalus	fin whale	1,102	X	
Megaptera novaeangliae	humpback whale	684	X	
Balaenoptera acutorostrata	minke whale	162		
Physeter catodon	sperm whale	300	X	
Eubalaena glacialis	right whale	29	X	
Balaenoptera borealis	sei whale	109	X	
Orcinus orca	killer whale	unk		
SMALL WHALES				
Tursiops truncatus	bottlenose dolphin	6,254		
Globicephala spp.	pilot whales	11,448		
Lagenorhynchus acutus	Atl. white-sided dolphin	24,287		
Phocoena	harbor porpoise	2,946		
Grampus griseus	grampus (Risso's) dolphin	10,220		
Delphinus delphis	saddleback dolphin	17,606		
Stenella spp.	spotted dolphin	22,376		
Stenella coeruleoalba	striped dolphin	unk		
Lagenorhynchus albirostris	white-beaked dolphin	unk		
Ziphius cavirostris	Cuvier's beaked dolphin	unk		
Stenella longirostris	spinner dolphin	unk		
Steno bredanensis	rough-toothed dolphin	unk		
Delphinapteras leucas	beluga	unk		
Mesoplodon spp.	beaked whales	unk		
TURTLES				
Caretta caretta	loggerhead turtle	4,017		X
Dermochelys coriacea	leatherback turtle	636	X	
Lepidochelys kempi	Kemp's ridley turtle	unk	X	
Chelonia mydas	green turtle	unk		X

Source: University of Rhode Island 1982.

Table 71. Overview of State laws for scup, Maine to North Carolina. (Note that this table is only a summary of State regulations. Fishermen should contact State agencies to obtain a complete copy of regulations applicable to scup in their State.)

	Maine
Size limits	None.
Gear restrictions	5.5" minimum mesh size for trawls, scottish seines, bottom-tending gillnets and bottom-tending seines. Regulations exist regarding the placement of stop seines and fish weirs. Additional gear/season restrictions for specific locations are detailed in Department regulations.
Area closures	Groundfish spawning closure in Booth Bay and Sheepscot Bay from May 1 to June 30.
Seasons	See above.
Licenses	A commercial license is required for the harvest, transport, and sale of fish that are not for personal use: $33 for individual, resident operators; $89 for resident operator with crew; $334 for nonresident operator and crew. No license is required for fish taken with hook and line for personal use. There is no recreational license, except for Atlantic Salmon.
Other	Nonresidents are required by law to report all groundfish catches.
	New Hampshire
Size limits	None.
Gear restrictions	Mobile fishing gear may not be used in state waters between April 16 and Dec 14. Use of trawls and drag seines are prohibited in Piscataqua River or its tributaries north of the Portsmouth Memorial Bridge.
Area closures	See above
Seasons	None.
Licenses	Resident commercial saltwater fishing license: $26; no sport fishing license. Residents are not required to have a license to sell fish caught by hook and line, but a $200 minimum license fee is required for nonresidents.
	Massachusetts
Size limits	As of January 1, 1995: 9" recreational and commercial; (All are possession restrictions; total length measurements.)
Gear restrictions	Minimum mesh sizes for mobile trawl gear:
* North of Cape Cod:	
	- 6" required year-round. Permitted small mesh exemptions are allowed for

underutilized species (e.g. dogfish, ocean pout) with no bycatch of regulated species.

* South of Cape Cod:

- 5.5" required Nov. 1 - April 23.
- 4.5" required June 1 - Oct. 31.
- No minimum required April 23 - June 1 (squid season).

* East of Cape Cod:

- 6" required year round.

Gillnets may not exceed 2,400 feet; mesh size of gillnets must be greater than 6" stretched measure.

Area closures — Buzzards Bay is closed to trawling year-round. State waters from Nauset Light around Monomoy west to Succonessett Point, Mashpee are closed to trawling from May 1 - Oct. 31. All waters south of Cape Cod banned to gillnetting April 1 - Nov. 15. (See Mass. regulations for additional closures.)

Seasons — See above.

Licenses — Commercial fishing licenses: Vessel license ranges from $130 to $260, depending on length; license for individuals = $65 each. There is no sport license for fish caught for personal use.

A license to sell fish caught with hook and line is $35, and applies to any individual selling fish.

Other — Night trawling prohibited 1/2 hour after sunset to 1/2 hour before sunrise from March 1- Oct. 31 and from 6 am- 6 pm from Nov. 1- Feb. 28. Also, the bycatch of finfish in the lobster fishery may not exceed the catch of lobster (by weight).

Rhode Island

Size limits — 8" total length measurement which applies to both commercial and recreational fishermen.

