2005 Atlantic Mackerel, *Loligo*, *Illex* and Butterfish Specifications Environmental Assessment Regulatory Impact Review Initial Regulatory Flexibility Analysis EFH Assessment

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1.0 Executive Summary

The Mid-Atlantic Fishery Management Council (Council) manages the Atlantic mackerel, squid, and butterfish fisheries pursuant to the Magnuson-Stevens Fishery Conservation Act of 1976 (MSFCMA), as amended by the Sustainable Fisheries Act (SFA) through the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan (FMP). The FMP outlines the requirements of the Council to set annual specifications for the Atlantic mackerel, squid and butterfish fisheries according to national standards specified in the SFA. These fisheries are managed through annual quotas which are based principally on National Standard One which requires that fishing mortality rates not exceed guidelines intended to prevent overfishing. The specifications for all three species include the setting of Initial OY (IOY), domestic annual harvest (DAH), domestic annual processing (DAP), and research quota (RQ) if appropriate. The specifications for mackerel and butterfish also allow for the allocation of joint venture processing (JVP) and total allowable level of foreign fishing (TALFF). The Council made 2005 recommendations for specifications at its June 2004 meeting and submitted them to the National Marine Fisheries Service (NMFS) in October 2004. Those recommendations are included in this document. The document also contains information and supporting analyses required under other applicable law, namely the National Environmental Policy Act (NEPA), Regulatory Flexibility Act (RFA), and Executive Order 12866.

Upon reviewing the Council's recommendations, NMFS determined that the preferred alternatives for squid (Loligo and Illex) and butterfish were appropriate and adequately supported by the analysis. Therefore, the preferred alternatives for those species are the same ones as selected by the Council. NMFS also determined that Council-preferred alternative for Atlantic mackerel was not supported by the data and did not adequately take into account other considerations. As a result, NMFS is proposing another preferred alternative for the 2005 mackerel specifications. The NMFS-preferred alternative and its impacts are described in this document. To maintain the integrity of the Council's original recommendations, and to give the reader an opportunity to compare and contrast the Council's recommendations with the NMFS-preferred alternative, this document has been modified in the following manner. The Council's original language and arguments have been left intact, and where the NMFS-preferred alternative differs from the Council-preferred alternative, new sections have been added to discuss and analyze those differences.

The purpose of this document is to examine the impacts to the environment that would result from the implementation of the 2005 management measures recommended for the Atlantic mackerel, squid and butterfish fisheries. The environmental impacts of the proposed measures were analyzed and the anticipated level of significance of these impacts is discussed in accordance with NEPA and National Oceanic and Atmospheric Administration Order (NAO) 216-6 formatting requirements for an EA. Because none of the preferred action alternatives are associated with significant impacts to the biological, social or economic, or physical environment, a "Finding of No Significant Impact" is determined.

The proposed specifications under the preferred alternative for *Illex* squid represent the 2004 status quo. As such, no biological, economic, social, habitat or protected resource impacts are anticipated as a result of the proposed action. The proposed action is consistent with FMP overfishing definition and is based on the most recent stock assessment information. In 2004, the Council specified the annual quota and other measures for *Loligo* squid for a period of up to three years (i.e., 2004 - 2007). After a review of available information, the Council recommended no change to the *Loligo* quota or other measures in 2005 and based on research projects approved for 2005, that the research set aside for scientific research for *Loligo* squid not exceed 255.1 mt.

For Atlantic mackerel, the Council originally recommended an allowable biological catch (ABC) of 335,000 mt, an IOY and DAH of 165,000 mt, a DAP of 150,000 mt, and zero for both JVP and total allowable levels of foreign fishing TALFF. The Council concluded that this action is expected to yield positive social and economic benefits but should have no biological, habitat or protected resource impacts. Upon review, NMFS is proposing another preferred alternative for the 2005 mackerel specifications. The new NMFS-preferred alternative would differ from the Council-preferred alternative as follows: IOYand DAH would be 115,000 mt, and DAP would be 100,000 mt. These changes directly affect the way in which TALFF and JVP are evaluated. The NMFS-preffered alternative and its impacts are described in this document, under separate headings that are identified as such.

For butterfish, the preferred alternative would reduce the annual quota to 1,681 mt to achieve the target fishing mortality rate specified in the FMP based on the most recent stock assessment for the species. In addition, the preferred alternative would impose a minimum mesh size restriction of 3.0 inches for directed butterfish trips (defined as trips retaining greater 5,000 pounds of butterfish). These measures should result in positive impacts to the butterfish stock by preventing overfishing and improving the chances that the stock will rebuild. The minimum mesh size requirement will reduce mortality on small, immature butterfish and reduce discards of small non-target species. The proposed action for butterfish could constrain landings which could have negative economic and social impacts in the near term. However, in the long term the net economic benefits will be positive as the stock is rebuilt and future yields increase. The anticipated impacts on the environment of each alternative are summarized in Table ES-1 below.

Table ES-1. Qualitative summary of the expected impacts of various quota specifications considered for 2004 compared to the status quo. A plus sign (+) signifies an expected positive impact, minus sign (-) signifies an expected negative impact and a zero (0) is used for null impact.

Environmental Dimension					
	Biological	Economic	Social	Protected Resources	Essential Fish Habitat
Alternative 1 - Atlantic mackerel (status quo); ABC=347,000 mt, IOY=170,000 mt, JVP=5,000 mt	0	-	-	0	0
Alternative 2 - Atlantic mackerel (Council-preferred alternative); ABC=335,000 mt, IOY=165,000 mt; JVP=0 mt	0	+	+	0	0
Alternative 3 - Atlantic mackerel; ABC=347,000 mt, IOY=165,000 mt; JVP=0 mt	0	0	0	0	0
Alternative 4 - Atlantic mackerel (NMFS-preferred alternative: ABC=335,000 mt, IOY=110,000 mt, JVP=0 mt	0	0	0	0	0
Alternative 1 - *Illex* (status quo and preferred alternative); DAH=24,000 mt	0	0	0	0	0
Alternative 2 - *Illex*; DAH=30,000 mt	-	-	-	-	-
Alternative 3 - *Illex*; DAH=19,000 mt	0	-	-	0	0
Alternative 1 - butterfish (status quo); DAH=5,900 mt	-	0	0	0	0
Alternative 2 - butterfish (preferred alternative); DAH=1,681 mt	+	-	-	+	+
Alternative 3 - butterfish; DAH=9,131 mt	-	0	0	0	0

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ENVIRONMENTAL ASSESSMENT FOR THE 2005 CATCH SPECIFICATIONS FOR ATLANTIC MACKEREL, SQUID, AND BUTTERFISH

2.0 LIST OF ACRONYMS

ASMFC	Atlantic States Marine Fisheries Commission or Commission
B	Biomass
CEQ	Council on Environmental Quality
DAH	Domestic Annual Harvest
DAP	Domestic Annual Processing
DPS	Distinct Population Segment
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
E.O.	Executive Order
ESA	Endangered Species Act of 1973
F	Fishing Mortality Rate
FR	Federal Register
FMP	Fishery Management Plan
GRA	Gear Restricted Area
HPTRP	Harbor Porpoise Take Reduction Plan
IRFA	Initial Regulatory Flexibility Analysis
IOY	Initial Optimal Yield
JVP	Joint Venture Processing
LTPC	Long-term Potential Catch
LWTRP	Large Whale Take Reduction Plan
M	Natural Mortality Rate
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
MRFSS	Marine Recreational Fisheries Statistical Survey
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum Sustainable Yield
mt	metric tons
NAO	National Oceanic and Atmospheric Administration Order
NE	New England
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PBR	Potential Biological Removal
PRA	Paperwork Reduction Act
PREE	Preliminary Regulatory Economic Evaluation
RIR	Regulatory Impact Review
RSA	Research Set-Aside
SAFMC	South Atlantic Fishery Management Council
SARC	Stock Assessment Review Committee
SAV	Submerged Aquatic Vegetation
SAW	Stock Assessment Workshop
SSB	Spawning Stock Biomass
SFA	Sustainable Fisheries Act
TAL	Total Allowable Landings
TALFF	Total Allowable Level OF Foreign Landings
TL	Total Length

VECs Valuable Environmental Components
VMS Vessel Monitoring System
VPA Virtual Population Analysis
VTR Vessel Trip Report

3.0 List of Tables, Figures and Maps

3.1 List of Tables

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4.0 Introduction and Background of Annual Specification Process

The Mid-Atlantic Fishery Management Council (Council) manages the Atlantic mackerel, squid, and butterfish fisheries pursuant to the Magnuson-Stevens Fishery Conservation Act of 1976 (MSFCMA), as amended by the Sustainable Fisheries Act (SFA) through the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan (FMP). The FMP outlines the requirements of the Council to set annual specifications for the Atlantic mackerel, squid and butterfish fisheries according to national standards specified in the SFA. These fisheries are managed through quotas which are based principally on National Standard one which requires that fishing mortality rates not exceed guidelines established in the SFA. In the case of *Loligo*, the annual quota may be specified for a period of up to three years. In 2004, the Council specified the *Loligo* quota for the period 2004-2006. The Council considered the 2005 recommendations for specifications for the other three species in the management unit at its June 2004 meeting and herein submits them to the Regional Administrator. This document not only serves as a vehicle for the Council's formal submission of recommendations for 2005 specifications, but also contains analyses upon which the recommendations are based.

4.1 Purpose of and Need for the Action

Regulations implementing the Atlantic Mackerel (*Scomber scombrus*), Squid (*Loligo pealei* and *Illex illecebrosus*), and Butterfish (*Peprilus triacanthus*) Fishery Management Plan (FMP) prepared by the Mid-Atlantic Fishery Management Council (Council) appear at 50 CFR Part 648. These regulations stipulate that the Secretary will publish a notice specifying the initial annual amounts of the initial optimum yield (IOY) as well as the amounts for allowable biological catch (ABC) domestic annual harvest (DAH), domestic annual processing (DAP), joint venture processing (JVP), and total allowable levels of foreign fishing (TALFF) for the species managed under the FMP. The requirement to specify annual quotas and other measures was established in the original FMP for each species.

These specifications are required pursuant to the implementing regulations of this FMP. The term IOY is used in this fishery to reinforce the fact that the Regional Administrator may alter this specification up to the ABC if economic and social conditions warrant an increase. Therefore, this specification is no different than OY or optimum yield. No reserves are permitted under the FMP for any of these species. Procedures for determining the initial annual amounts are found in §648.21. They were most recently modified in Amendment 5 to the FMP.

Amendment 5 specified that the Atlantic Mackerel, Squid, and Butterfish 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, virtual population analysis results, target mortality levels, beneficial impacts of size/mesh regulations, and the level of noncompliance by fishermen or States. Amendment 5 also requires the Monitoring Committee to use this data to recommend to the Council Committee 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 harvest level (OY) for Atlantic mackerel, squid, or butterfish is not exceeded. The Council receives the report of the Committee and then makes its recommendations to the Regional Administrator.

The primary purpose of setting annual quotas and other measures for these fisheries is to prevent overfishing and to achieve optimum yield. Optimum yield is defined as the amount of fish which will provide the greatest overall benefit to the Nation in terms of food production and recreational opportunities and is based on the maximum sustainable yield for each managed species. While none of the stocks managed under this FMP are currently considered overfished, the annual specification of quotas and other management measures can also provide for the rebuilding of stocks to a level consistent with maximum sustainable yield. Failure to specify annual quotas and other management measures could result in overfishing and failure to achieve optimum yield.

4.2 MANAGEMENT OBJECTIVES OF THE FMP

The objectives of the FMP are:

1. Enhance the probability of successful (i.e., the historical average) recruitment to the fisheries.
2. Promote the growth of the US commercial fishery, including the fishery for export.
3. Provide the greatest degree of freedom and flexibility to all harvesters of these resources consistent with the attainment of the other objectives of this FMP.
4. Provide marine recreational fishing opportunities, recognizing the contribution of recreational fishing to the national economy.
5. Increase understanding of the conditions of the stocks and fisheries.
6. Minimize harvesting conflicts among US commercial, US recreational, and foreign fishermen

The annual quota specifications are designed to achieve optimum yield which is based primarily on maximum sustainable yield . By maintaining harvest levels consistent with maximum sustained yield, the Council increases the probability that successful recruitment will occur for each of the managed species. By definition, maintenance of the stocks at levels that produce maximum sustainable yield should result in average levels of recruitment to the stocks. The specification of the quota for Atlantic mackerel provides for both commercial and recreational allocation of the mackerel resource which helps to achieve objectives two, three and six. The seasonal allocation of the *Loligo* quota is intended, in part, to help achieve objective three. The quota specification for all four species in the management unit are designed to achieve optimum yield in each fishery.

5.0 MANAGEMENT ALTERNATIVES

The alternatives were selected based on the evaluation of a range of quota specifications that correspond to biologically based reference points (as specified in the FMP) and various assumptions about stock status. In all cases, the quota recommended by the Council under the preferred alternative for each species is based on the yield or level of catch associated with the overfishing definition specified in the FMP, as modified by relevant economic or social factors. These yield estimates are based on the national standard benchmark of maximum sustainable yield as specified in the SFA, as modified in the FMP to a lower "target" level to assure that the overfishing threshold is not exceeded. Additional alternatives to the target yield levels specified in the FMP that were examined include changes/reductions from the reference level yield based on assumptions about current stock size or other factors such as economic considerations or reductions to the allowable yield to account for discard mortality. In each case below, the status quo alternative is equivalent to no action alternative because the current regulations contain a "roll-over" provision. This provision specifies that if the Regional Administrator fails to publish annual quota specifications before the start of the new fishing year, then the previous years' quota specifications shall remain effect. Thus, by default, the no action alternative maintains the status quo.

5.1 Alternatives for Atlantic mackerel

5.1.1 Alternative 1 for Atlantic mackerel (2004 status quo/no action)

The specifications under this alternative would be ABC = 347,000 mt, IOY=170,000 mt, DAH=170,000 mt, DAP=150,000 mt and JVP=5,000 and TALFF=0 mt (this includes an allocation of 15,000 mt to the recreational fishery).

5.1.2 Alternative 2 for Atlantic mackerel (Council-preferred alternative)

The specifications under this alternative would be ABC = 335,000 mt, IOY=165,000 mt, DAH=165,000 mt, DAP=150,000 mt and JVP=0 and TALFF=0 mt (this includes an allocation of 15,000 mt to the recreational fishery).

5.1.3 Alternative 3 for Atlantic mackerel

The specifications under this alternative would be ABC = 347,000 mt, IOY=165,000 mt, DAH=165,000 mt, DAP=150,000 mt and JVP=0 and TALFF=0 mt (this includes an allocation of 15,000 mt to the recreational fishery).

5.1.4 Alternative 4 for Atlantic mackerel (NMFS-preferred alternative)

The specifications under this alternative would be ABC = 335,000 mt, IOY=115,000 mt, DAH=115,000 mt, DAP=100,000 mt and JVP=0 and TALFF=0 mt (this includes an allocation of 15,000 mt to the recreational fishery).

5.2 Alternatives for *Illex*

5.2.1 Alternative 1 for *Illex* (2004 status quo/no action and preferred alternative)

The specifications under this alternative would be Max OY, ABC, IOY, DAH, and DAP = 24,000 mt and JVP and TALFF = 0 mt. In addition, the Council recommended that the non-moratorium incidental catch allowance for *Illex* be maintained at 10,000 pounds per trip when the directed fishery is open. When the directed fishery is closed (at 95% of DAH), all vessels will be restricted to 10,000 pounds per trip.

5.2.2 Alternative 2 for *Illex*

The specifications under this alternative would be Max OY, ABC, IOY, DAH, and DAP = 30,000 mt and JVP and TALFF = 0 mt. This represents the least restrictive alternative in terms of ABC for *Illex* which was considered by the Council.

5.2.3 Alternative 3 for *Illex*

The specifications under this alternative would be Max OY =24,000 mt, ABC, IOY, DAH, and DAP = 19,000 mt and JVP and TALFF = 0 mt.

5.3 Alternatives for Butterfish

5.3.1 Alternative 1 for butterfish (2004 status quo/no action)

The specifications under this alternative would be Max OY = 16,000 mt, ABC = 7,200 mt, and IOY, DAH, and DAP = 5,900 mt and JVP and TALFF = 0 mt.

5.3.2 Alternative 2 for butterfish (preferred alternative)

The specifications under this alternative would be Max OY = 12,175 mt, ABC = 4,545 mt, and IOY, DAH, and DAP = 1,681 mt and JVP and TALFF = 0 mt. In addition, this alternative would implement a minimum cod end mesh size requirement of 3.0 inches diamond, inside stretch measure (for depth of 100 meshes or a distance of 1/3 forward of the terminus of the net, whichever is less) for butterfish trips greater than 5,000 pounds.

5.3.3 Alternative 3 for butterfish

The specifications under this alternative would be Max OY = 12,175 mt and ABC = 12,175 mt, and IOY, DAH, and DAP = 9,131 mt and JVP and TALFF = 0 mt.

6.0 DESCRIPTION OF AFFECTED ENVIRONMENT AND FISHERIES

6.1 Physical Environment

The principal area within which the Atlantic mackerel, squid and butterfish fisheries are prosecuted is the Northeast Shelf Ecosystem which includes the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream. A number of distinct subsystems comprise the region, including the Gulf of Maine, Georges Bank, and Mid-Atlantic Bight. The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. Georges Bank is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern edge. It is characterized by highly productive, well-mixed waters and fast-moving currents. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, NC.

Climate, physiographic, and hydrographic differences separate the Atlantic ocean from the Gulf of Maine to Florida into two distinct areas, the New England-Middle Atlantic Area and the South Atlantic Area, with the natural division occurring at Cape Hatteras. These differences result in major zoogeographic faunal changes at Cape Hatteras. The New England region from Nantucket Shoals to the Gulf of Maine includes Georges Bank, one of the worlds most productive fishing grounds. The Gulf of Maine is a deep cold water basin, partially sealed off from the open Atlantic by Georges and Browns Banks, which fall off sharply into the continental shelf.

The New England-Middle Atlantic area is fairly uniform physically and is influenced by many large coastal rivers and estuarine areas including Chesapeake Bay, the largest estuary in the United States; Narragansett Bay; Long Island Sound; the Hudson River; Delaware Bay; and the nearly continuous band of estuaries behind the barrier beaches from southern Long Island to Virginia. The southern edge of the region includes the estuarine complex of Currituck, Albemarle, and Pamlico Sounds, a 2500 square mile system of large interconnecting sounds behind the Outer Banks of North Carolina (Freeman and Walford 1974 a-d, 1976 a and b).

The South Atlantic region is characterized by three long crescent shaped embayments, demarcated by four prominent points of land, Cape Hatteras, Cape Lookout, and Cape Fear in North Carolina, and Cape Romain in South Carolina. Low barrier islands occur along the coast south of Cape Hatteras with concomitant sounds that are only a mile or two wide. These barriers become a series of large irregularly shaped islands along the coast of Georgia and South Carolina separated from the mainland by one of the largest coastal salt-water marsh areas in the world. Similarly, a series of islands border the Atlantic coast of Florida. These barriers are separated in the north by broad estuaries which are usually deep and continuous with large coastal rivers, and in the south by narrow, shallow lagoons (Freeman and Walford 1976 b-d).

The continental shelf (characterized by water less than 650 ft in depth) extends seaward approximately 120 miles off Cape Cod, narrows gradually to 70 miles off New Jersey, and is 20 miles wide at Cape Hatteras. South of Cape Hatteras, the shelf widens to 80 miles near the Georgia-Florida border, narrows to 35 miles off Cape Canaveral, Florida and is 10 miles or less off the southeast coast of Florida and the Florida Keys. The shelf is at its narrowest, reaching seaward only 1.5 miles, off West Palm Beach, Florida.

Surface circulation is generally southwesterly on the continental shelf during all seasons of the year, although this may be interrupted by coastal indrafting and some reversal of flow at the northern and southern extremities of the area. Water temperatures range from less than 33 ºF in the New York Bight in February to over 80 ºF off Cape Hatteras in August. Coastwide, an annual salinity cycle occurs as the result of freshwater stream flow and the intrusion of slope water from offshore. Water salinities nearshore average 32 ppt, increase to 34-35 ppt along the shelf edge, and exceed 36.5 ppt along the main lines of the Gulf stream.

6.2 Biology of the Resources

6.2.1 Atlantic mackerel

Atlantic mackerel is a fast swimming, pelagic, schooling species distributed between Labrador (Parsons 1970) and North Carolina (Anderson 1976a). The existence of separate northern and southern spawning contingents was first proposed by Sette (1950). The southern group spawns primarily in the Mid-Atlantic Bight during April-May while the northern group spawns in the Gulf of St. Lawrence in June-July. Both groups overwinter between Sable Island (off Nova Scotia) and Cape Hatteras in water generally warmer than 45 F (USDC 1984a).

Both groups make extensive northerly (spring) and southerly (autumn) migrations to and from spawning and summer feeding grounds. The southern contingent begins its spring migration from waters off North Carolina and Virginia in March- April, and moves steadily northward, reaching New Jersey and Long Island usually by April-May, where spawning occurs. These fish may spend the summer as far north as the Maine coast. In autumn this contingent moves southward and returns to deep offshore water near Block Island after October (Hoy and Clark 1967).

The northern contingent arrives off southern New England in late May, and moves north to Nova Scotia and the Gulf of St. Lawrence where spawning occurs usually by July (Hoy and Clark 1967, Bigelow and Schroeder 1953). This contingent begins its southerly autumn migration in November and December and disappears into deep water off Cape Cod.

Even though there are two spawning groups of mackerel in the Northwest Atlantic, biochemical studies (Mackay 1967) have not established that genetic differences exist between them. These two contingents intermingle off southern New England in spring and autumn (Sette 1950). Tagging studies reported by Beckett *et al.* (1974), Parsons and Moores (1974) and Moores *et al.* (1975) indicate that some mackerel that summer at the northern extremity of the range overwinter south of Long Island. Precise estimates of the relative contributions of the two contingents cannot be made (ICNAF 1975). Both contingents have been fished by the foreign winter fishery and no attempt was made to separate these populations for assessment purposes by the International Commission for the Northwest Atlantic Fisheries (ICNAF), although separate Total Allowable Catches (TAC) were in effect for Subareas 5 and 6 and for areas to the north from 1973- 1977. Since 1975 all mackerel in the northwest Atlantic have been assessed as a unit stock (Anderson 1982). Thus, Atlantic mackerel are considered one stock for fishery management purposes.

Mackerel spawning occurs during spring and summer and progresses from south to north. The southern contingent spawns from mid-April to June in the Mid-Atlantic Bight and the Gulf of Maine and the northern contingent spawns in the southern Gulf of St. Lawrence from the end of May to mid-August (Morse 1978). Most spawn in the shoreward half of continental shelf waters, although some spawning extends to the shelf edge and beyond. Spawning occurs in surface water temperatures of 45-57 ºF, with a peak around 50-54 ºF (Grosslein and Azarovitz 1982).

All Atlantic mackerel are sexually mature by age 3, while about 50% of the age 2 fish are mature. Average size at maturity is about 10.5-11" FL (Grosslein and Azarovitz 1982). Growth is very rapid with fish reaching 7.9 in (20 cm) by their first autumn (Anderson and Paciorkowski 1978). The maximum age observed is 17 years (Pentilla and Anderson 1976). Fecundity estimates ranged from 285,000 to 1.98 million eggs for southern contingent mackerel between 12-17" FL. Analysis of egg diameter frequencies indicated that mackerel spawn between 5 and 7 batches of eggs per year. The eggs are 0.04-0.05" in diameter, have one 0.1" oil globule, and generally float in the surface water layer above the thermocline or in the upper 30- 50'. Incubation depends primarily on temperature; it takes 7.5 days at 52 °F, 5.5 days at 55 °F, and 4 days at 61°F (Grosslein and Azarovitz 1982).

Mackerel are 0.1" long at hatching, grow to about 2" in two months, and reach a length of 8" in December, near the end of their first year of growth. During their second year of growth they reach about 10" in December, and by the end of their fifth year they grow to an average length of 13" FL. Fish that are 10-13 years old reach a length of 15-16" (Grosslein and Azarovitz 1982). MacKay (1973) and Dery and Anderson (1983) have found an inverse relationship between growth and year class size.

Atlantic mackerel are opportunistic feeders that can ingest prey either by individual selection of organisms or by passive filter feeding (Pepin *et al.* 1988). Larvae feed primarily on zooplankton. Juveniles eat mostly small crustaceans such as copepods, amphipods, mysid shrimp and decapod larvae. They also feed on small pelagic molluscs (*Spiratella* and *Clione*) when available. Adults feed on the same food as juveniles but diets also include a wider assortment of organisms and larger prey items. For example, euphausid, pandalid and crangonid shrimp are common prey; chaetognaths, larvaceans, pelagic polychaetes and larvae of many marine species have been identified in mackerel stomachs. Immature mackerel begin feeding in the spring; older fish feed until gonadal development begins, stop feeding until spent and then resume prey consumption (Berrien 1982).

Predation has a major influence on the dynamics of Northwest Atlantic mackerel (Overholtz *et al.* 1991b). In fact, predation mortality is probably the largest component of natural mortality on this stock, and based on model predictions, may be higher than previously thought (Overholtz *et al.* 1991b). Atlantic mackerel serve as prey for a wide variety of predators including other mackerel, dogfish, tunas, bonito, striped bass, Atlantic cod (small mackerel), and squid, which feed on fish <4-5.2 in (10 to 13 cm) in length. Pilot whales, common dolphins, harbor seals, porpoises and seabirds are also significant predators (Smith and Gaskin 1974; Payne and Selzer 1983; Overholtz and Waring 1991; Montevecchi and Myers 1995). Other predators include swordfish, bigeye thresher, thresher, shortfin mako, tiger shark, blue shark, spiny dogfish, dusky shark, king mackerel, thorny skate, silver hake, red hake, bluefish, pollock, white hake, goosefish and weakfish (Scott and Tibbo 1968; Maurer and Bowman 1975; Stillwell and Kohler 1982, 1985; Bowman and Michaels 1984).

6.2.2 *Loligo pealei*

Previous studies of the life history and population dynamics of this species assumed that *Loligo* died after spawning at an age of 18-36 months based on the analysis of length frequency data (which suggested a "crossover" life cycle (Mesnil 1977, Lange and Sissenwine 1980)). However, recent advances in the aging of squid have been made utilizing counts of daily statolith growth increments (Dawe *et al.* 1985, Jackson and Choat 1992). Preliminary statolith ageing of *Loligo* indicates a life span of less than one year (Macy 1992, Brodziak and Macy 1994). Consequently, the most recent stock assessment for *Loligo* was conducted assuming that the species has an annual life-cycle and has the capacity to spawn throughout the year (NMFS 1994), as now appears typical of pelagic squid species studied throughout the world (Jereb *et a*l. 1991).

Loligo eggs are collected in gelatinous capsules as they pass through the female's oviduct during mating. Each capsule is about 3" long and 0.4" in diameter. Mating activity among captive *Loligo* was initiated when clusters of newly spawned egg capsules were placed in the tank. During spawning the male cements bundles of spermatophores into the mantle cavity of the female, and as the capsule of eggs passes out through the oviduct its jelly is penetrated by the sperm. The female then removes the egg capsule and attaches it to a preexisting cluster of newly spawned eggs. The female lays between 20 and 30 of these capsules, each containing 150 to 200 large (about 0.05"), oval eggs, for a total of 3,000 to 6,000 eggs. These clusters of demersal eggs, with as many as 175 capsules per cluster, are found in shallow waters (10-100') and may often be found washed ashore on beaches (Grosslein and Azarovitz 1982).

The diet of *Loligo* changes with increasing size; small immature individuals feed on planktonic organisms (Vovk 1972a, Tibbetts 1977) while larger individuals feed on crustaceans and small fish (Vinogradov and Noskov 1979). Cannibalism is observed in individuals larger than 2 in (5 cm) (Whitacker 1978). Juveniles 1.6-2.4 in (4.1-6 cm) long fed on euphausiids and arrow worms, while those 2.4-4 in (6.1-10 cm) fed mostly on small crabs, but also on polychaetes and shrimp (Vovk and Khvichiya 1980, Vovk 1985). Adults 4.8-6.4 in (12.1-16 cm) long fed on fish (Clupeids, Myctophids) and squid larvae/juveniles, and those >6.4 in (16 cm) fed on fish and squid (Vovk and Khvichiya 1980, Vovk 1985). Fish species preyed on by *Loligo* include silver hake, mackerel, herring, menhaden (Langton and Bowman 1977), sand lance, bay anchovy, menhaden, weakfish, and silversides (Kier 1982). Maurer and Bowman (1985) demonstrated seasonal and inshore/offshore differences in diet: in the spring in offshore waters, the diet was composed of crustaceans (mainly euphausiids) and fish; in the fall in inshore waters, the diet was composed almost exclusively of fish; and in the fall in offshore waters, the diet was composed of fish and squid.

Juvenile and adult *Loligo* are preyed upon by many pelagic and demersal fish species, as well as marine mammals and diving birds (Lange and Sissenwine 1980, Vovk and Khvichiya 1980, Summers 1983). Marine mammal predators include long-finned pilot whale, *Globicephala melas*, and common dolphin, *Delphinus delphis* (Waring *et al.* 1990, Overholtz and Waring 1991, Gannon *et al.* 1997). Fish predators include bluefish, sea bass, mackerel, cod, haddock, pollock, silver hake, red hake, sea raven, spiny dogfish, angel shark, goosefish, dogfish and flounder (Maurer 1975, Langton and Bowman 1977, Gosner 1978, Lange 1980).

6.2.3 *Illex illecebrosus*

The age and growth of *Illex* has been well studied relative to other squid species, being one of the few for which the statolith ageing method has been validated (Dawe *et al.* 1985). Research on the age and growth of *Illex* based on counts of daily statolith growth increments indicates an annual life span (Dawe *et al.* 1985).

Illex is a semelparous, terminal spawner with a protracted spawning season. There have been no direct observations of spawning in nature, but speculation about the timing and location is based on squid size and timing of advanced male maturity stages (O'Dor and Dawe 1998), back-calculated hatch dates from aging studies, and the collection of hatchling (Hendrickson pers. comm). *Illex* spawning takes place in the deep waters of the continental slope during winter (MAFMC 1995). Spawning likely occurs throughout the year (O'Dor and Dawe 1998) with most intense spawning generally occurring from December to March (Lange and Sissenwine 1980), but this varies among years and locations. Between Cape Canaveral, Florida and Charleston, North Carolina, spawning occurs during December to January (Rowell *et al.* 1985a, MAFMC 1995), while off Newfoundland, spawning has been reported from January through June (Squires 1967).

The principal spawning area is believed to be south of Cape Hatteras over the Blake Plateau (Black *et al.* 1987, MAFMC 1995), but other spawning occurs between the Florida Peninsula and central New Jersey at depths down to 990 ft (300 m; Fedulov and Froerman 1980, MAFMC 1995). Spawning probably occurs in the northern part of the Gulf Stream/Slope Water frontal zone (Dawe and Beck 1985, O'Dor and Balch 1985, Rowell et al 1985a).

Short-finned squid feed primarily on fish, cephalopods (i.e. squid) and crustaceans. Fish prey include the early life history stages of Atlantic cod, Arctic cod and redfish (Squires 1957, Dawe *et al.* 1997), sand lance (Dawe *et al.* 1997), mackerel and Atlantic herring (O'Dor *et al.* 1980, Wigley 1982, Dawe *et al.* 1997), haddock and sculpin (Squires 1957). *Illex* also feed on adult capelin (Squires 1957, O'Dor *et al.* 1980, Dawe *et al.* 1997), smelt and mummichogs (O'Dor *et al.* 1980). Cannibalism is significant, and *Illex* also feed on long-finned squid, *Loligo pealei* (Vinogradov 1984). Maurer and Bowman (1985) have demonstrated a seasonal shift in diet. When *Illex* are offshore in the spring, they primarily consume euphausiids, whereas they consume mostly fish and squid when they are inshore in the summer and fall. Individuals 2.4-4 in (6-10 cm) and 10.4-12 in (26-30 cm) ate mostly squid, 4.4-6 in (11-15 cm) *Illex* ate mostly crustaceans and fish, and those 6.4-8 in (16-20 cm) ate mostly crustaceans. Perez (1994) also demonstrated an ontogenetic shift in diet, as short-finned squid consume less crustaceans and more fish as they grow larger.

Numerous species of pelagic and benthic fishes are known to prey extensively on *Illex*, including bluefin tuna (Butler 1971), silver hake and red hake (Vinogradov 1972). Other fish predators include bluefish (Maurer 1975, Buckel 1997), goosefish (Maurer 1975, Langton and Bowman 1977), four-spot flounder (Langton and Bowman 1977), Atlantic cod (Lilly and Osborne 1984), sea raven (Maurer 1975), spiny dogfish (Templeman 1944, Maurer 1975), and swordfish (Langton and Bowman 1977, Stillwell and Kohler 1985, Scott and Scott 1988). Mammalian predators include pilot whales (Squires 1957, Wigley 1982) and the common dolphin (Major 1986). Seabird predators include shearwaters, gannets and fulmars (Brown *et al.* 1981). Short-finned squid are known to exhibit a variety of defense mechanisms in order to reduce predation, such as camouflage coloration, (O'Dor 1983), schooling behavior, direction changes and ink release (Major 1986).

6.2.4 Butterfish

Butterfish spawning takes place chiefly during summer (June- August) in inshore waters generally less than 100' deep. The times and duration of spawning are closely associated with changes in surface water temperature. The minimum spawning temperature is approximately 60 ^{o}F. Peak egg production occurs in Chesapeake Bay in June and July, off Long Island and Block Island in late June and early July, in Narragansett Bay in June and July, and in Massachusetts Bay June to August (Grosslein and Azarovitz 1982).

Butterfish eggs are found throughout the New York Bight and on Georges Bank, and they occur in the Gulf of Maine, but larvae appear to be relatively scarce east and north of Nantucket Shoals. In 1973, from mid-June to early September, larvae were common in the plankton off Shoreham, NY. Post larvae and juveniles were common in plankton net samples taken in August in the vicinity of Little Egg Inlet, NJ. Juveniles 3-4" long have been taken in Rhode Island waters in late October (Grosslein and Azarovitz 1982).

Growth is fastest during the first year and decreases each year thereafter. Young of the year butterfish collected in October trawl surveys (at about 4 months old) average 4.8" long. Fish about 16 months old are 6.6", at about 28 months old fish are 6.8", and at 40 months old they are 7.8". Maximum age is reported as six years. More recent studies showed that the population was composed of four age groups ranging from young of the year to over age three (Grosslein and Azarovitz 1982). Some butterfish are sexually mature at age one, but all are sexually mature by age two (Grosslein and Azarovitz 1982).

Butterfish feed mainly on planktonic prey, including thaliaceans (primarily Larvacea and Hemimyaria), molluscs (primarily squids), crustaceans (copepods, amphipods, and decapods), colenterates (primarily hydrozoans), polychaetes (primarily Tomopteridae and Goniadidae), small fishes, and ctenophores (Fritz 1965, Leim and Scott 1966, Haedrich 1967, Horn 1970a, Schreiber 1973, Mauer and Bowman 1975, Tibbets 1977, Bowman and Michaels 1984).

Butterfish are preyed on by many species including haddock, silver hake, goosefish, weakfish, bluefish, swordfish, sharks (hammerhead), and *Loligo* (Bigelow and Schroeder 1953, Scott and Tibbo 1968, Horn 1970a, Maurer and Bowman 1975, Tibbets 1977, Stillwell and Kohler 1985, Brodziak 1995a).

6.3 Habitat (Including Essential Fish Habitat (EFH))

As defined in section 3 (10) of the Magnuson-Stevens Fishery Conservation Act of 1976 (MSFCMA), EFH is "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." NMFS interprets "waters" to include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

Matrices of habitat parameters (i.e. temperature, salinity, light, etc.) for eggs/larvae and juveniles/adults were developed in the Atlantic mackerel, *Loligo* and *Illex* squid and butterfish EFH background documents which were included in Amendment 8 to the Atlantic Mackerel, Squid, and Butterfish FMP. In addition, Amendment 8 identified and described essential fish habitat for Atlantic mackerel, *Loligo* and *Illex* squid and butterfish in section 2.2.2 and this description is summarized below.

Atlantic mackerel

In general, Atlantic mackerel EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the Exclusive Economic Zone (EEZ)), from Maine through Cape Hatteras, North Carolina in areas that comprise the highest 75% of the catch for each of the life stages (eggs /larvae/juveniles/adults) where Atlantic mackerel were collected in MARMAP ichthyoplankton surveys. Inshore, EFH is the “mixing” and/or “seawater” portions of all the estuaries where each of the life stages are “common,” “abundant,” or “highly abundant” on the Atlantic coast, from Passamaquaddy Bay, Maine to James River, Virginia. More specific EFH designations for the Atlantic mackerel’s life stages are listed below.

Eggs: Atlantic mackerel eggs are collected from shore to 50 ft and temperatures between 41 ºF and 73 ºF.

Larvae: Atlantic mackerel larvae are collected in depths between 33 ft and 425 ft and temperatures between 43 ºF and 72 ºF.

Juveniles: Juvenile Atlantic mackerel are collected from shore to 1050 ft and temperatures between 39 ºF and 72 ºF.

Adults: Adult Atlantic mackerel are collected from shore to 1250 ft and temperatures between 39 ºF and 61 ºF.

Loligo

The *Loligo* population is comprised of pre-recruits and recruits, which are terms that are used by NEFSC and correspond roughly to the life history stages juveniles and adults, respectively. *Loligo* pre-recruits are less than or equal to 8 cm and recruits are greater than 8 cm. The EFH is the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine through Cape Hatteras, North Carolina in areas that comprise the highest 75% of the catch for each of the life stages (pre-recruits and recruits) where *Loligo* were collected in the NEFSC trawl surveys. More specifically, pre-recruit *Loligo* are collected from shore to 700 ft and temperatures between 4 °F and 27 °F, while recruited *Loligo* are collected from shore to 1000 ft and temperatures between 39 °F and 81 °F.

Illex

Illex EFH is the same as that for *Loligo*, with a couple of exceptions. Generally, pre-recruit *Illex* are collected from shore to 600 ft and temperatures between 36 °F and 73 °F, while recruited *Illex* are collected from shore to 600 ft and temperatures between 39 °F and 66 °F. *Illex* pre-recruits are less than or equal to 10 cm and recruits are greater than 10 cm.

Butterfish

Butterfish EFH is the same as that for Atlantic mackerel, with the following qualifications for various life stages.

Eggs: butterfish eggs are collected from shore to 6000 ft and temperatures between 52 °F and 63 °F.

Larvae: butterfish larvae are collected in depths between 33 ft and 6000 ft and temperatures between 48 °F and 66 °F.

Juveniles: juvenile butterfish are collected in depths between 33 ft and 1200 ft and temperatures between 37 °F and 82 °F.

Adults: adult butterfish are collected in depths between 33 ft and 1200 ft and temperatures between 37 °F and 82 °F.

6.4 Port and Community Description

The Council fully described the ports and communities that are associated with the Atlantic mackerel, *Loligo* and *Illex* squid and butterfish fisheries in Amendment 8 to the FMP. An update of the importance of the Atlantic mackerel, squid and butterfish to the ports and communities along the Atlantic Coast of the United States are described in section 6.6 of this EA. The landings of Atlantic mackerel in 2003 by port are given in Table 4. Cape May, NJ accounted for 48.5% of the of mackerel landings in 2003, followed by Gloucester, MA (17.9%), North Kingstown, RI (13.4%), and New Bedford, MA (16.6%). The ports most dependent on Atlantic mackerel based on percent of total revenue from the mackerel fishery landings in 2003 North Kingstown, RI (26%), Cape May, NJ (8%), Gloucester, MA (3%) and Newport, RI (2%) (Table 5). The landings of *Loligo* by port in 2003 are given in Table 17. Point Judith, RI accounted for over one-third of the *Loligo* landings in 2003. Other important ports in terms of *Loligo* landings included Hampton Bay, NY (6.8%), Montauk, NY (10.1%) Cape May, NJ (6.7%), Newport, RI (6.5%) and North Kingstown, RI (15.4%). There were 11 ports that were dependent on *Loligo* for more than 10% of the value of total fishery landings in those ports in 2003 (Table 18). The landings of *Illex* by port in 2003 are given in Table 25. North Kingstown, RI accounted for greater than 62 % of the *Illex* landings in 2003. Other important ports in terms of *Illex* landings included Cape May, NJ (23.5%), and Newport, RI (9.2%). No ports were dependent on *Illex* for more than 10% of the value of total fishery landings in 2003 (Table 26). The landings of butterfish by port in 2003 are given in Table 33. Three ports, North Kingston, RI Cape May NJ, and Newport, RI accounted for more than 95% of the butterfish landings in 2003. There were no ports that were dependent on butterfish for more than 10% of the value of total fishery landings in 2003 (Table 34).

6.5 Endangered and Other Protected Species

There are numerous species which inhabit the environment within the management unit of this FMP that are afforded protection under the Endangered Species Act (ESA) of 1973 (i.e., for those designated as threatened or endangered) and/or the Marine Mammal Protection Act of 1972 (MMPA). Thirteen are classified as endangered or threatened under the ESA, while the remainder are protected by the provisions of the MMPA. The Council has determined that the following list of species protected either by the Endangered Species Act of 1973 (ESA), the Marine Mammal Protection Act of 1972 (MMPA), or the Migratory Bird Act of 1918 may be found in the environment utilized by Atlantic mackerel, squid and butterfish fisheries:

Cetaceans

Species	Status
Northern right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Sperm whale (*Physeter macrocephalus*	Endangered
Minke whale (*Balaenoptera acutorostrata*)	Protected
Beaked whales (*Ziphius and Mesoplodon spp.*)	Protected
Risso's dolphin (*Grampus griseus*)	Protected
Pilot whale (*Globicephala spp.*)	Protected
White-sided dolphin (*Lagenorhynchus acutus*)	Protected
Common dolphin (*Delphinus delphis*)	Protected
Spotted and striped dolphins (*Stenella spp.*)	Protected
Bottlenose dolphin (*Tursiops truncatus*)	Protected

Sea Turtles

Species	Status
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
Loggerhead sea turtle (*Caretta caretta*)	Threatened

Fish

Species	Status
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Atlantic salmon (*Salmo salar*)	Endangered
Smalltooth sawfish (*Pristis pectinata*)	Endangered

Birds

Species	Status
Roseate tern (*Sterna dougallii dougallii*)	Endangered
Piping plover (*Charadrius melodus*)	Endangered

Critical Habitat Designations

Species	Area
Right whale	Cape Cod Bay

The Protected resource species which are found within the general area of the management unit of this FMP are listed above. Several species groups are of particular concern. The first group includes the species listed as endangered under the Endangered Species Act. There are six species of large whales which are listed as endangered under the ESA: the northern right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*), blue whale (*Balaenoptera musculus*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus).* The most prominent species in this group is the north Atlantic right whale, which is the most endangered large whale in the world. While fishery interactions are a major concern relative to the survival of this species, the Atlantic mackerel, *Loligo* and *Illex* squid and butterfish fisheries are not known to interact with right whales. Likewise, there are no known interactions between these fisheries and any of the other large whales listed as endangered that are found in US EEZ.

In addition to the large whales, there are nine other species found within the management unit of the FMP which are listed as endangered under the Endangered Species Act . These include five species of sea turtles: the leatherback sea turtle (*Dermochelys coriacea*), Kemp's ridley sea turtle (*Lepidochelys kempii*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), and loggerhead sea turtle (*Caretta caretta*); two species of fish: the shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic salmon (*Salmo salar*); and two species of birds: the roseate tern (*Sterna dougallii dougallii*) and piping plover (*Charadrius melodus*). With the exception of turtles, none of these endangered species are known to interact with the Atlantic mackerel, squid or butterfish fisheries. Preliminary examination of observer coverage data pertaining to turtle bycatch in Mid-Atlantic trawl fisheries for 2001 indicated that one leatherback turtle was taken off New Jersey in October in gear targeting *Loligo* squid (the animal was released alive). In 2002, five turtles were taken in fisheries targeting *Loligo* squid during September and October off the coasts of New Jersey and Rhode Island (unpublished NMFS observer data). However, of those five, four were severely decomposed and had already been entangled in ghost gill net gear. The fifth observed turtle take in 2002was a loggerhead which was observed to be fresh dead. No turtle takes were observed in the Atlantic mackerel, squid squid or butterfish fisheries in 2000, 2003 or in 2004 through April. An estimate of the total bycatch of these species is not presently available.

Finally, there are eight additional groups of cetaceans found within the management unit of the FMP which are protected under the Marine Mammal Protection Act. These include the Minke whale (*Balaenoptera acutorostrata*), beaked whales (*Ziphius and Mesoplodon spp*.), Risso's dolphin (*Grampus griseus*), pilot whales (*Globicephala spp*.), white-sided dolphin (*Lagenorhynchus acutus*), common dolphin (*Delphinus delphis*), spotted and striped dolphins (*Stenella spp*.), and bottlenose dolphin (*Tursiops truncatus*). Within this group, three species are of particular concern because they have been documented as interacting with the Atlantic mackerel, squid and butterfish trawl fishery as defined under the MMPA. These include common dolphin, white-sided dolphin and pilot whales. NMFS plans on covening aTake Reduction Team for the Atlantic trawl fishery, which will include the Atlantic mackerel squid and butterfish trawl fisheries in the summer of 2006. The purpose of this team will be to reduce the take of common dolphin and pilot whales in these fisheries.

Fishery Classification under Section 118 of Marine Mammal Protection Act

Under section 118 of the MMPA , NMFS must publish and annually update the List of Fisheries (LOF), which places all US commercial fisheries in one of three categories based on the level of incidental serious injury and mortality of marine mammals in each fishery (arranging them according to a two tiered classification system). The categorization of a fishery in the LOF determines whether participants in that fishery may be required to comply with certain provisions of the MMPA, such as registration, observer coverage, and take reduction plan requirements. The classification criteria consists of a two tiered, stock-specific approach that first addresses the total impact of all fisheries on each marine mammal stock (Tier 1) and then addresses the impact of the individual fisheries on each stock (Tier 2). If the total annual mortality and serious injury of all fisheries that interact with a stock is less than 10% of the PBR for the stock then the stock is designated as Tier 1 and all fisheries interacting with this stock would be placed in Category III. Otherwise, these fisheries are subject to categorization under Tier 2. Under Tier 2, individual fisheries are subject to the following categorization:

I. Annual mortality and serious injury of a stock in a given fishery is greater than or equal to 50% of the PBR level;

II. Annual mortality and serious injury of a stock in a given fishery is greater than one percent and less than 50% of the PBR level; or

III. Annual mortality and serious injury of a stock in a given fishery is less than one percent of the PBR level.

In Category I, there is documented information indicating a "frequent" incidental mortality and injury of marine mammals in the fishery. In Category II, there is documented information indicating an "occasional" incidental mortality and injury of marine mammals in the fishery. In Category III, there is information indicating no more than a "remote likelihood" of an incidental taking of a marine mammal in the fishery or, in the absence of information indicating the frequency of incidental taking of marine mammals, other factors such as fishing techniques, gear used, methods used to deter marine mammals, target species, seasons and areas fished, and species and distribution of marine mammals in the area suggest there is no more than a remote likelihood of an incidental take in the fishery. "Remote likelihood" means that it is highly unlikely that any marine mammal will be incidentally taken by a randomly selected vessel in the fishery during a 20-day period.

The Atlantic Squid, Mackerel, Butterfish Trawl Fishery is currently listed as a Category I fishery in the List of Fisheries for 2003 for the taking of marine mammals by commercial fishing operations under section 118 of the Marine Mammal Protection Act (MMPA) of 1972. The Atlantic Squid, Mackerel, Butterfish Trawl Fishery was previously classified by NMFS as a Category II fishery. This change resulted from a Tier 1 evaluation of NMFS Sea Sampling data which demonstrated that the Atlantic Squid, Mackerel, Butterfish Trawl Fishery incidentally injured and killed the following marine mammal species and stocks during 1996-1998: common dolphin (WNA stock), white-sided dolphin (WNA stock) and *Globicephala* sp. (includes long-finned and short-finned pilot whales) (WNA stock). Based on data presented in the draft 2000 Stock Assessment Report (SAR), annual serious injury and mortality across all fisheries for pilot whale, common dolphin and white sided dolphin stocks exceeds 10% of the PBR (78, 184, and 107 respectively). Therefore, the Atlantic Squid, Mackerel, Butterfish Trawl Fishery was subject to Tier 2 analysis. Waring et *al* 2002 estimated an annual average mortality of 43 pilot whales and 367 common dolphins per year in this fishery, which is greater than 50% of Potential Biological Removal (PBR) for each species. Therefore, the NMFS elevated this fishery to Category I. Since this fishery has become a Category I fishery under MMPA, it will receive a high priority with respect to observer coverage and consideration for measures under future Take Reduction Plans for any of the species listed above. NMFS intends on convening a Take Reduction Team in the summer of 2006 to reduce the take of these species in the Atlantic trawl fisheries, including the Atlantic mackerel, squid, and butterfish fishery.

Description of species of concern which are protected under MMPA

The following is a description of species of concern because they are protected under MMPA or ESA and, as discussed above, there were documented interactions with fishing gears used to harvest species managed under this FMP.

Common dolphin

The common dolphin may be one of the most widely distributed species of cetaceans, as it is found worldwide in temperate, tropical, and subtropical seas. In the North Atlantic, common dolphin appear to be present along the coast over the continental shelf along the 200-300m isobaths or over prominent underwater topography from 50 N to 40 S latitude (Evans 1994; Waring *et al*. 2002). The species is less common south of Cape Hatteras. Common dolphins are distributed along the continental slope (100 to 2,000 meters), and are associated with Gulf Stream features in waters off the northeastern USA coast (CETAP 1982; Selzer and Payne 1988; Waring *et al.* 1992). They are widespread from Cape Hatteras northeast to Georges Bank (35° to 42° North latitude) in outer continental shelf waters from mid-January to May (Hain *et al.* 1981; CETAP 1982; Payne *et al.* 1984). Common dolphins move northward onto Georges Bank and the Scotian Shelf from mid-summer to autumn (Palka *et al.* in review). Selzer and Payne (1988) reported very large aggregations (greater than 3,000 animals) on Georges Bank in autumn. Common dolphins are rarely found in the Gulf of 1,000 m. Maine, where temperature and salinity regimes are lower than on the continental slope of the Georges Bank/mid-Atlantic region (Selzer and Payne 1988). Migration onto the Scotian Shelf and continental shelf off Newfoundland occurs during summer and autumn when water temperatures exceed 11 C (Sergeant *et al.* 1970; Gowans and Whitehead 1995; Waring *et al.* 2002).

Total numbers of common dolphins off the USA or Canadian Atlantic coast are unknown, although five estimates from selected regions of the habitat do exist for select time periods. The best available abundance estimate for common dolphins is 30,768 (CV=0.32) as estimated from the July 6 to September 6, 1998 USA Atlantic surveys. This estimate is considered best because these surveys have the most complete coverage of the species' habitat. PBR for the western North Atlantic common dolphin is 227 (Waring *et al.* 2002).

Fishery Interactions

Total annual estimated average fishery-related mortality or serious injury to this stock during 1996-2000 was 375 common dolphins (CV=0.40; Waring *et al.* 2002). Prior to 1977, there was no documentation of marine mammal bycatch in distant-water fleet (DWF) activities off the northeast coast of the USA. During the period 1977-1986, observers recorded 123 mortalities in foreign Loligo squid-fishing activities (Waring *et al.* 1990). In 1985 and 1986, Italian vessels took 56 and 54 animals, respectively, which accounts for 89% (n = 110) of the total takes in foreign Loligo squid-fishing operations. No mortalities were reported in foreign Illex squid fishing operations. Because of spatial/temporal fishing restrictions, most of the bycatch occurred along the continental shelf edge (100 m) isobath during winter (December to February).

From 1977-1991, observers recorded 110 mortalities in foreign mackerel-fishing operations (Waring *et al.*1990; NMFS unpublished data). This total includes one documented take by a USA vessel involved in joint-venture fishing operations in which USA captains transfer their catches to foreign processing vessels. The bycatch occurred during winter/spring (December to May).

Data on current incidental takes in USA fisheries are available from several sources. In 1986, NMFS established a mandatory self-reported fisheries information system for large pelagic fisheries. Data files are maintained at the Southeast Fisheries Science Center (SEFSC). The Northeast Fisheries Science Center (NEFSC) Sea Sampling Observer Program was initiated in 1989, and since that year several fisheries have been covered by the program. In late 1992 and in 1993, the SEFSC provided observer coverage of pelagic longline vessels fishing off the Grand Banks (Tail of the Banks) and provides observer coverage of vessels fishing south of Cape Hatteras.

Bycatch has been observed by NMFS Sea Samplers in the pelagic drift gillnet, pelagic pair trawl, pelagic longline fishery, mid-Atlantic coastal gillnet, North Atlantic bottom trawl, Northeast multispecies sink gillnet, and Atlantic squid, mackerel, butterfish trawl fisheries (Waring *et al.* 2003).

The status of common dolphins in the US Atlantic EEZ is unknown. The species is not listed as threatened or endangered under the Endangered Species Act. There are insufficient data to determine the population trends for this species. The total fishery-related mortality and serious injury for this stock is not less than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate. This is a strategic stock because the1996-2000 average annual fishery-related mortality and serious injury exceeds PBR (Waring *et al.* 2003).

White-sided dolphin

White-sided dolphins are found in temperate and sub-polar waters of the North Atlantic, primarily on continental shelf waters to the 100 m depth contour. The species inhabits waters from central west Greenland to North Carolina (about 35o N) and perhaps as far east as 43° W (Evans 1987). Distribution of sightings, strandings and incidental takes suggest the possible existence of three stocks units: a Gulf of Maine, a Gulf of St. Lawrence and a Labrador Sea stock (Palka *et al.* 1997). White-sided dolphins were seen frequently in eastern Gulf of Maine waters and in waters at the mouth of the Gulf of St. Lawrence, but only a few sightings were recorded in the waters between these two regions (Waring *et al.* 2002).

The Gulf of Maine stock of white-sided dolphins is most common in continental shelf waters from Hudson Canyon (approximately 39 N) north through Georges Bank, and in the Gulf of Maine to the lower Bay of Fundy. Sightings data indicate seasonal shifts in distribution (Northridge *et al.* 1997). During January to April, low numbers of white-sided dolphins are found from Georges Bank to Jeffreys Ledge (off New Hampshire), and even lower numbers are south of Georges Bank, as documented by a few strandings collected on beaches of Virginia and North Carolina. From June through September, large numbers of white-sided dolphins are found from Georges Bank to lower Bay of Fundy. From October to December, white-sided dolphins occur at intermediate densities from southern Georges Bank to southern Gulf of Maine (Payne and Heinemann 1990). Sightings south of Georges Bank, in particular, around Hudson Canyon have been seen at all times of the year but at low densities. The Virginia and North Carolina observations appear to represent the southern extent of the species range.

The total number of white-sided dolphins along the eastern USA and Canadian Atlantic coast is unknown. The best estimate of abundance for the Gulf of Maine stock of whitesided dolphins is 51,640 (CV=0.38). There are insufficient data to determine population trends for this species (Waring *et al.* 2002). PBR for the Gulf of Maine stock of the western North Atlantic whitesided dolphin is 364 (Waring *et al.* 2002).

Fishery Interactions

Recently, within USA waters, white-sided dolphins have been observed caught in the Northeast sink gillnet, mid-Atlantic coastal gillnet, pelagic drift gillnet, North Atlantic bottom trawl, and Atlantic squid, mackerel, butterfish trawl fisheries. Estimated average annual fishery-related mortality and serious injury to the Gulf of Maine stock of the western North Atlantic white-sided dolphin from these USA fisheries during 1996-2000 was 118 (CV=0.48) dolphins per year (Waring *et al.* 2002).

The status of white-sided dolphins in the US Atlantic EEZ is unknown. The species is not listed as threatened or endangered under the Endangered Species Act. There are insufficient data to determine population trends for this species. The total fishery-related mortality and serious injury for this stock is not less than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate. This is a non-strategic stock because estimated average annual fishery-related mortality and serious injury does not exceed PBR (Waring *et al.* 2002).

Long-finned and short-finned pilot whales

There are two species of pilot whales in the Western Atlantic — the Atlantic or long-finned pilot whale, *Globicephala melas*, and the short-finned pilot whale, *G. macrorhynchus*. These species are difficult to identify to the species level at sea; therefore, the descriptive material below refers to *Globicephala* sp., and is identified as such. The species boundary is considered to be in the New Jersey to Cape Hatteras area. Sightings north of this are likely *G. melas*. Pilot whales are distributed principally along the continental shelf edge in the winter and early spring off the northeast USA coast, (CETAP 1982; Payne and Heinemann 1993). In late spring, pilot whales move onto Georges Bank and into the Gulf of Maine and more northern waters, and remain in these areas through late autumn (CETAP 1982; Payne and Heinemann 1993). In general, pilot whales occupy areas of high relief or submerged banks. They are also associated with the Gulf Stream north wall and thermal fronts along the continental shelf edge (Waring *et al.* 1992; NMFS unpublished data; Waring *et al.* 2002).

The long-finned pilot whale is distributed from North Carolina to North Africa (and the Mediterranean) and north to Iceland, Greenland and the Barents Sea (Sergeant 1962; Leatherwood *et al.* 1976; Abend 1993; Buckland *et al.* 1993). The short-finned pilot whale is distributed worldwide in tropical to warm temperate water (Leatherwood and Reeves 1983). The total number of short-finned pilot whales off the eastern USA and Canadian Atlantic coast is unknown. The best available abundance estimate for *Globicephala* sp., 14,524 (CV=0.30), is the sum of the estimates from the two 1998 USA Atlantic surveys, where the estimate from the northern USA Atlantic is 9,800 (CV=0.34) and from the southern USA Atlantic is 4,724 (CV=0.61) (Waring *et al.* 2002). This joint estimate is considered best because together these two surveys have the most complete coverage of the species' habitat. PBR for the western North Atlantic Globicephala sp. is 108 (Waring *et al.* 2002).

Fishery Interactions

Total fishery-related mortality and serious injury cannot be estimated separately for the two species of pilot whales in the US Atlantic EEZ because of the uncertainty in species identification by fishery observers. The Atlantic Scientific Review Group advised adopting the risk-averse strategy of assuming that either species might have been subject to the observed fishery-related mortality and serious injury. Total annual estimated average fishery-related mortality or serious injury of this stock during 1996-2000 in the USA fisheries listed below was 193 pilot whales (CV=0.43) (Waring *et al.* 2002).

During 1977-1991, observers recorded 436 pilot whale mortalities in foreign-fishing activities (Waring *et al.* 1990; Waring 1995). A total of 391 (90%) were taken in the mackerel fishery, and 41 (9%) occurred during Loligo and Illex squid-fishing operations. This total includes 48 documented takes by USA vessels involved in joint venture fishing operations in which USA captains transfer their catches to foreign processing vessels.

Bycatch has been observed by NMFS Sea Samplers in the pelagic drift gillnet, pelagic longline, and pelagic pair trawl, bluefin tuna purse seine, North Atlantic bottom trawl, Atlantic squid, mackerel, butterfish trawl, and Mid- Atlantic coastal gillnet fisheries, but no mortalities or serious injuries have documented in the Northeast multispecies sink gillnet fishery .

Other Mortality

Pilot whales have a propensity to mass strand throughout their range, but the role of human activity in these events is unknown (Waring *et al.* 2002). Between 2 and 120 pilot whales have stranded annually either individually or in groups in NMFS Northeast Region (Anon. 1993b) since 1980. The status of long-finned and short-finned pilot whales relative to OSP in US Atlantic EEZ is unknown, but stock abundance may have been affected by reduction in foreign fishing, curtailment of the Newfoundland drive fishery for pilot whales in 1971, and increased abundance of herring, mackerel, and squid stocks. There are insufficient data to determine the population trends for these species. The species are not listed under the Endangered Species Act. The total fishery-related mortality and serious injury for these stocks is not less than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate. These are a strategic stocks because the 1996-2000 estimated average annual fishery-related mortality, excluding Nova Scotia bycatches to pilot whales, *Globicephala* sp., exceeds PBR (Waring *et al.* 2002).

Description of Species of Concern Protected Under the Endangered Species Act

In addition to the large whales, there are nine other species found within the management unit of the FMP which are listed as endangered under the Endangered Species Act . These include five species of sea turtles: the leatherback sea turtle (*Dermochelys coriacea*), Kemp's ridley sea turtle (*Lepidochelys kempii*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), and loggerhead sea turtle (*Caretta caretta*); two species of fish: the shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic salmon (*Salmo salar*); and two species of birds: the roseate tern (*Sterna dougallii dougallii*) and piping plover (*Charadrius melodus*). Preliminary examination of observer coverage data pertaining to turtle bycatch in Mid-Atlantic trawl fisheries for 2001 indicated that one leatherback turtle was taken off New Jersey in October in gear targeting *Loligo* squid. In 2002, five turtles were taken in fisheries targeting *Loligo* squid during September and October off the coasts of New Jersey and Rhode Island (unpublished NMFS observer data). However, four of the turtles observed in 2002 were severely decomposed and were observed to be entangled in ghost gill net gear. No turtle interactions were observed in these fisheries during 2003 or through April 2004. An estimate of the total bycatch of these species is not presently available. A brief description of the ESA listed species of concern is given below.

Loggerhead Sea Turtle

The loggerhead sea turtle (*Carretta carretta*) occurs throughout the temperate and tropical regions of the Atlantic, Pacific and Indian Oceans (Dodd 1998). The loggerhead turtle was listed as "threatened" under the ESA on July 28, 1978, but is considered endangered by the World Conservation Union (IUCN) and under the Convention on International Trade in Endangered Species of Flora and Fauna (CITES). Loggerhead sea turtles are found in a wide range of habitats throughout the temperate and tropical regions of the Atlantic. These include open ocean, continental shelves, bays, lagoons, and estuaries (NMFS& FWS 1995).

Since they are limited by water temperatures, sea turtles do not usually appear on the summer foraging grounds in the Gulf of Maine until June, but are found in Virginia as early as April. They remain in these areas until as late as November and December in some cases, but the large majority leave the Gulf of Maine by mid-September. Loggerheads are primarily benthic feeders, opportunistically foraging on crustaceans and mollusks (NMFS & FWS 1995). Under certain conditions they also feed on finfish, particularly if they are easy to catch *(e.g.,* caught in gillnets or inside pound nets where the fish are accessible to turtles).

A Turtle Expert Working Group (TEWG 2000), conducting an assessment of the status of the loggerhead sea turtle population in the Western North Atlantic (WNA), concluded that there are at least four loggerhead subpopulations separated at the nesting beach in the WNA. However, the group concluded that additional research is necessary to fully address the stock definition question. The four nesting subpopulations include the following areas: northern North Carolina to northeast Florida, south Florida, the Florida Panhandle, and the Yucatan Peninsula. Genetic evidence indicates that loggerheads from Chesapeake Bay southward to Georgia appear nearly equally divided in origin between South Florida and northern subpopulations. Additional research is needed to determine the origin of turtles found north of the Chesapeake Bay.

The TEWG (1998) analysis also indicated the northern subpopulation of loggerheads is stable or declining. A recovery goal of 12,800 nests has been assumed for the Northern Subpopulation, but TEWG (1998) reported nest number at around 6,200 (TEWG 1998). More recently, the addition of nesting data from the years 1996, 1997 and 1998, did not change the assessment of the TEWG that the number of loggerhead nests in the Northern Subpopulation is stable or declining (TEWG 2000). Since the number of nests have declined in the 1980's, the TEWG concluded that it is unlikely that this subpopulation will reach this goal given this apparent decline and the lack of information on the subpopulation from which loggerheads in the WNA originate. Continued efforts to reduce the adverse effects of fishing and other human-induced mortality on this population are necessary.

The most recent 5-year ESA sea turtle status review (NMFS & USFWS 1995) highlights the difficulty of assessing sea turtle population sizes and trends. Most long-term data comes from nesting beaches, many of which occur extensively in areas outside U.S. waters. Because of this lack of information, the TEWG was unable to determine acceptable levels of mortality. This status review supports the conclusion of the TEWG that the northern subpopulation may be experiencing a decline and that inadequate information is available to assess whether its status has changed since the initial listing as threatened in 1978. NMFS & USFWS (1995) concluded that loggerhead turtles should remain designated threatened but noted that additional research will be necessary before the next status review can be conducted.

Leatherback Sea Turtle

Leatherback turtles are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour 1972). The leatherback sea turtle is the largest living turtle and ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS, 1995). Evidence from tag returns and strandings in the western Atlantic suggests that adults engage in routine migrations between boreal, temperate and tropical waters (NMFS and USFWS, 1992). In the U.S., leatherback turtles are found throughout the action area of this amendment. Located in the northeastern waters during the warmer months, this species is found in coastal waters of the continental shelf and near the Gulf Stream edge, but rarely in the inshore areas. However, leatherbacks may migrate close to shore, as a leatherback was satellite tracked along the mid-Atlantic coast, thought to be foraging in these waters. A 1979 aerial survey of the outer Continental Shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Shoop and Kenney (1992) also observed concentrations of leatherbacks during the summer off the south shore of Long Island and off New Jersey. Leatherbacks in these waters are thought to be following their preferred jellyfish prey. This aerial survey estimated the leatherback population for the northeastern U.S. at approximately 300-600 animals (from near Nova Scotia, Canada to Cape Hatteras, North Carolina).

Compared to the current knowledge regarding loggerhead populations, the genetic distinctness of leatherback populations is less clear. However, genetic analyses of leatherbacks to date indicate female turtles nesting in St. Croix/Puerto Rico and those nesting in Trinidad differ from each other and from turtles nesting in Florida, French Guiana/Suriname and along the South African Indian Ocean coast. Much of the genetic diversity is contained in the relatively small insular subpopulations. Although populations or subpopulations of leatherback sea turtles have not been formally recognized, based on the most recent reviews of the analysis of population trends of leatherback sea turtles, and due to our limited understanding of the genetic structure of the entire species, the most conservative approach would be to treat leatherback nesting populations as distinct populations whose survival and recovery is critical to the survival and recovery of the species. Further, any action that appreciably reduced the likelihood for one or more of these nesting populations to survive and recover in the wild, would appreciably reduce the species' likelihood of survival and recovery in the wild.

Leatherbacks are predominantly a pelagic species and feed on jellyfish (i.e., *Stomolophus*, *Chryaora*, and *Aurelia* (Rebel 1974)), cnidarians (medusae, siphonophores) and tunicates (salps, pyrosomas). Time-Depth-Recorder data recorded by Eckert *et al.* (1998b) indicate that leatherbacks are night feeders and are deep divers, with recorded dives to depths in excess of 1000 meters. However, leatherbacks may come into shallow waters if there is an abundance of jellyfish nearshore.

Although leatherbacks are a long lived species (> 30 years), they are slightly faster to mature than loggerheads, with an estimated age at sexual maturity reported as about 13-14 years for females, and an estimated minimum age at sexual maturity of 5-6 years, with 9 years reported as a likely minimum (Zug and Parham 1996) and 19 years as a likely maximum (NMFS 2001). In the U.S. and Caribbean, female leatherbacks nest from March through July. They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and thus, can produce 700 eggs or more per nesting season (Schultz 1975). The eggs will incubate for 55-75 days before hatching. The habitat requirements for post-hatchling leatherbacks are virtually unknown (NMFS and USFWS 1992).

Anthropogenic impacts to the leatherback population are similar to those discussed above for the loggerhead sea turtle, including fishery interactions as well as intense exploitation of the eggs (Ross 1979). Eckert (1996) and Spotila *et al.* (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries. Zug and Parham (1996) attribute the sharp decline in leatherback populations to the combination of the loss of long-lived adults in fishery related mortality, and the lack of recruitment stemming from elimination of annual influxes of hatchlings because of intense egg harvesting.

Poaching is not known to be a problem for U.S. nesting populations. However, numerous fisheries that occur in both U.S. state and Federal waters are known to negatively impact juvenile and adult leatherback sea turtles. These include incidental take in several commercial and recreational fisheries. Fisheries known or suspected to incidentally capture leatherbacks include those deploying bottom trawls, off-bottom trawls, purse seines, bottom longlines, hook and line, gill nets, drift nets, traps, haul seines, pound nets, beach seines, and surface longlines (NMFS and USFWS 1992). At a workshop held in the Northeast in 1998 to develop a management plan for leatherbacks, experts expressed the opinion that incidental takes in fisheries were likely higher than is being reported.

Leatherback interactions with the southeast shrimp fishery are also common. Turtle Excluder Devices (TEDs), typically used in the southeast shrimp fishery to minimize sea turtle/fishery interactions, are less effective for the large-sized leatherbacks. Therefore, the NMFS has used several alternative measures to protect leatherback sea turtles from lethal interactions with the shrimp fishery. These include establishment of a Leatherback Conservation Zone (60 FR 25260). NMFS established the zone to restrict, when necessary, shrimp trawl activities from off the coast of Cape Canaveral, Florida to the Virginia/North Carolina Border. Leatherbacks are also susceptible to entanglement in lobster and crab pot gear, possibly as a result of attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, attraction to the buoys which could appear as prey, or the gear configuration which may be more likely to wrap around flippers.

Spotila *et al.* (1996) recommended not only reducing mortalities resulting from fishery interactions, but also advocated protection of eggs during the incubation period and of hatchlings during their first day, and indicated that such practices could potentially double the chance for survival and help counteract population effects resulting from adult mortality. They conclude, "stable leatherback populations could not withstand an increase in adult mortality above natural background levels without decreasing . . . the Atlantic population is the most robust, but it is being exploited at a rate that cannot be sustained and if this rate of mortality continues, these populations will also decline. "

Nest counts are currently the only reliable indicator of population status available for leatherback turtles. The status of the leatherback population in the Atlantic is difficult to assess since major nesting beaches occur over broad areas within tropical waters outside the United States. Recent information suggests that Western Atlantic populations declined from 18,800 nesting females in 1996 (Spotila *et al.* 1996) to 15,000 nesting females by 2000. It does appear, however, that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting females.

Kemp's Ridley Sea Turtle

The Kemp's ridley is probably the most endangered of the world's sea turtle species. The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). Estimates of the adult population reached a low of 1,050 in 1985, but increased to 3,000 individuals in 1997. First-time nesting adults have increased from 6% to 28% from 1981 to 1989, and from 23% to 41% from 1990 to 1994, indicating that the ridley population may be in the early stages of growth (TEWG 1998). More recently the TEWG (2000) concluded that the Kemp's Ridley population appears to be in the early stages of exponential expansion. While the number of females nesting annually is estimated to be orders of magnitude less than historical levels, the mean rate of increase in the annual number of nests has accelerated over the period 1987-1999. Preliminary analyses suggest that the intermediate recovery goal of 10,000 nesting females by 2020 may be achievable (TEWG 2000).

Juvenile Kemp's ridleys inhabit northeastern US coastal waters where they forage and grow in shallow coastal during the summer months. Juvenile ridleys migrate southward with autumnal cooling and are found predominantly in shallow coastal embayments along the Gulf Coast during the late fall and winter months.

Ridleys found in mid-Atlantic waters are primarily post-pelagic juveniles averaging 40 cm in carapace length, and weighing less than 20 kg. After loggerheads, they are the second most abundant sea turtle in Virginia and Maryland waters, arriving in there during May and June and then emigrating to more southerly waters from September to November. In the Chesapeake Bay, ridleys frequently forage in shallow embayments, particularly in areas supporting submerged aquatic vegetation (Lutcavage and Musick 1985). The juvenile population in Chesapeake Bay is estimated to be 211 to 1,083 turtles.