Gear restrictions — Trawling is prohibited in the upper portion of Narragansett Bay from Nov 1 - July 1; 5" cod end minimum mesh size in a portion of central Narragansett Bay from Nov 1 - Feb 28. Numerous specific gillnet regulations by geographic location and season; trap and fyke net regulations regarding leaders, distance from shore, distance between traps, etc. Each person utilizing traps or pots in the fishery for scup are limited to no more than 50 pots, and each vessel is limited to 50 pots regardless of the number of license holders on board. In addition, scup traps (pots) must be constructed with escape openings which may be circular (minimum 2 3/8" diameter), rectangular (1 7/8" X 5 3/4" minimum) or of square mesh wire at least 2 1/4" X 2 1/4".

Area closures — Numerous restrictions on the location of traps off the Island of Rhode Island, the Sakonnet River, and in Narragansett Bay. Cannot set, haul, and/or maintain a seine within 0.5 mile of the seaward entrance of several ponds/rivers; significant portion of the state is closed to various forms of netting.

Seasons — Fish traps must be out of the water Jan 1 - end of Feb.

Licenses — Multipurpose commercial licenses allow for harvest and sale of fish: $150, with additional fees for specific gear types. There is no sport license to fish for personal use.

Connecticut

Size limits	8" total length measurement which applies to both commercial and recreational fishermen.
Gear restrictions	Cod end minimum mesh size of 5.5" (6" square) in trawls from Nov 15 - June 30 and 4"(4.5" square) from July 1 - Nov 14. May 15- July 31 vessels fishing for squid may use mesh of any size. Gillnet minimum mesh size 3"; Pound, trap, fyke, and weir minimum mesh: 2".
Area closures	Fish traps and pound nets may not be set in an area off the mouth of the Connecticut River; pound nets must be set at least one mile apart; trawling is prohibited in rivers, coves and harbors as well as in portions of Long Island Sound (LIS). Night trawling prohibited in the western two-thirds of LIS. Vessels greater than 44 ft prohibited in western one-third of LIS unless owner fished there in 1982.
Seasons	None except as noted above.
Licenses	A variety of commercial resident and non-resident licenses are available allowing for the harvest and sale of fish. Fees range from $50- $225. No marine recreational fishing license required but commercial sale of fish taken by hook and line requires a commercial license ($50) and the fee is doubled for species regulated by recreational creel limit. Personal use fishing with trawls and other specific gear requires a commercial license.

New York

Size limits	7" total length measurement which applies to commercial fishermen only.
Gear restrictions	No minimum mesh size for trawls at the present time.
Area closures	There are numerous specific locations where trawl and/or other net gear are restricted.
Seasons	None.
Licenses	A commercial license is required for the harvest and sale of fish: Resident: $100, Non-resident: $1,000. (The non-resident harvest license may only be purchased in January.) A non-resident license which allows landing only: $250. There is no sport license for fish caught for personal use.

New Jersey

Size limits	7" total length measurement which applies to commercial fishermen only.
Gear restrictions	None pertaining to scup. Gillnets may not exceed 2,400 ft in length from Feb 1 - May 15, and may not exceed 1,200 ft from May 15 - Dec 15.
Area closures	Trawling and purse seining (for food fish) are prohibited within two miles of the coast; gillnetting is limited to the Atlantic Ocean and Delaware Bay.

Seasons	Gillnets cannot be fished from Dec 16 - Feb 1.
Licenses	Commercial gears are licensed, with fees dependent on the gear type. There is no sport fishing license for hook and line gear, and no license is required to sell hook and line caught fish. Limited entry for gill net licenses in Delaware Bay only.

Delaware

Size limits	None.
Gear restrictions	Trawls, purse seines, power-operated seines, and run-around gillnets are prohibited. A single gillnet cannot exceed 200 yards in length; a series of connected gillnets cannot exceed 500 yards; a fyke net cannot exceed 72" in diameter; fish traps may not exceed 125 cubic ft and must have an escape panel. There is a moratorium on issuance of new commercial (> 200 ft) gillnet permits until the number of fishermen falls below 30.
Area closures	Areas within a 0.5 mile sector at the mouths of all major tributaries to the Delaware River and Bay are closed to all fixed gears; numerous specific areas closed to commercial fishing.
Seasons	From April 1 - May 10, commercial fishermen cannot set over 1,000 yards of **fixed** gillnet from one vessel; from May 10 to Sept 30, commercial fishermen cannot set over 1,000 yards of **drifting** gillnet from one vessel; drift gillnets cannot be set from 2,400 hrs Friday - 1,600 hrs Sunday during this period; specific seasonal closures for gillnets in certain areas.
Licenses	Commercial food fishing license is required for the harvest and sale of fish: Residents: $150; Non-residents: $1,500. Additional fees are levied for the use of specific gear types. There is no sport license for fish caught for personal use.

Maryland

Size limits	None.
Gear restrictions	Trawls prohibited within one mile of the coastline, and in Chesapeake Bay. Use of monofilament gillnets prohibited, except in coastal bays and the Atlantic Ocean; several specific gillnet restrictions exist for Chesapeake Bay; minimum mesh sizes for pound nets, haul seines, and fyke nets are 1.5"; purse seines prohibited.
Area closures	There are numerous specific locations where trawl, gill, seine and/or other net gear are restricted.
Seasons	None.
Licenses	An appropriate commercial fishing or license or a fish dealers license is required to catch, buy, sell, process, export, transport, or otherwise deal in fish that were caught in the tidal waters of Maryland. License fees vary from $37.50 to $300.00 depending

on license type. Chesapeake sportfishing license: resident - $7.00, non-resident $12.00.

Virginia

Size limits	None.

Gear restrictions	Trawls and encircling gillnets are prohibited in Virginia waters. Minimum mesh sizes: pound nets = 2"; haul seines over 200 yards = 3"; Various gill net mesh restrictions in various areas at different times of the year.
Area closures	Fish trot lines cannot be set on the sea side of the eastern shore. Various area gill net closures at different times of the year.
Seasons	None.
Licenses	Commercial licenses are required for specific fishing gears, with the fee dependent on the gear type. There is sport fishing license (Atlantic Ocean exempt) with variable fees and a $25 license is required to sell hook and line caught fish. All fishermen must register ($150 fee) before they can purchase individual gear licenses. There also is a two year waiting period for commercial registration.
Other	Virginia required mandatory reporting for all species caught in commercial gear in Virginia waters beginning in 1993.

North Carolina

Size limits	None.
Gear restrictions	No net may be towed by more than one vessel except in long-haul (seine) fishing operations. Flynet codends must be at least 15 ft. in length and have a minimum mesh of 3" square or 3.5 "diamond. In addition, flynets must have an extension a minimum of 20 ft. in length constructed of 3" square mesh. All trawls fished in the Atlantic Ocean (except flynets) required to have a minimum codend mesh of 5.5". Additional exceptions include vessels possessing State Atlantic mackerel and/or squid permits and crab trawls.
Area closures	Numerous specific gear restrictions by geographic area. Trawls are prohibited within one-half mile of the beach between the Virginia line and Oregon Inlet. No flynet fishing in Atlantic Ocean south of Cape Hatteras.
Seasons	Several specific seasonal restrictions pertaining to gillnets.
Licenses	A commercial license is required for vessels, with fees dependent on vessel length (non-residents have an additional $200 surcharge). An endorsement on the vessel license or a non-vessel endorsement to sell fish is required to sell fish products.
Other	There is a two-year moratorium on any new vessel, shellfish or crab license.

Table 72. Landings by species for all scup - otter trawl trips harvesting 1,000 pounds or more of scup, 1992.