The model presented by Crouse *et al.* (1987) illustrates the importance of subadults to the stability of loggerhead populations and may have important implications for Kemp's ridleys. The vast majority of ridleys identified along the Atlantic Coast have been juveniles and subadults. Sources of mortality in this area include incidental takes in fishing gear, pollution and marine habitat degradation, and other man-induced and natural causes. Loss of individuals in the Atlantic, therefore, may impede recovery of the Kemp's ridley sea turtle population. Sea sampling data from the northeast otter trawl fishery and southeast shrimp and summer flounder bottom trawl fisheries has recorded takes of Kemp's ridley turtles.

Green Sea Turtle

Green sea turtles are more tropical in distribution than loggerheads, and are generally found in waters between the northern and southern 20°C isotherms. In the western Atlantic region, the summer developmental habitat encompasses estuarine and coastal waters as far north as Long

Island Sound, Chesapeake Bay, and the North Carolina sounds, and south throughout the tropics (NMFS 1998). Most of the individuals reported in U.S. waters are immature (NMFS 1998). Green sea turtles found north of Florida during the summer must return to southern waters in autumn or risk the adverse effects of cold temperatures.

There is evidence that green turtle nesting has been on the increase during the past decade. For example, increased nesting has been observed along the Atlantic coast of Florida on beaches where only loggerhead nesting was observed in the past (NMFS 1998). Recent population estimates for the western Atlantic area are not available. Green turtles are threatened by incidental captures in fisheries, pollution and marine habitat degradation, destruction/disturbance of nesting beaches, and other sources of man-induced and natural mortality.

Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats, and enter benthic foraging areas, shifting to a chiefly herbivorous diet (NMFS 1998). Post-pelagic green turtles feed primarily on sea grasses and benthic algae, but also consume jellyfish, salps, and sponges. Known feeding habitats along U.S. coasts of the western Atlantic include shallow lagoons and embayments in Florida, and similar shallow inshore areas elsewhere (NMFS 1998). Sea sampling data from the scallop dredge fishery and southeast shrimp and summer flounder bottom trawl fisheries have recorded incidental takes of green turtles

Hawksbill Sea Turtle

The hawksbill turtle occurs in tropical and subtropical seas of the Atlantic, Pacific and Indian Oceans. The species is widely distributed in the Caribbean Sea and western Atlantic Ocean, with representatives of at least some life history stages regularly occurring in southern Florida and the northern Gulf of Mexico (especially Texas); in the Greater and Lesser Antilles; and along the Central American mainland south to Brazil. Within the United States, hawksbills are most common in Puerto Rico and its associated islands, and in the U.S. Virgin Islands. In the continental U.S., the species is recorded from all the gulf states and from along the eastern seaboard as far north as Massachusetts, with the exception of Connecticut, but sightings north of Florida are rare.

The hawksbill is a small to medium-sized sea turtle. In the U.S. Caribbean, nesting females average about 62-94cm in straight carapace length. Weight is typically to 80 kg in the wider Caribbean, with a record weight of 127 kg. Hatchlings average about 42 mm straight carapace length and range in weight from 13.5-19.5 g.

Hawksbills utilize different habitats at different stages of their life cycle. Posthatchling hawksbills occupy the pelagic environment, taking shelter in weedlines that accumulate at convergence points. Hawksbills reenter coastal waters when they reach approximately 20-25 cm carapace length. Coral reefs are widely recognized as the resident foraging habitat of juveniles, subadults and adults. This habitat association is undoubtedly related to their diet of sponges, which need solid substrate for attachment. The ledges and caves of the reef provide shelter for resting both during the day and night. Hawksbills are also found around rocky outcrops and high energy shoals, which are also optimum sites for sponge growth. Hawksbills are also known to inhabit mangrove-fringed bays and estuaries, particularly along the eastern shore of continents where coral reefs are absent. In Texas, juvenile hawksbills are associated with stone jetties.

Hawksbills utilize both low- and high-energy nesting beaches in tropical oceans of the world. Both insular and mainland nesting sites are known. Hawksbills will nest on small pocket beaches, and, because of their small body size and great agility, can traverse fringing reefs that limit access by other species. They exhibit a wide tolerance for nesting substrate type. Nests are typically placed under vegetation.

The status of the hawksbill turtle has not changed since it was listed as endangered in 1970. It is a solitary nester, and thus, population trends or estimates are difficult to determine. The decline of nesting populations is accepted by most researchers. In 1983, the only known apparently stable populations were in Yemen, northeastern Australia, the Red Sea, and Oman. Commercial exploitation is the major cause of the continued decline of the hawksbill sea turtle. There is a continuing demand for the hawksbill's shell as well as other products including leather, oil, perfume, and cosmetics. Prior to being certified under the Pelly Amendment, Japan had been importing about 20 metric tons of hawksbill shell per year, representing approximately 19,000 turtles. A negotiated settlement was reached regarding this trade on June 19, 1992. The hawksbill shell commands high prices (currently $225/kilogram), a major factor preventing effective protection.

Incidental catch of hawksbill turtles during fishing operations is an unquantified and potentially significant source of mortality. Gill nets, longlines and shrimp trawls all take turtles in Gulf of Mexico waters. The extent to which hawksbills are killed or debilitated after becoming entangled in marine debris are unknown, but it is believed to be a serious and growing problem. Hawksbills have been reported entangled in monofilament gill nets, "fish nets", fishing line and rope. Hawksbill turtles eat a wide variety of debris such as plastic bags, plastic and styrofoam pieces, tar balls, balloons and plastic pellets. Effects of consumption include interference in metabolism or gut function, even at low levels of ingestion, as well as absorption of toxic byproducts.

6.6 Fishery and Socioeconomic Environment

6.6.1 Atlantic mackerel

6.6.1.1 Status of the Stock

The Northwest Atlantic mackerel stock was most recently assessed at SAW-30 (NMFS 2000). The assessment concluded that the Atlantic mackerel stock is currently at a high level of abundance and is under-exploited. Based on trends in survey indices, recruitment has been well above average throughout most of the 1990's. However, estimates of fishing mortality and stock sizes based on virtual population analyses conducted in SAW-30 were considered unreliable. A recent Canadian assessment confirmed the conclusion that the Atlantic mackerel stock is currently at a high level of abundance (Gregoire 1996).

6.6.1.2 Historical Commercial Fishery

Atlantic mackerel have a long history of exploitation off the northeastern coast of the United States dating back to colonial times. The modern northwest Atlantic mackerel fishery underwent dramatic change with the arrival of the European distant-water fleets (DWF) in the early 1960's. While the first DWF landings reported in 1961 were not large (11,000 mt), they increased substantially to over 114,000 mt by 1969. Total international commercial landings (NAFO Subareas 2-6,) peaked at 437,000 mt in 1973 and then declined sharply to 77,000 by 1977 (Overholtz 1989).

The MSFCMA established control of the portion of the mackerel fishery occurring in US waters (NAFO Subareas 5-6) under the auspices of the Council. Reported foreign landings in US waters declined from an unregulated level of 385,000 mt in 1972 to less than 400 mt from 1978-1980 under the MSFCMA (the foreign mackerel fishery was restricted by NOAA Foreign Fishing regulations to certain areas or "windows"). Under the control of Mid-Atlantic Fishery Management Council (MAFMC) mackerel FMP and subsequent amendments, foreign mackerel catches were permitted to increase gradually to 15,000 mt in 1984 and then to a peak of almost 43,000 mt in 1988.

Recent US management policy of no TALFF combined with political and economic changes in Eastern Europe resulted in a decline in foreign landings from 9,000 mt in 1991 to 0 in 1992 and 1993. US commercial landings of mackerel increased steadily from roughly 3000 mt in the early 1980s to greater than 31,000 mt in 1990. However, US mackerel landings declined to 12,418 mt in 1992 and 4,653 mt in 1993. NMFS weighout data indicate that US landings were roughly 8,500 mt in 1994 and 1995. US Atlantic mackerel landings increased to about 15,500 mt in 1996 and 1997 (valued at ranged from $4.6 million to $9.5 million). NMFS weighout data indicate that US Atlantic mackerel landings then declined to approximately 12,500 mt in 1998 and 1999 (valued at $4.7 million and $3.6 million, respectively). Atlantic mackerel landings declined further to 5,645 mt in 2000 (valued at $2.0 million) but increased to 12,308 mt in 2001 (valued at $2.2 million) and 26,192 mt valued at ($6.1 million) in 2002.

NMFS weighout data (Maine-Virginia), shows that the average ex-vessel prices for Atlantic mackerel in the US declined steadily from $400/mt ($0.18/lb) in 1989 to $281/mt ($0.13/lb) in 1994. Since then, ex-vessel prices have moved upward from $296/mt ($0.13/lb) in 1994 to $321/mt ($0.15/lb) in 1995. Ex-vessel prices for Atlantic mackerel declined slightly in 1996 to $296/mt ($0.13/lb) and then increased to $376/mt ($0.17/lb) in 1998. Ex-vessel prices for Atlantic mackerel declined again in 1999 to $299/mt ($0.13/lb) and then increased to $354/mt in 2000 ($0.16/lb). Ex-vessel prices for Atlantic mackerel increased again in 2000 to $354/mt ($0.16/lb) but declined to $178/mt ($0.08/lb) in 2001. Ex-vessel prices for Atlantic mackerel increased again in 2002 to $233/mt ($0.16/lb), even in the face of a 113% increase in US production of Atlantic mackerel in 2002. Industry members report that the increase in price in 2002 was due to an increase in the average size of mackerel landed in 2002. The ex-vessel price for Atlantic mackerel remained steady in 2003 at $234/mt.

6.6.1.3 2003 Commercial Fishery

Based on NMFS dealer reports, a total of 394 vessels landed 30,738 mt (valued at $7.2 million) of Atlantic mackerel in 2003 (Table 1). The 2003 landings of Atlantic mackerel by state are given in Table 2. Rhode Island (15.9%) , New Jersey (48.8%) and Massachusetts (34.6%) accounted for the majority of landings in 2003. Although mackerel landings occur year round, the primary mackerel fishing season extends from January through April when greater than 95% of the annual landings are taken (Table 3). The principal gear used to land mackerel in 2003 were mid-water trawls (82%) and bottom otter trawls (17%) (Table 4).

The landings of Atlantic mackerel in 2003 by port are given in Table 5. Cape May, NJ accounted for 48.5% of the of mackerel landings in 2003 ,followed by Gloucester, MA (17.9%), North Kingstown, RI (13.4%), and New Bedford, MA (16.6%). The ports most dependent on Atlantic mackerel based on percent of total revenue from the mackerel fishery landings in 2003 North Kingstown, RI (26%), Cape May, NJ (8%), Gloucester, MA (3%) and Newport, RI (2%) (Table 6).

6.6.1.4 Analysis of Human Environment/Permit Data

According to unpublished NMFS permit file data, there were 2377 vessels with Atlantic mackerel permits in 2003 (a slight decrease compared to 2002). These permits are currently open access and are available to any vessel which meets the size and horsepower restrictions implemented in Amendment 8 to the FMP. The distribution of vessels which possessed Atlantic mackerel permits in 2002 by home port state is given in Table 7. Most of these vessels were from the states of Massachusetts (43.9%), Maine (10.9%), New York (10.2%), New Jersey (10.4%), Rhode Island (6.4%), Virginia (4.7%), New Hampshire (3.8%) and North Carolina (3.8%).

In addition, there were 359 dealers which possessed Atlantic mackerel, squid and butterfish dealer permits in 2003. The distribution of these dealers by state is given in Table 8. Of the 359 dealers which possessed an Atlantic mackerel, squid and butterfish dealer permit in 2003, there were 95 dealers that reported buying Atlantic mackerel in 2003 (Table 9).

Atlantic mackerel landing by permit category are given in Table 10. There were 304 vessels which landed 30,605 mt of Atlantic mackerel which possessed mackerel permits. Thus only about 13% of the vessels with mackerel permits actively fished in the mackerel fishery in 2003. Almost half of the vessels with *Loligo*/butterfish moratorium permits were active in the mackerel fishery in 2003, while 32% of the *Illex* permit holders were active in this fishery.

6.6.1.5 Recreational Fishery

Atlantic mackerel are seasonally important to the recreational fisheries of the Mid-Atlantic and New England regions. They are available to recreational anglers in the Mid-Atlantic primarily during the spring migration. Historically, mackerel first appear off Virginia in March and gradually move northward. Christensen *et al.* 1979 found mackerel to be available to the recreational fishery from Delaware to New York for about three weeks (generally from early April to early May). As a result, the annual recreational catch of mackerel appears to be sensitive to changes in their migration and subsequent distribution pattern (Overholtz *et al.* 1989).

Recreational landings of Atlantic mackerel since 1981, as estimated from the NMFS Marine Recreational Fishery Statistics Survey, are given in Table 11. Total recreational mackerel landings have varied from 284 mt in 1992 to 4,223.4 mt in 1986. In recent years, recreational mackerel landings have varied from roughly 1740 mt in 1997 to 690 mt in 1998. However, recreational mackerel landings have exceeded 1,200 mt in most years since 1994. Annual recreational mackerel landings by state (Table 11) indicate that, in most years, the majority of recreational mackerel landings occur from Virginia to Maine, with highest catches occurring from New Jersey to Massachusetts. Most Atlantic mackerel are taken from boats (Table 12).

6.6.1.5 Description of areas fished

Atlantic mackerel landings in 2003 by NMFS three digit statistical area (Figure 1) are given in Table 13. Statistical areas 616, 612, 615, and 613 accounted for the majority of the commercial Atlantic mackerel landings in 2003.

6.6.1.6 Current Market Overview for Mackerel

The Management Plan for Atlantic Mackerel, Squid, and Butterfish Fisheries requires that specific evaluations be made in the quota setting process before harvest rights are granted to foreign interests in the form of TALFF or joint venture allocations. The Council has concluded in recent years that conditions in the world market for mackerel have changed only slightly from year to year.

6.6.1.6.1 Recent World Production and Prices

According to the FAO, world landings of Atlantic mackerel were on an increasing trend in the early 1990s. In 1993, Atlantic mackerel world landings were estimated to be 840,833 mt. This represented a 7% increase from the 1992 landings (FAO 2000). Total world landings of Atlantic mackerel peaked in 1994 at 842,920 mt. World landings of Atlantic mackerel decreased steadily to about 560,000mt by 1997 and then increased slightly to 657,278 mt in 1998 (FAO 2000). World landings of Atlantic mackerel decreased to 617,784 mt in 1999 and then increased slightly to about 690,000 mt in 2000. In 2001 (the most recent year for which published FAO statistics are available), mackerel production increased slightly to 710,411 mt.

6.6.1.6.2 Future Supplies of Mackerel

The potential for future mackerel production depends largely on the future production of the European mackerel stock. European mackerel stock production appears to have stabilized at levels of about 600,000 mt. These levels are approximately 150,000-200,000 mt lower than those observed in mid-1990s. This reduction in European mackerel production is also about equal to the long term sustainable yield of the Northwest Atlantic mackerel stock. Thus, it appears that the recent increase in world demand for US mackerel will likely continue to remain high even if US production begins to increase to levels approaching MSY since US production appears to be supplanting European production in the world marketplace.

6.6.1.6.3 US Production and Exports of Mackerel

NMFS weighout data showed that in 1995, Atlantic mackerel landings increased by 81% from the 1993 level. The average value of mackerel increased over 14% for the same period. In 1991, landings peaked due to a relatively successful IWP venture between Russia and the state of New Jersey, and the one-year open door into the Japanese market. That year US producers were able to ship over more than 2,800 mt of frozen mackerel to Japan at an average value of $882/mt. The following year shipments fell to only 63 mt.

Overall, US exports of fresh/chilled and frozen mackerel in 1995 were estimated at 3,296 mt, this represented a 12% increase from 1994, and a 51% increase from 1993 (Ross 1996). In 1995, US producers were able to export 2,303 mt of frozen Atlantic mackerel valued at $1.7 million ($747/mt), and 992 mt of fresh/chilled mackerel valued at $1.5 million ($1,207/mt). US exports of Atlantic mackerel continued to increase in 1996 to 6,137 mt valued at $5.3 million. US exports of all mackerel species were 17,367 mt valued at $14.2 million in 1998. US exports of all mackerel species declined to 11,747 mt in 1998.

The lack of mackerel in the North Sea area and the potential for future mackerel TAC reductions are providing opportunities for US producers to place additional exports of mackerel in the international market. Mackerel prices in the international market have increased in recent years which should help the US Atlantic mackerel industry in their attempt to sell large volumes of this product (Ross 1996). In 1995, the US exported small quantities of Atlantic mackerel to non-traditional markets such as South Korea, Mexico, and Brazil. In 1996, US exporters placed Atlantic mackerel in Latvia, the Philippines, and South Africa.

By 2003, US exports of all mackerel products totaled 25,332 mt valued at $18.3 million. The leading markets for US exports of mackerel in 2003 were Nigeria (9,023 mt), Bulgaria (3,519 mt), Romania (3,482 mt) and Canada (2,405 mt).

6.6.2 *Loligo pealei*

6.6.2.1 Status of the stock

Amendment 8 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management (FMP) was developed to bring the FMP into compliance with the Sustainable Fisheries Act (SFA). The SFA, which reauthorized and amended the Magnuson-Stevens Act, made a number of changes to the existing National Standards, as well as to definitions and other provisions in the Magnuson-Stevens Act, that caused the Guidelines to be significantly revised. The most significant changes were made to National Standard 1, which imposed new requirements concerning definitions of overfishing in fishery management plans. The overfishing definition for Loligo was revised in Amendment 8 to comply with the SFA as follows: overfishing for *Loligo* will be defined to occur when the catch associated with a threshold fishing mortality rate of F_{max} is exceeded (F_{max} is a proxy for F_{msy}). When an estimate of F_{msy} becomes available, it will replace the current overfishing proxy of F_{max}. Annual quotas will be specified which correspond to a target fishing mortality rate. Target F is defined as 75% of the F_{msy} when biomass is greater than B_{msy}, and decreases linearly to zero at 50% of B_{MSY}. Maximum OY is specified as the catch associated with a fishing mortality rate of F_{max}. In addition, the biomass target is specified to equal B_{MSY}.

Recent survey data for *Loligo* squid indicate that abundance of this species has increased significantly since analyses presented in SAW-29. Estimates of biomass based on NEFSC fall 1999 and spring 2000 survey indices for *Loligo* indicate that the stock has been at or near B_{msy} since 1998 In fact, the 1999 fall survey index was the sixth highest value observed in the time series since 1967 and the second highest since 1987. The 2000 spring survey index for *Loligo* was the tenth highest in the time series since 1968 and the fifth highest since 1987 (Lai, pers. comm.). The fall survey index for *Loligo* increased to 17.8 kg/tow in 2000, declined to 10.8 kg/tow in 2001, increased to 18.8 kg/tow in 2002 and declined again to 7.9 kg/tow in 2003 (Figure 1). The stock appears to be fluctuating around the long term average stock size in recent years.

The *Loligo* stock was most recently assessed by the 34th Northeast Regional Stock Assessment Committee (SARC 34). New analyses of survey data indicated that Loligo stock biomass since 1967 has fluctuated without trend and has supported annual catches around 20,000 mt. A new surplus production model suggests that biomass has fluctuated between 14,000 and 27,000 mt since 1987. During this period quarterly F fluctuated between 0.06 and 0.6 about a mean of 0.24. While estimates of biomass have increased in recent years based on survey data, biomass in the longer has fluctuated without trend (Figure 1).

SARC 34 concluded that it is unlikely that overfishing is occurring. The largest feasible scaled catch-survey estimates of fishing mortality for 2000-2001 ranged from 0.11-0.17 per quarter. Estimates of fishing mortality from a surplus production model ranged from 0.12-0.31 per quarter. Thus all recent estimates of fishing mortality are well below the biomass weighted estimates of F_{max} for *Loligo*. Results from length based virtual population analyses (LVPA) and catch survey biomass estimates for winter and spring surveys generally indicated that fishing mortality rates for *Loligo* declined to relatively low levels during 2000 and 2001.

SARC 34 also concluded that it is unlikely that the Loligo stock is overfished. Survey data (with the exception of the Massachusetts inshore spring survey), LVPA results, scaled survey biomass estimates, and production modeling estimates all indicate that *Loligo* biomass was high in 2000 and 2001. The smallest feasible catch-survey biomass estimate for 2001 was 34,000 mt, which is smaller than the best available estimate of $B_{msy}/2$ (40,000 mt). However, the probability that the *Loligo* biomass is less than or equal to the lowest feasible biomass is small. SARC 34 recommended that the Council maintain the current catch of about 20,000 mt (to include both landings and discards).

6.6.2.2 Historical Commercial Fishery

United States fishermen have been landing squid along the Northeastern coast of the US since the 1880's (Kolator and Long 1978). The early domestic fishery utilized fish traps and otter trawls but was of relatively minor importance to the US fishery due to low market demand. The squid taken were used primarily for bait (Lux et al. 1974). However, squid have long been a popular foodfish in various foreign markets and therefore a target of the foreign fishing fleets throughout the world, including both coasts of North America (Okutani 1977). USSR vessels first reported incidental catches of squid off the Northeastern coast of the United States in 1964. Fishing effort directed at the squids began in 1968 by USSR and Japanese vessels. By 1972, Spain, Portugal and Poland had also entered the fishery. Reported foreign landings of *Loligo* increased from 2000 mt in 1964 to a peak of 36,500 mt in 1973. Foreign *Loligo* landings averaged 29,000 mt for the period 1972-1975.

Foreign fishing for *Loligo* began to be regulated with the advent of extended fishery jurisdiction in the US in 1977. Initially, US regulations restricted foreign vessels fishing for squid (and other species) to certain areas and times (the so-called foreign fishing "windows"), primarily to reduce spatial conflicts with domestic fixed gear fishermen and minimize bycatch of non-target species. The result of these restrictions was an immediate reduction in the foreign catch of *Loligo* from 21,000 mt in 1976 to 9,355 mt in 1978.

By 1982, foreign *Loligo* catches had again risen above 20,000 mt. At this time, US management of the squid resources focused on the Americanization of these fisheries. This process began with the development of joint ventures between US fishermen and foreign concerns. Domestic annual harvest (DAH) was increased from 7,000 mt in the 1982-83 fishing year to 22,000 mt for 1983-84. Foreign allocations were reduced from 20,350 mt during 1982-83 to 5,550 mt during 1983-84 (Lange 1985). The foreign catch of *Loligo* fell below 5,000 mt by 1986, to 2 mt in 1987 and finally to zero in 1990.

The development and expansion of the US squid fishery was slow to occur for several reasons. First, the domestic market demand for squid in the US had traditionally been limited to the bait market. Secondly, the US fishing industry lacked both the catching and processing technology necessary to exploit squid in offshore waters. In the late 19th and early 20th century, squid were taken primarily by pound nets. Even though bottom otter trawls eventually replaced pound nets as the primary gear used to capture squid during this century, the US industry did not develop the appropriate technology to catch and process squid in deep water until the 1980's.

The annual US domestic squid landings (including *Illex* landings) from Maine to North Carolina averaged roughly 2,000 mt from 1928-1967 (NMFS 1994a). During the period 1965-1980, US *Loligo* landings ranged from roughly 1,000 mt in 1968 to 4,000 mt in 1980. The US *Loligo* fishery began to increase dramatically beginning in 1983 when reported landings exceeded 15,000 mt. With the cessation of directed foreign fishing in 1987, the US domestic harvest of *Loligo* averaged 17,800 mt during 1987-1992. The ex-vessel value of US caught *Loligo* increased from 7.8 million dollars in 1983 to 23.3 million by 1992.

US *Loligo* landings were about 22,500 mt in 1993 and 1994 (valued at $29.1 and $31.9 million, respectively). *Loligo* landings declined to 17,928 mt in 1995 (value declined to $23.0 million) and then increased slightly to 18,008 mt in 1995 (dockside value remained stable at $23.1 million). *Loligo* landings declined to 12,459 mt in 1996 (valued at $18.6 million) and then increased to 16,203 mt in 1997 (valued at $26.5 million). *Loligo* landings were about 18,500 mt in 1998 and 1999 and then declined to 16,561 mt in 2000. Based on NMFS dealer reports, a total 14,091 mt (31.1 million pounds) of *Loligo* (valued at $20.5 million) was landed in 2001. Based on NMFS dealer reports, a total 16,672 mt of *Loligo* (valued at $23.5 million) was landed in 2002.

6.6.2.4 2003 Commercial Fishery

Based on NMFS dealer reports, a total 11,623 mt of *Loligo* (valued at $19.3 million) was landed in 2003. The 2003 landings of *Loligo* by state are given in Table 14. Four states, Rhode Island, New York, New Jersey and Massachusetts accounted for the majority (96%) of *Loligo* landings in 2003. Rhode Island accounted for over half of the 2003 *Loligo* landings. The 2003 landings of *Loligo* by month are given in Table 15. The majority of *Loligo* landings occurred in the fall through winter months. Most (97%) were taken by otter trawls (Table 16).

The landings of *Loligo* by port in 2003 are given in Table 17. Point Judith, RI accounted for over one-third of the *Loligo* landings in 2003. Other important ports in terms of *Loligo* landings included Hampton Bay, NY (6.8%), Montauk, NY (10.1%) Cape May, NJ (6.7%), Newport, RI (6.5%) and North Kingstown, RI (15.4%). There were 11 ports that were dependent on *Loligo* for more than 10% of the value of total fishery landings in those ports in 2003 (Table 18).

6.6.2.5 Analysis of Human Environment/Permit Data

According to unpublished NMFS permit file data, there were 378 vessels with *Loligo*/butterfish moratorium permits in 2003. These are limited access permits and are available only to vessels which meet the qualifications specified in Amendment 5 to the FMP in 1997. The distribution of vessels which possessed Loligo/butterfish moratorium permits in 2002 by home port state is given in Table 19. Most of these vessels were from the states of Massachusetts (28.8%), New York (18.3%), Rhode Island (17.5%), New Jersey (18.0%), North Carolina (6.9%), Virginia (3.2%), and Connecticut (2.1%). In addition, there were 359 dealers which possessed Atlantic mackerel, squid and butterfish dealer permits in 2003. The distribution of these dealers is given by state in Table 8. Of the 359 dealers which possessed a Atlantic mackerel, squid and butterfish dealer permit in 2003, there were 117 dealers that reported buying Loligo in 2003 (Table 20).

Based on NMFS dealer reports, a total of 402 vessels landed 11,623 mt (25.6 million pounds) of *Loligo* valued at $19.3 million in 2003 (Table 1). Most of *Loligo* landed in 2003 was taken by *Loligo*/butterfish moratorium permit holders (Table 10). About 70% of the vessels which possessed *Loligo*/butterfish moratorium permits in 2003 actually landed *Loligo.* There were 165 vessels which landed 2,154 mt of *Loligo* in 2003 which possessed incidental catch permits (Table 10).

6.6.2.6 Description of areas fished

The 2003 landings of *Loligo* by NMFS statistical area (three digit) are given in Table 21. There were four statistical areas which, individually, accounted for greater than 10% of the *Loligo* landings in 2003: 525, 616, 537, and 622. Collectively, these four areas accounted for about two thirds of the 2003 *Loligo* landings. The top seven statistical areas accounted for greater than 75% of the 2003 *Loligo* landings.

6.6.3 *Illex illecebrosus*

6.6.3.1 Status of the Stock

The most recent stock assessment occurred in 2003 at SAW 37. At that time, it was not possible to evaluate current stock status because there were no reliable estimates of absolute stock biomass or fishing mortality to compare with existing reference points. However, based on a number of qualitative analyses, overfishing was not likely to have occurred during 1999-2002. Relative exploitation indices for the domestic U.S. fishery have declined since reaching a peak in 1999 and were below the 1982-2002 mean during 2000-2002. Squid body weights and indices from U.S. and Canadian surveys have been low for an extended period of time and suggest that the fraction of the stock available on the U.S. shelf is currently in a low productivity regime. Current absolute stock size is unknown and no stock projections were done in SAW 29 or 37.

6.6.3.2 Historical Commercial Fishery

As in the case of *Loligo*, *Illex* have been exploited by US fishermen since at least late 1800's, being used primarily as bait. From 1928 to 1967, reported annual US squid landings from Maine to North Carolina (including *Loligo pealei*) ranged from 500-2,000 mt (Lange and Sissenwine 1980). However, foreign fishing fleets became interested in exploitation of the neritic squid stocks of the Northwest Atlantic Ocean when the USSR first reported squid bycatches in the mid-1960's. By 1972, foreign fishing fleets reported landing 17,200 thousand mt of *Illex* from Cape Hatteras to the Gulf of Maine. During the period 1973-1982, foreign landings of *Illex* in US waters averaged about 18,000 mt, while US fisherman averaged only slightly more than 1,100 mt per year. Foreign landings from 1983-1986 were part of the US joint venture fishery which ended in 1987 (NMFS 1994a). The domestic fishery for *Illex* increased steadily during the 1980's as foreign fishing was eliminated in the US EEZ. US landings first exceeded 10,000 mt in 1987 and ranged roughly from 11,000 mt in 1990 to 17,800 mt in 1992.

Because their geographical range extends well beyond the US EEZ, *Illex* are subject to heavy exploitation in waters outside of US jurisdiction. During the mid-1970's, a large directed fishery for *Illex* developed in NAFO subareas 2-4. Reported landings of *Illex* increased dramatically from 17,700 mt in 1975 to 162,000 mt in 1979. *Illex* landings in NAFO subareas 2-4 subsequently plummeted to slightly less than 13,000 mt by 1982. Hence, within the total stock of *Illex* (NAFO Subareas 2-6) landings peaked in 1979 at 180,000 mt but have since declined sharply, ranging from 2,800 to 22,200 mt during the period 1983-1991 (NMFS 1994a).

In 1992, US *Illex* landings were a then record high 17,827 mt with an ex-vessel value of $9,700,000 (average price=$0.54 per kg/$0.25 per lb). Statistical area 622 accounted for 63% of the total harvest, while three areas (SA 622,626, and 632) accounted for 96% of the total in 1992. Temporally, 94% of the 1992 *Illex* landings were taken during June through October. Otter trawl gear accounted for virtually all (99.9%) of the 1992 landings.

Illex landings reached 18,012 mt in 1993 and then rose slightly to a then record high 18,344 mt in 1994. In 1993, prices fell to $473/mt but rose sharply in 1994 to $569/mt. NMFS weighout data indicate that *Illex* landings declined to 14,049 mt in 1995 (dockside value declined to $8.0 million). In 1996, US *Illex* landings increased to 16,969 mt (valued at $9.7 million) and then declined to 13,632 mt (valued at $6.1 million) in 1997. *Illex* landings were 22,705 mt in 1998 valued at $9.2 million. *Illex* landings averaged 17,142 mt for the period 1994-1998. Unpublished NMFS weighout data indicate that 7,361 mt of *Illex* valued at $3.9 million was landed in 1999and that 9,041 mt of *Illex* valued at $3.7 million was landed in 2000. Unpublished NMFS weighout data indicate that 3,939 mt of *Illex* valued at $1.8 million was landed in 2001. Unpublished NMFS weighout data indicate that 2,723 mt of *Illex* valued at $1.4 million was landed in 2002.

6.6.3.4 2003 Commercial Fishery

Unpublished NMFS weighout data indicate that 6,389 mt of *Illex* valued at $4.0 million was landed in 2003. The 2003 landings of *Illex* by state are given in Table 22. Two states, Rhode Island and New Jersey accounted for the majority (>95%) of *Illex* landings in 2003. Rhode Island accounted for more than 72% of the 2003 *Illex* landings. The 2003 landings of *Illex* by month are given in Table 23. The majority of Illex landings occurred during June through October. Virtually all (99.4%) were taken by bottom otter trawls (Table 24).

The landings of *Illex* by port in 2003 are given in Table 25. North Kingstown, RI accounted for greater than 62 % of the *Illex* landings in 2003. Other important ports in terms of *Illex* landings included Cape May, NJ (23.5%), and Newport, RI (9.2%). No ports were dependent on *Illex* for more than 10% of the value of total fishery landings in 2003 (Table 26).

6.6.3.5 Analysis of Human Environment/Permit Data

Based on NMFS dealer reports, a total of 28 vessels landed 6,389 mt of *Illex* valued at $3.9 million in 2003 (Table 1). Virtually all of the *Illex* landed in 2003 was taken by *Illex* moratorium permit holders (Table 10). However, only 25% of the vessels which possessed *Illex* moratorium permits in 2003 actually landed *Illex*. Thus, the majority of the *Illex* fleet was inactive in the 2003 *Illex* fishery. Most of the vessels which landed *Illex* during 2003 also possessed *Loligo*/butterfish moratorium and Atlantic mackerel permits (Table 10). There were 9 vessels which landed 1.0 mt of *Illex* which possessed incidental catch permits.

According to unpublished NMFS permit file data, there were 72 vessels with *Illex* moratorium permits in 2003. These are limited access permits and are available only to vessels which meet the qualifications specified in Amendment 5 to the FMP. The distribution of vessels which possessed *Illex* moratorium permits in 2003 by home port state is given in Table 27. Most of these vessels were from the states of New Jersey (33.3%) Massachusetts (13.9%), Rhode Island (15.3%) New York (9.7%), and North Carolina (9.7%). In addition, there were 359 dealers which possessed Atlantic mackerel, squid and butterfish dealer permits in 2003. The distribution of these dealers is given by state in Table 8. Of the 359 dealers which possessed an Atlantic mackerel, squid and butterfish dealer permit in 2003, there were 16 dealers that reported buying *Illex* in 2003 (Table 28).

6.6.3.6 Description of the areas fished

The 2003 landings of *Illex* by statistical area (Figure 1) are given in Table 29 (includes only the three digit statistical areas that individually accounted for greater than 1% of the *Illex* landings in 2003). Three statistical areas (632,626 and 622) accounted for the vast majority (91%) of *Illex* landings in 2003. Statistical area 632 accounted for greater than half of the total *Illex* landings in 2003.

6.6.4 Atlantic butterfish

6.6.4.1 Status of the stock

The Atlantic butterfish stock was recently assessed at SARC 38 (NMFS 2004). Atlantic butterfish were previously assessed in August 1993 (SAW 17). The current assessment (SARC 38) relies on NMFS survey biomass indices (kg/tow) [from NEFSC Winter, Spring, and Autumn research vessel surveys], USA landings from the NMFS dealer database, USA discard estimates from the NMFS observer program, and foreign catch (Murawski and Waring 1979). The abundance and catch data provide a very noisy signal, due to the variable availability of butterfish to the survey and because 2/3rd of the catch is from imprecisely estimated discards. A delay-difference model was developed as a basis for stock assessment.

Fishing mortality estimates averaged about 0.5 during 1967-1977 and then declined to an average of about 0.3 thereafter (NMFS 2004). Fishing mortality increased to 0.58 in 1996 and then declined to 0.12 in 2000. The average F during 2000-2002 was 0.39 and the F in 2002 was 0.34. There is an 80% probability that F in 2002 was between 0.25-1.02 (NMFS 2004). Recruitment biomass (Age 0) has been highly variable over a range of spawning biomass between 10,000 mt - 50,000 mt. Average recruitment biomass during 1968-2002 was 23,200 mt. Recruitment for this stock averaged 26,600 mt during 1968-1994 and more recently has declined to 5,000 mt and 3,000 mt in 2001 and 2002, respectively (NMFS 2004). Butterfish spawning stock biomass (Age 0) has been variable during 1968-2002 , fluctuating between 7,800-62,900 mt and averaging 23,200 mt. Spawning stock biomass in 2002 was estimated to be 8,700 mt, one of the lowest in the time series. Average biomass fluctuated between 7,800 -77,200 mt during 1969-2002, averaged 34,000 mt, and declined to 7,800 mt in 2002. There is an 80% probability that average biomass in 2002 was between 2,600-10,900 mt (NMFS 2004).

Based on the current overfishing definition, overfishing is not occurring (NMFS 2004). New biological reference points estimated for butterfish in SARC 38 are F_{msy}=0.38 and B_{msy}=22,798 mt. According to these estimates, fishing mortality in 2002 was near F_{msy} and stock biomass was 8,700 or less than half of B_{msy}. However, the estimates of fishing mortality and biomass are highly uncertain. Recruitment has declined since 1995 and was poor in 2001 and 2002. The last two NEFSC fall survey indices for butterfish were among the lowest of the time series dating back to 1967. Discards are a significant source of mortality for this stock: discards are estimated to be twice landings. SARC 38 noted that conservation and management measures should be implemented to reduce discards.

6.6.4.2 Historical Commercial Fishery

Atlantic butterfish were landed exclusively by US fishermen from the late 1800's (when formal record keeping began) until 1962 (Murawski and Waring 1979). Reported landings averaged about 3,000 mt from 1920-1962 (Waring 1975). Beginning in 1963, vessels from Japan, Poland and the USSR began to exploit butterfish along the edge of the continental shelf during the late-autumn through early spring. Reported foreign catches of butterfish increased from 750 mt in 1965 to 15,000 mt in 1969, and then to about 18,000 mt in 1973. With the advent of extended jurisdiction in US waters, reported foreign landings declined sharply from 10,353 mt in 1976 to 1,326 mt in 1978. Foreign landings were slowly phased out by 1987. Since 1988, foreign butterfish landings have averaged about 1 mt.

During the period 1965-1976, US Atlantic butterfish landings averaged 2,051 mt. From 1977-1987, average US landings doubled to 5,252 mt, a historical peak of slightly less than 12,000 mt landed in 1984. Since then US landings have declined sharply to an average of 2,500 mt since 1988. Recent reductions in Japanese demand for butterfish has probably had a negative effect on butterfish landings.

Butterfish landings totaled 2,700 mt in 1992. Almost half (45%) of the 1992 total came from southern New England waters (Statistical area 53). Two statistical areas, 53 and 61, accounted for over 75% of the 1992 total. About half of the landings occurred during January and February, the remainder being distributed throughout the rest of the year. Butterfish landings were 3,631 mt and 2,013 mt in 1994 and 1995 , respectively. NMFS weighout data indicate that US butterfish landings increased to 3,489 mt in 1996 (valued at $5.1 million) and then decreased to 2,797 mt (valued at $4.7 million) in 1997. NMFS weighout data indicate that butterfish landings were 1,964 mt in 1998 (valued at $2.5 million) and that butterfish landings increased to 2,116 mt in 1999 (valued at $2.7 million). Butterfish landings decreased to 1,432 mt in 2000 (valued at $1.5 million). Unpublished NMFS weighout data indicate that 4,373 mt of butterfish valued at $3.2 million was landed in 2001. Unpublished NMFS weighout data indicate that 872 mt of butterfish valued at $0.9 million was landed in 2002.

6.6.4.3 2003 Commercial Fishery

Unpublished NMFS weighout data indicate that 473 mt of butterfish valued at $0.6 million was landed in 2003. The 2003 landings of butterfish by state are given in Table 30 Two states, Rhode Island and New York accounted for the majority (>75%) of butterfish landings in 2003. Rhode Island accounted for 49.3% of the 2003 butterfish landings. The 2003 landings of butterfish by month are given in Table 31. Most (88%) were taken with bottom otter trawls (Table 32).

The landings of butterfish by port in 2003 are given in Table 33. Three ports, North Kingston, RI Cape May NJ, and Newport, RI accounted for more than 95% of the butterfish landings in 2003. There were no ports that were dependent on butterfish for more than 10% of the value of total fishery landings in 2003 (Table 34).

6.6.4.4 Analysis of Human Environment/Permit Data

According to unpublished NMFS permit file data, there were 381 vessels with *Loligo*/butterfish moratorium permits in 2003. These are limited access permits and are available only to vessels which meet the qualifications specified in Amendment 5 to the FMP in 1997. The distribution of vessels which possessed Loligo/butterfish moratorium permits in 2002 by home port state is given in Table 19. Most of these vessels were from the states of Massachusetts (28.8%), New York (18.3%), Rhode Island (17.5%), New Jersey (18.0%), North Carolina (6.9%), Virginia

(3.2%), and Connecticut (2.1%). In addition, there were 359 dealers which possessed Atlantic mackerel, squid and butterfish dealer permits in 2003. The distribution of these dealers is given by state in Table 8. Of the 359 dealers which possessed a Atlantic mackerel, squid and butterfish dealer permit in 2003, there were 104 dealers that reported buying butterfish in 2003 (Table 35).

Based on NMFS dealer reports, a total of 383 vessels landed 473 mt of butterfish valued at $0.6 million in 2003 (Table 1). Most of the butterfish landed in 2003 was taken by *Loligo/*butterfish moratorium permit holders (Table 10). There were 164 vessels which landed 143 mt of butterfish which possessed incidental catch permits

6.6.4.5 Description of the areas fished

The 2003 landings of butterfish by NMFS three-digit statistical area (Figure 1) are given in Table 37. Statistical area 537 was the most important area, accounting for 27.8% of total butterfish landings in 2003. Other important statistical areas for butterfish included areas 525, 526, 613, 616, and 539.

7.0 ENVIRONMENTAL CONSEQUENCES – ANALYSIS OF (DIRECT AND INDIRECT) IMPACTS

7.1 Impacts of Alternatives for Atlantic mackerel

7.1.1 Biological Impacts

The four alternatives considered for Atlantic mackerel specifications for 2005 are fully described in section 5.1. The specifications under alternative 1 would be ABC = 347,000 mt, IOY=170,000 mt, DAH=170,000 mt, DAP=150,000 mt and JVP=5,000 and TALFF=0 mt. The specifications under alternative 2 (Council-preferred alternative) would be ABC = 335,000 mt, IOY=165,000 mt, DAH=165,000 mt, DAP=150,000 mt and JVP=0 and TALFF=0 mt. The specifications under alternative 3 would be ABC = 347,000 mt, IOY=165,000 mt, DAH=165,000 mt, DAP=150,000 mt and JVP=0 and TALFF=0 mt. The specifications under alternative 4 would be ABC = 335,000 mt, IOY=115,000 mt, DAH=115,000 mt, DAP=100,000 mt and JVP=0 and TALFF=0 mt. The specification of IOY under the four alternatives ranged from 115,000 mt to 175,000 mt. These levels of exploitation are not expected to have a negative biological effect on the Atlantic mackerel stock. The overfishing definition adopted for Atlantic mackerel in Amendment 8 is designed to protect the stock from overfishing and was developed to comply with the Sustainable Fisheries Act. Based on the current condition of the stock, an IOY specification of 175,000 mt (the highest value considered) is considerably less than the yield associated with either the target or threshold fishing mortality rate specified for this stock based on the Amendment 8 overfishing definition. The most recent estimate of Atlantic mackerel stock biomass was estimated to be 2.1 million mt, well above the target biomass of 890,000 mt. Therefore, the yield associated with the target fishing mortality rate of F=0.25 adopted in Amendment 8 is 369,000 mt, which is the appropriate basis for ABC.

Therefore, the ABC specifications under alternatives 2 and 4 (the Council- and the NMFS-preferred alternative) is consistent with the overfishing control rule adopted in Amendment 8 (F=0.25 yield estimate of 369,000 mt - the estimated Canadian catch of 34,000 mt). Population modeling of the Atlantic mackerel stock dynamics indicate that the acceptable safe level of harvest from the current mackerel stock size is considerably higher than the level proposed under any of the three alternatives considered. As a result, the level of exploitation associated with an IOY in the range of 115,000 to 175,000 mt is not expected to have any significant biological effects on the Atlantic mackerel stock. This conclusion, however, is based on the assumption that the current stock size is very large. The Monitoring Committee noted in their deliberations that the recommended ABC is based on a dated stock size estimate that is highly uncertain. In addition, the Monitoring Committee noted that the recommended ABC specification is a short term yield only and is not sustainable.

An IOY specification of 175,000 mt or less is not expected to significantly impact non-target species that prey on Atlantic mackerel since assumptions about natural mortality are made implicitly in the calculation of MSY. That is, the allowable fishery yields at the biological reference points defined in the FMP are *in addition to* assumed mortality due to natural causes, including mortality due to predation.

The list of species taken incidentally and discarded in the directed Atlantic mackerel fishery are listed in Table 38. The species listed included those with discards that comprised more than 2% of the total catch by weight on trips which landed 5,000 pounds of more of Atlantic mackerel based on the unpublished NMFS sea sampling data for the 1989-2003. The species of importance based on this criteria included Atlantic herring, spiny dogfish, scup, red hake, blueback herring and butterfish. All of these species will be impacted to some degree by the prosecution of the Atlantic mackerel fishery. However, an IOY specification of 175,000 mt or less is not expected to significantly increase or re-distribute fishing effort by gear type in 2005. Therefore, none of the proposed measures are expected to significantly impact the non-target fish species listed in Table 38 compared to the status quo.

7.1.2 Habitat Impacts

As noted in Table 3, Atlantic mackerel are taken primarily with mid-water otter trawls. This gear is not expected to adversely impact essential fish habitat since it is not in contact with the seabed. Since all of the alternatives considered represent the status quos or a reduction in IOY in 2005, no increases in fishing effort are expected as result of the three alternatives considered. As a result, none of the alternatives considered for Atlantic mackerel are expected to negatively impact essential fish habitat. In fact, IOY under the NMFS-preferred alternative represents a 55,000 mt reduction compared to the 2004 status quo specification. Therefore, it should not result in an increase in fishing effort or redistribute effort by gear type.

7.1.3 Impacts on Endangered and Other Protected Species

ESA-listed cetaceans and others protected under the MMPA (described in section 6.5) may occur in areas where the Atlantic mackerel fishery operates. The U.S. commercial Atlantic mackerel fishery takes place over the mid-Atlantic shelf region from Cape Hatteras to southern New England primarily during December through May as the species migrate. Smaller coastal fisheries work the stocks within the Gulf of Maine from May-December. Mid-water trawl gear is the primary gear type for the Atlantic mackerel fishery. ESA-listed cetaceans may be present in mid-Atlantic and New England waters year round but most animals move in the late fall to more southern locations for mating and/or calving or disperse farther offshore. Mid-Atlantic waters are used as a migratory pathway in the spring as right whales and humpback whales return from their wintering calving areas in the south. Most species of ESA-listed cetaceans, including right, humpback, fin and sperm whales are observed in southern New England waters by March-April. Right, humpback, and fin whales are also observed in Gulf of Maine waters throughout the summer. Of these species, humpback and fin whales are most likely to be affected by the Atlantic mackerel fishery since both species are known to prey on Atlantic mackerel. The most recent Northwest Atlantic mackerel stock assessment was at SAW-30 (NMFS 2000). The assessment concluded that the Atlantic mackerel stock is currently at a high level of abundance and is under-exploited. The stock is capable of sustaining any likely increase in fishing effort from this action. Furthermore, the action will not deplete the food source to such an extent that any whales who compete for the food resource will be adversely affected. In addition, these whales may be attracted to domestic vessels as they transfer their catch to a JVP, as has been seen in other fisheries. However, records suggest that mid-water trawl gear does not pose a significant entanglement risk to these ESA-listed cetaceans, and there is no information on ESA-listed cetaceans interacting with this fishery as mackerel is being transferred from a domestic vessel to a JVP. Observation records for the time period (1994 to 2001) show there were no known interactions between the Atlantic mackerel fishery and ESA-listed cetacean species.

Sea turtle distribution also overlaps with the operation of the Atlantic mackerel fishery. Sea turtles typically occur in southern waters or at the southern limit of mid-Atlantic waters throughout the winter, and migrate up the coast to southern New England waters in the spring as water temperatures increase. However, most of these species, including green, Kemp's ridley and loggerhead sea turtles, stay close to the coast feeding on bottom dwelling species (i.e., crabs) or vegetation where the mackerel fishery is less likely to occur. Leatherbacks do not prey on mackerel and are unlikely to be attracted to operations of this fishery. While, loggerheads do not typically prey on fish species, and are unlikely to catch or target fast moving fish such as mackerel. Thus, the chance of interactions between sea turtles and the inshore Atlantic mackerel fishery is not anticipated. While in waters farther offshore where the predominant sea turtle species are leatherbacks and larger loggerheads the interaction possibilities may be greater. Observation data from 1994 to 2001 show no interactions have occurred between the mackerel sink gillnet and otter trawl fishery and endangered cetaceans or sea turtles.

Based on the analysis of observed mortalities given in Waring *et al.* (2003), the two cetacean species of primary concern in the prosecution of the Atlantic mackerel fishery include common dolphins and pilot whales. As noted above, all of the alternatives considered represent the status quos or a reduction IOY in 2005, so no increases in fishing effort are expected as result of the three alternatives considered. As a result, none of the alternatives considered for Atlantic mackerel are expected to increase fishing effort or redistribute effort by gear type. Therefore, the implementation of any of the three alternatives is not expected to impact protected species described in section 6.5 relative to 2004 specifications for Atlantic mackerel.

7.1.4 Socioeconomic Impacts

7.1.4.1 Council-Preferred Alternative

The Council-preferred alternative selected an IOY that the Council argues is consistent with the recent increases in processing capacity and domestic landings of mackerel. As noted above, there has been a steady increase in domestic harvest of Atlantic mackerel in recent years. The Council argues that the IOY it proposes for 2005 will provide the greatest overall benefit to the nation because it responds to the investments made in the last several years in the domestic mackerel fishery, particularly in the processing sector. Also, setting an IOY at a level that the domestic fishery can harvest and process precludes any TALFF or JVP that could threaten the strides the domestic mackerel fishery is making towards harvesting the allowable biological catch. Foreign caught mackerel as the result of any TALFF could compete for the markets currently buying domestic processed mackerel. The specification of IOY at the Council-preferred level should allow the US mackerel industry to take advantage of improved world market conditions for Atlantic mackerel, which will directly benefit the ports and communities which are dependent upon Atlantic mackerel. In recent years the production of Atlantic mackerel in Europe has declined relative to the production of Atlantic mackerel in the early 1990's. This relative decline in European production has resulted in an increase in world demand for US mackerel. While development of the domestic mackerel fishery has been slowed by such factors as transportation costs to foreign markets, significant strides are being made towards realizing the goal of the MSFCMA to fully utilize the mackerel fishery by the US industry. The recent increase in US processing capacity in conjunction with high world demand has created conditions which are favorable for continued growth of US mackerel fishery.

The Council concluded that due to recent increases in processing capacity and domestic landings, the US has the capacity to land and process 165,000 mt of mackerel, which is the Council-preferred level of IOY in 2005. As a result, the Council concluded that IOY=DAH and therefore TALFF=0. The Council reached this conclusion based on the fact that there has been a steady increase in domestic harvest of Atlantic mackerel in recent years, with the landings increasing dramatically in recent years. For example, mackerel landings roughly doubled annually from 5,645 mt in 2000 to 26,192 mt in 2002. Since then, mackerel landings increased nearly three-fold from 2001 to 2003 and four-fold from 2001 to 2004. Preliminary landings of Atlantic mackerel indicate that 53,352 mt of mackerel were landed as of October 31, 2004. Industry members testified that landings in 2004 could reach or exceed 60,000 mt by the end of the 2004 fishing year. Given this testimony and the observation that there is generally a lag in production relative to increases in harvest and processing capacity, the Council concluded that the US domestic fishery could potentially land all of the IOY in 2005.

The MSFMCA provides that the specification of TALFF, if any, shall be that portion of the optimum yield of a fishery which will not be harvested by vessels of the United States. While a nominal surplus exists between ABC and DAH, the Council is concerned that the current estimate of ABC for Atlantic mackerel may be overly optimistic. The current estimate of ABC is based upon a stock size estimate that over ten years old. Given the uncertainty in the extant estimates of mackerel stock size, the Council is concerned that the true stock size may be smaller and mackerel harvests should probably not exceed 150,000 - 200,000 mt. This concern is based on advice received in the past from the Northeast Fisheries Science Center in the face of uncertainty about the status of the Atlantic mackerel stock. In past years, the NEFSC issued a special advisory to the Council that mackerel harvests should probably not exceed 200,000 mt, since overfishing of this stock occurred in the 1970's when mackerel landings exceeded these levels. In light of that advice, the Council concluded that no surplus may exist between the true potential production level for mackerel and the Council-preferred alternative for IOY for 2005 and, therefore, that TALFF should be specified at zero. In addition, the term optimum yield under the Magnuson-Stevens Act means the amount of fish which will provide the provide the greatest overall benefit to the Nation with respect to food production and recreation, taking into account the protection of marine ecosystems. The Council believes that the Council-preferred level of IOY will provide the greatest overall benefit to the nation. Based on this analysis and a review of the state of the world mackerel market and possible increases in US production levels, the Council concluded that the specification of zero TALFF will yield positive social and economic benefits to the mackerel fishery and to the Nation.

Because the Council-preferred IOY that results in a zero TALFF specification in 2005, the economic benefit to the nation would be reduced relative to the 2001 TALFF specification (3,000 mt). Foreign vessels fishing in the US EEZ for Atlantic mackerel must pay fees based on the mt of mackerel harvested. For Atlantic mackerel, the poundage fee paid to the nation is $64.76 per mt. In 2001, TALFF was specified at 3000 mt. Assuming the entire TALFF allocation was harvested, almost $195,000 in fees would have been collected for the nation. In addition, TALFF operations are often brokered by a US representative. Although the amount of income gained by the US broker is unknown, this income will also be lost with the elimination of TALFF in the 2005 fishing year. However, this loss will be recouped easily through the specification of an IOY at a level that stimulates the growth of the domestic mackerel market with its concomitant benefits to the communities and service industries that will participate in this development.

The status quo specification of IOY for 2004 is 170,000 mt. This is 5,000 mt greater than the Council-preferred alternative adopted by the Council for 2005. The difference is due to a reduction in the JVP specification for the preferred alternative for 2005. In previous years, the Council specified JVP greater than zero because it believed US processors lacked the capability to process the total amount of mackerel that US harvesters could land (i.e., this was a limiting factor). The Council has been systematically reducing JVP because the Council concluded that the surplus between DAP and DAH has been declining as US shore side processing for mackerel has expanded over the last several years. The Council received testimony from processors and harvesters that the shore side processing sector of this industry has been under going significant expansion since 2002-2003. As a result of the continued expansion in shore side processing capacity, the Council concluded that shore side processing capacity was no longer a limiting factor relative to domestic production of Atlantic mackerel. As a result, the Council concluded that the US mackerel fishery has the potential to land and process the DAH (i.e., DAP=DAH), so JVP is specified at 0 in 2005 under the Council-preferred alternative. In addition to the recent increases in domestic processing capacity, the Council noted that there has been only minimal JVP activity over the past five years. For example, JVP landings of Atlantic mackerel were 0 in 2000, 46.7 mt in 2001, 1,740 mt in 2002 and then declined to 0 again in 2003 and 2004. Thus, the Council's conclusion that DAH=DAP in 2005 was based, in part, on the fact no JVP activity has occurred for Atlantic mackerel since 2002.

7.1.4.2 NMFS-Preferred Alternative

The Council proposed that the IOY and the DAH for the 2005 Atlantic mackerel fishery be set at 165,000 mt. The MSFCMA provides that the specification of TALFF, if any, shall be that portion of the optimum yield of a fishery that will not be harvested by vessels of the United States. As a result, the Council's proposal to set IOY equal to DAH necessarily results in a TALFF of zero. While NMFS agrees that there are legitimate and legally defensible reasons to set the IOY at a level that can be harvested by the domestic fleet and that would thereby preclude the specification of a TALFF, NMFS does not find that the Council's analysis justifies the levels of IOY and DAH that it recommends. The Council recommended an IOY of 165,000 mt, arguing that this level would provide the greatest overall benefit to the nation with respect to food production and recreational opportunities. This level of IOY was also adopted because the Council believes that it allows for a significant increase in domestic landings, which have increased considerably in the last several years due to major investments in the domestic mackerel processing sector. This level of IOY represents a modification of MSY based on economic and social factors (the mackerel regulations at §648.21 (b)(2)(ii) state that, "IOY is a modification of ABC, based on social and economic factors, and must be less than or equal to ABC"). The Council expressed its concern, supported by industry testimony, that an allocation of TALFF would threaten the expansion of the domestic industry. TALFF catches would allow foreign vessels to harvest U.S. fish and sell their product on the world market, in direct competition with the U.S. industry efforts to expand exports. The Council noted that this would prevent the U.S. industry from taking advantage of declines in the European production of Atlantic mackerel that have resulted in an increase in world demand for U.S. fish. In 2003, the primary nations that received the U.S. exports were Nigeria, Bulgaria, Romania, and Canada. The only economic benefit associated with a TALFF is the foreign fishing fees it generates. These fees pale in comparison to the economic benefits associated with the development of the domestic mackerel fishery. Increased mackerel production generates jobs both for plant workers and other support industries. More jobs generate more income for people resident in coastal communities and generally enhance the social fabric of these communities.

For these reasons, the Council concluded, and NMFS agrees, that the specification of an IOY at a level that can be fully harvested by the domestic fleet, thereby precluding the specification of a TALFF, will assist the U.S. mackerel industry to expand and will yield positive social and economic benefits to both U.S. harvesters and processors. NMFS therefore recommends that IOY be specified at 115,000 mt. NMFS believes that the commercial and recreational fishery will harvest this amount of mackerel in 2005, based on a reasonable projection of the commercial sector harvesting capacity. Because IOY=DAH, this specification is consistent with the Council's recommendation that the level of IOY should not provide for a TALFF.

The Council's DAH recommendation is composed of commercial landings and recreational landings. The specification of DAH at 165,000 mt includes an allocation for recreational catch of 15,000 mt, and an allocation for commercial landings of 150,000 mt. After reviewing the Council analysis, NMFS concludes that the available data does not support a projection of commercial landings at that level in 2005. The Council assumes that commercial landings in

2004 will be approximately 60,000 mt, and that the landings for 2005 could be twice that level. The increases in U.S. commercial landings in recent years do not support the Council's conclusion that landings could rise to 150,000 mt. Landings from 2001-2002 more than doubled (increasing 112 percent, from 12,308 mt to 26,192 mt). Landings from 2002 to 2003 (30,378 mt) rose by roughly 16 percent. As of October 1, 2004, 53,352 mt of mackerel had been landed. The final landings for 2004 will likely be roughly the same as they were as of October 1, 2004 (historically, a very small percentage of mackerel is landed in November and December, e.g., roughly 1 percent in 2003). The increase in landings from 2003 (30,738 mt) to 2004 (53,352 mt) is roughly 74 percent. It appears reasonable to project that domestic commercial landings in 2005 could approach a doubling of the 2004 landings. The domestic processor sector appears to have overcome the "start-up" problems associated with new investment in additional processing capacity.

Given all this data, and the upward trend noted, NMFS is proposing to set the DAH at 115,000 mt (including 15,000 mt for the recreational catch). This specification would allocate 100,000 mt for the commercial fishery, allowing room for the fishery to expand in line with its recent significant increase in landings. Given the trends in landings, and the industry's testimony that the fishery is poised for significant growth, I conclude that it is reasonable to assume that in 2005 the commercial fishery will harvest 100,000 mt of mackerel.

NMFS agrees with the Council recommendation to specify JVP at zero (as compared with 5,000 mt of JVP in 2004). In previous years, the Council specified JVP greater than zero because it believed U.S. processors lacked the capability to process the total amount of mackerel that U.S. harvesters could land. The Council has been systematically reducing JVP because it concluded that the surplus between DAH and DAP has been declining as U.S. shoreside processing capacity for mackerel has expanded over the last several years. The Council received testimony from processors and harvesters that the shoreside processing sector of this industry has been undergoing significant expansion since 2002-2003. As a result of this expansion, the Council concluded that shoreside processing capacity was no longer a limiting factor relative to domestic production of mackerel. The Council, therefore, concluded that the U.S. mackerel processing sector has the potential to process the DAH, so JVP would be specified at zero. In coming to this conclusion, the Council assumed that DAH would be set at 165,000 mt. The argument for zero JVP specification is even stronger for a proposed DAH set at 115,000 mt.

It is important to note that under the Magnuson-Stevens Fishery Conservation and Management Act at 204(b)(6), DAH = DAP + JVP. Thus, DAP cannot be set higher than DAH, and that is why the NMFS-preferred alternative sets DAP at 100,000 mt (equal to the domestic, commercial harvest). However, as noted in section 7.1.4.1, the Council does offer some evidence that the actual mackerel processing capacity is as high as 150,000 mt.

7.2 Impacts of Alternative for *Illex* on the Environment

7.2.1 Biological Impacts

The Council considered three quota options for *Illex* in 2005. Alternative 1 would maintain the 2004 specifications in 2005 (status quo) and was also the preferred alternative. Under this alternative the Council recommended that the specification of MAX OY and ABC be specified at 24,000 mt (yield associated with F_{msy}) in 2005 (same as in 2004) Under this option, the directed fishery for *Illex* would remain open until 95% of ABC is taken or 22,800 mt. This level of landings is also ostensibly equal to the most recent estimate of the yield associated with 75% F_{msy} for *Illex*. When 95% of ABC is taken, the directed fishery will be closed and a 10,000 pound trip limit will remain in effect for the remainder of the fishing year. Due to the large volume/low value nature of the *Illex* fishery, closure of the directed fishery essentially results in a complete closure of the fishery, since a very low level of landings is expected after a directed *Illex* fishery closure. Thus, the Council concluded that these specifications are consistent with the FMP overfishing definition for *Illex* and, therefore, are not expected to have any negative biological effects on the *Illex* stock, nor will it impact non-targeted species.

In setting the quota for 2005, the Council considered the management advice provided by SAW 37 that the nominal TAC of 24,000 mt, which assumes a stock at B_{msy}, may not be sufficient to prevent overfishing in years of moderate abundance. SAW 37 recommended that, given uncertainties in the stock distribution and population biology , the fishery should be managed in relation to the proportion of the stock on the shelf and available to US fisheries. The Council could follow this advice if the stock size and/or the proportion of the stock available to US fisheries were known in a given year. However, since for 2005 both are currently unknown, the Council concluded that the specification of the quota at 24,000 mt is not likely to result in overfishing. This conclusion is based on the observation that given recent economic and stock conditions, the fishery is unlikely to produce catches approaching 24,000 mt unless stock size begins to approach or exceed B_{msy}. If the landings were to approach 22,600 mt (the point at which the directed fishery is closed) in 2005, then the Council concluded that it is likely that stock biomass would be at or above B_{msy}. For example, since the foreign fishery was eliminated in the mid-1980's, the domestic fishery has only produced landings approaching 24,000 mt in one year - 1998. SAW 29 concluded that fishing mortality was unlikely to have occurred during 1994-1998 because the *upper bound* on the feasible estimates of fishing mortality for *Illex* for those years was *below* potential F_{msy} proxies. During the period 1994-1998, US landings averaged about 17,320 mt and ranged from 13,629 mt in 1997 to 23,597 in 1998. The Council assumed that at least some of those years could be considered to be years of "moderate abundance." Yet average landings of about 75% of the level at which the directed fishery would be closed (i.e., 22,600 mt under the preferred alternative) during the period 1994-1998 resulted in fishing mortality estimates whose upper bounds of confidence were below the overfishing proxies. The Council concluded that while some chance exists that the overfishing could occur, this outcome is unlikely based on the analyses provided in SAW 29. Recent fishery performance has been poor due to low availability, poor market conditions and reduced fishing effort. The overfishing definition adopted for *Illex* squid in Amendment 8 results in setting a fixed quota for a resource that exhibits large inter-annual variability in abundance. Changes in *Illex* abundance and US landings of the species are a result of fluctuations in population size in the Northwest Atlantic Ocean, availability to the fishery in the US EEZ, and world market conditions. Ideally, the fishery would be managed on a real time basis and harvest policy would be adjusted during the fishing season according to stock conditions. Unfortunately, the current understanding of *Illex* stock dynamics and available data are insufficient to permit implementation of such a real time management system. Rather, the Council has implemented the current management program for *Illex* in the US EEZ which sets a fixed quota which, under most circumstances, prevents overfishing. This management approach strikes a balance between minimizing the risk that overfishing might occur and minimizing the chance that yield is not foregone unnecessarily in years of high abundance. If evidence were available that the overfishing was occurring based on stock assessment data in 2005, the current FMP does allow for in-season adjustments to the IOY.

The species taken incidentally and discarded in the directed *Illex* fishery are listed in Table 38. The species listed included those with discards that comprised more than 2% of the total catch by weight on trips comprised of greater than 50% of *Illex* by weight based on the unpublished NMFS sea sampling data for the 1989-2003. The species of importance based on this criteria included butterfish, chub mackerel, unclassified herring, silver hake, red hake and John Dory. All of these species will be impacted to some degree by the prosecution of the Illex fishery. However, Alternative 1 is not expected to significantly increase or re-distribute fishing effort by gear type in 2005. Therefore, Alternative 1is not expected to significantly impact the non-target fish species listed in Table 38 compared to the status quo.

The second alternative evaluated in this environmental assessment was the specification of the quota for *Illex* at 30,000 mt (Alternative 2). The specification of ABC at 30,000 mt may not prevent overfishing in years of moderate to low abundance of *Illex* squid. Such overfishing would have a negative biological impact on the *Illex* stock which, in turn, would be expected to negatively affect the large number of species and stocks of marine mammals and fish that prey on *Illex*. Known predators of *Illex* are the fourspot flounder, goosefish, and swordfish. *Illex* is probably eaten by a substantially greater number of fish; however, partially digested animals are often difficult to identify and are simply recorded as squid remains, with no reference to the species. There are at least 47 other species of fish that are known to eat "squid". All of these species could be negatively impacted if the abundance of *Illex* were to decline as a result of overfishing, although the extent of such impacts cannot be quantified. As noted above, the non-target species taken incidentally and discarded in the directed *Illex* fishery are listed in Table 38. The species of importance based on this criteria included butterfish, chub mackerel, unclassified herring, silver hake, red hake and John Dory. All of these species will be impacted to some degree by the prosecution of the Illex fishery. However, Alternative 2 could reasonably be expected to significantly increase or re-distribute fishing effort by gear type in 2005. Therefore, the proposed measures under Alternative 2 could negatively impact the non-target fish species listed in Table 38 compared to the status quo. However, the Council is not able to determine whether these impacts would be significant or not.

The third alternative evaluated in this environmental assessment was the specification of the quota for *Illex* at 19,000 mt (Alternative 2). Under this option, the directed fishery for *Illex* would remain open until 95% of ABC is taken (18,050 mt). As noted above, in SAW 29 an upper bound on annual fishing mortality was computed for the US EEZ portion of the stock based on a model which incorporated weekly landings and relative fishing effort and mean squid weights during 1994-1998. These estimates of F were well below the biological reference points. Based on the analyses presented in SAW 29, it can be concluded that this level ABC, which is less than the yield at F_{msy}, will not have any negative biological consequences for the *Illex* stock or non-target species since the measure is not expected to increase or redistribute fishing effort by gear type. As noted above, the species taken incidentally and discarded in the directed *Illex* fishery are listed in Table 38 All of these species will be impacted to some degree by the prosecution of the *Illex* fishery. However, Alternative 3 is not expected to significantly increase or re-distribute fishing effort by gear type in 2005. Therefore, Alternative 3 is not expected to significantly impact the non-target fish species listed in Table 38 compared to the status quo.

7.2.2 Habitat Impacts

Illex are taken almost exclusively by bottom otter trawls (99.6%). Since alternatives 1 and 3 are not expected to increase fishing effort in the *Illex* fishery, these alternative are not expected to increase any existing impacts on EFH caused by this fishery. However, specifications for *Illex* under alternative 2 (30,000 mt) could result in an increase in fishing effort or redistribute effort by gear type. Therefore, this alternative for *Illex* could negatively impact essential fish habitat relative to the status quo, although the extent of such impacts cannot be quantified.

7.2.3 Impacts on Endangered and Other Protected Species

See section 7.1.3 for information relative to fishery interactions in the Atlantic mackerel, squid and butterfish trawl fishery. Based on an analysis of available observer data, the cetacean of primary concern relative to the prosecution of the *Illex* fishery is the pilot whale. NMFS intends on convening a take reduction team which will develop measures to reduce the take of common dolphins and pilot whales in offshore Atlantic trawl fisheries, including the *Illex* fishery. While the significance of the impact on these cetacean stocks by the *Illex* fishery is currently unknown, the specifications under the alternatives 1 and 3 are not expected to increase fishing effort or redistribute effort by gear type. As such, the implementation of these alternatives are not expected to impact the protected species described in section 6.5 relative to 2004 specifications for *Illex*. However, specifications for *Illex* under alternative 2 (30,000 mt) could result in an increase in fishing effort or redistribute effort by gear type. Therefore, this alternative for *Illex* could negatively impact the protected species described in section 6.5 relative to 2004 specifications for *Illex*, although the extent of such impacts cannot be quantified. There are no known interactions between the *Illex* fishery and ESA listed species including sea turtles.

7.2.4 Socioeconomic Impacts

Alternative 1 for *Illex* in 2005 represents the status quo, so no reductions in landings or revenues due to the 2005 specifications under this alternative are expected. Therefore, no change in economic and/or social impacts to the US *Illex* industry are expected from the preferred alternative. As a result, none of the vessel owners, crews, dealers, processors or fishing communities associated with the ports given in Tables 25 and 26 are expected to be significantly affected by the this quota alternative for the 2005 annual specifications for *Illex*. In addition, the other two alternatives represent no constraint on the fishery relative to recent landings. So neither of these alternatives are expected have a any negative effect on the ports and communities which are dependent on the *Illex* fishery.

7.3 Impacts of Alternatives for Butterfish on the Environment

7.3.1 Biological Impacts

The specifications under alternative 1 (2004 status quo) would be Max OY = 16,000 mt, ABC = 7,200 mt, and IOY, DAH, and DAP = 5,900 mt and JVP and TALFF = 0 mt. These specifications were based on the SAW 17 assessment which estimated yield at MSY at 16,000 mt and the yield associated with 75% F_{msy} at 12,000 mt. In making it's 2004 quota recommendation for butterfish, the Council also took into consideration the advice from the SAW 17 stock assessment which cautioned that discards might be significant and should be taken into account when setting the annual quota. As a result the Council recommended setting the annual quota at 5,900 mt primarily to allow for discards in this and other fisheries. Based on conclusions of the most recent stock assessment (SARC 38), these specifications could have negative biological consequences for the butterfish stock. Given estimates of the most recent stock biomass presented in SARC 38, it is likely that landings of 5,900 mt would exceed both the fishing mortality target (75% F_{msy}) and the overfishing threshold (F_{msy}). The current stock size is believed to be slightly below the biomass threshold of ½ B_{msy} as specified in the current FMP based on analyses presented in SARC 38. In addition, fishing mortality in recent years was estimated to be about the fishing mortality limit of F_{msy}. These fishing mortality rates occurred at harvest levels far below 5,900 mt. Assuming that the ratio of discards of landings remains constant in 2005, then it is likely that if 5,900 mt was landed then fishing mortality (which is a function of landings and discards) would far exceed the overfishing threshold (F_{msy}). If this were to occur, stock biomass would not be expected to increase given recent recruitment levels. Fishing in excess of the overfishing threshold would likely result in additional depletion of spawning stock biomass and hence reduce the probability of increased recruitment.