Common Name	Species % of Total Pounds*	Pounds	Species % of Total Value	Value
SQUID (***LOLIGO***)	13,018,782	29.350%	7,284,066	30.199%
SCUP	8,726,706	19.674%	5,359,489	22.220%
MACKEREL, ATLANTIC	6,154,322	13.874%	937,815	3.888%
HAKE, SILVER	6,005,925	13.540%	2,621,675	10.869%
FLOUNDER, SUMMER	1,756,288	3.959%	2,893,398	11.996%
BUTTERFISH	1,327,231	2.992%	735,860	3.051%
ANGLER	1,072,460	2.418%	786,734	3.262%
BLUEFISH	1,057,301	2.384%	265,791	1.102%
FLOUNDER, WINTER	1,028,547	2.319%	989,719	4.103%
HAKE, RED	818,438	1.845%	215,078	0.892%
SKATES UNC	707,300	1.595%	70,080	0.291%
SEA BASS, BLACK	527,857	1.190%	485,966	2.015%
HERRING, ATLANTIC	394,617	0.890%	27,616	0.114%
FLOUNDER, YELLOWTAIL	283,940	0.640%	282,531	1.171%
COD	214,515	0.484%	190,671	0.791%
SQUID ***(ILLEX)***	165,623	0.373%	42,347	0.176%
WEAKFISH, SQUETEAGUE	159,393	0.359%	122,011	0.506%
TAUTOG	153,497	0.346%	87,188	0.361%
DOGFISH (NK)	101,820	0.230%	17,607	0.073%
DOGFISH SPINY	99,379	0.224%	10,701	0.044%
LOBSTER	86,447	0.195%	313,335	1.299%
TILEFISH	63,173	0.142%	43,101	0.179%
EEL, CONGER	58,399	0.132%	15,301	0.063%
FLOUNDER, WITCH	54,691	0.123%	63,336	0.263%
FLOUNDER, SAND-DAB	47,298	0.107%	13,090	0.054%
SEA ROBINS	40,407	0.091%	9,945	0.041%
POUT, OCEAN	34,588	0.078%	5,396	0.022%
SCALLOP, SEA	32,234	0.073%	152,331	0.632%
HAKE, WHITE	30,625	0.069%	11,346	0.047%
OTHER FISH	20,590	0.046%	824	0.003%
CRAB, HORSESHOE	16,420	0.037%	1,675	0.007%
OTHER FISH	12,539	0.028%	8,407	0.035%
STURGEONS	9,249	0.021%	10,213	0.042%
CONCHS	8,872	0.020%	14,242	0.059%
SQUIDS (NS)	8,833	0.020%	4,459	0.018%
MENHADEN	8,545	0.019%	541	0.002%
CRAB, JONAH	8,151	0.018%	3,575	0.015%
FLOUNDERS (NK)	6,510	0.015%	4,235	0.018%
SHAD, AMERICAN	6,473	0.015%	2,304	0.010%
POLLOCK	4,540	0.010%	2,709	0.011%
MACKEREL, SPAN	4,211	0.009%	2,764	0.011%
BONITO	3,570	0.008%	1,219	0.005%
WHELK, KNOBBED	2,511	0.006%	1,365	0.006%
PUFFER, NORTHERN	2,313	0.005%	1,222	0.005%
SHARK, NK	1,785	0.004%	1,092	0.005%
WHELK, CHANNELED	1,193	0.003%	777	0.003%

Table 72 (continued). Landings by species for all scup - otter trawl trips harvesting 1,000 pounds or more of scup, 1992.

Common Name	Species % of Total Pounds*	Pounds	Species % of Total Value	Value
JOHN DORY	1,026	0.002%	472	0.002%
BASS, STRIPED	940	0.002%	1,603	0.007%
FLOUNDER, AM. PLAICE	850	0.002%	554	0.002%
CUNNER	757	0.002%	66	0.000%
HERRING (NK)	706	0.002%	101	0.000%
WHITING, KING	699	0.002%	180	0.001%
SHARK, PORBEAGLE	687	0.002%	195	0.001%
SHARK, SANDBAR	556	0.001%	200	0.001%
WHITING, BLACK	515	0.001%	155	0.001%
SHARK, THRESHER	365	0.001%	102	0.000%
WOLFFISHES	340	0.001%	217	0.001%
SHARK, TIGER	321	0.001%	69	0.000%
CRAB, ROCK	227	0.001%	225	0.001%
CROAKER, ATLANTIC	171	0.000%	40	0.000%
REDFISH	165	0.000%	84	0.000%
PERCH, WHITE	160	0.000%	42	0.000%
TRIGGERFISH	145	0.000%	68	0.000%
HADDOCK	137	0.000%	122	0.001%
SWORDFISH	72	0.000%	243	0.001%
AMBER JACK	38	0.000%	24	0.000%
ALEWIFE	31	0.000%	2	0.000%
SPOT	20	0.000%	5	0.000%
DOGFISH SMOOTH	18	0.000%	8	0.000%
COBIA	15	0.000%	15	0.000%
SHARK, DUSKY	14	0.000%	4	0.000%
HAKE MIX RED & WHITE	5	0.000%	2	0.000%
CRAB, BLUE	5	0.000%	2	0.000%
Total	44,357,093	100.000%	24,119,947	100.000%

Note: Records with Vessel identity unknown were excluded.

Number of Trips = 1,155.

Table 73. State shares of a coastwide quota of 8.5 million pounds. Shares are based on five years of landings data, 1988-1992.

State	%	lbs
ME	0.22	18,843
MA	6.81	578,630
RI	43.60	3,706,013
CT	4.11	349,178
NY	16.12	1,370,042
NJ	26.28	2,233,928
MD	0.14	12,030
VA	1.41	119,726
NC	1.31	111,609
Total	100.00	8,500,000

Table 74. Bimonthly allocations based on a coastwide quota of 8.5 million pounds. Shares are based on ten years of bimonthly landings data, 1988-1992.

Bimonthly Period	%	lbs
Jan - Feb	18.0	1,530,000
Mar - Apr	30.4	2,584,000
May - June	22.4	1,904,000
Jul - Aug	5.3	450,500
Sep - Oct	7.3	620,500
Nov - Dec	16.6	1,411,000
Total	100.0	8,500,000