Under alternative 2 (preferred alternative) the specifications would be max OY = 12,175 mt, ABC = 4,545 mt, and IOY, DAH, and DAP = 1,681 mt and JVP and TALFF = 0 mt. The FMP specifies maximum optimum yield as the catch associated with F_{msy} or MSY. The most recent stock assessment re-estimated MSY at 12,175 for butterfish which now becomes the basis for the max OY specification according to the FMP. In addition, the FMP specifies that the annual quota be the catch associated with 75% of F_{msy}. Based on the current overfishing definition, overfishing is not occurring (NMFS 2004). New biological reference points estimated for butterfish in SARC 38 are F_{msy}=0.38 and B_{msy}=22,798 mt. SARC 38 estimated F in 2000-2002 to be about F_{msy} (0.39). As a result, the Council considered several options when setting a quota for butterfish in 2005. Based on analyses presented in SARC 38 and assuming that biomass in

2005 will be nominal the same as 2000-2002, then the catch associated with the target F would be 2,242 mt and forms the basis for the specification of ABC. Assuming that the discard to landing ratio remains constant, then IOY, DAH, and DAP = 1,681 mt (i.e., the allowable landings equals ABC less estimated discards). This level of landings should achieve the target fishing mortality rate and allow for stock rebuilding. Therefore, compared to the status quo, the preferred alternative should result in positive benefits to the butterfish stock.

Under Alternative 3, the specifications would be Max OY and ABC = 12,175 mt, IOY, DAH, and DAP = 9,131 mt and JVP and TALFF = 0 mt. The yield under this alternative assumes that the stock would be at or above B_{msy} in 2005. Hence, ABC which includes landings and discards, would be equal to MSY and the allowable level of landings would be the yield at 75% F_{msy}. Given the current level of the stock, this level of landings would likely result in overfishing and additional depletion of the spawning stock biomass. Any further reductions in spawning stock biomass will decease the probability of successful recruitment and stock rebuilding. Overall, the fishing mortality rate under this alternative would be expected to have unacceptable negative biological consequences for the butterfish stock.

The list of species taken incidentally and discarded in the directed butterfish fishery are listed in Table 38. The species listed include those with discards that comprised more than 2% of the total catch by weight on trips which landed 500 pounds of more of butterfish based on the unpublished NMFS sea sampling data for the 1989-2003. The species of importance based on this criteria included red hake, silver hake, spiny dogfish, scup, skates, fourspot flounder, *Loligo* squid and Atlantic mackerel. All of these species will be impacted to some degree by the prosecution of the butterfish fishery. However, effort under alternative 1 (status quo) and alternative 2 (preferred alternative) would be expected to remain the same or decline relative to the staus quo specifications. Therefore, Alternatives 1 and 2 are not expected to significantly impact the non-target fish species listed in Table 38 compared to the status quo. However, alternative 3 for butterfish could reasonably be expected to significantly increase or re-distribute fishing effort by gear type in 2005. Therefore, the proposed measures under Alternative 3 could negatively impact the non-target fish species listed in Table 38 compared to the status quo. However, the Council is currently unable to determine whether these impacts would be significant or not.

As noted above, alternative 2 (preferred alternative) would also implement a 3.0 minimum cod end mesh size requirement for butterfish otter trawl trips greater than 5,000 pounds. In order to define the level of a directed trip for the butterfish fishery unpublished VTR data was examined. For butterfish, a range of trip-level landings levels in terms of both pounds and percent of total trip was considered. Total landings by year inclusive of all trips were tabulated for trips which landed butterfish. These totals were compared to annual landings when trips below a given threshold level were eliminated. The relative contribution to total landings by trip-levels above the threshold could then be determined. Based on this evaluation, the Council concluded that directed butterfish trips could reasonably be defined as trips which landed 5,000 or more lbs of butterfish (Figure 2). A description of mesh sizes currently used to land butterfish is given below in section 7.3.4.

The purpose of this minimum mesh size requirement is to allow for escapement of unmarketable sized butterfish and fish below the size at which 50% of the butterfish are sexually mature. Based on inspection of the size composition of discarded butterfish from unpublished sea sampling data (see SARC 38), the minimum marketable size for butterfish is approximately 14.0 cm (5.5 inches). Based on the selection factor of 1.8 given by Meyer and Merrriner (1976), the mesh size corresponding to an L_{50} of 14 cm is 77.8 cm or about 3.0 inches.

The minimum mesh requirement of 3.0 inches in the directed butterfish fishery should have a number of positive biological impacts. First, discards in the directed fishery should be reduced, which, in combination with the reduced quota, should result in reduced fishing mortality on the butterfish stock (especially on small, sexually immature butterfish). This should result in an increase in spawning stock biomass which will increase the chance of successful recruitment and aid in stock rebuilding. In addition, by delaying age at entry to the fishery, an increase in yield per recruit should be realized. Finally, an increase in mesh size in the butterfish fishery should also result in an decrease in bycatch of non-target species in the directed butterfish fishery.

7.3.2 Habitat Impacts

Butterfish are taken with a number of gears. The gear used of concern relative to habitat is bottom otter trawls which accounts for about 88% of the landings. Because alternative 1 represents the 2004 status quo specification for butterfish, it should not result in an increase in fishing effort or redistribute effort by gear type. Therefore, by maintaining the status quo in 2005, alternative 1 is not expected to increase any existing impacts on EFH caused by this fishery.

Relative to the 2004 specifications, alternative 2 for butterfish represents a decrease in quota. As a result, it would be anticipated that fishing effort might decrease as a result of this alternative. Therefore, by implementation of alternative 2 for butterfish is likely to reduce impacts on EFH caused by this fishery relative to the 2004 specifications.

Under alternative 3, landings could potentially exceed recent observed landings since the quota specified under this option far exceeds recent landings. Therefore, it is possible that fishing effort could increase under this option. However, recent analyses indicate that most of the butterfish landings are taken incidental to the prosecution of other directed fisheries. As such, an increase in the landings does not necessarily translate into increased levels of fishing effort. Therefore, this alternative is not expected to result in an increase in fishing effort or redistribute effort by gear type. Therefore, alternative 3 is not expected to increase any existing impacts on EFH caused by this fishery.

7.3.3 Impacts on Endangered and Other Protected Species

The basic interactions between fisheries and protected resources are discussed in section 6.5 (see Affected Environment). As discussed in that section, these fisheries are listed as category 1 fisheries under MMPA. However, within the overall classification, no interactions between marine mammals and the butterfish have been observed. Therefore, the impacts expected from the alternatives considered below should be minimal based on available data.

Alternative 1 represents the 2004 status quo so this alternative is not expected to increase fishing effort or redistribute effort by gear type. As such, the implementation of this alternative is not expected to impact the protected species described in section 6.5 relative to 2004 specifications for butterfish. Likewise, alternative 2 represents a decrease in the butterfish quota, so this alternative is not expected to increase fishing effort or redistribute effort by gear type.

Only alternative 3 has the potential to increase fishing effort in 2005. However, as noted above, most butterfish are taken incidentally during fishing effort directed at other species such as *Loligo* and whiting. As such, an increase in the quota specification for butterfish in 2005 does not necessarily mean that fishing effort for butterfish will increase under this alternative. Therefore, given that no interaction between the butterfish fisheries and protected resources have been observed and that effort is unlikely to increase under alternative 3, this alternative is not expected to impact the protected species described in section 6.3 relative to 2004 specifications for butterfish.

7.3.4 Socioeconomic Impacts

Since alternative 1represents the 2004 status quo specifications, no reductions in landings or revenues due to the specifications under this alternative are expected. Therefore, no change in economic and/or social impacts to the US butterfish industry are expected from this alternative. As a result, none of the vessel owners, crews, dealers, processors or fishing communities associated with the ports given in Tables 33 and 34 are expected to be significantly affected by the this alternative for the 2005 annual specifications for butterfish.

Relative to the 2004 specifications, alternative 2 for butterfish represents a decrease in quota. As a result, it would be anticipated that revenues from fishing for butterfish might decrease as a result of this alternative. Therefore, by implementation of alternative 2 for butterfish is likely to negatively affect the vessel owners, crews, dealers, processors or fishing communities associated with the ports given in Tables 33 and 34.

Alternative 3 would result in an increase in the quota for 2005 compared to previous years specifications. As a result, it would be anticipated that revenues from fishing for butterfish might increase in the short term as a result of this alternative. Therefore, implementation of alternative 3 for butterfish is likely to positively affect the vessel owners, crews, dealers, processors or fishing communities associated with the ports given in Tables 33 and 34 in the near term. However, sustained levels of fishing at this level given current stock conditions is likely to be deleterious to the stock and hence the fishery.   If overfishing of the butterfish stock continues, then the long term negative consequences to the stock would result in revenue losses and negative economic and social impacts for the vessel owners, crews, dealers, processors or fishing communities associated with the ports given in Tables 33 and 34.

As noted above, alternative 2 (preferred alternative) would also implement a 3.0 minimum cod end mesh size requirement for otter trawl trips landing greater than 5,000 pounds of butterfish. During the period 2001-2003, there were 16,854 trips which landed butterfish based on unpublished NMFS VTR data. The distribution of mesh size use on these trips and the contribution of each mesh size to the total landings is given in Table 39 and Figure 3. More than half (57%) of the landings of butterfish during 2001-2003 were taken with mesh sizes less than 3.0 inches. Within this mesh size range, most was taken with mesh sizes between 2.5 and 3.0 inches. The trips using this mesh size range (i.e., less than 3.0 inches) could potentially be affected by the proposed mesh size. However, the proposed 3.0 inch mesh requirement would only apply to otter trawl trips landing 5,000 pounds or more of butterfish. In terms of numerical frequency of trips, the vast majority of trips during 2001-2003 landed less than 5,000 pounds of butterfish (Figure 4) based on unpublished NMFS VTR data.   Table 40 characterizes butterfish landings by trip for thresholds of pounds landed per trip for the period 2001-2003. While 57% of the landings by weight were taken on trips of greater than or equal to 5,000 pounds during the period, less than 1% of the trips landing butterfish were greater than or equal 5,000 pounds. There were only 26 vessels which landed butterfish on trips greater than or equal to 5,000 pounds and reported using mesh sizes less than 3.0 inches on those trips. The Council concluded that the economic impact of this measure should be negligible because the vast majority of trips and vessels will not be affected because they land less than 5,000 pounds per trip.   The costs for those vessels which do land butterfish on trips larger than 5,000 pounds should also be negligible because virtually all of those vessels already possess cod ends 3.0 inches or greater, so they should not incur any additional costs due to the proposed minimum mesh requirement.

7.4 Research Set-Asides (RSA) Recommendations

Framework Adjustment 1 to the Atlantic Mackerel, Squid and Butterfish FMP established a program in which data collection projects can be funded in part through a percentage research set-aside (RSA) from the total annual quota for each species. The purpose of this program is to support research and the collection of additional data that would otherwise be unavailable. Through the set aside program, the Council encourages collaborative efforts between the public, research institutions, and government in broadening the scientific base upon which management decisions are made. Reserving a small portion of the annual harvest of a species to subsidize the research costs of vessel operations and scientific expertise is considered an important investment in the future of the nation's fisheries.

An additional benefit of this program is the assurance that new data collected by non-governmental entities will receive the peer review and analysis necessary to be utilized in improving the management of public fisheries resources. The annual research set-aside amount may vary between 0 and 3% of each species' quota. For those species that have both a commercial quota and a recreational harvest limit, the set-aside calculation shall be made from the combined total allowable landing level.

For 2005, the Council recommended that 255.1 mt of quota be set aside for *Loligo* for scientific research.

Table RSA-1. Proposed Research Quota Set-asides, in mt, for Loligo squid for the Fishing Year January 1 through December 31, 2005.

Specifications	*Loligo*
Research Set-aside	255.1
Remaining Quota	16,744.9
Total	17,000

Two research projects were submitted to NMFS that would require an exemption from some of the current or proposed regulations for *Loligo* (see Appendix I for a complete description of the research projects). The following analysis was prepared in response to the need for an analyses of the impacts of the research set-asides on the human environment pursuant to NEPA. Should the research projects be conducted, researchers could be permitted to fish for *Loligo* squid in the scup gear restricted areas (GRAs) and be allowed to retain landings of *Loligo* squid in amounts greater than 2,500 pounds during a closure of the directed *Loligo* squid fishery.

7.4.1 Biological Impacts

As noted in the above table, the amount of research quota set-aside relative to the overall annual quotas for *Loligo* squid is minimal. Therefore, given the limited scope and duration of the research projects, it is unlikely that exemptions from the scup gear restricted areas (GRAs) or the retention of *Loligo* squid landings in amounts greater than 2,500 pounds during a closure of the directed *Loligo* squid fishery would have negative biological impacts since fishing mortality on the *Loligo* stock is controlled by the overall quota (which includes the RSA amounts specified). A more detailed description of each of the proposed exemptions is given below and additional descriptions of the stocks and their habitats can be found under sections 4.0 and 5.0 above.

In an attempt to reduce scup bycatch and unwanted discards, regulations implementing scup GRAs were implemented beginning in 2000. Under these regulations, vessels fishing for non-exempt species, including *Loligo* squid, are required to fish using the scup minimum mesh size of 4 ½ in. Given the need to use small mesh sizes to retain *Loligo* squid (1 7/8 inch minimum mesh size), the *Loligo* squid fishery inside the scup GRAs was essentially eliminated. THe approved projects would test gear modifications in an attempt to allow unwanted scup bycatch to escape while retaining *Loligo* squid catches. To evaluate these gear modifications, researchers have requested exemptions that would permit fishing for *Loligo* squid in the scup GRAs using mesh sizes less than 4 ½ inches.

The harvesting of *Loligo* squid in the scup GRAs is not expected to have negative biological impacts on the *Loligo* squid fishery. As mentioned above, the amount of *Loligo* squid set-aside is minimal and is included in the overall *Loligo* squid quota. Therefore, the 3 percent set-aside, whether harvested through research projects or through the normal prosecution of the *Loligo* squid fishery, would have occurred. Further biological impacts from this exemption are related to the retention and discard of scup taken in the small mesh squid gear used in these experiments. These impacts will be evaluated in the Environmental Assessment for the 2005 annual scup specifications.

The annual *Loligo* squid quota is divided into quarterly quota periods (Table RSA-2). Current regulations specify that after the quarterly quota is attained the directed *Loligo* squid fishery is closed and only an incidental catch amount of 2,500 lb per calendar day may be retained. Some of the research projects have requested an exemption from the 2,500 lb limit. This would allow research vessels to land *Loligo* squid in amounts greater than 2,500 lb per calender day during a quarterly closure of the directed *Loligo* squid fishery.

Table RSA-2. *Loligo* Squid Quarterly Allocations.

Quarter		Percent	Metric Tons	Research Set-aside
I	(Jan-Mar)	33.23	5,564	N/A
II	(Apr-Jun)	17.61	2,949	N/A
III	(Jul-Sep)	17.30	2,897	N/A
IV	(Oct-Dec)	31.86	5,335	N/A
Total		100	16,745	255.1

The annual quota established for *Loligo* squid is the chief mechanism used to control fishing mortality. The research set-aside quota is deducted from the annual quota prior to the allocation of the quota into quarters. The total allowable landings for the 2005 *Loligo* squid fishery is 17,000 mt, 255.1 mt of which may be used as research set-aside. The research set-aside amount (255.1 mt) is deducted from the overall *Loligo* squid quota prior to dividing the quota into quarterly allocations. Research quota harvested after a quarterly closure of the directed fishery will not count towards that quarter's quota, but instead will count towards the overall *Loligo* squid quota for the entire year. This will prevent total quota overages, and thus possible negative biological impacts from occurring as the result of research quota harvested after the directed fishery has closed. As noted in the proposed scup GRA exemption, the amount of *Loligo* squid set-aside is minimal and the 255.1 mt set-aside, whether harvested through research projects or through the normal prosecution of the *Loligo* squid fishery, may have occurred with or without the research set aside program. Therefore, the harvesting of *Loligo* squid after a closure of the directed fishery is not expected to have negative biological impacts on the *Loligo* squid fishery.

7.4.2 Habitat Impacts

The recommended RSA levels are given in Table RSA-1. Through the use of the research quota set-aside, the basic fishing operations for *Loligo* squid are expected to remain the same. In addition, the RSA specification should not result in an increase in fishing effort or redistribute effort by gear type. Therefore, the overall impact to essential fish habitat is not expected to change. It should be noted, however, that fishing activities under the RSA program may occur in times outside those of the normal directed fisheries. The resulting impacts to EFH of these RSA fishing activities, if any, are not precisely known but are believed to be minimal. This conclusion is based on the fact that the RSA amount represents only 1.5% of the quota and it is likely that this relatively small portion of the fishery will be prosecuted in the same location as the normal non-RSA fishery.

7.4.3 Impacts on Endangered and Other Protected Species

There are numerous species which inhabit the management unit of this FMP that are afforded protection under the ESA and/or the MMPA. Through the use of the research quota set-aside, the basic fishing operations for *Loligo* are expected to remain the same. It should be noted, however, that fishing activities under the RSA program may occur in areas and/or times outside those of the normal directed fisheries. The degree of the resulting impacts on protected resources of these RSA fishing activities, if any, are not precisely known but are believed to be minimal. Therefore, the overall impact to species afforded protection under the ESA and the MMPA are not expected to change. A complete description of these species and a discussion of the potential impacts the *Loligo* squid fishery may have on them can be found in section 6.5.

7.4.4 Socioeconomic Impacts

Under this program, successful applicants receive a share of the annual quota for the purpose of conducting scientific research. The Nation receives a benefit in that data or other information about that fishery is obtained for management or stock assessment purposes that would not otherwise be obtained. In fisheries where the entire quota would be taken and the fishery is prematurely closed (i.e., the quota is constraining), the economic and social costs of the program are shared among the non-RSA participants in the fishery. That is, each participant in a fishery that utilizes a resource that is limited by the annual quota relinquishes a share of the amount of quota retained in the RSA quota.

In 2003, the Loligo fishery was constrained by the quota. Assuming the same number of vessels participate in the 2005 *Loligo* fishery as in 2003, the cost of the RSA for *Loligo* would be shared among a maximum of 402 vessels (this assumes that only one vessel is awarded the entire RSA amount). In this example, the average non-RSA vessel would forego 0.63 mt of *Loligo* to the RSA quota category (valued at $1,047). The total revenue amount foregone to the RSA quota category would be valued at $423,976.

As discussed above, researchers have requested exemptions from the minimum mesh restrictions in the scup GRAs and for the retention of *Loligo* squid landings in amounts greater than 2,500 pounds during a closure of the directed *Loligo* squid fishery. Because the amount of set-aside quota is limited, these exemptions are expected to have only minimal economic and social impacts. A detailed description of the fishing activities, economic environment, and participants in these fisheries can be found under section 6.0.

Under the research quota set-aside program, vessels that do not possess a limited access *Loligo* squid permit may participate in research projects. Therefore, it is possible that research participants, outside the scope of vessels possessing limited access *Loligo* squid permits, may harvest *Loligo* squid in amounts greater than is currently permitted under the open access incidental catch *Loligo* squid permit (2,500 lb per calender day). This could have an economic impact on limited access *Loligo* squid permit holders because it is possible that a small portion of the annual quota may be redistributed to vessels that might not ordinarily participate in this fishery. However, because the research set-aside quota is of a limited amount, the overall economic impacts to limited access permitted vessel owners and their crews will be minimal. No negative economic or social impacts for dealers or processors under this scenario are expected.

Because some vessels may be harvesting *Loligo* squid in amounts greater than 2,500 lb per calender day during a quarterly closure of the directed *Loligo* squid fishery, vessels could receive higher prices for their catch than would ordinarily occur during the regular opening of the fishery. This could provide positive economic impacts for the vessel owners and crews participating in research projects. Also, dealers and processors intent on maintaining a steady inventory of fresh *Loligo* squid may benefit.

7.5 CUMULATIVE IMPACTS OF PREFERRED ALTERNATIVE ON IDENTIFIED VALUED ECOSYSTEM COMPONENTS (VEC)

The biological, economic and social impacts of the preferred alternative proposed by the Council for *Illex* and the NMFS-preferred alternative for the Atlantic mackerel fishery are expected to be minimal since they maintain the status quo (*Illex*) or represent only a slight change from the 2004 specifications (mackerel--especially with respect to likely landings). In the case of butterfish, positive biological impacts are expected since the preferred alternative should prevent overfishing and allow for stock rebuilding. The reduced quota could have short term negative impacts on the vessels participating in the butterfish fishery. However, these short term effects are necessary to conserve the stock and will result in longer term economic and social benefits when the stock increases in size. The proposed specifications are considered the most reasonable to achieve the fishery conservation objectives while minimizing the impacts on fishing communities as per the objectives of the FMP. A summary of the environmental consequences for each of the alternatives considered is given in the Table ES-1 (see Executive summary).

7.5.1 Introduction; Definition of Cumulative Effects

A cumulative impact analysis is required by the Council on Environmental Quality's (CEQ) regulation for implementation of NEPA. Cumulative effects are defined under NEPA as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other action (40 CFR part 1508.7)." A formal cumulative impact assessment is not necessarily required as part of an Environmental Assessment under NEPA as long as the significance of cumulative impacts has been considered (U.S. EPA 1999). The following remarks address the significance of the expected cumulative impacts as they relate to the federally managed Atlantic mackerel, squid and butterfish fisheries.

This analysis contains a summary of relevant past, present and reasonably foreseeable future actions that, in conjunction with the proposed action, could impact the Atlantic mackerel, squid and butterfish fisheries. The time frame for this analysis is primarily the 1980s and 1990s for historical information and approximately 5-years into the future for reasonably foreseeable future actions affecting the fisheries. The geographic scope of this analyses is the range of the Atlantic mackerel, squid and butterfish fisheries in the U.S. EEZ and adjacent fishing communities, from the U.S.- Canada border, through Cape Hatteras, North Carolina. This cumulative effects analysis is focused on the following five VECs: (1) Target fisheries and resources; (2) non-target species or bycatch; (3) protected species; (4) habitat; and (5) communities.

Past, Present and Reasonable Foreseeable Future Actions

The cumulative impacts of past, present, and future Federal fishery management actions (and the specification recommendations in this document) should generally be positive. The mandates of the MSFCMA, as currently amended by the SFA and NEPA, require that management actions be taken only after consideration of impacts to the biological, physical, economic, and social dimensions of the human environment. Therefore, it is expected that under the current management regime, the long term cumulative impacts of federal fishery management actions under this FMP and annual specifications process will contribute toward improving the human environment. Past actions which had a major impact on the fishery included: the implementation of a limited access program in Amendment 5 to control capacity in the *Loligo*, butterfish, and *Illex* fisheries; revision of the overfishing definitions for all four managed species in Amendment 6; modification of vessel upgrade rules in Amendment 7; and implementation of overfishing control rules and other measures (including a framework adjustment procedure) to bring the FMP into compliance with the SFA in Amendment. Future actions include the development of Amendment 9 which could 1) extend the moratorium on entry to the commercial *Illex* fishery, 2) allow for specification of management measures for multiple years, 3) revise the current overfishing definition for *Loligo* squid, 4) implement management alternatives for Atlantic mackerel, squid, and butterfish to prevent, mitigate or minimize adverse effects from fishing to bring the FMP into compliance with Section 303(a)(7) of the SFA, 5) implement measures to reduce discards in these fisheries and 6) identify essential fish habitat for *Loligo* squid eggs. Finally, the Council is considering the development of a limited or controlled access program for the commercial Atlantic mackerel fishery in Amendment 10.

In addition to the direct effects on the environment from fishing, the cumulative effects to the physical and biological dimensions of the environment may also come from non-fishing activities. Non-fishing activities, in this sense, relate to habitat loss from human interaction and alteration or natural disturbances. These activities are widespread and can have localized impacts to habitat such as accretion of sediments from at-sea disposal areas, oil and mineral resource exploration, aquaculture, construction of at-sea wind farms, bulk transportation of petrochemicals and significant storm events. In addition to guidelines mandated by the MSFMCA, NMFS reviews some of these types of effects during the review process required by Section 404 of the Clean water Act and Section 10 of the Rivers and Harbors Act for certain activities that are regulated by Federal, state, and local authority. The jurisdiction of these activities is in "waters of the United States" and includes both riverine and marine habitats. A database which could facilitate documentation regarding cumulative impacts of non-fishing activities on the physical and biological habitat in the management unit covered by this FMP is not available at this time. The development of a habitat and effect database would expedite the review process and outline areas of increased disturbance. Inter-agency coordination would also prove beneficial.

Effective Federal fishery management of Atlantic mackerel, *Loligo* and *Illex* squid, and butterfish has occurred for the past two decades. The management strategy during the first phase of the Atlantic Mackerel, Squid, and Butterfish FMP was to provide for the orderly development of the domestic fisheries for these resources under the purview of the MSFMCA. This process involved the sequential phasing out of foreign fishing for these species in US waters and the gradual transfer of offshore fishing methods and technology to the domestic fishing fleet. For both squid species and butterfish, the domestic fisheries have been fully developed. All three species are considered to be fully utilized by the US domestic fishery and none are considered to be overfished as a result of the management plan developed by the Council. For Atlantic mackerel, the full development of the domestic fishery is still ongoing. The Atlantic mackerel stock is currently considered to be in good condition and is designated as under-exploited. While it appears that this stock is capable of supporting increased levels of exploitation by the US domestic fishery, as noted above, the Council is also currently considering the development of a controlled access plan to control expansion of harvest capacity and avoid over-capitalization in the Atlantic mackerel fishery.

The cumulative impacts of this FMP were last fully addressed in the EIS for Amendment 8 and are currently being re-addressed in the draft Amendment 9 which is under development. All four species in the management unit are managed primarily via annual quotas to control fishing mortality. This FMP requires a specifications process which allows for the review and modifications to management measures specified in the FMP on an annual basis which allows for review. In addition, the Council added a framework adjustment procedure in Amendment 8 which allows the Council to add or modify management measures through a streamlined public review process. As noted above, the cumulative impact of this FMP and annual specification process has been positive since its implementation after passage of the Magnuson Act.

Through development of the FMP and the subsequent annual specification process, the Council continues to manage these resources in accordance with the National Standards required under the Magnuson-Stevens Act. First and foremost the Council has met the obligations of National Standard 1 by adopting and implementing conservation and management measures that have prevented overfishing, while achieving, on a continuing basis, the optimum yield for the four species and the United States fishing industry. The Council uses the best scientific information available (National Standard 2) and manages these two resources throughout their range (National Standard 3). The management measures do not discriminate between residents of different states (National Standard 4), they do not have economic allocation as its sole purpose (National Standard 5), the measures account for variations in fisheries (National Standard 6), avoid unnecessary duplication (National Standard 7), they take into account the fishing communities (National Standard 8), address bycatch in these fisheries (National Standard 9) and promote safety at sea (National Standard 10). By continuing to meet the National Standards requirements of the Magnuson-Stevens Act through future FMP amendments and actions, the Council will insure that cumulative impacts of these actions will remain overwhelmingly positive for the ports and communities that depend on these fisheries, as well as the Nation as a whole.

The cumulative effects of the proposed quotas will be examined for the following five areas: targeted species, non-targeted species, protected species, habitat, and communities.

7.5.2 Targeted Fisheries and Resources

First and foremost, the Council has met the obligations of National Standard 1 by adopting and implementing conservation and management measures that have prevented overfishing, while achieving, on a continuing basis, the optimum yield for the four species and the United States fishing industry. Atlantic mackerel were overfished prior to management and then were subsequently rebuilt under the FMP and its Amendments. *Loligo* were considered overfished in 2000 but remedial action by the Council in subsequent years (i.e., reduced quotas) resulted in stock rebuilding to the point that the species in no longer consider overfished. *Illex* and butterfish have never been designated as overfished.

The most obvious and immediate impact on the stocks managed under this FMP results from the mortality that occurs from fishing activities. The Council manages federally permitted vessels which fish for these four species throughout their range in both Federal and state waters. Fishing mortality from all fishing activities that land these species is controlled and accounted for by the quotas described in section 5.0. In addition to fishing mortality related landings, there are other fishing activities that take these species as bycatch that impact these populations because they represent additional sources of mortality (i.e., due to discarding). However, estimates of bycatch related mortality in non-directed fisheries are incorporated into the stock assessment for each species. Therefore, mortality from non-directed sources is explicitly accounted for in stock assessment models which form the basis for establishing the proposed quotas. In addition to mortality on these stocks due to fishing, there are other indirect effects on these stocks from non-fishing anthropogenic activities in the Atlantic Ocean, but these are generally not quantifiable at present. Nonetheless, since these species occur over wide areas of the mid and north Atlantic Ocean and inhabit both inshore and offshore pelagic waters, it is unlikely that any indirect anthropogenic activity currently significantly impact these populations, especially in comparison to the direct effects on these populations as a result of fishing.

In summary, a major goal of this FMP has been the Americanization of these fisheries. Prior to the passage of the Magnuson Act and development of this FMP, the foreign prosecution of these fisheries occurred at much higher levels of fishing effort, which in many cases, resulted in overfishing . The first phase of the domestic fishery development was the elimination of these foreign fisheries and the transfer of the offshore fishing technology to the US fishing fleet. Thus, the immediate and cumulative impact was to end overfishing of these stocks, most notably in the case of Atlantic mackerel. In addition, the foreign fishery landings for the other three species in the management unit also reached unsustainable levels prior to FMP development and implementation. The second phase of FMP implementation was the controlled development of these fisheries which allowed stock rebuilding, especially in the case of Atlantic mackerel. The final phase of FMP implementation has been to adopt and implement new overfishing defintions which are consistent with the SFA. The end result has been, at least in the case of *Loligo* and *Illex*, that harvest capacity and quotas have been matched to provide for long term, sustainable utilization of these resources.

The quotas and other measures under the preferred alternatives for 2005 serve to achieve the objectives of the FMP. The impacts on the environment for each of these alternatives is described in section 7.0. The quotas proposed under the preferred alternative for each species were developed to achieve the primary goal of the FMP and SFA which is to prevent overfishing. They are also intended to provide for the greatest overall benefit to the nation. These measures in conjunction with previous actions including establishment of a limited access fishery for the squids and butterfish in Amendment 5 and overfishing definitions in Amendment 8, help maximize social and economic benefits from these resources for both the industry and the nation. Future actions such as extension of the *Illex* moratorium in Amendment 9 and the development of a controlled access plan for the Atlantic mackerel fishery in Amendment 10 should continue to allow the Council to manage these resources such that the objectives of the SFA continue to be met.

7.5.3 Non-target species or bycatch

National Standard 9 addresses bycatch in fisheries. This National Standard requires Councils to consider the bycatch effects of existing and planned conservation and management measures. Bycatch can, in two ways, impede efforts to protect marine ecosystems and achieve sustainable fisheries and the full benefits they can provide to the Nation. First, bycatch can increase substantially the uncertainty concerning total fishing-related mortality, which makes it more difficult to assess the status of stocks, to set the appropriate OY and define overfishing levels, and to ensure that OYs are attained and overfishing levels are not exceeded. Second, bycatch may also preclude other more productive uses of fishery resources.

The term "bycatch" means fish that are harvested in a fishery, but that are not sold or kept for personal use. Bycatch includes the discard of whole fish at sea or elsewhere, including economic discards and regulatory discards, and fishing mortality due to an encounter with fishing gear that does not result in capture of fish (i.e., unobserved fishing mortality). Bycatch does not include any fish that legally are retained in a fishery and kept for personal, tribal, or cultural use, or that enter commerce through sale, barter, or trade. Bycatch does not include fish released alive under a recreational catch-and-release fishery management program. A catch-and-release fishery management program is one in which the retention of a particular species is prohibited. In such a program, those fish released alive would not be considered bycatch.

None of the management measures by the Council for 2005 under the preferred alternatives will promote or result in increased levels of bycatch relative to the status quo. However, the preferred alternative for butterfish includes a requirement that otter trawl vessels possessing more than 5,000 pounds of butterfish use codend mesh sizes greater than three inches. This minimum mesh size requirement should allow for increased escapement of small butterfish and other small non-targets and therefore reduce discards. In terms of the butterfish stock, this, in combination with the reduced quota, should result in an increase in spawning stock biomass and aid in stock rebuilding.

Past measures implemented under this FMP which help to control or reduce discards of non-target species in these fisheries include 1) limited entry and quotas which are intended to control or reduce fishing effort, 2) incidental catch allowances for non-moratorium vessels and all vessels during directed fishery closures and 3) minimum mesh requirements. The measures proposed under the preferred alternative for each species, in conjunction with these past actions, should maintain or reduce historical levels of bycatch and discards in these fisheries. The Council is considering a number of additional measures to address discards in these fisheries in Amendment 9, including modification of the *Illex* exemption from the *Loligo* minimum mesh requirement, establishment of small mesh gear restricted areas, increase in the minimum mesh size for *Loligo*, implementation of gear modifications in the *Loligo* fishery to reduce bycatch, and modification of the incidental catch allowance for the *Loligo* fishery. All of these measures, in conjunction with the preferred alternatives proposed by the Council for the squid and butterfish fisheries and by NMFS for Atlantic mackerel fishery, should result in a reduction in bycatch and discards of non-target species in these fisheries.

7.5.4 Protected Species

There are numerous species which inhabit the environment within the management unit of this FMP that are afforded protection under the ESA of 1973 and/or the Marine Mammal Protection MMPA. Eleven are classified as endangered or threatened under the ESA, while the remainder are protected by the provisions of the MMPA. The species protected either by the ESA, the MMPA, or the Migratory Bird Act of 1918, that be found in the environment utilized by Atlantic mackerel, squid and butterfish fisheries are listed in section 6.5.

As noted above, none of the management measures for 2005 under the preferred alternatives will promote or result in increased levels of bycatch relative to the no action, since the specifications under the preferred alternatives are either equal to or less than the 2004 status quo. As noted above, a major goal of this FMP has been the Americanization of these fisheries. Prior to the passage of the Magnuson Act and development of this FMP, the foreign prosecution of these fisheries occurred at much higher levels of fishing effort. As described in section 6.5, the foreign fisheries for Atlantic mackerel, squid and butterfish were a major source of mortality for a number of marine mammal stocks. The elimination of these fisheries and subsequent controlled development of the domestic fisheries for Atlantic mackerel, squid and butterfish have resulted in fishing effort levels much lower than those which occurred in the foreign fisheries prior to FMP development and implementation. Other proposed future actions by the Council which should have positive benefits relative to marine mammal stocks are the extension of the moratorium on entry to the *Illex* fishery in Amendment 9 and the controlled access plan for Atlantic mackerel being considered for Amendment 10. Both of these actions will control entry of new fishing effort into these fisheries. The cumulative effect of the proposed measures for 2005 in conjunction with past and future management actions under the FMP and take reduction measures developed under the MMPA should reduce the impact of these fisheries on marine mammal stocks including common dolphin, white sided dolphin, and pilot whales.

7.5.5 Habitat

The 2002 final rule for EFH requires that fishery management plans minimize to the extent practicable adverse effects on essential fish habitat caused by fishing (section 600.815 (a) (2)). Pursuant to the final EFH regulations (50 CFR 600.815(a)(2)), FMPs must contain an evaluation of the potential adverse effects of fishing on EFH designated under the FMP, including effects of each fishing activity regulated under the FMP or other Federal FMPs. The evaluation should consider the effects of each fishing activity on each type of habitat found within EFH. FMPs must describe each fishing activity, review and discuss all available relevant information (such as information regarding the intensity, extent, and frequency of any adverse effect on EFH: the type of habitat within EFH that may be affected adversely; and the habitat functions that may be disturbed), and provide conclusions regarding whether and how each fishing activity adversely affects EFH. The evaluation should also consider the cumulative effects of multiple fishing activities on EFH

Otter trawls are the principal gear used in these fisheries. In general, bottom tending mobile gear have the potential to reduce habitat complexity and change benthic communities. Available research indicates that the effects of mobile gear are cumulative and are a function of the frequency and intensity with which an area is fished, the complexity of the benthic habitat (structure), energy of the environment (high energy and variable or low energy and stable), and ecology of the community (long-lived versus short lived). The extent of an adverse impact on habitat requires high resolution data on the location of fishing effort by gear and the location of specific seafloor habitats.

Stevenson *et al.* (2003) performed an evaluation of the potential impacts of otter trawls using the following information: 1) the EFH designations adopted by the Mid-Atlantic, New England, and South Atlantic Fishery Management Councils; 2) the results of a Fishing Gear Effects Workshop convened in October 2001; 3) the information provided in this report, including the results of existing scientific studies, and the geographic distribution of bottom otter trawl use in the Northeast region; and 4) the habitats utilized by each species and life stage as indicated in their EFH designations and supplemented by other references. First, the habitat's value to each species and life stage was characterized to the extent possible, based on its function in providing shelter, food and/or the right conditions for reproduction. For example, if the habitat provided shelter from predators for juvenile or other life stages, gear impacts that could reduce shelter were of greater concern. In cases where a food source was closely associated with the benthos (*e.g.* infauna), the ability of a species to use alternative food sources was evaluated. Additionally, since benthic prey populations may also be adversely affected by fishing, gear impacts that could affect the availability of prey for bottom-feeding species or life stages were of greater concern than if the species or life stages were piscivorous. In most cases habitat usage was determined from the information provided in the EFH Source Documents (NOAA Technical Memorandum NMFS-NE issues 123-153) with additional information from Collette and Klein-MacPhee (2002).

Based upon this qualitative draft assessment approach, Stevenson *et al.* (2003) indicated that otter trawls potentially have a high adverse impact on 18 life stages for 8 species, predominantly juveniles and adults; moderate impacts on 40 life stages of 21 species, predominantly juveniles, adults, and spawning adults; low impacts on about 30 life stages for 14 species, predominantly juveniles, adults, and spawning adults; no impacts on one life stage of one species, halibut eggs; and are not applicable to 67 life stages of 28 species, predominantly eggs and larvae (Table 38).

While the otter trawls utilized in this fishery have the potential to adversely affect EFH, available effort analyses are currently insufficient to predict the extent of adverse impacts from this fishery. However, since the preferred alternatives either maintain the status quo or are likely to reduce fishing effort, they should not result in an increase in fishing effort or redistribute effort by gear type. Therefore, these alternatives are not expected to increase any existing impacts on EFH caused by this fishery relative to the status quo. As noted above, the past actions in the FMP in conjunction with the measures proposed for 2005 have had the cumulative effect of controlling fishing effort through limited access programs and quotas. The Council is currently developing Amendment 9 which includes measures which address gear impacts on essential fish habitat. As a result, the Council will present a more thorough analysis of the effects of gears used in the Atlantic mackerel, squid and butterfish fisheries on EFH in Amendment 9. The Council anticipates that the measures proposed for 2005, in conjunction with past actions and those being developed in Amendment 9 should control or reduce impacts of these fisheries on EFH.

7.5.6 Communities

National Standard 8 requires that management measures take into account the fishing communities. The Council hired Dr. Bonnie McCay and her associates from Rutgers University to describe the ports and communities that are associated with the Atlantic Mackerel, Squid and Butterfish fisheries. Communities from Maine to Virginia are involved in the harvesting of Atlantic mackerel, squid and butterfish and are described in more detail in that report which is available upon request from the Council. Through implementation of the FMP for these species the Council seeks to achieve the primary objective of the Magnuson-Stevens Act which is to achieve optimum yield from these fisheries.

As noted above, a major goal of this FMP has been to develop the domestic fisheries for these species in a controlled manner. Prior to FMP development, the foreign prosecution of these fisheries occurred at much higher levels of fishing effort, which in many cases, resulted in overfishing. Thus, the first cumulative effect of the FMP has been to end foreign exploitation of these resources and to guide the development of the domestic harvest and processing fishery infrastructure. Part of this fishery rationalization process included the development of limited access programs to control capitalization while maintaining harvests at levels that are sustainable. In addition, by meeting the National Standards prescribed in the SFA, the Council has strived to meet one of the primary objectives of the act- to achieve optimum yield in each fishery. The proposed specifications for 2005, in conjunction with the past and future actions described above, will have positive cumulative impacts for the communities which depend on these resources. While the preferred alternative for butterfish could have short term negative effects on these communities because of reduced quota, the long term effects should be positive as the stock is rebuilt and harvests return to sustainable levels.

7.5.7 Summary of cumulative impacts

The impacts of the preferred alternatives on the biological, physical, and human environment are described in section 7. The synergistic interaction of improvements in the efficiency of the fishery are expected to generate positive impacts overall. These impacts will be felt most strongly in the social and economic dimension of the environment. Direct economic and social benefit from improved fishery efficiency is most likely to affect participants in these fisheries. These benefits are addressed in the RIR/FRFA of this document. Indirect benefits of the preferred alternatives are likely to affect consumers and in areas of the economic and social environment that interact in various ways with these fisheries.

The proposed actions, together with past and reasonable foreseeable future actions, are not expected to result in significant cumulative impacts on the biological, physical, and human components of the environment. However, several negative impacts could result from the proposed actions in 2005. First, the butterfish quota represents a reduction compared to previous years and could have short tern negative economic consequences. However, while the preferred quota for butterfish represents a decrease in quota relative to landings in 2001, it does not compared to the most recent two years for which data are available. Therefore, there could be some short term negative economic effects relative to 2001 fishery, but in the long term the benefits are expected to be positive since stock rebuilding is expected under this alternative.

Further, the stock size estimate for Atlantic mackerel is dated and considered uncertain. Therefore, both the Council and NMFS-preferred alternatives set IOY at levels well below ABC (see Sections 5.1.2 and 5.1.4). It is expected that this cautious approach, in conjunction with past and future management practices in the Atlantic mackerel fishery, will maintain the Atlantic mackerel stock at sustainable levels and should not result in significant cumulative impacts.

In addition, these fisheries are known to have had historical interactions with marine mammals. However, these interactions have primarily been with non-ESA listed species (pilot whales, common and white-sided dolphins). Further, the proposed alternatives either maintain the status quo or result in a reduction compared to the 2004 specifications. Therefore, potential interactions with ESA listed and non-listed species are not expected to increase.

These fisheries have been well managed since implementation of the FMP in the early 1980s. Both the resources and the fisheries they support appear to be in good condition. As long as management continues to prevent overfishing, the fisheries and their associated communities should continue to prosper. As noted above, the historical development of the FMP resulted in a number of actions which have impacted these fisheries. The cumulative effects of past actions in conjunction with the proposed measures for 2005 and possible future actions are discussed above. Within the construct of that analysis, the Council has concluded that no significant impacts will result from the specifications proposed for 2005.

8.0 OTHER APPLICABLE LAW

8.1 Magnuson-Stevens Fishery Conservation and Management Act

8.1.1 The Proposed Action Relative to the National Standards

Section 301(a) of the MSFCMA 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 action meets them.

8.1.1.1 National Standard 1 - Overfishing Definition

"Conservation and management measures shall prevent overfishing while achieving, on a continuous basis, the optimum yield from each fishery for the United States fishing industry."

The Sustainable Fisheries Act (SFA), which reauthorized and amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) made a number of changes to the existing National Standards. With respect to National Standard 1, the SFA imposed new requirements concerning definitions of overfishing in US fishery management plans. In order to comply with National Standard 1, the SFA requires that each Council FMP define overfishing as a rate or level of fishing mortality that jeopardizes a fisheries capacity to produce maximum sustainable yield (MSY) on a continuing basis and defines an overfished stock as a stock size that is less than a minimum biomass threshold.

The SFA also requires that each FMP specify objective and measurable status determination criteria for identifying when stocks or stock complexes covered by the FMP are overfished. To fulfill the requirements of the SFA, status determination criteria are comprised of two components: 1) a maximum fishing mortality threshold and 2) a minimum stock size threshold. The maximum F threshold is specified as F_{msy}. The minimum biomass threshold is specified as ½ the MSY level. The overfishing definitions for each of the species managed under this FMP were modified in Amendment 8 to comply with the SFA. All of the quotas proposed under the preferred alternatives for the 2005 specifications are consistent with overfishing definitions adopted in Amendment 8. Therefore, the proposed action is consistent with National Standard 1.

8.1.1.2 National Standard 2 - Scientific Information

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

The analyses in this proposed action are based on the best scientific information available. The proposed quotas for each species are based on the most recent stock assessment for each species as follows: the butterfish quota recommendation is based on SAW 38, the *Loligo* quota recommendation is based on SAW 34, the *Illex* quota recommendation is based on SAW 37, and the Atlantic mackerel quota recommendation is based on SAW 30. Therefore, this action is consistent with National Standard 2.

8.1.1.3 National Standard 3 - Management Units

"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."

Each species in the management unit of this FMP is managed as a single unit throughout its range, from Maine through Florida. The proposed action does not alter the management unit. Therefore, this proposed action is consistent with National Standard 3.

8.1.1.4 National Standard 4 - Allocations

"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."

Amendment 5 established a limited entry program for *Illex* and *Loligo*/butterfish. The actions proposed here are not expected to significantly alter the allocation established under Amendment 5 of any of the resources managed under this FMP. Therefore, the proposed actions are consistent with National Standard 4.

8.1.1.5 National Standard 5 - Efficiency

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

The management program implemented by the Amendments to the Atlantic Mackerel, Squid, and Butterfish FMP are intended to allow the fisheries managed pursuant to this FMP to operate at the lowest possible cost (e.g., fishing effort, administration, and enforcement) given the FMP's objectives. The measures proposed place no restrictions on processing, or marketing and no unnecessary restrictions on the use of efficient techniques of harvesting. Therefore the proposed actions are consistent with National Standard 5.

8.1.1.6 National Standard 6 - Variations and Contingencies

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

All of the other measures proposed allow for consideration in variations among, and contingencies in, fisheries, fishery resources and catches. The primary focus of the proposed actions are to establish quotas to maintain fishing mortality within the limits prescribed in the FMP for each species/fishery. These quotas can be adjusted within the fishing season if appropriate stock assessment become available that justify such changes. This mechanism allows for adjustments in response to variations among, and contingencies in, fisheries, fishery resources and catches. Therefore, the proposed action is consistent with National Standard 6.

8.1.1.7 National Standard 7 - Cost and Benefits

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

The description of how this National Standard is met by the FMP was described in Amendments 5, 6 and 8. The current FMP specifies managements measures intended to achieve the objectives of the SFA. These measures include quotas, permitting and reporting requirements and other measures such as trip limits and minimum mesh sizes. All of these measures were developed and implemented to minimize costs. In addition, none of these measures duplicate other federal or dates management actions. This proposed action is not expected to alter the costs of management under this FMP. Therefore, there is no reason to alter the conclusion that the proposed action is consistent with National Standard 7.

8.1.1.8 National Standard 8 - Communities

"Conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities."

The purpose of this FMP has been to provide a framework for the orderly development of the Atlantic mackerel, *Loligo* and *Illex* squid and butterfish fisheries while preventing overfishing. Therefore, most if not all of the fishing communities along the US east coast have been positively impacted by the FMP. Additional discussion of this issue is provided in the inpacts n the environment section.

The proper management of the stock complexes managed under this FMP through implementation of the management measures described in recent Amendments have been beneficial to the commercial and recreational fishing communities of the Atlantic Coast. By preventing overfishing of the stocks and overcapitalization of the industry, positive benefits to the fishing communities have and will continue to be realized. Therefore, the proposed action is consistent with National Standard 8.

8.1.1.9 National Standard 9 - Bycatch

"Conservation and management measures shall, to the extend practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch."

This national standard requires Councils to consider the bycatch effects of existing and planned conservation and management measures. To avoid discarding of squid and butterfish taken by non-moratorium vessels during the prosecution of other fisheries, a non-moratorium incidental permit category was created in Amendment 5. Vessels that did not qualify for a *Loligo*/butterfish or *Illex* moratorium permit may land *Loligo*, *Illex*, and/or butterfish if (1) it possesses an incidental catch permit, (2) fishes with a net legal in the directed fishery, (3) lands no more that 2,500 pounds of *Loligo* and/or butterfish or 10,000 pounds of *Illex* per trip, and (4) the operator of the vessel files the appropriate trip reports. The incidental catch allowance may be adjusted by the Regional Administrator based on the recommendation of the Council. This management measure was implemented specifically to minimize discarding of these species in non-directed fisheries and will not be altered by the proposed action. In addition, the minimum mesh size requirement proposed for butterfish will allow for escapement of small butterfish and other small non-target species.

The amount of discarding in the commercial fisheries for these species should be also be minimized since capping the fishery at 1996 levels avoided overfishing of the squids and butterfish. Also, state and federal mesh regulations already in effect for other species (i.e., summer flounder, weakfish, black sea bass, etc.) will reduce the bycatch of small butterfish. In addition, Amendmet 8 added framework provisions described in Section 3.1.1 to deal with discard problems in the future, should they arise. The primary mechanism that the Council will use to address the discard problems in the small mesh fisheries for *Loligo* and butterfish is through the use of gear restricted areas for the small mesh fisheries directed at principally at *Loligo* and butterfish. Specifically, since this discard problem has been identified, gear restrictions have been put into place under the scup annual specifications to reduce discards in these fisheries. These GRA's will be reviewed annually to determine the appropriate times and areas of restrictions necessary to minimize discards in these fisheries. All of these measures already in place as well as the GRA's will result in the minimization of bycatch and discard mortality in the commercial fisheries for these species, to the extent practicable. Therefore, National Standard 9 is satisfied.

8.1.1.10 National Standard 10 - Safety at Sea

"Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea."

The proposed action should not affect the vessel operating environment, gear loading requirements or create derby style fisheries for Atlantic mackerel, squid or butterfish. The Council developed this FMP and subsequent amendments with the consultation of industry advisors to help ensure that this was the case. In summary, the Council has concluded that the proposed action will not impact or affect the safety of human life at sea. Therefore the action is consistent with National Standard 10.

8.1.2 OTHER MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT REQUIREMENTS

Section 303(a)(12) of the MSFCMA requires the Councils to assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish. This requirement has been addressed under section 7.1.9 of Amendment 8. This conclusion was reached because the FMP currently does not contain any measures which would cause the discarding of Atlantic mackerel in the recreational fishery for the species. In addition, there are no other recreational fisheries for the species managed under this FMP.

Section 303(a)(13) of the MSFCMA requires the Councils to include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery and, to the extent practicable, quantify trends in landings of the managed fishery resources by the commercial, recreational, and charter fishing sectors. The description of fishing activities for the recreational Atlantic mackerel was presented in section 6.6. Additional information pertaining to the recreational and charter fishing sectors is presented below (Additional Characterization of the Recreational and Party/Charter Fisheries).

Section 303(a)(14) of the MSFCMA requires that to the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, any harvest restrictions or recovery benefits are allocated fairly and equitably among commercial, recreational, and charter fishing sectors in the fishery. This amendment would not change the allocations between the recreational and commercial Atlantic mackerel fisheries.

8.1.2.1 Additional Characterization of the Recreational and Party/Charter Fisheries

8.1.2.1.1 Marine recreational descriptive statistics

In 1994, sportfishing surveys were conducted by NMFS in the Northeast Region (Maine to Virginia) to obtain demographic and economic information on marine recreational fishing participants from Maine to Virginia. Data from the surveys were then used to access socio-economic characteristics of these participants, as well as to identify their marine recreational fishing preferences and their perceptions of current and prospective fishery management regulations. This information will be used in future stages of the research to estimate statistical models of the demand for marine recreational fishing for eight important recreational species. The information that follows is excepted and paraphrased from a preliminary report by Steinback *et. al.* (1999).

"Marine recreational fishing is one of the most popular outdoor recreational activities in America. In 1992, the lowest level of participation during the last ten years, approximately 2.57 million residents of coastal states in the Northeast Region participated in marine recreational fishing in their own state. Participation increased approximately 5% in 1993 (2.7 million) and increased another 14% in 1994 (3.1 million), exceeding the ten-year average of 2.9 million. Although the total number of finfish caught in the Northeast Region has declined over the past ten years effort (trips) has remained relatively stable. An estimated 22.4 million fishing trips were taken in 1994, up from 19.3 million in 1993."

The following discussion contains demographic and socio-economic characteristics of anglers, as well as their preferences, attitudes, and opinions, toward recreational fishing activities and regulations. There was little or no difference in mean age across subregions. "The largest proportion of anglers in both subregions were 36-45 years old (NE=28%, MA=25%). However, comparatively, New England anglers were younger than Mid-Atlantic anglers. Results show that participation in marine recreational fishing increased with age, peaked between ages of 36 to 45, and subsequently declined thereafter. The resultant age distribution is similar to the findings of other marine recreational studies. However, the distribution is not reflective of the general population in these subregions. Bureau of the Census estimates indicate population peaks between the ages of 25 to 34 in both subregions, declines until the age of 64 and then increases substantially." The complete distribution of recreational anglers by age for both subregions is as follows: between the ages of 16-25, 8% in NE and 7% in Massachusetts; between 26-35, 24% in NE and 20% in Massachusetts; between 36-45, 28% in NE and 25% in Massachusetts; between 56-65, 12% in NE and 15% in Massachusetts; and 65 and over, 8% in NE and 11% in Massachusetts. In this survey anglers under the age of 16 were not interviewed and are not included in the analysis.

In both subregions at least 88% of the anglers (age 25 and over) had obtained at least a high school degree (NE=91%, MA=88%). "While the educational background is similar across subregions, a greater portion of the anglers in New England earned college or post graduate/professional degrees (NE=29%, MA=23%). The shape of the educational distribution essentially mirrored the general population in both subregions. However, the average number of anglers without a high school degree was considerably lower than Bureau of the Census estimates (age 25 and over) for the general population. On the other hand, it appears that anglers in new England and the Mid-Atlantic earned less post graduate/professional degrees than Bureau of Census estimates."

When anglers were asked to describe their racial or ethnic origin, almost all of the anglers interviewed in both subregions considered themselves to be white (NE=95%, MA=90%). "In the Mid-Atlantic, most of the remaining individuals were black (7%), leaving 3% to be of other ethnic origins. In New England, the remaining anglers were evenly distributed across other ethnic origins. The high occurrence of white fishermen is representative of the general population of the coastal states in New England, Approximately 94% of the population in 1993 was estimated to be white. However, in the Mid-Atlantic, the percentage of white anglers was considerable higher than Bureau of Census populations estimates, and the percentage of black fishermen was 12 percent lower."

When anglers were asked to indicate from a range of categories what their total annual household income was, only minor differences between subregions were found. "The largest percentage of household incomes fell between $30,001 and $45,000 for both subregions (NE=27%, MA=26%). In comparison to the general population, anglers' annual household incomes are relatively higher in both subregions. Results are consistent with previous studies which showed that angler household incomes are generally higher than the population estimates."

If it is assumed that "years fished" is a proxy for "experience," the survey data shows that anglers in New England are relatively less experienced than anglers in the Mid-Atlantic. The distribution of recreational anglers years of experience is as follows: 0-5 years of experience, 22% in NE and 16% in Massachusetts; 6-10 years of experience, 10% in NE and 10% in Massachusetts; 11-15 years of experience, 13% in NE and 14% in Massachusetts; 16-20 years of experience, 9% in NE and 9% in Massachusetts; 21-25 years of experience, 12% in NE and 12% in Massachusetts; 26-30 years of experience, 13% in NE and 12% in Massachusetts; and 30 or more years of experience, 21% NE and 26% in Massachusetts.

On average, it was found that New England anglers spent more on boat fees, lodging, and travel expenses than Mid-Atlantic anglers (due to budget and interview time constraints, expenditure information pertaining to bait, tackle, ice, or meals was not collected). "During the follow-up telephone portion of the survey, anglers that fished from a party/charter boat or a private/rental boat were asked how much they personally spent on boat fees for the trip in which they were interviewed. Boat fees averaged $61.00 per trip in New England and $51.00 in the Mid-Atlantic. Two categories of lodging expenses were obtained. The first category (Lodging (>0)) is an estimate of the mean lodging expense per night for those anglers who indicated they spent at least one night away from their residence and personally incurred lodging costs. Subsequently, the second category (Lodging (all)) is an estimate of mean lodging expenses across all overnight anglers, regardless of whether an angler incurred a lodging expense. Per night costs were estimated by dividing total lodging costs for the trip by the number of days the angler was away from his/her residence on the trip. Anglers that personally incurred lodging expenses spent $58.00 on average per night in New England and $47.00 per night in the Mid-Atlantic. Across all overnight anglers, per night lodging expenses in New England averaged $29.00 and in the Mid-Atlantic, $21.00. Anglers expenditures also included money spent on gas, travel fares, tolls, and ferry and parking fees. One-way travel expenditures averaged $11.00 in new England and $8.00 in the Mid-Atlantic per trip. Therefore, if arrival costs are tantamount to departure costs, average round-trip travel expenses would approximate $22.00 in New England and $16.00 in the Mid-Atlantic." Since certain expenditures such as parking, tolls, and other travel fares may be incurred only once, the estimated round-trip travel expense should be considered an upper bound estimate.

Survey results show that over 50% of the anglers in both subregions indicated boat ownership (NE=51%, MA=53%). These results were obtained when anglers were asked if anyone living in their household owns a boat that is used for recreational saltwater fishing.

Regarding the duration of the interviewed trip length, "at least 80 percent of the anglers in both subregions indicated they were on a one-day fishing trip (NE=80%, MA=84%). One-day fishing trips were defined to be trips in which an angler departs and returns on the same day. Less than one fourth of the respondents indicated the day fishing was part of a longer trip which they spent at least one night away from their residence (NE=20%, MA=16%)."

"Respondents were asked why they chose to fish at the site they were interviewed. "Convenience" and "better catch rates" were the main reasons why anglers chose fishing sites in both subregions. Forty-nine percent of the anglers in New England and 57 percent of the anglers in the Mid-Atlantic indicated "convenience" as either first or second reason for site choice. "Better catch rates" was the first or second stated reason for site choice by 51 percent of the anglers in New England and 50 percent of the anglers in the Mid-Atlantic. Other notable responses were "always go there," "boat ramp," "access to pier," and "scenic beauty." Results indicate that although anglers chose fishing sites for many different reasons, sites that offered good catch rates and were convenient attracted the most anglers."

Recreational anglers were asked to rate recreational fishing against their other outdoor activities during the last two months. Specifically, they were asked if fishing was their most important outdoor activity, their second most important outdoor activity, or only one of many outdoor activities? "Over 60% of the respondents in both subregions (NE=61%, MA=68%) reported marine recreational fishing was their most important outdoor activity during the past two months. Less than 30 percent in both subregions (NE=27%, MA=20%) said recreational fishing was only one of many outdoor activities. These results were consistent with national outdoor recreation surveys carried over the past three decades indicating that fishing is consistently one of the top outdoor recreational activities in terms of number of people who participate.

Recreational anglers ratings of reasons (7 preestablished reasons for fishing) for marine fishing are presented in Steinback *et. al.* (1999). More than 66% of the anglers in both subregions said that it was very important to go marine fishing because it allowed them to: spend quality time with friends and family (NE=81%, MA=85%); enjoy nature and the outdoors (NE=89%, MA=87%); experience or challenge of sport fishing (NE=69%, MA=66%); and relax and escape from my daily routine (NE=83%, MA=86%). "The reasons that were rated as not important by the largest proportion of anglers consisted of: fish to eat (NE=42%), to be alone (NE=55%, MA=58%), and to fish in a tournament or when citations were available (NE=79%, MA=73%). In the Mid-Atlantic, although to catch fish to eat was rated as being somewhat important by the largest proportion of anglers (40%), approximately 31 percent felt that catching fish to eat was very important. Whereas, in New England, only 20 percent concurred. It is clear from these responses that marine recreational fishing offers much more than just catching fish to anglers. Over 80 percent of the respondents in both subregions perceived recreational fishing as a time to spend with friends and family, a time to escape from their daily routine, and time to enjoy nature and outdoors. While catching fish to eat is somewhat important to anglers, findings of this survey generally concur with previous studies that found non-catch reasons are rated highly by almost all respondents while catch is very important for about a third and catching to eat fish is moderately important for about another third."

"The economic survey sought to solicit anglers opinions regarding four widely applied regulatory methods used to restrict total recreational catch of the species of fish for which they typically fish: (1) limits on the minimum size of the fish they can keep; (2) limits on the number of fish they can keep; (3) limits on the times of the year when they can keep the fish they catch; and (4) limits on the areas they fish. Anglers were asked whether or not they support or opposed the regulations." Strong support existed for all regulatory methods in both subregions. Limits on the minimum size of fish anglers could keep generated the highest support in both regions (NE=93%, MA=93%), while limits on the area anglers can fish, although still high, generated relatively lower support (NE=68%, MA=66%).

Regulations which limit the number of fish anglers can keep ranked second (NE=91%, MA=88%). The results from this solicitation indicate that recreational anglers in the Northeast Region appear to be conservation oriented and generally support regulations employed to restrict total catch. Not surprisingly, when analyzing anglers opinions regarding the four widely applied regulatory methods, it was found that anglers in all modes indicated strong support for the regulatory measures. With minimum size limits generating the strongest support, followed by catch limits, seasonal closures, and lastly, area closures. "Although party/charter, private/rental, and shore respondents did offer varying degrees of support for each of a selection of regulatory measures, similar support existed across all modes. Support was highest for common regulatory methods currently being implemented in New England and the Mid-Atlantic (e.g., size and bag limits), than for area and seasonal closures."

8.1.3 Essential Fish Habitat Assessment

Atlantic mackerel, squid and butterfish have EFH designated in many of the same habitats that have been designated as EFH for most of the groundfish within the Northeast Multispecies FMP, including: Atlantic cod, haddock, monkfish, ocean pout, American plaice, pollock, redfish, white hake, windowpane flounder, winter flounder, witch flounder, yellowtail flounder, Atlantic halibut and Atlantic sea scallops. Broadly, EFH is designated as the bottom habitats consisting of varying substrates (depending upon species) within the Gulf of Maine, Georges Bank, and the continental shelf off southern New England and the mid-Atlantic south to Cape Hatteras for the juveniles and adults of these groundfish. In general, these areas are the same as those designated for Atlantic mackerel, squid and butterfish, including substrate/bottom habitat.

Fishing activities for Atlantic mackerel, squid and butterfish occur in these EFH areas. The primary gear utilized to harvest these species is the bottom otter trawl, although a significant portion of the Atlantic mackerel landings are taken with mid-water otter trawls . Since the otter trawl most prevalent in these fisheries is the bottom- tending mobile gear type, it is most likely to be associated with adverse impacts to bottom habitat. The primary impact associated with this type of gear is reduction of habitat complexity (Auster and Langton, 1998).

Amendment 8 included overfishing definitions which are the same or more conservative than overfishing definitions from previous Amendments. As a result, the quota specifications resulting from these new overfishing definitions are the same or lower than in previous years. This should effectively result in the same or reduced gear impacts to bottom habitats by reducing or maintaining the harvest of the managed species within this FMP. Any reductions in harvesting effort may indirectly benefit EFH by creating an overall reduction of disturbance by a gear type that impacts bottom habitats. Other management actions already in place should control redirection of effort into other bottom habitats (including, but not limited to stock rebuilding programs for other species that are designated as overfished, limited access programs to control entry of new fishing effort, and measures such as days-at sea limits, quotas, seasons and trip limits that tend to limit fishing effort in this and other managed fisheries throughout the Northwest Atlantic Ocean under US jurisdiction).

The quotas under the preferred alternatives proposed in this action maintain the status quo or in the cases of butterfish and mackerel, reduce the quota relative to 2004 specifications. Therefore, the Council has concluded that the 2005 quota specifications proposed for Atlantic mackerel, squid and butterfish will have no more adverse impacts on EFH than those than may currently exist. As noted in previous sections, the Council is currently developing a draft of Amendment 9 which includes measures which address gear impacts from these fisheries on essential fish habitat. As a result, the Council will present a more thorough analysis of the effects of gears used in the Atlantic mackerel, squid and butterfish fisheries on Essential Fish Habitat in Amendment 9.

8.2 NEPA

8.2.1 Finding of No Significant Impact

National Oceanic and Atmospheric Administration Order (NAO) 216-6 (revised May 20, 1999) provides nine criteria for determining the significance of the impacts of a proposed action. These criteria are discussed below:

1. Can the proposed action be reasonably expected to jeopardize the sustainability of any target species that may be affected by the action?

None of the proposed specifications for 2005 are expected to jeopardize the sustainability of any target species affected by the action (see Section 7.0 Environmental Consequences). All of the proposed quota specifications under the preferred alternatives for each species are consistent with the FMP overfishing definitions. This action will protect the long-term sustainability of the Atlantic mackerel, *Illex* and *Loligo* squid, and butterfish stocks.

2. Can the proposed action be reasonably expected to allow substantial damage to the ocean and coastal habitats and/or EFH as defined under the Magnuson-Stevens Act and identified in FMPs?

The area affected by the proposed specifications in the Atlantic mackerel, squid, and butterfish fisheries has been identified as EFH for the above mentioned species as well as tilefish, summer flounder, scup, black sea bass, and species associated with the Northeast multispecies FMP. The action in the context of the fisheries as a whole has the potential to have an adverse impact on EFH. However, because the adverse impact on EFH is not substantial, NMFS conducted an abbreviated EFH consultation pursuant to 50 CFR 600.920(h) and an EFH Assessment that incorporates all of the information required in 50 CFR 600.920(g)(2), that was prepared and included in the most recent Framework document. The preferred alternatives for the proposed 2005 specifications should not result in any increase in or redirection of effort. As a result, no new EFH Conservation Recommendations are necessary (see Section 8.1.3 EFH Assessment).

3. Can the proposed action be reasonably expected to have a substantial adverse impact on public health or safety?

The proposed action is not expected to have a substantial adverse impact on public health or safety. None of the measures alters the manner in which the industry conducts fishing activities for the target species, therefore, there is no change in fishing behavior that would affect safety. None of the measures has an impact on public health.

4. Can the proposed action be reasonably expected to have an adverse impact on endangered or threatened species, marine mammals, or critical habitat of these species?

The proposed specifications continue or reduce the 2004 ABC specifications for each species for the upcoming fishing year. None of the specifications are expected to alter fishing methods or increase fishing activities. Therefore, this action is not expected to affect endangered or threatened species or critical habitat in any manner not considered in previous consultations on the fisheries. Based on at sea observations, these fisheries are known to interact with three species protected under the MMPA- common dolphin, white-sided dolphins and pilot whales. The actions proposed here should not increase the risk of interactions with these species since they are expected to maintain or reduce fishing effort. In addition, none of the proposed measures alters fishing methods or activities. NMFS currently plans on convening a Take

Reduction Team in the fall of 2006 to further assess impacts and develop measures to reduce trawl gear interactions and the take of marine mammals in offshore trawl fisheries.

5. Can the proposed action be reasonably expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

The proposed action is not expected to result in cumulative effects on target or non-target species. The proposed measures maintain the 2004 status quo or reduce ABC specifications for an additional year. None of the measures alters fishing methods or increases fishing activities. As such, the proposed measures are not expected to result in significant cumulative effects on target or non-target species (see Section 7.5 Cumulative Impacts).

6. Can the proposed action be reasonably expected to jeopardize the sustainability of any non-target species?

The proposed action is not expected to jeopardize the sustainability of any non-target species. The proposed measures maintain or decrease the ABC specifications for the upcoming fishing year. None of the specifications are expected to result in increased fishing effort. In addition, none of the measures are expected to alter fishing methods or increase fishing activities. Therefore, none of the proposed actions are expected to jeopardize the sustainablility of non-target species.

7. Can the proposed action be expected to have a substantial impact on biodiversity and ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?

The proposed action is not expected to have a substantial impact on biodiversity and ecosystem function within the affected area.

8. Are significant social or economic impacts interrelated with significant natural or physical environmental effects?

As discussed in Section 7.0 of this EA, the proposed specifications for 2005 are not expected to result in significant social or economic impacts, or significant natural or physical environmental effects not already analyzed. Therefore, there are no significant social or economic impacts interrelated with significant natural or physical environmental impacts.

9. To what degree are the effects on the quality of the human environment expected to be highly controversial?

The proposed measures maintain or reduce the status quo ABC specifications for each species for an additional year. Therefore, the measures contained in this action are not expected to be highly controversial.

FONSI Statement

Having reviewed the environmental assessment and the available information relating to the proposed 2005 annual specifications for Atlantic Mackerel, Squid and Butterfish, I have determined that there will be no significant environmental impacts, individually or cumulatively, resulting from this action and that preparation of an environmental impact statement on the action is not required by Section 102(2)(c) of the National Environmental Policy Act or its implementing regulations.

______________________________ ______________________________

Assistant Administrator for Fisheries, NOAA Date

8.3 Endangered Species Act

The numerous species which inhabit the management unit of this FMP that are afforded protection under the Endangered Species Act (ESA) of 1973 (i.e., for those designated as threatened or endangered) are described in Section 6.0.

8.4 Marine Mammal Protection Act

The numerous species which inhabit the management unit of this FMP that are afforded protection under the Marine Mammal Protection Act of 1972 (MMPA) are described in Section 6.0.

8.5 Coastal Zone Management Act

The Council determined that this action is consistent to the maximum extent practicable with the enforceable provisions of the approved coastal management programs of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida. This determination was submitted for review by the responsible state agencies under section 307 of the Coastal Zone Management Act. Concurrence in consistency was submitted to the responsible state agencies of New Hampshire, Connecticut, New Jersey, Pennsylvania, Delaware, and Virginia, North Carolina, South Carolina, Georgia and Florida.

8.6 Section 515 (Data Quality Act)

A Data Quality Act evaluation was made and it concluded that the data and analyses in this EA is in compliance with the requirements of Section 515. The data and analyses utilized by the Council in developing the proposed measures for 2005 were based on the most recent peer reviewed stock assessment for each species and underwent additional peer review by the Atlantic Mackerel, Squid and Butterfish Committee.

8.7 Paperwork Reduction Act

The Paperwork Reduction Act (PRA) concerns the collection of information. The intent of the PRA is to minimize the Federal paperwork burden for individuals, small business, state and local governments, and other persons as well as to maximize the usefulness of information collected by the Federal government. There are no changes to the existing reporting requirements previously approved under this FMP for vessel permits), dealer reporting and vessel logbooks.

As stated above, this action does not implement new reporting or record keeping measures. There are no changes to existing reporting requirements. Currently, all Atlantic mackerel squid and butterfish Federally-permitted dealers must submit weekly reports of fish purchases. In addition to detailed weekly reports of all purchases for all species from fishing vessels, dealers must also submit a weekly summary of their purchases via the Interactive Voice Response (IVR) system. The owner or operator of any vessel issued a vessel permit for Atlantic mackerel squid and butterfish must maintain on board the vessel, and submit, an accurate daily fishing log report for all fishing trips, regardless of species fished for or taken. The owner of any party or charter boat issued an Atlantic mackerel party/charter permit and carrying passengers for hire shall maintain on board the vessel, and submit, an accurate daily fishing log report for each charter or party fishing trip that lands Atlantic mackerel, unless such a vessel is also issued another permit that requires regular reporting, in which case a fishing log report is required for each trip regardless of species retained. These reporting requirements are critical for monitoring the harvest level of these fisheries.

8.8 Impacts of Plan Relative to Federalism/E.O. 12132

The proposed action does not contain policies with federalism implications sufficient to warrant preparation of a federalism assessment under Executive Order 12132.

8.9 Executive Order 12898/Environmental Justice

This Executive Order provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. " EO 12898 directs each Federal agency to analyze the environmental effects, including human health, economic, and social effects of Federal actions, including effects on minority populations, low-income populations, and Indian tribes, when such analysis is required by NEPA. Agencies are further directed to "identify potential effects and mitigation measures in consultation with affected communities, and improve the accessibility of meetings, crucial documents, and notices."

The proposed action under the preferred alternative maintains the status quo in terms of participation in the Atlantic mackerel, squid and butterfish fisheries. Since the proposed action represents no change relative to the current level of participation in these fisheries, no negative biological, economic or social effects are anticipated as a result (see section 6.0). Therefore, the proposed action under the preferred alternatives are not expected to cause disproportionately high and adverse human health, environmental or economic effects on minority populations, low-income populations, or native American tribes.

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10.0 LIST OF AGENCIES AND PERSONS CONSULTED

In preparing this annual specifications analysis the Council consulted with the NMFS, New England and South Atlantic Fishery Management Councils, Fish and Wildlife Service, Department of State, and the states of Maine through Florida through their membership on the Mid-Atlantic, New England and /or South Atlantic Fishery Management Councils. In addition, states that are members within the management unit were be consulted through the Coastal Zone Management Program consistency process. Letters were sent to each of the following states (point of contact in parentheses) within the management unit reviewing the consistency of the proposed action relative to each state's Coastal Zone Management Program: Maine (Kathleen Leyden), New Hampshire (Brian Mazerski), Massachusetts (Joe Pelcarski), Rhode Island (Grover Fugate), Connecticut (Charles Evans), New York (William Barton), New Jersey (Mark Mauriello), Pennsylvania (Lawrence Toth), Delaware (Sarah Cooksey), Maryland (Gwynne Schultz), Virginia (Silvia Gazzera), North Carolina (Steven Benton), South Carolina (Chris Brooks), Georgia (Stuart Stevens) and Florida (Ralph Cantral).

11.0 LIST OF PREPARERS

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INITIAL REGULATORY FLEXIBILITY ANALYSIS (IRFA) & REGULATORY IMPACT REVIEW FOR THE 2005 CATCH SPECIFICATIONS FOR ATLANTIC MACKEREL, SQUID, AND BUTTERFISH

1. INTRODUCTION

NMFS requires the preparation of a Regulatory Impact Review (RIR) for all regulatory actions that either implement a new Fishery Management Plan (FMP) or significantly amend an existing plan or regulation. The RIR is part of the process of preparing and reviewing FMPs and provides a comprehensive review of the changes in net economic benefits to society associated with regulatory actions. The analysis also provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problems. The purpose of the analysis is to ensure that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way.

2.0 EVALUATION OF E.O. 12866 SIGNIFICANCE

The proposed action does not constitute a significant regulatory action under Executive Order 12866 for the following reasons. (1) It will not have an annual effect on the economy of more than $100 million. Based on unpublished NMFS preliminary data (Maine-North Carolina) the total commercial value for the Atlantic mackerel, squid and butterfish fisheries combined was estimated at $31.1 million in 2003. The measures considered in this regulatory action will not affect total revenues generated by the commercial industry to the extent that a $100 million annual economic impact will occur. The proposed actions are necessary to maintain the harvest of squid and butterfish at sustainable levels. The proposed action benefits in a material way the economy, productivity, competition and jobs. The proposed action will not adversely affect, in the long-term, competition, jobs, the environment, public health or safety, or state, local, or tribal government communities. (2) The proposed actions will not create a serious inconsistency or otherwise interfere with an action taken or planned by another agency. No other agency has indicated that it plans an action that will affect the Atlantic mackerel, squid and butterfish fisheries in the EEZ. (3) The proposed actions will not materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of their participants. (4) The proposed actions do not raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

The economic benefits of the Atlantic Mackerel, Squid and Butterfish FMP have been evaluated periodically as amendments to the FMP have been implemented. These analyses have been conducted at the time a major amendment is developed and interim actions (framework adjustments or quota specifications) may be presumed to leave the conclusions reached in the initial benefit-cost analyses unchanged provided the original conservation and economic objectives of the plan are being met.

Amendment 8 implemented overfishing definitions which are the same or more conservative than overfishing definitions from previous Amendments. As a result, the quota specifications resulting from these new overfishing definitions are the same or lower than in previous years. The economic effects of these overfishing definitions and quota specifications were evaluated at the time Amendment 8 was implemented. The economic analysis presented at that time Amendment 8 implemented was largely qualitative in nature.

For each scenario, potential impacts on several areas of interest are discussed. The objective of this analysis is to describe clearly and concisely the economic effects of the various alternatives. The types of effects that should be considered include the following changes in landings, prices, consumer and producer benefits, harvesting costs, enforcement costs, and distributional effects. Due to the lack of an empirical model for these fisheries and knowledge of elasticities of supply and demand, a qualitative approach to the economic assessment was adopted. Nevertheless, quantitative measures are provided whenever possible.

A more detailed description of the economic concepts involved can be found in "Guidelines for Economic Analysis of Fishery Management Actions" (USDC 2000), as only a brief summary of key concepts will be presented here.

Benefit-cost analysis is conducted to evaluate the net social benefit arising from changes in consumer and producer surpluses that are expected to occur upon implementation of a regulatory action. Total Consumer Surplus (CS) is the difference between the amounts consumers are willing to pay for products or services and the amounts they actually pay. Thus CS represents net benefits to consumers. When the information necessary to plot the supply and demand curves for a particular commodity is available, consumer surplus is represented by the area that is below the demand curve and above the market clearing price where the two curves intersect. Since an empirical model describing the elasticities of supply and demand for these species is not available, it was assumed that the price for these species was determined by the market clearance price market or the interaction of the supply and demand curves. These prices were the base prices used to determine potential changes in prices due to changes in landings.

Net benefit to producers is producer surplus (PS). Total PS is the difference between the amounts producers actually receive for providing goods and services and the economic cost producers bear to do so. Graphically, it is the area above the supply curve and below the market clearing price where supply and demand intersect. Economic costs are measured by the opportunity cost of all resources including the raw materials, physical and human capital used in the process of supplying these goods and services to consumers.

One of the more visible costs to society of fisheries regulation is that of enforcement. From a budgetary perspective, the cost of enforcement is equivalent to the total public expenditure devoted to enforcement. However, the economic cost of enforcement is measured by the opportunity cost of devoting resources to enforcement vis à vis some other public or private use and/or by the opportunity cost of diverting enforcement resources from one fishery to another.

Alternatives for Atlantic mackerel

The specifications under alternative 1 would be ABC = 347,000 mt, IOY=170,000 mt, DAH=170,000 mt, DAP=150,000 mt and JVP=5,000 and TALFF=0 mt. The specifications under alternative 2 (Council-preferred) would be ABC = 335,000 mt, IOY=165,000 mt, DAH=165,000 mt, DAP=150,000 mt and JVP=0 and TALFF=0 mt. The specifications under alternative 3 would be ABC = 347,000 mt, IOY=165,000 mt, DAH=165,000 mt, DAP=150,000 mt and JVP=0 and TALFF=0 mt. The specifications under alternative 4 (NMFS-preferred) would be ABC = 335,000 mt, IOY=115,000 mt, DAH=115,000 mt, DAP=100,000 mt, and JVP=0 and TALFF=0 mt.

Due to a lack of an empirical model for these fisheries and knowledge of elasticities of supply and demand, a qualitative approach to the economic assessment was adopted. Nevertheless, quantitative measures are provided whenever possible.

Landings

The quota proposed for 2005, as in previous years, has not been constraining, so no change in the domestic harvest of Atlantic mackerel would be expected as a result of the specifications in 2005 under any of the alternatives considered for Atlantic mackerel.

Prices

Given the likelihood that the alternatives for Atlantic mackerel will result in no change in mackerel landings and that mackerel prices are a function of numerous factors including world supply and demand, it is assumed that there will not be a change in the price for this species.

Consumer Surplus

Assuming Atlantic mackerel prices will not be affected under the scenario constructed above, there will be no corresponding change in consumer surplus associated with these fisheries.

Harvest Costs

No changes to harvest costs are expected as a result of these measures.

Producer surplus

Assuming Atlantic mackerel prices will not be affected under the scenario constructed above, there will be no corresponding change in producer surplus associated with these fisheries.

Enforcement Costs

Properly defined, enforcement costs are not equivalent to the budgetary expense of dockside or at-sea inspection of vessels. Rather, enforcement costs from an economic perspective, are measured by opportunity cost in terms of foregone enforcement services that must be diverted to enforcing regulations. The measures are not expected to change enforcement costs.

Distributive Effects

There are no changes to the quota allocation process for mackerel. As such, no distributional effects are identified for this fishery.

Alternatives for *Illex*

The specifications for *Illex* under alternative 1 (status quo and preferred) would be Max OY, ABC, IOY, DAH, and DAP = 24,000 mt and JVP and TALFF = 0 mt. The specifications for *Illex* under alternative 2 would be Max OY, ABC, IOY, DAH, and DAP = 30,000 mt and JVP and TALFF = 0 mt. The specifications for *Illex* under alternative 3 would be Max OY, ABC, IOY, DAH, and DAP = 19,000 mt and JVP and TALFF = 0 mt.

Due to a lack of an empirical model for these fisheries and knowledge of elasticities of supply and demand, a qualitative approach to the economic assessment was adopted. Nevertheless, quantitative measures are provided whenever possible.

Landings

Under the alternatives considered for *Illex*, none are expected to result in a change in landings due to the specifications for the alternative measures in 2005. The landings for *lllex* have been below the alternatives considered for this species. Therefore, none of the specifications considered by the Council under the alternatives for 2005 for *Illex* are expected to result in an increase or decrease in landings in 2005.

Prices

Given the likelihood that the alternatives considered for Illex would not affect landings in 2005, it is assumed that there will not be a change in the price for this species

Consumer Surplus

Assuming *Illex* prices will not be affected under the scenario constructed above, there will be no corresponding change in consumer surplus associated with these fisheries under the alternative measures considered.

Harvest Costs

No changes to harvest costs are expected as a result of the alternatives considered for Illex.

Producer surplus

Assuming *Illex* prices will not be affected under the scenarios constructed above, there will be no corresponding change in producer surplus associated with alternatives considered for Illex.

Enforcement Costs

The alternatives considered for *Illex* are not expected to change enforcement costs.

Distributive Effects

There are no changes to the quota allocation process for *Illex* under the alternatives considered. As such, no distributional effects are expected for these fisheries.

Alternatives for butterfish

The specifications under alternative 1 (2004 status quo) would be Max OY = 16,000 mt, ABC = 7,200 mt, and IOY, DAH, and DAP = 5,900 mt and JVP and TALFF = 0 mt. The specifications under alternative 2 (preferred alternative) would be Max OY = 12,175 mt, ABC = 4,545 mt, and IOY, DAH, and DAP = 1,681 mt and JVP and TALFF = 0 mt. In addition, this alternative would implement a 3.0 minimum cod end mesh size requirement for butterfish trips greater than 5,000 pounds. The specifications under alternative 3 would be Max OY = 12,175 mt and ABC = 12,175 mt, and IOY, DAH, and DAP = 9,131 mt and JVP and TALFF = 0 mt.

Due to a lack of an empirical model for these fisheries and knowledge of elasticities of supply and demand, a qualitative approach to the economic assessment was adopted. Nevertheless, quantitative measures are provided whenever possible.

Landings

No change in the domestic harvest of butterfish would expected as a result of the specifications in 2005 under alternatives 1 or 3. However, since alternative 2 may constrain fishing activity then landings may decrease under this alternative.

Prices

Given the likelihood that alternatives 1 and 3 will result in no change in butterfish landings and that butterfish prices are a function of numerous factors including supply and demand, it is assumed that there will not be a change in the price for this species under these alternatives. However, since landings could decrease under alternative 2 then price may increase under this alternative.

Consumer Surplus

Assuming butterfish prices will not be affected under alternatives 1 and 3, there will be no corresponding change in consumer surplus associated with these alternatives. However, under alternative 2 consumer surplus would be expected to decrease as a result of the increase in price associated with this alternative.

Harvest Costs

No changes to harvest costs are expected as a result of the alternatives considered for butterfish.

Producer surplus

Assuming butterfish prices will not be affected under alternatives 1 and 3, there will be no corresponding change in producer surplus associated with these alternatives. However, under alternative 2 producer surplus would be expected to change as a result of the increase in price associated with this alternative. The magnitude of the PS change will be associated with the price elasticity of demand for butterfish.

The law of demand states that price and quantity demanded are inversely related. Given a demand curve for a commodity (good or service), the elasticity of demand is a measure of the responsiveness of the quantity that will be taken by consumers giving changes in the price of that commodity (while holding other variables constant). There are several major factors that influence the elasticity for a specific commodity. These factors largely determine whether demand for a commodity is price elastic or inelastic[1]: 1) the number and closeness of substitutes for the commodity under consideration, 2) the number of uses to which the commodity can be put; and 3) the price of the commodity relative to the consumers's purchasing power (income). There are other factors that may also determine the elasticity of demand but are not mention here because they are beyond the scope of this discussion. As the number and closeness of substitutes and/or the number of uses for a specific commodity increase, the demand for the specific commodity will tend to be more elastic. Demand for commodities that take a large amount of the consumer's income is likely to be elastic compared to services with low prices relative to the consumer's

[1]Price elasticity of demand is elastic when a change in quantity demanded is large relative to the change in price. Price elasticity of demand is inelastic when a change in quantity demanded is small relative to the change in price. Price elasticity of demand is unitary when when a change in quantity demanded and price are the same.

income. It is argued that the availability of substitutes is the most important of the factors listed in determining the elasticity of demand for a specific commodity (Leftwich 1973; Awk 1988). Seafood demand in general appears to be elastic. In fact, for most species, product groups, and product forms, demand is elastic (Asche and Bjørndal 2003).

For example, an increase in the ex-vessel price of butterfish may increase PS. A decrease in the ex-vessel price of butterfish may also increase PS if we assumed that the demand for butterfish is moderate to highly elastic. However, the magnitude of these changes cannot be entirely assessed without knowing the exact shape of the market demand curve for this species.

Enforcement Costs

Properly defined, enforcement costs are not equivalent to the budgetary expense of dockside or at-sea inspection of vessels. Rather, enforcement costs from an economic perspective, are measured by opportunity cost in terms of foregone enforcement services that must be diverted to enforcing regulations. Alternative 1 and 3 are not expected to change enforcement costs. However, alternative 2 specifies a minimum mesh size for the directed butterfish fishery. Since this requirement is new to this fishery, it is possible that enforcement costs could increase as a result.

Distributive Effects

There are no changes to the quota allocation process for butterfish under any of the alternatives considered. As such, no distributional effects are identified for this fishery.

<u>Summary of Impacts</u>

The overall impacts of Atlantic mackerel, *Loligo*, *Illex* and butterfish landings on prices, consumer surplus, and consumer surplus are difficult to determine without detailed knowledge of the relationship between supply and demand factors for these fisheries. In the absence of detailed empirical models for these fisheries and knowledge of elasticities of supply and demand, a qualitative approach was employed to assess potential impacts of the management measures.

The impact of each of the regulatory alternatives relative to the base year (2003) is summarized in Table FRFA-1. When potential outcomes from implementing a specific alternative are equal for all three species in direction, the resulting directional effect is presented as zero. However, when outcomes from implementing a specific alternative differ across species, the directional effects will be presented separately for each species. A “-1" indicates that the level of the given feature would be reduced given the action as compared to the base year. A “+1" indicates that the level of the given feature would increase relative to the base year and a “0" indicates no change. In this analysis, the base line condition was 2003 landings. This comparison will allow for the evaluation of the potential fishing opportunities associated with each alternative in 2005 versus the fishing opportunities that occurred in 2003.

Alternative 2 for butterfish shows an increase in prices associated with lower landings expected in 2005 compared to 2003. As such, consumer surplus is expected to decrease and producer surplus is expected to increase. No changes in the competitive nature of these fisheries is expected to occur if any of these management measures were implemented. All the alternatives would maintain the competitive structure of the fishery, that is, there are no changes in the manner the quotas are allocated. However, the large reductions in the quota level under alternative 2 for butterfish may affect vessels engaged in that fishery differently due to their capability to adjust to quota changes. Under alternative 2 for butterfish, enforcement costs could increase as a result of new requirement for a minimum mesh size in the directed butterfish fishery under this alternative.

It is important to mention that although the measures that are evaluated in this specification package are for the 2005 fisheries, the annual specification process for these fisheries could have potential cumulative impacts. The extent of any cumulative impacts from measures established in previous years is largely dependent on how effective those measures were in meeting their intended objectives and the extent to which mitigating measures compensated for any quota overages. Section 6.0 of the EA has a description or historical account of cumulative impacts of the measures established under the FMP since it was implemented .

Table IRFA-1. Qualitative comparative summary of economic effects of regulatory alternatives for Atlantic mackerel, squid and butterfish in 2005 relative to 2003.

Parameter	Alternatives for Mackerel and *Illex*	Alternative 1 and 3 Butterfish	Alternative 2 Butterfish
Landings	0	0	-
Prices	0	0	+
Consumer Surplus	0	0	-
Harvest Costs	0	0	0
Producer Surplus	0	0	+/-
Enforcement Costs	0	0	+
Distributive Impacts	0	0	0
"-1" denotes a reduction relative 2003; "0" denotes no change relative 2002; and "+1" denotes an increase relative to 2002.			

3.0 INITIAL REGULATORY FLEXIBILITY ANALYSIS

3.1 INTRODUCTION AND METHODS

The Regulatory Flexibility Act (RFA) requires the Federal rulemaker to examine the impacts of proposed and existing rules on small businesses, small organizations, and small governmental jurisdictions. In reviewing the potential impacts of proposed regulations, the agency must either certify that the rule "will not, if promulgated, have a significant economic impact on a substantial number of small entities or prepare a final regulatory flexibility analysis." The Small Business Administration (SBA) defines a small business in the commercial fishing and recreational fishing activity, as a firm with receipts (gross revenues) of up to $3.0 million.

The measures regarding the 2005 quotas could affect any vessel holding an active Federal permit for Atlantic mackerel, *Loligo*, *Illex* or butterfish (see Table IRFA-2 below), as well as vessels that fish for any one of these species in state waters. According to 2003 NMFS permit file data, 2,407 commercial vessels were holding Atlantic mackerel permits, 381 vessels were holding *Loligo*/butterfish moratorium permits, 72 vessels possessed *Illex* permits, 2119 vessels held incidental catch permits. All of these vessels readily fall within the definition of small business. In addition, the 2005 quotas could affect any dealer which holds a federal Atlantic mackerel, squid and butterfish dealer permit. According to 2003 NMFS permit file data, there were 362 dealers which possessed federal Atlantic mackerel, squid and butterfish dealer permits. The DAH specifications under the preferred alternative for Atlantic mackerel and *Illex* squid represent no constraint on vessels in these fisheries. The level of landings allowed under the preferred alternatives 2005 has not been achieved by vessels in these fisheries in recent years. From 2001-2003, butterfish landings averaged 1,906 mt. If the 2005 proposed DAH specification of 1,681 mt for butterfish is achieved, there would be an decrease in landings and revenue in the butterfish fishery relative to the average landings from 2001-2003. However, the proposed DAH of 1,681 mt would represent no constraint on the fishery relative to the last two fishing years. Absent such a constraint, no impacts on revenues are expected as a result of the proposed action.

Table IRFA-2. Number of vessels which landed Atlantic mackerel, *Loligo*, *Illex*, and butterfish by permit category in 2004.

Permit Category	(n)	Vessel Which Landed: Mackerel	*Loligo*	*Illex*	Butterfish
Mackerel	(2407)	304	278	22	264
Loligo/Butterfish	(381)	164	267	23	210
Illex	(72)	38	51	18	23
Incidental	(2119)	192	267	9	164

(Source: Unpublished NMFS permit and dealer data).

Since all permit holders may not actually land any of the four species, the more immediate impact of the specifications may be felt by the commercial vessels that are actively participating in these fisheries (see Table RIR-1). An active participant was defined as being any vessel that reported having landed one or more pounds of any one of the four species in the Northeast dealer data during calendar year 2003. The dealer data covers activity by unique vessels that hold a Federal permit of any kind and provides summary data for vessels that fish exclusively in state waters. This means that an active vessel may be a vessel that holds a valid Federal Atlantic mackerel, squid, or butterfish permit, a vessel that holds a valid Federal permit but no Atlantic mackerel, squid, or butterfish permit; a vessel that holds a Federal permit other than Atlantic mackerel, squid, or butterfish permit and fishes for those species exclusively in state waters; or may be a vessel that holds no Federal permit of any kind. Of the four possibilities the number of vessels in the latter two categories cannot be estimated because the dealer data provides only summary information for state waters vessels and because the vessels in the last category do not have to report landings.

In the present IRFA the primary unit of observation for purposes of performing a threshold analysis is vessels that landed any one or more of the four species during calendar year 2003 irrespective of their permit status.

Not all landings and revenues reported through the Federal dealer data can be attributed to a specific vessel. Vessels with no Federal permits are not subject to any Federal reporting requirements with which to corroborate the dealer reports. Similarly, dealers that buy exclusively from state waters only vessels and have no Federal permits, are also not subject to Federal reporting requirements. Thus, it is possible that some vessel activity cannot be tracked with the landings and revenue data that are available. Thus, these vessels cannot be included in the threshold analysis, unless each state were to report individual vessel activity through some additional reporting system - which currently does not exist. This problem has two consequences for performing threshold analyses. First, the stated number of entities subject to the regulation is a lower bound estimate, since vessels that operate strictly within state waters and sell exclusively to non-Federally permitted dealers cannot be counted. Second, the portion of activity by these uncounted vessels may cause the estimated economic impacts to be over- or underestimated.

The effects of actions were analyzed by employing quantitative approaches to the extent possible. In the current analysis, effects on profitability associated with the management measures should be evaluated by looking at the impact the measures on individual vessel costs and revenues. However, in the absence of cost data for individual vessels engaged in these fisheries, changes in gross revenues are used a proxy for profitability.

Procedurally, the economic effects of the quota alternatives were estimated as follows. First, the Northeast dealer data were queried to identify all vessels that landed at least one or more pounds of Atlantic mackerel, squid, or butterfish permit in calendar year 2003.

The second step was to estimate total revenues from all species landed by each vessel during calendar year 2003. This estimate provides the base from which subsequent quota changes and their associated effects on vessel revenues were compared. Since 2003 is the last full year from which data are available (partial year data could miss seasonal fisheries), it was chosen as the base year for the analysis. That is, partial landings data for 2004 were not used in this analysis because the year is not complete. As such, 2003 data were used as a proxy for 2004.

The third step was to deduct or add, as appropriate, the expected change in vessel revenues depending upon which of the quota alternatives were evaluated. This was accomplished by estimating proportional reductions or increases in the quota alternatives versus the base year 2003 (2004 proxy).

The fourth step was to divide the estimated 2003 revenues from all species by the 2003 base revenues for every vessel in each of the classes. For each quota alternative a summary table was constructed that reports the results of the threshold analysis. These results were further summarized by home state as defined by permit application data when appropriate.

The threshold analysis just described is intended to identify impacted vessels and to characterize the potential economic impact on directly affected entities. In addition, analyses were conducted to assess disproportionality issues. Specifically, disproportionality was assessed by evaluating if a regulation places a substantial number of small entities at a significant competitive disadvantage. Disproportionality is judged to occur when a proportionate affect on profits, costs, or net revenue is expected to occur for a substantial number of small entities. As noted above, gross revenue used as a proxy for profits due lack of cost date for individual vessels. In the current analysis, alternative 2 for butterfish was the only alternative judged to have possible disproportionate effects which are discussed in section 3.2.3.

To further characterize the potential impacts on indirectly impacted entities and the larger communities within which owners of impacted vessels reside, selected county profiles are typically constructed. Counties included in the profile typically meet the following criteria: the number vessels with revenue loss exceeding 5 percent per county was either greater than 4, or all impacted vessels in a given state were from the same home county. However, as indicated in the threshold analysis conducted in section 3.2.4 below, there was only one county identified as having enough impacted vessels to meet the criteria specified.

3.2 ANALYSIS OF THE IMPACTS OF ALTERNATIVES

For the purpose of ease of comparison, the specifications in previous years compared to actual fishery performance are given by species in the Tables IRFA 3-5 below.

Table IRFA-3. Summary of Specifications and Landings for Atlantic Mackerel (mt).

	1999	2000	2001	2002	2003	2004
ABC	383,000[1]	347,000[1]	347,000[1]	347,000[1]	347,000[1]	347,000[1]
IOY	75,000	75,000	88,000	85,000	175,000	170,000
DAH	75,000[2]	75,000[2]	85,000[2]	85,000	175,000	170,000
DAP	50,000	50,000	50,000	50,000	150,000	150,000
JVP	10,000	10,000	20,000	10,000	10,000	5,000
TALFF	0	0	3,000	0	0	0
US Commercial	12,045	5,645	12,308	26,192	30,738	53,352[3]
US Value (m $)	3.6	2.0	2.2	6.1	7.2	-
US Recreational	1,335	1,448	1,536	1,285	824	-
Total US	13,375	7,093	13,844	27,477	31,562	-
Canadian	16,561	13,383	23,868	34,402	34,413	-

[1] ABC = F_{target} - estimated Canadian landings.
[2] Includes recreational allocation of 15,000 mt.
[3] Preliminary landings as of October 31, 2004 based on NMFS Dealer Reports.

Table IRFA-4. Summary of specifications and landings for *Illex* (mt).

	1998	1999	2000	2001	2002	2003	2004
Max OY	24,000	24,000	24,000	24,000	24,000	24,000	24,000
ABC	19,000	19,000[1]	24,000	24,000	24,000	24,000	24,000
IOY	19,000	19,000[1]	24,000	24,000	24,000	24,000	24,000
DAH	19,000	19,000[1]	24,000	24,000	24,000	24,000	24,000
DAP	19,000	19,000[1]	24,000	24,000	24,000	24,000	24,000
JVP	0	0	0	0	0	0	0
TALFF	0	0	0	0	0	0	0
Landings (mt)	22,706	7,361	9,041	3,938	2,723	6,389	1,107[2]
Value (millions $)	9.2	3.9	3.7	1.8	1.4	4.0	-

[1] 22,800 mt when Amendment 8 was approved.
[2] Preliminary landings as of June 2, 2004 based on NMFS Dealer Reports.

Table IRFA5. Summary of specifications and landings for butterfish (mt).

	1998	1999	2000	2001	2002	2003	2004
Max OY	16,000	16,000	16,000	16,000	16,000	16,000	16,000
ABC	7,200	7,200	7,200	7,200	7,200	7,200	7,200
IOY	5,900	5,900	5,900	5,900	5,900	5,900	5,900
DAH	5,900	5,900	5,900	5,897	5,900	5,900	5,900
DAP	5,900	5,900	5,900	5,897	5,900	5,900	5,900
JVP	0	0	0	0	0	0	0
TALFF[2]	0	0	0	3	0	0	0
Landings (mt)	1,964	2,116	1,432	4,373	872	473	na
Value (millions $)	2.5	2.7	1.5	3.2	0.9	0.6	-

3.2.1 Impacts of Alternative 1-4 for Atlantic mackerel

The specifications under alternative 1 would be ABC = 347,000 mt, IOY=170,000 mt, DAH=170,000 mt, DAP=150,000 mt and JVP=5,000 and TALFF=0 mt. The specifications under alternative 2 (Council-preferred alternative) would be ABC = 335,000 mt, IOY=165,000 mt, DAH=165,000 mt, DAP=150,000 mt and JVP=0 and TALFF=0 mt. The specifications under alternative 3 would be ABC = 347,000 mt, IOY=165,000 mt, DAH=165,000 mt, DAP=150,000 mt and JVP=0 and TALFF=0 mt. The specifications under alternative 4 (NMFS-preferred) would be ABC = 335,000 mt, IOY=115,000 mt, DAH=115,000 mt, DAP=100,000 mt, and JVP=0 and TALFF=0 mt.

In every case, the alternatives considered for Atlantic mackerel for the 2005 specifications of IOY exceed landings of the species for 2003. Therefore, the 2005 quota specifications considered for the Atlantic mackerel fishery represented no constraint on vessels in the fishery in aggregate or individually. Therefor fishery in aggregate or individually. In the absence of such constraints, there is no impact e, specification of the 2005 alternatives would represent no constraint on vessels in the on revenues under the Regulatory Flexibility Act. As a result, specifications considered for Atlantic mackerel will have no negative impacts on businesses involved in the commercial harvest of Atlantic mackerel in 2005.

3.2.2 Impacts of Alternatives for *Illex*

The specifications for *Illex* under alternative 1 (status quo) would be Max OY, ABC, IOY, DAH, and DAP = 24,000 mt and JVP and TALFF = 0 mt. The specifications for *Illex* under alternative 2 would be Max OY, ABC, IOY, DAH, and DAP = 30,000 mt and JVP and TALFF = 0 mt. The specifications for *Illex* under alternative 3 would be Max OY, ABC, IOY, DAH, and DAP = 19,000 mt and JVP and TALFF = 0 mt.

In every case, the alternatives considered for *Illex* for the 2005 specifications of IOY exceed landings of the species for 2003. Therefore, the 2005 quota specifications considered for the *Illex* fishery represented no constraint on vessels in the fishery in aggregate or individually. Therefore, specification of the 2005 alternatives would represent no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there is no impact on revenues under the Regulatory Flexibility Act. As a result, specifications considered for *Illex* will have no negative impacts on businesses involved in the commercial harvest of *Illex* in 2005.

3.2.3 Impacts of Alternatives for butterfish

The specifications under alternative 1 (2004 status quo) would be Max OY = 16,000 mt, ABC = 7,200 mt, and IOY, DAH, and DAP = 5,900 mt and JVP and TALFF = 0 mt. The specifications under alternative 2 (preferred alternative) would be Max OY = 12,175 mt, ABC = 4,545 mt, and IOY, DAH, and DAP = 1,681 mt and JVP and TALFF = 0 mt. In addition, this alternative would implement a 3.0 minimum cod end mesh size requirement for butterfish trips greater than 5,000 pounds. The specifications under alternative 3 would be Max OY = 12,175 mt and ABC = 12,175 mt, and IOY, DAH, and DAP = 9,131 mt and JVP and TALFF = 0 mt.

The IOY specifications butterfish under alternatives 1 and 3 exceed the landings of the species in recent years. Therefore, the 2005 quota specifications under alternatives 1and 3 would represent no constraint on vessels in this fishery in aggregate or individually. In the absence of such constraints, there are no impacts on revenues under the Regulatory Flexibility Act. As a result, the specifications under alternatives 1 and 3 will have no negative impacts on businesses involved in the commercial harvest of this species.

Under alternative 2, butterfish landings could be constrained in 2005 relative to the 2001-2003 fisheries. During the period 2001-2003, butterfish landings averaged 1,906 mt. Therefore, under alternative 2 for butterfish in 2005, IOY, DAH and DAP would reduce landings by about 12% compared to average landings during the period 2001-2003. However, compared to the most recent year for which complete information is available (2003) when landings were 473 mt, these specifications are not likely to reduce revenues substantially. The primary function of the quota under alternative 2 is to prevent the development of directed butterfish fishery to that extent that overfishing would occur.

Tables and Figures

Table 1. Total landings and value of Atlantic mackerel, *Loligo*, *Illex* and butterfish in 2003.

	Landings (mt)	Value ($)	Vessels	Trips
Atlantic mackerel	30,738	7,215,746	394	2,741
Loligo	11,623	19,326,643	402	9,967
Illex	6,389	3,979,378	28	142
Butterfish	473	600,930	383	8,179

Source: Unpublished NMFS dealer reports.

Table 2. Landings of Atlantic mackerel by state in 2003 based on unpublished NMFS dealer reports.

State	Landings (mt)	Percent of Total
RI	4,884	15.9%
NJ	14,994	48.8%
MA	10,637	34.6%
NY	70	0.2%
CT	15	0.1%
ME	<1	0.0%
VA	51	0.2%
MD	2	0.0%
NC	4	0.0%
NH	80	0.2%
DE	<1	0.0%
Total	30,738	100.0%

Source: Unpublished NMFS dealer reports.

Table 3. Landings of Atlantic mackerel by month in 2003 based on unpublished NMFS dealer reports.

Month	Landings (mt)	Percent of Total
1	6,029	19.6%
2	8,279	26.9%
3	12,768	41.5%
4	2,969	9.7%
5	312	1.0%
6	12	0.1%
7	1	0.0%
8	3	0.0%
9	2	0.0%
10	9	0.0%
11	27	0.0%
12	327	1.1%
Total	30,738	100.0%

Source: Unpublished NMFS dealer reports.

Table 4. Landings of Atlantic mackerel by gear in 2003 based on unpublished NMFS dealer reports.

Gear Category	Landings	Percent of Total
MID-WATER TRAWL	25,373	82.5%
TRAWL, OTTER, BOTTOM	5,139	16.7%
POTS AND TRAPS	<1	0.0%
POUND NET	102	0.1%
GILL NET	82	0.3%
HOOK AND LINE	36	0.0%
UNKNOWN	3	0.0%
Total	30,738	100.0%

Source: Unpublished NMFS dealer reports.

Table 5. Atlantic mackerel landings by port in 2003.

Port	Landings (mt)	Percent of Total
CAPE MAY, NJ	14,903	48.5%
NORTH KINGSTOWN, RI	4,122	13.4%
GLOUCESTER, MA	5,514	17.9%
NEW BEDFORD, MA	5,092	16.6%
OTHER	1,108	3.6%
TOTAL	30,738	100.0%

Source: Unpublished NMFS dealer reports.

Table 6. Value ($) of landings all species landed and Atlantic mackerel by port in 2003 (for ports where mackerel comprised >1% of total value of all species and total port value for mackerel exceeded $25,000).

Port	Vessels	Value All Species	Value Mackerel Only	Percent
NORTH KINGSTOWN, RI	4	7,733,546	2,041,780	26
CAPE MAY, NJ	13	36,063,255	2,791,667	8
GLOUCESTER, MA	43	27,262,231	938,009	3
NEWPORT, RI	15	9,063,778	236,660	2

Source: Unpublished NMFS dealer reports.

Table 7. Atlantic mackerel vessel permit holders in 2003, by home port state.

Home Port State	Number of Vessels	Percent of Total
MA	1044	43.9%
ME	258	10.9%
NY	242	10.2%
NJ	248	10.4%
RI	152	6.4%
VA	112	4.7%
NC	91	3.8%
NH	91	3.8%
CT	46	1.9%
MD	25	1.1%
FL	19	0.8%
PA	12	0.5%
DE	12	0.5%
GA	5	0.2%
OTHER	6	0.3%
Total	2377	100.0

Source: Unpublished NMFS permit data

Table 8. Atlantic mackerel, squid and butterfish dealer permit holders in 2003 by state.

Home Port State	No. Dealers	Pct of Total
MA	98	27.3%
NY	75	20.9%
RI	43	12.0%
NC	30	8.4%
ME	28	7.8%
NJ	27	7.5%
VA	25	7.0%
NH	7	1.9%
MD	6	1.7%
CT	5	1.4%
FL	4	1.1%
PA	4	1.1%
DE	3	0.8%
LA	2	0.6%
AL	1	0.3%
PR	1	0.3%
Total	359	100.0%

Source: Unpublished NMFS permit data.

Table 9. Atlantic mackerel, squid and butterfish dealer permit holders who bought Atlantic mackerel in 2003 by state.

Home Port State	No. Dealers	Pct of Total
MA	26	27.4%
NY	23	24.2%
RI	22	23.2%
NJ	7	7.4%
NC	5	5.3%
NH	4	4.2%
VA	3	3.2%
MD	2	2.1%
CT	1	1.1%
HI	1	1.1%
ME	1	1.1%
Total	95	100.0%

Source: Unpublished NMFS dealer reports and permit data.

Table 10. Total landings of Atlantic mackerel, *Loligo*, *Illex* and butterfish during 2003 by permit category.

	Permit Categories							
	Loligo / Butterfish Moratorium		Squid / Butterfish Incidental Catch		Atlantic Mackerel		Illex squid Moratorium	
Species	Landings (mt)	Number of Vessels	Landings (mt)	Number of Vessels	Landings (mt)	Number of Vessels	Landings (mt)	Number of Vessels
MACKEREL	19,130	164	6,628	192	30,605	304	19,648	38
SQUID (LOLIGO)	11,180	267	2,154	165	10,604	278	5,145	51
SQUID (ILLEX)	6,389	23	1	9	6,279	21	6,389	18
BUTTERFISH	394	210	143	164	364	264	105	43
Total	31,110	431	8,769	357	41,209	582	24,793	89

Source: Unpublished NMFS dealer reports and permit data.

Table 11. Recreational landings (metric tons) of Atlantic mackerel by state, 1981-2003.

STATE	ME	NH	RI	MA	CT	NY	NJ	DE	MD	VA	NC
1981	383.9	99.5	32.0	239.1	112.2	67.5	2275.7	0.0	0.0	0.0	0.0
1982	23.5	80.6	27.2	24.0	227.6	101.4	706.5	0.0	0.0	0.0	0.0
1983	77.3	51.1	123.4	243.8	0.0	0.2	430.3	47.2	392.7	1618.5	17.4
1984	138.7	172.4	157.6	312.8	1.6	20.5	731.9	605.3	170.8	7.8	0.0
1985	1110.0	83.9	162.6	507.4	39.9	35.5	752.5	8.5	0.0	12.9	0.0
1986	133.4	14.3	46.1	628.7	36.5	22.7	1839.3	775.0	0.0	487.6	0.0
1987	318.5	55.3	0.1	485.4	330.6	1681.8	992.3	0.0	132.0	35.8	0.0
1988	538.7	72.6	5.5	1952.5	2.0	0.0	1.0	524.9	159.3	0.0	0.0
1989	147.2	73.8	9.9	877.5	0.2	119.0	253.1	106.7	194.9	4.3	0.0
1990	79.7	65.6	41.7	1009.7	0.0	11.2	400.2	16.3	220.2	22.4	0.0
1991	298.3	0.4	150.5	1172.9	0.0	364.6	457.5	21.1	79.3	21.2	0.0
1992	71.2	4.9	10.0	154.4	0.0	0.6	2.2	9.5	19.8	11.4	0.0
1993	136.1	3.9	0.0	53.9	0.2	33.5	26.1	0.0	345.8	0.0	0.0
1994	337.0	390.7	43.7	895.3	0.0	0.1	32.4	1.7	4.3	0.0	0.0
1995	276.5	52.2	3.2	517.3	0.0	7.1	372.6	16.4	3.1	0.8	0.0
1996	146.6	215.4	10.9	793.0	2.8	0.5	112.7	3.7	52.2	1.8	0.7
1997	409.3	211.9	18.3	556.4	0.0	23.4	438.7	25.8	28.2	24.6	0.2
1998	149.2	89.7	7.7	351.7	0.0	7.3	70.1	2.6	6.3	4.7	0.2
1999	258.2	156.1	44.9	624.0	0.0	15.3	214.1	0.0	17.1	5.3	0.0
2000	364.3	166.0	2.5	857.2	0.0	9.8	31.2	0.3	1.4	15.1	0.0
2001	287.3	223.6	7.2	885.2	0.0	17.5	77.8	12.6	22.1	2.4	0.0
2002	386.6	65.0	1.9	728.3	3.0	0.0	95.9	2.5	2.2	0.0	0.0
2003	165.7	97.1	7.9	509.8	0.0	18.7	22.0	0.2	0.3	2.9	0.0

Source: MRFSS.

Table 12. Recreational landings (pounds) of Atlantic mackerel by mode, 1981-2003.

Year	Shore	Party / Charter	Private / Rental
1981	27,072	5,558,341	1,491,302
1982	243,103	1,063,118	1,318,763
1983	82,102	5,833,502	702,317
1984	114,807	2,659,114	2,339,182
1985	123,087	4,184,595	1,673,902
1986	119,234	3,702,247	5,489,359
1987	180,588	2,763,642	5,944,386
1988	173,079	1,013,699	6,010,771
1989	404,414	1,438,032	2,096,378
1990	217,594	1,290,037	2,608,176
1991	191,743	1,383,457	4,081,506
1992	127,267	92,274	406,418
1993	187,953	161,110	972,663
1994	528,577	927,253	2,303,719
1995	330,454	923,154	1,500,303
1996	353,111	511,685	2,090,183
1997	662,304	1,458,065	1,708,164
1998	146,469	241,322	1,132,294
1999	192,221	645,648	2,105,503
2000	279,945	179,294	2,732,591
2001	179,869	361,581	2,844,174
2002	216,606	50,587	2,566,763
2003	271,792	115,971	1,309,823

Source: MRFSS

Table 13. NMFS statistical areas where 1% or more of Atlantic mackerel commercial landings occurred in 2003.

Statistical Area	Landings (mt)	Percent of Total
613	2,259	6.1%
537	550	1.5%
615	7,437	20.2%
612	8,875	24.1%
621	1,304	3.5%
616	14,733	40.0%
622	1,254	3.5%

Source: Vessel trip report data.

Table 14. Landings of *Loligo pealei* landings by state in 2003

State	Landings (mt)	Percent of Total
RI	7,121	61.3%
NY	2,087	17.9%
NJ	1,074	9.3%
MA	849	7.3%
CT	403	3.5%
VA	40	0.3%
ME	38	0.3%
NC	6	0.1%
MD	1	0.0%
PA	1	0.0%
Total	11,620	100.0%

Source: Unpublished NMFS dealer reports.

Table 15. Landings of *Loligo pealei* by month in 2003.

Month	Landings (mt)	Percent of Total
1	1,187	10.2%
2	1,985	17.1%
3	1,808	15.6%
4	398	3.4%
5	276	2.4%
6	87	0.8%
7	49	0.4%
8	114	1.0%
9	1,202	10.3%
10	860	7.4%
11	2,038	17.5%
12	1,618	13.9%
Total	11,620	100.0%

Source: Unpublished NMFS dealer reports.

Table 16. Landings of *Loligo pealei* by gear category in 2003.

Gear Category	Landings (mt)	Percent of Total
TRAWL, OTTER, BOTTOM	11,303	97.3%
POUND NET	86	0.7%
POTS AND TRAPS	2	0.0%
GILL NET	3	0.0%
UNKNOWN	226	1.9%
HOOK AND LINE	1	0.0%
OTHER	2	0.0%
Total	11,620	100.0%

Source: Unpublished NMFS dealer reports.

Table 17. *Loligo* squid landings by port in 2003.

Port	Landings (mt)	Pct
POINT JUDITH, RI	4532	39.0%
NORTH KINGSTOWN, RI	1794	15.4%
MONTAUK, NY	1175	10.1%
HAMPTON BAY, NY	794	6.8%
CAPE MAY, NJ	778	6.7%
NEWPORT, RI	753	6.5%
NEW BEDFORD, MA	392	3.4%
BOSTON, MA	260	2.2%
EAST LYME, CT	237	2.0%
PT. PLEASANT, NJ	199	1.7%
NEW LONDON, CT	117	1.0%
All Others	591	5.1%

Source: Unpublished NMFS dealer reports

Table 18. Value of landings of all species by port compared to total value of all species landed by port in 2003 where Loligo comprised >10% of total value.

Port	Vessels	Value All Species	Value Loligo Only	Pct
EAST LYME, CT	3	463,158	462,952	100.0%
ELIZABETH, NJ	1	113,053	89,840	79.5%
BROOKLYN, NY	1	70,629	40,956	58.0%
HAMPTON BAY, NY	39	5,964,421	1,731,568	29.0%
FALMOUTH, MA	16	421,269	115,151	27.3%
NORTH KINGSTOWN, RI	7	7733546	2053618	26.6%
POINT JUDITH, RI	88	31,866,456	7,848,152	24.6%
FREEPORT, NY	8	814692	188352	23.1%
MONTAUK, NY	33	10225428	2353966	23.0%
NEW LONDON, CT	4	1335517	278297	20.8%
NEWPORT, RI	30	9063778	1106117	12.2%

Table 19. Home port state of vessels with Loligo/butterfish moratorium permits in 2003.

Home Port State	No. Vessels	Pct of Total
MA	109	28.8%
NY	69	18.3%
NJ	68	18.0%
RI	66	17.5%
NC	26	6.9%
VA	12	3.2%
CT	8	2.1%
ME	8	2.1%
PA	4	1.1%
MD	3	0.8%
NK	3	0.8%
DE	1	0.3%
NH	1	0.3%
Total	378	100

Source: Unpublished NMFS permit data.

Table 20. Federally permitted dealers who bought *Loligo* in 2003, by state.

Home Port State	No. Dealers	Pct of Total
NY	35	29.9
MA	24	20.5
RI	24	20.5
NC	15	12.8
NJ	8	6.8
VA	6	5.1
MD	2	1.7
CT	1	0.8
ME	1	0.8
PA	1	0.8
Total	117	100.0

Source: Unpublished NMFS dealer reports and permit data.

Table 21. NMFS statistical areas where 1% or more of *Loligo* landings were taken in 2003.

Stat Area	Landings (mt)	Pct of Total
525	2,225.890	21.0%
616	2,026.577	19.1%
537	1,760.226	16.6%
622	1,198.024	11.3%
613	630.341	5.9%
526	606.482	5.7%
632	516.220	4.9%
539	379.405	3.6%
626	181.495	1.7%
562	142.126	1.3%
621	139.400	1.3%
538	136.994	1.3%

Source: Vessel trip report data.

Table 22. Landings of *Illex illecebrosus* by state in 2003.

State	Landings (mt)	Percent of Total
RI	4,609	72.1%
NJ	1,501	23.5%
NC	242	3.8%
VA	35	0.6%
MA	<1	0.0%
CT	<1	0.0%
NY	<1	0.0%
Total	6,389	100.0%

Source: Unpublished NMFS dealer reports.

Table 23. Landings of *Illex illecebrosus* by month in 2003.

Month	Landings (mt)	Percent of Total
1	<1	0.0%
2	<1	0.0%
3	0	0.0%
4	<1	0.0%
5	1	0.0%
6	1,139	17.8%
7	1,295	20.3%
8	1,217	19.1%
9	553	8.7%
10	1,969	30.8%
11	212	3.3%
12	<1	0.0%
Total	6,389	100.0%

Source: Unpublished NMFS dealer reports.

Table 24. Landings of *Illex illecebrosus* by gear type in 2003.

Gear Category	Landings (mt)	Percent of Total
TRAWL, OTTER, BOTTOM	6,351	99.4%
TRAWL, OTTER,MIDWATER	37.9	0.6%
UNKNOWN	<1	0.0%
Total	6,389	100.0%

Source: Unpublished NMFS dealer reports.

Table 25. *Illex* squid landings by port in 2003.

Port	Landings (mt)	Pct	Cum Pct
NORTH KINGSTOWN, RI	3,999	62.6%	62.6%
CAPE MAY, NJ	1,502	23.5%	86.1%
NEWPORT, RI	585	9.2%	95.3%
All Others	303	4.7%	100.0%

Source: Unpublished NMFS dealer reports.

Table 26. Value of *Illex* squid landings by port compared to total value of all species landed by port in 2003 where *Illex* comprised >1% of total value and *Illex* value for the port is >$25,000.

Port	Vessels	Value All Species	Value Illex Only	Percent Value
WANCHESE, NC	6	10,083,264	107,279	1.0
CAPE MAY, NJ	10	36,063,255	649,824	2.0

Source: Unpublished NMFS dealer reports.

Table 27. Home port state of vessels with *Illex* moratorium permits in 2003.

Home Port State	No. Vessels	Pct of Total
NJ	24	33.3%
RI	11	15.3%
MA	10	13.9%
NC	7	9.7%
NY	7	9.7%
VA	7	9.7%
PA	3	4.2%
CT	1	1.4%
ME	1	1.4%
NH	1	1.4%
Total	72	100.0%

Source: Unpublished NMFS permit data.

Table 28. Federally permitted dealers who bought *Illex* squid in 2003, by state.

Home Port State	No. Dealers	Pct of Total
RI	6	37.5%
NC	4	25.0%
MA	2	12.5%
CT	1	6.3%
NJ	1	6.3%
NY	1	6.3%
VA	1	6.3%
Total	16	100.0%

Source: Unpublished NMFS dealer reports and permit data.

Table 29. NMFS statistical areas where1% or more of *Illex* squid landings were taken in 2002.

Stat Area	Landings (mt)	Pct of Total
632	3417	53.7%
622	1435	22.6%
626	920	14.5%
636	323	5.1%
623	98	1.5%
522	86	1.4%

Source: Vessel trip report data.

Table 30. Landings of butterfish by state in 2003.

State	Landings (mt)	Percent of Total
RI	233	49.3%
NY	121	25.7%
NJ	31	6.5%
CT	31	6.5%
NC	18	3.8%
VA	9	1.9%
MA	27	5.7%
MD	2	0.4%
ME	<1	0.0%
NH	<1	0.0%
DE	<1	0.0%
Total	473	100.0%

Source: Unpublished NMFS dealer reports.

Table 31. Landings of butterfish by month in 2003.

Month	Landings (mt)	Percent of Total
1	49	10.3%
2	47	9.9%
3	69	14.5%
4	35	7.3%
5	47	10.0%
6	37	7.7%
7	15	3.2%
8	19	4.0%
9	28	5.8%
10	48	10.2%
11	35	7.3%
12	46	9.7%
Total	473	100.0%

Source: Unpublished NMFS dealer reports.

Table 32. Landings of butterfish by gear type in 2003.

Gear Category	Landings (mt)	Percent of Total
TRAWL, OTTER, BOTTOM	**416**	**87.9%**
POUND NET	**22**	**4.7%**
GILL NET	**23**	**4.8%**
POTS AND TRAPS	**2**	**0.4%**
UNKNOWN	**10**	**2.1%**
HOOK AND LINE	**<1**	**0.0%**
SEINE	**<1**	**0.0%**
Total	**473**	**100.0%**

Source: Unpublished NMFS dealer reports.

Table 33. Landings of butterfish by port in 2003.

Port	Landings (mt)	Pct
NORTH KINGSTOWN, RI	3999	62.6%
CAPE MAY, NJ	1502	23.5%
NEWPORT, RI	585	9.2%
All Others	303	4.7%

Source: Unpublished NMFS dealer reports.

Table 34. Value of butterfish landings by port compared to total value of all species landed by port in 2002 where butterfish comprised >1% of total value .

Port	Vessels	Value All	Value butterfish	Pct
AMMAGANSETT, NY	4	500195	22477	4.5%
NEW LONDON, CT	4	1335517	23513	1.8%
GREENPORT, NY	7	577296	10023	1.7%
FREEPORT, NY	9	814692	12918	1.6%
MONTAUK, NY	32	10225428	97523	1.0%

Source: Unpublished NMFS dealer reports.

Table 35. Federally permitted dealers who bought butterfish in 2003, by state.

Home Port State	Dealers	Percent of Total
NY	32	30.8%
RI	23	22.1%
MA	17	16.3%
NC	13	12.5%
NJ	9	8.7%
VA	5	4.8%
MD	2	1.9%
CT	1	1.0%
ME	1	1.0%
NH	1	1.0%
Total	104	100.0%

Source: Unpublished NMFS dealer reports.

Source: Unpublished NMFS dealer reports and permit data.

Table 36. NMFS statistical areas from where 1% or more of butterfish landings were taken in 2003.

Statistical Area	Landings (mt)	Pct of Total
537	138	27.8%
525	78	15.7%
616	53	10.6%
526	47	9.4%
611	44	8.9%
539	38	7.6%
613	25	5.0%
622	14	2.7%
612	11	2.2%
614	8	1.7%
538	7	1.4%
562	6	1.2%
524	5	1.1%
621	5	1.0%

Source: Vessel trip report data.

Table 37. Summary of impacts of proposed and alternative specifications for 2005 for Atlantic mackerel, *Illex* squid and butterfish.

Species	Alternative	Total No. Vessels	Total Revenue Change ($ millions)	Revenue Change/ Vessel ($)	No. Vessels w/ Revenue Reduced by > 5%
A. mackerel	Alt. 1	394	0	0	0
A. mackerel	Alt. 2	394	0	0	0
A. mackerel	Alt. 3	394	0	0	0
Illex	Alt. 1	28	0	0	0
Illex	Alt. 2	28	0	0	0
Illex	Alt. 3	28	0	0	0
butterfish	Alt. 1	383	0	0	0
butterfish	Alt. 2	383	0	0	0
butterfish	Alt. 3	383	0	0	0

Table 38. Species taken and discarded in directed trips for butterfish, *Illex* squid, and Atlantic mackerel based on unpublished NMFS sea sampling data from 1989-2003.

BUTTERFISH

SPECIES	Catch Disposition: Disc	Catch Disposition: Kept	Grand Total	Pct Disc (Overall)	Pct Disc (Sp)
BUTTERFISH	616,677	721,249	1,337,926	19%	46%
HAKE, RED	472,524	61,800	534,324	14%	88%
HAKE, SILVER	412,321	752,783	1,165,104	12%	35%
DOGFISH SPINY	404,083	576	404,659	12%	100%
SKATES	247,586	23,740	271,326	7%	91%
SCUP	180,513	142,694	323,207	5%	56%
FLOUNDER, FOURSPOT	149,171	469	149,640	4%	100%
SQUID (LOLIGO)	110,011	1,442,435	1,552,446	3%	7%
MACKEREL, ATLANTIC	102,095	758,033	860,128	3%	12%

ILLEX

SPECIES	Catch Disposition: Disc	Catch Disposition: Kept	Grand Total	Pct Disc (Overall)	Pct Disc (Sp)
SQUID (ILLEX)	75885.2	9144041.5	9219926.7	25%	0.8%
BUTTERFISH	64662.9	68442.6	133105.5	21%	48.6%
MACKEREL, CHUB	63848.4	9877	73725.4	21%	86.6%
HERRING (NK)	31430.5	0	31430.5	10%	100.0%
HAKE, SILVER	15878.9	327.8	16206.7	5%	98.0%
HAKE, RED	14857.3	80	14937.3	5%	99.5%
JOHN DORY	9916.1	3813.8	13729.9	3%	72.2%

Table 38 continued

MACKEREL					
	Catch Disposition				
SPECIES	Disc	Kept	Grand Total	Pct Disc (Overall)	Pct Disc (Sp)
MACKEREL, ATLANTIC	443793	6624359.5	7068152.5	41.7%	6.3%
HERRING, ATLANTIC	169086	480571	649657	15.9%	26.0%
DOGFISH SPINY	106643	8885.4	115528.4	10.0%	92.3%
SCUP	63152.9	27375.2	90528.1	5.9%	69.8%
HAKE, RED	48448	4821	53269	4.6%	90.9%
HERRING, BLUE BACK	33562.3	38950	72512.3	3.2%	46.3%
BUTTERFISH	32096.2	40912.4	73008.6	3.0%	44.0%

Table 39. Butterfish Landings by Mesh Size, 2001-2003

Mesh Size (in mm)*	N (trips)	Percent Trips	Landings (lbs)	Percent Landings	Cumulative Landings (%)**
<1	34	0	1,376	0	0
1.5	101	1	26,900	0	0
2	922	6	137,975	1	2
2.5	2,250	13	6,057,521	55	57
3	3,181	19	1,612,153	15	71
3.5	5,350	32	2,039,048	19	90
4	458	3	258,593	2	92
4.5	195	1	73,747	1	93
5	1,529	9	295,892	3	96
5.5	358	2	262,867	2	98
6	399	2	30,238	0	98
6.5	972	6	129,655	1	100
>6.5	945	6	54,487	0	100
Total=	16,694		10,980,452		

*Mesh size bins include less than size bin noted, and greater than or equal to previous bin size.

**Cumulative percent landings through bin size noted.

Table 40. Frequency distribution of landings per trip of butterfish based on unpublished NMFS VTR data, 2001-2003.

Minimum Trip Size	Trips	Percent Trips	Cumulative Trips (%)	Landings (lbs.)*	Cumulative Landings (lbs.)	Percent Landings	Cumulative Landings (%)
0	9,632	57	57	269,860	269,860	2	2
100	3,081	18	75	462,749	732,609	4	7
250	1,611	10	85	551,134	1,283,743	5	12
500	1,279	8	93	848,549	2,132,292	8	19
1000	1,109	7	99	2,023,980	4,156,272	18	38
5000	86	1	100	540,692	4,696,964	5	43
10000	26	0	100	361,673	5,058,637	3	46
25000	14	0	100	518,184	5,576,821	5	51
50000	5	0	100	312,270	5,889,091	3	54
100000	11	0	100	5,114,900	11,003,991	46	100
sum=	**16,854**			**11,003,991**			

* Landings denote quantity kept and do not include discards.

Figure 1. NMFS Northeast Statistical Areas.

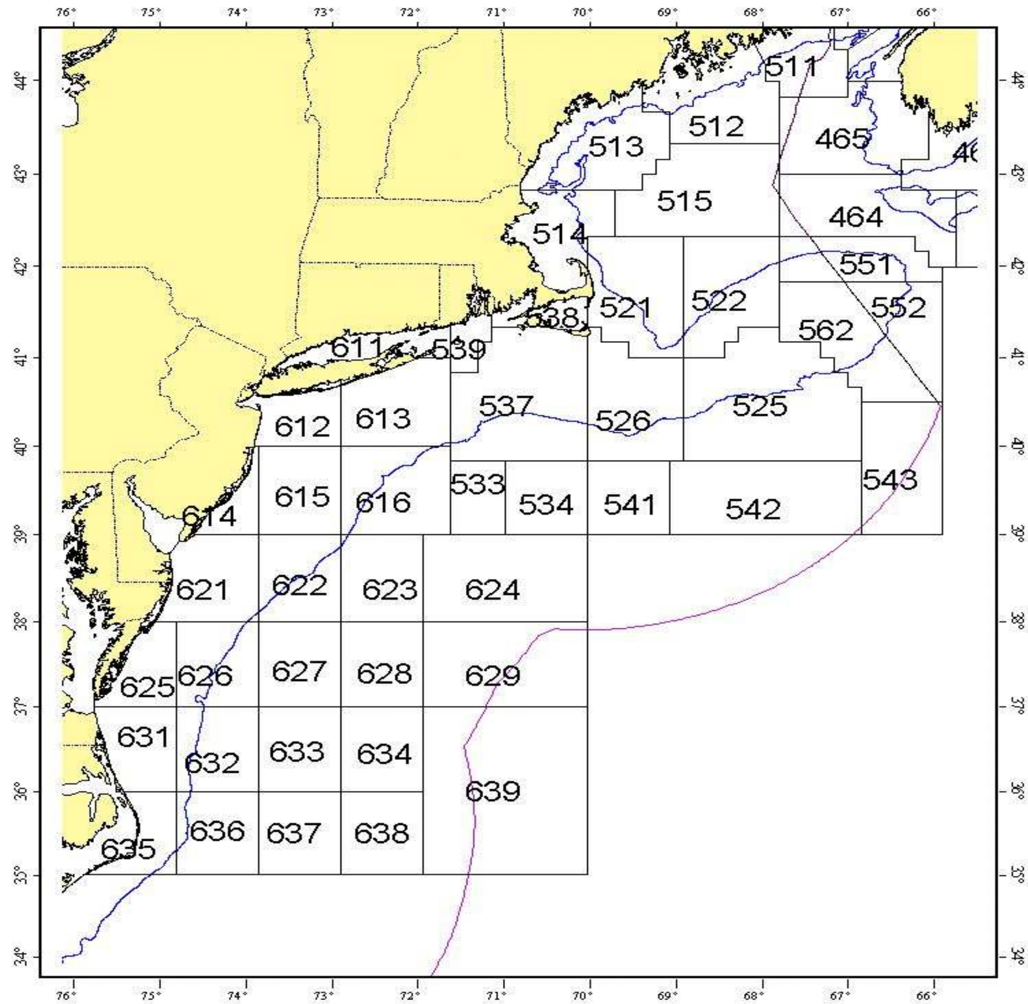


Figure 2. Butterfish landings by trip size based on unpublished 2001-2003 NMFS VTR data.

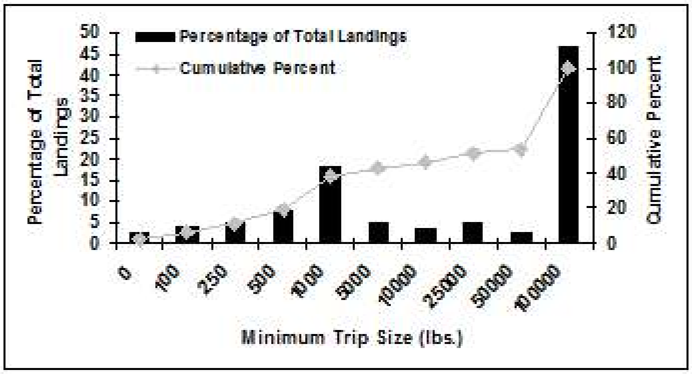
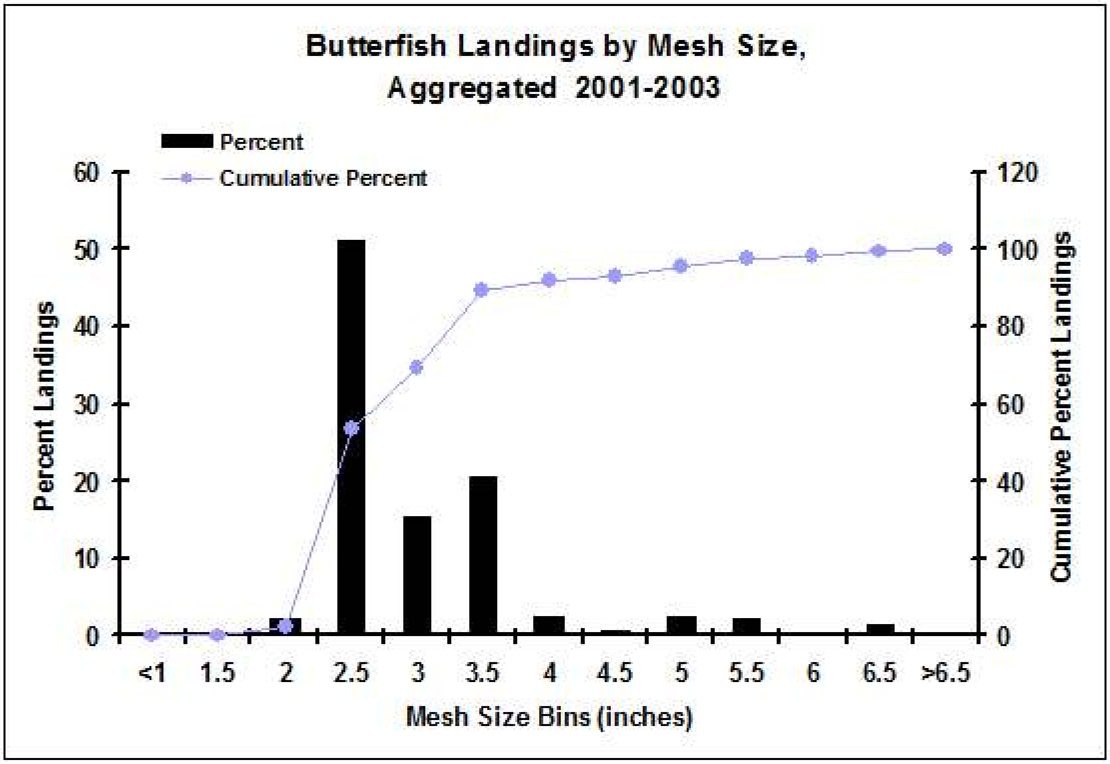
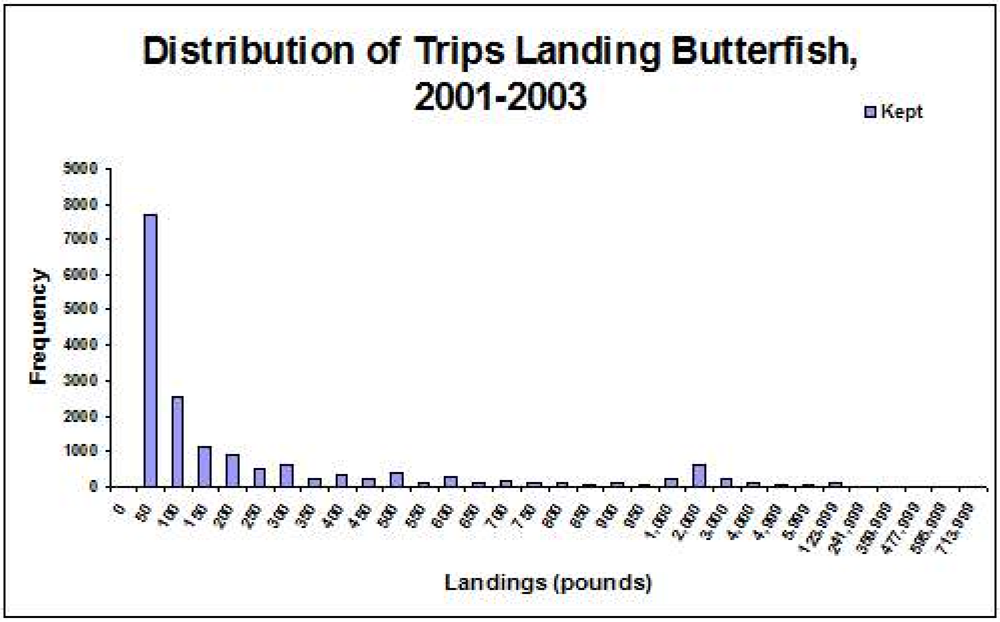


Figure 3



Butterfish Landings by Mesh Size,
Aggregated 2001-2003
Percent
Cumulative Percent
Percent Landings
Cumulative Percent Landings
60
50
40
30
20
10
0
120
100
80
60
40
20
0
<1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
>6.5
Mesh Size Bins (inches)

Figure 4.


Distribution of Trips Landing Butterfish, 2001-2003
Kept
Frequency
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Landings (pounds)

Appendix I
Scope of Work for 2005 Mid-Atlantic Research Set-Aside (RSA) Projects

04-RSA-003 - National Fisheries Institute, Inc. (NFI) and Rutgers, The State University of New Jersey (Rutgers), "Development of a Supplemental Finfish Survey Targeting Mid-Atlantic Migratory Species." Principal Investigator – Eric N. Powell.

Project Abstract: To obtain third year support for the development/refinement of a commercial-vessel based survey program in the Mid-Atlantic region that tracks the migratory behavior of selected recreationally and commercially important species. Information gathered from the study would supplement the National Marine Fisheries Service (NMFS) finfish survey databases and will include development of methods to better evaluate how seasonal migration of fish in the Mid-Atlantic influences stock abundance estimates.

RSA Amount: 192,177 lbs (87,170 kg) of summer flounder, 120,000 lbs (54,431 kg) of scup, 281,350 lbs (127,618 kg) of *Loligo* squid, 61,500 lbs (27,859 kg) of black sea bass, and 297,750 lbs (135,057 kg) of bluefish

Project Description: This project involves collaborative efforts from NFI, Rutgers, and the NMFS Northeast Fisheries Science Center (NEFSC). The field work will be carried out by up to two research vessels conducting a trawl survey along up to 8 offshore transects in January, March, May, and November (Figure 1). The transects will include 6 fixed offshore transects, one each near Alvin, Hudson, Baltimore, Poor Man's, Washington, and Norfolk Canyons, and 2 adaptive transects positioned within the Mid-Atlantic area based on a pre-cruise meeting with NFI, Rutgers, and the NEFSC.

Sampling will be conducted along each transect at depths near 40 (73 m), 50 (91m), 60 (110 m), 80 (183 m), 100 (183 m), 125 (229 m), 150 (247 m), 200 (366 m), 225 (411 m), and 250 fm (457 m), with up to five additional trawl sites added along each of the transects based on the catches of the target species. Primary target species will be summer flounder, scup, black sea bass, monkfish, silver hake, Loligo squid, offshore hake, and spiny dogfish, and secondary target species will be skates, yellowtail flounder, winter flounder, and lobster. One tow will be conducted at each station over a fixed distance of 1 nautical mile (1.8 km), with a tow speed of 3 to 3.2 knots (5.8 to 5.9 km/hr). Careful records will be kept of all gear descriptions so that subsequent surveys can use consistent gear. A four-seam box net will be used with a 2.4-inch (6.1- cm) mesh codend. Sampling protocol for handling the catch from the trawl survey will follow standard NOAA Fisheries survey methods. Every effort will be made to weigh the entire catch, or to put in baskets the entire catch and weigh a subsample of the baskets. Lengths will be obtained for target species. If time does not permit sampling between tows, fish sorted for length measurement will be placed in labeled containers and stored until processing can occur. Temperature and depth profiles will be taken for each tow. Pre- and post-cruise meetings will be held to confirm study logistics and conduct retrospective analysis of cruise activities. Scientific research personnel will be on board the vessel at all times when the survey is conducted.

The project will involve one or two vessels in the 75 to 100 ft (23 to 30 m) size range conducting approximately 180, 15 to 30 minute, research bottom tows. The research vessel/vessels will need exemptions from closed areas, seasonal and gear restrictions, and minium size restrictions.

Additional, approximately 25 more vessels will be harvesting the RSA amounts allocated to the project. These vessels will need exemptions to closed seasons and trip limits for the RSA species listed under the project. The most likely ports for landings will be in Rhode Island, New York, New Jersey, and Virginia.

04-RSA-002 - NFI and Rutgers, "Increased Escapement of Finfish in the *Loligo* Squid Fishery." Principal Investigator – Eric N. Powell.

Project Abstract: To obtain second year support for a study on finfish discarded due to regulatory restrictions in quota or bycatch landing limits in *Loligo* squid-targeted tows. The investigation would be conducted using up to two fishing vessels. Nets will be compared using legal mesh size for squid of 1.875 inch (4.8 cm) and several larger mesh sizes of 2.36 inch (6.0 cm), and 3.0 inch (7.6 cm). Study results will lend insight into bycatch of finfish species when different mesh sizes are used in the *Loligo* squid fishery.

RSA Amount: 30,000 lbs (13,608 kg) of black sea bass, 120,000 lbs (54,431 kg) of scup, flounder, 281,000 lbs (127,460 kg) of *Loligo* squid, and 161,740 lbs (73,364 kg) of summer flounder

Project Description: This project will test different mesh sizes in squid nets under commercial use. Exact tow number will depend on the time of each tow, which will be determined by the Captain during fishing. The project proposes a total of 36 days at sea for up to 2 research vessels in the 75 to 100 ft (23 m to 30 m) range. Assuming a fishing trip of about 4 days dock to dock, this will provide for about 27 fishing days. Commercial vessels fishing for *Loligo* squid normally do not exceed 4 tows per day. Thus, the field work would entail 80 to100 tows. The vessels conducting the research, preferably will be fishing in parallel, since this permits discriminating the time/location (always confounded) and boat effect statistically. The effort per vessel will be a 40-50 tows, about 14 fishing days, and about 4 fishing trips for each vessel. Research scientists will be on board each vessel. The research protocol for handling the catch includes the measurement of catch weight for all caught species, and the acquisition of length and weight measurements for up to 100 individuals for a selected subset of species on each tow.

Field work is most likely to take place in February/March near the Hudson Canyon. High butterfish and silver hake discarding events in the *Loligo* fishery are recorded in the observer database in this area during January-March, but are much less common further south. Based on input from NMFS and Industry, field work may encompass a broader area in and/or near the Northern and Southern Gear Restricted Areas (Figure 2).

The legal mesh size for *Loligo* squid is 1.875 inches (4.8 cm). However, a 2.36-inch (6.0-cm) mesh is also commonly used. Up to three mesh sizes may be tested ranging from 1.875 (4.8 cm) to 3.0 inch (7.6 cm). The most likely meshes tested will be 1.875 inch (4.8 cm), 2.36 inch (6.0 cm), and 3.0 inch (7.6 cm). Two or 3 mesh sizes will be tested. Evaluating three mesh sizes will reduce the total number of replicate tows per mesh to about 30, (15 per boat) if two boats are used.

The research vessel/s will need exemptions from closed areas, seasonal and gear restrictions, and minium size restrictions.

Additionally, approximately 25 more vessels will be harvesting the RSA amounts allocated to the project. These vessels will need exemptions to closed seasons and trip limits for the RSA species listed under the project. The most likely ports for landings will be in Rhode Island, New York, New Jersey, Virginia, and North Carolina.